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PROCEEDINGS

9TH NATIONAL WOMEN'S SCIENCE CONGRESS

Rashtriya Mahila Vijnana Sammelana

6-7th November 2016, RLJIT, Doddaballapura

Organised by

MATRU VEDIKE (Women Scientists Forum)

SWADESHI VIJNANA ANDOLANA-KARNATAKA

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CONTENTS

Sl No			Page No
1.	Forward		3
2.	Theme Wise Full text of Papers		
	(i) PANINEEYAM	: Humanitis and Lingustic Sciences	4 - 29
	(ii) PATANJALEEYAM	: Psychospiritual and Philosophical Sciences	30 - 39
	(iii) BHARATEEYAM	: Sociocultural Sciences, Arts, Music & Natyasastra	40 - 61
	(iv) KAUTILYEEYAM	: Economic, Political Sciences & Arthasastra	62 - 78
	(v) DHANVANTAREEYAM	: Health Medical Sciences & Ayurveda	79 - 116
	(vi) PARASHREEYAM	: Agricultural, Horticultural & Animal Sciences, Fisheries,Forestry	117 - 144
	(vii) VASUNDAREEYAM	: Cosmology, Ecology, Environmental & Earth Sciences	145 - 158
	(viii) NAGARJUNEEYAM	: Chemical, Biological & Materials Sciences	159 - 171
	(ix) BHASKAREEYAM	: Physical, Mathematical & Astro-Physical Sciences	172 - 181
	(x) BHARADVAJEEYAM	: Civil, Mechanical, Aerospace & Transportation Sciences	182 - 193
	(xi) J. C. BOSEEYAM	: Electronics, Electrical, Energy & Communication Sciences	194 - 236
	(xii) VARAHAMIHIRAM	: IT, BT, NT, FT and Frontier Sciences	237 - 268
3.	Author Index		269 - 271
4.	Puraskara		
	(i) Marie Curie Mahila Vijnana Puraskara		
	(ii) C. V. Raman Mahila Vijnana Puraskara		

ISSN 2250 - 3978 LILAVATI (PRINT)

Forward

There is a dearth of "Women in Science" all over the world, more so in Bharat, where women shines in quantity as well as quality in every other field except hard sciences. There is thus on intense need to encourage – give real courage to women in larger numbers in soft as well as hard sciences (psychospiritual, socio-cultural and materials sciences). To a very large extent, we have succeeded in our efforts. This is evident from the increase in number of participants in the Women Science Congress as well as in the improvements in the quality of research – review papers presented at the women's Science Congress.

The successful conduct of Women's Science Congress annually has made a great impact nationally. And women are boldly facing the challenges in all fields of human activity in Bharat, in literature, in education administrations, in science administration, in legal profession, and of course in politics as well as bureaucracy. Their number is increasing in all these fields. And most importantly, they are occupying many positions of power and influence.

Scientific career in experimental materials and physical sciences is much different from the rest of careers. It is a field of and for original thinking. It is a field of creative activity, and above all, it needs a prolonged (day & nights) continuity in thought and action. This needs a greater concentration and attention. Often, it needs many sacrifices at the personal as well as social levels; and at the family level, it needs a spouse who not only understands the intensity of scientific commitment but also appreciates the need for 24x7 engagement in the field of science, especially the materials sciences. If you read the life stories of Nobel laureates, including those from Bharat (C. V. Raman, S. Chandrashekar, Hargovind Khorana, Ramakrishnan, or even great Bharatiya scientists like Yellapragada Subba Rao, P. C. Ray, J. C. Bose, G.N. Ramachandran and C. N. R. Rao), it becomes clear that materials science is a life - long passion for them.

Women generally have an additional role – that of a mother. And naturally, Nobel laureates are few amongst women. Scientific achievements of women therefore need a greater appreciation than that of men. Women should be proud of such achievements that give them greater comfidence and courage. It is for this reason that we consider Madame Marie Curie as the ideal of a women scientist and we celebrate her birth anniversary. Fortunately, it coincides with the birth anniversary of Sir C. V. Raman – the only Indian to work in India under Indian conditions and received a Nobel Prize.

As with all Science Congress we conduct (Karnataka Science Congress in Kannada and Women's Science Congress), we consider science in the broad perspective of applying scientific thinking in both experiencial, experimental or social activities. For practical purposes, these are broadly in twelve themes (which we named after great Indian Scientists) as follows: (1) Panineeyam: Humanities & Linguistic Sciences; (2) Patanjaleeyam; Psychospiritual & Philosophical Sciences; (3) Bharateeyam; Sociocultural Sciences, Arts, Music & Natyasastra; (4) Kautilyeeyam: Economic, Political Sciences & Arthasastra; (5) Dhanvantareeyam; Health, Medical Sciences & Ayurveda; (6) Parashareeyam; Agricultural, Horticultural & Animal Sciences, Fisheries, Forestry; (7) Vasundareeyam: Cosmology, Ecology, Environmental & Earth Sciences; (8) Nagarjuneeyam: Chemical, Biological & Materials Sciences; (9) Bhaskareeyam: Physical, Mathematical & Astro-Physical Sciences; (10) Bharadvajeeyam: Civil, Mechanical, Aerospace & Transportation Sciences; (11) J. C. Boseeyam: Electronics, Electrical, Energy & Communication Sciences; (12) Varahamihiram: Information Technology, Biotechnology, Nanotechnology, Food Technology and Frontier Sciences.

It is heartening to note that this arrangement is broadly accepted by the scientific community. We look forward to greater and greater participation in each of these fields.

(Prof. K. I. Vasu)
Stapaka-Poshaka-Margadarshaka of
Swadeshi Vijnana Andolana-Karnataka

(Sri. Ramesh. H)
General Secretary
Swadeshi Vijnana Andolana-Karnataka

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THEME :-01

PANINEEYAM

Humanitis and Lingustic Sciences

Sl No	Title of the Paper	Authors	Page No
1.	POETIC BLEMISHES – ACCORDING TO SANSKRIT POETICS	Dr.M.A.Shrutikeerthi	6 - 7
2.	WIVES AND MISTRESSES IN SELECT NOVELS OF SHIVARAM KARANTH WITH SPECIAL REFERENCE TO PAMMA AND DUGGI IN MEY MANAGALA SULLIYALLI	Dr. R. Purnima	7 - 11
3.	DESIGNING SCHOOL CURRICULUM USING MULTIPLE INTELLIGENCES APPROACH – A REVIEW ARTICLE	Ms. Amitha V Dr. Vijayalaxmi AHM	12 - 15
4.	POLITICAL PROMINENCE FOR WOMEN IN KARNATAKA STATE	Smt. Prathima M Bidarimath Dr. M. V.Ushadevi	16 - 20
5.	WOMEN EMPOWERMENT IN INDIA: A CAREFUL ANALYSIS	Gana K P Shilpa M N	20 - 22
6.	WOMEN EMPOWERMENT	Jyothi.B Keerthana M.M	22 - 29

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POETIC BLEMISHES – ACCORDING TO SANSKRIT POETICS

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In the history of Sanskrit Poetics the topic of काव्यदोष is of great importance. According to Bhamaha - not even a single faulty word is to be allowed in a composition. According to Dandin – Abstention from poetizing is no crime and it does not entail any punishment or disease. But bad composition indeed is spoken of as veritable death by the learned. But both Bhamaha and Dandin do not define a दोष. According to Bharata – Gunas are opposits of – दोषाः. According to वामन – गुणविपर्ययात्मानो दोषाः । For the first time the secret of दोषाः was revealed by आनन्दवर्धन & अभिनवगुप्त there is no relation between दोष & गुण. Everything is related to रस. Whatever hinders the definition of रस is a दोष. Therefore अनौचित्य alone is काव्यदोष. Kuntaka does not treat at length and doctrine of blams. Gives examples for अनौचित्यदोष from kalidasa's works. Though Mahimabhatta attempts to demolish the theory of ध्वनि he accepts the doctrine of अनौचित्य and also रस as the soul of poetry.

Finally as व्याकरण is important for भाषाशुद्धि or correct language. दोषविवेचना is essential for काव्यसौन्दर्य । Mammata is honoured for his contribution on दोषाः. Hence we can look for illustrations into काव्यप्रकाा & also other poets.

स्तुवन्ति गुर्वीमभिधेय संपदं विुद्धिमुक्तेपरे विपश्चितः ।
इति स्थितायां प्रतिपूरुषं रुचौ सुदुर्लभा सर्वमनोरमा गिरः ॥

तथापि, eventhen, in the history of Sanskrit Poetics the topic of काव्यदोष is of great importance. According to Bhamaha 'not even a single faulty word is to be allowed in a composition. It verily brings discredit to the author even as a degenerate son to the father'-

सर्वथा पदमप्येकं न निगद्यमवद्यवत् ।
विलक्ष्मणा हि काव्येन दुस्सुतेनेव निन्द्यते ॥

According to Dandin – 'Abstention from poetizing is no crime and it does not entail any punishment or disease. But bad composition indeed is spoken of as veritable death by the learned' -

नाकवित्वमधर्माय व्याधये दण्डनाय वा ।
कुकवित्वं पुनः साक्षान्मृतिमाहुर्मनीषिणः ॥

'Even a slight defeet is sure to mar the effect of poetry just as a single leprous spot is sufficient to render a handsome body ugly and hence it should not be endured' -

तदल्पमपि नोपेक्ष्यं काव्यं दुं कथञ्चन ।
स्याद्व्रपुः सुन्दरमपि श्वित्रेणैकेन दुर्भरम् ॥

But both Bhamaha and Dandin do not define a दोष. They give reasons as to why they are called दोषाः. Next, they start classifying दोषाः as अपार्थ, व्यर्थ ... etc. (१० दोषाः).

Bharata in his नाास्त्र gives an outline of दोषाः & speaks of ten दोषाः. But his main concern is dramaturgy, and hence his, conception of दोषाः has in view रसाः. According to Bharata–गुणविपर्यया दोषाः Gunas are opposits of- दोषाः.

According to वामन गुणविपर्ययात्मानो दोषाः । This is not scientific. There is अन्योन्याश्रयदोष. Even if a person is aware of all the poetic excellences, he may not be knowing poetic flaws. व्याकरणाुद्ध is not stated as गुण. ऑळ्ळ व्याकरणविरुद्धप्रयोग becomes a flow. Again च्युतसंस्–कार is a दोष. But it is difficult to say for which गुण it is विपर्यय. गुणविपर्यय can be both दोष & गुण.

For the first time the secret of दोषाः was revealed by आनन्दवर्धन. According to आनन्दवर्धन & अभिनवगुप्त there is no relation between दोष & गुण–

नापि गुणेभ्यो व्यतिरिक्तं दोषत्वम्(–लोचन). Everything is related to रस. Whatever hinders the definition of रस is a दोष. Therefore अनौचित्य alone is काव्यदोष –

अनौचित्यादृते नान्यद् रसभस्य कारणम् ।
प्रसिद्धौचित्यबन्धस्तु रसस्योपनिषत्परा ॥

He defend his stand by stating – ननु सूक्तिसहस्रद्योतितात्मनां महात्मनां दोषोद्घोषणमात्मन एव दूषणं भवतीति न विभज्यदतिम् ।

Kuntaka does not treat at length and doctrine of blams. Gives examples for अनौचित्यदोष from kalidasa's works. According to Kuntaka it is not a part, but the whole poem becomes fainted due to अनौचित्यप्रबन्धस्–यापि क्वचित्प्रकरणैकदेोऽप्यौचित्यविरहादेकदेादाहदूषितदग्धपटप्रायता प्रसज्यते ।

Though Mahimabhatta attempts to demolish the theory of ध्वनि he accepts the doctrine of अनौचित्य and also रस as the soul of poetry. Classifies दोषाः as अनौचित्यदोषाः which are classified as अन्तरदोषाः & बहिरदोषाः ।

Bhoja states 16 दोषाः of पद + १६ दोषाः of वाक्य + १६ of वाक्यार्थ.

मम्मट is said to have set the standard for दोषाः. According to Mammata मुख्यार्थहतिदोषः, रसश्चमुख्यः – Then states 13 पददोषाः + ३ समासदोषाः + १३ वाक्यदोषाः + a few पदांदोषाः + अर्थदोषाः (२३) + रसदोषाः ।

But वक्त्राद्यौचित्यवाद्दोषोऽपि गुणः क्वचित्. All said and done the aim of the poet should be -

वस्तुतस्तु कवीनां चेद्धृदयानन्दकारणम् ।
न दुं स्यादन्यथा चेद्दुतां भजति ध्रुवम् ॥

Finally even आनन्दवर्धन writes - एको हि दोषः गुणसन्निपाते निमतीन्दोः किरणेष्विवाः । Vishvanatha states -

रसापकर्षका दोषाः ते पुनः पञ्चधा मताः ।
पदे पदाौ वाक्येऽर्थे सम्भवन्ति रसोऽपि यत् ॥

While criticizing the काव्यलक्षण ब्ज़ मम्मट –
कीटानुविद्धरत्नादि साधारण्येन काव्यता ।
दुेष्वपि मता यत्र रसाद्यनुगमः स्फुटः ॥

He gives examples for – दोषाणां च क्वाचिददोषत्वं क्वचिदुणत्वम् । This theory further leads to नित्यानित्यदोषाः.

वामन in his work raises an objection & answers – गुणाः include दोषाः. Hence why a separate chapter on दोषाः ? That too before treeting गुणाः ? अर्थतस्तदवगमः किमर्थं ते पृथक्प्रपञ्च्यन्त इत्यत्राह सौकर्याय प्रपञ्चः । उद्दि लक्षणलक्षिता हि दोषाः सुज्ञाता भवन्ति ॥

The nature of दोषाः become clear only when enciated, defined and classified scientifically. Thus according to our ancients without a clear knowledge of दोषाः, the idea that a good काव्य should have गुणाः, अलाराः, रसाः etc. is not of much use. The ignorance of दोषाः makes a person appreciate अलील, ग्राम्य etc. compositions.

Just as व्याकरण is important for भाषाुद्धि or correct language. दोषविवेचना is essential for काव्यसौन्दर्य । Mammata is honoured for his contribution on दोषाः. Hence we can look for illustrations into काव्यप्रकाा & also other poets.

Bibiliography:

1) संस्कृत साहित्य परिचयः – Dr. M. N. Joshi, Roopa Publication, Dharwad – 2002

2) संस्कृत साहित्यस्य प्रमुख प्रकाराः – एकं अध्ययनम् – Ph.D., thesis of Dr. M. A. Shruthi kirthi, Kuvempu University, Karnataka – 2004

3) संस्कृतकविचरिते (कन्नड) द्वितीयः सम्पुटः दि ॥ एम्. एन्. श्रीनिवास अय्यंगार्, बृन्दावन् प्रिंटर्स् & पब्लिार्स् (प्रै) लिमिटेड्, बेंगलूरु – १९८६.

4) B.O.R.I., - 1965

5) ध्वन्यालोकः – भारतीय विद्या प्रकाान, वाराणसी १९९१

६) वैयाकरण सिद्धान्त कौमुदी कृष्णदास अकाडमी, चौखम्बा प्रेस् वाराणसी १९८७

7) ಶಬ್ದಾರ್ಥಕೌಸ್ತುಭಃ – ಸಂಪುಟ 1 –6, ಬಾಷ್ಕೋ ಪಬ್ಲಿಕೇಶನ್ಸ್, ಬೆಂಗಳೂರು ಪ್ರೆಸ್–2003

8) ಕುವಲಯಾನಂದ – ಅನು–ಡಾ.ಟಿ.ಜಿ.ಸಿದ್ಧಪ್ಪಾರಾಧ್ಯ, ಶ್ರೀಭಾಸ್ಕರಪ್ರಿಂಟರ್ಸ್, ಮೈಸೂರು – 1987

9) ಕನ್ನಡ ಧ್ವನ್ಯಾಲೋಕ ಮತ್ತು ಲೋಚನಸಾರ – ಶ್ರೀ ರಾಘವೇಂದ್ರ ಮುದ್ರಣಾಲಯ, ಬೆಂಗಳೂರು 1990

WIVES AND MISTRESSES IN SELECT NOVELS OF SHIVARAM KARANTH WITH SPECIAL REFERENCE TO PAMMA AND DUGGI IN MEY MANAGALA SULLIYALLI

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Mey Managala Sulliyalli, examines failure and fulfilment in the lives of women who stand within and also outside the Institution of marriage. Manjula (the protagonist of Mey Managala Sulliyalli) is of the opinion that the predicament of wedded women is almost analogous to that of the mistresses. Though, a prostitute by virtue of her caste is permitted to explore possibilities of self fulfilment, she too has her limitations. She has to live separating her body and her mind. Karanth is also critical of the orthodox mechanical set up. Wives are helpless for they lack the mettle to satisfy their husbands. This has made them resign themselves to their fate. By being subjected to her biological destiny, she is forced into a narrow and restricted role. Her capacity for autonomous action is questioned by a male dominated world. In fact, Karanth's opinion about marriage is dualistic. As presented in some novels, the world of conventional marriage is not all that bleak and dismal. The Paper reflects on the portrayal of wives and mistresses, their agonies and ecstasies in the novels selected for this study.

Forty five novels, (the fictional output of Karanth), written at different times and in different moods, cover almost a life time of the writer. Karanth's desire to reflect women's issues and his sensitivity to women in general, and the 'fallen woman' in particular demand scholarly attention. Karanth's fictional world is large enough to make room for women of variegated colours, and qualities. Karanth is able to see the problems relating to wives or mistresses in all its complexity and consider conflicting experiences with the same measure of impartiality.

There are some novels in which neither the problem related to mistresses presented nor any such individual represented. Sometimes there is just a slight reference to prostitutes, at times there is only a para or a page devoted to the Institution of Prostitution. It is interesting that in Deva Dutaru only the road in which brothels are housed is mentioned. It is equally

eye catching that in Nashta Diggajagalu, a particular prostitute whose name is not even made known is referred to. Sometimes 'fallen women' do not appear but are only alluded to in the novels.

Amba from Madras is dismissed in a sentence. Through the old nurse from Bombay kept by Subraya, the husband of Nagaveni, the writer exposes the double standards of morality that was operating in the patriarchal Hindu society. Padma is a total opportunist who dumps both her new born infant and an invalid beau. Completely opposite to these disrespectful women is the highly revered Kalavati. Putti, and the mistress kept by Ithal are another name for loyalty and constancy.

Tara of Omti Dani, Kirti and Indumati of Moga Padeda Mana, are an extension of Chandu, Rajjevi and Lakshmi. In their defiled bodies is housed the most unethical values. The callous,/ inconsiderate,/ avaricious/disloyal Basavi (Karulina Kare), (Chennamma Nambidavara Naaka, Naraka),and Maachi (Dharmarayana Samsara) are sex itself. They are not disturbed by the conflict that results when one is torn between the body and the mind.

As a contrast to these amoral women are Champi, Kusuma, Sarasi and the two Gulabis. They make themselves abiding by their steadfastness and commitment. Most of them are accepted by the wedded wives not as foes but as sisters. It is the constancy, honesty and sincerity of Putti and Kusuma of Samikshe that makes them earn this praise:

A mistress who loves must be thought – a model of faith, (Samikshe p. 249).

Yashavanta of Alida Mele discovers in Sarasi, his kept-woman what was absent in Kamala, his spouse. Despite being the offspring of prostitutes, the intense wish of Gulabi of Jaaruva Daariyalli and Gulabi of Ukkida Nore is to find committed lovers. But both are torn by the conflict between the body and the mind. Karanth who has immense respect for those who strive to make their life beautiful, sees strength/ daintiness in the life of the two Gulabis, who though born to prostitutes make interminable attempts to find bona fide lovers.

Driven by force of circumstances, Malati in Kanya Bali accepts prostitution. Later, when her father comes as a client, she ends her life. Nirbhagya Janma is about prostitutes Champi and Manorama and the traumatic experience of the abandoned wife Bhagyalakshmi.

Mey Managala Suliyalli, which won for its author the 'Pampa' Award, is the only work of Karanth, in which the life of a courtesan/ a veshye, is shown almost from her cradle to her cremation. Unlike many prostitutes appearing in Karanth's works who are just harlots, the veshye Manjula, is a consummate artist.

The above mentioned women who have traded or compromised provide the writer's ideas about love and sex because they portray human relationships in a dramatic and realistic manner. Far from being stereotyped, each character is slightly different from the other. Their caste, class and culture are diverse. No doubt, they reflect the range of the writer's social vision and bring a great deal of human interest to the story.

The descendents of these women, though minor, either serve as a comparison or a contrast. Many of them, hold our mood, and sustain our interest. Karanth is equally concerned with the problems concerning 'fallen women' in a society that is in transition. At least some women are no longer the object of pleasure for men. Women who seek liberation from the family profession also occupy a space in Karanth's novels. The role of the woman is not static or fixed but it is portrayed as evolutionary and changing historically. They mirror the range of the writer's social vision. How far the younger generation can brighten its own life and make life meaningful without being exploited is taken into consideration.

Karanth's use of contrast and comparison is a feature of interest. Not all the descendants of prostitutes cared to liberate themselves. Rajeevi and Chandu (Marali Mannige) fell in line with their predecessors. Gulabi, (Sarasammana Samadhi), had no qualms about her family profession. It is interesting that not all the descendants cared to preserve the family profession. Unlike women who uphold it, there are several who attempt to escape from it. Redemption through marriage is considered. This reflects a new tendency to rehabilitate rather than ostracize such women. Suhasini, the daughter of Kusuma of Samikshe, Uma, the daughter of Mukte of Innonde Dari, Indumati, the daughter of Sarasi of Alida Mele and the daughter of Gulabi of Ukkida Nore were happily married. Uma and Indumati were not only happily married but were also employed.

A few women are redeemed by marriage but there are also descendants who marry, but are frustrated and disenchanted by their conjugal life. Kusuma of Samikshe, the daughter of a prostitute, was not happily married. Vasu had the nerve to marry her. But he failed in his duty as a husband to keep her happy. He became repentant only after Kusuma jumped into a well. He realized that all she got by marrying

him was only the mental satisfaction that she too had earned the title of a respectable married woman. But the price she paid to earn the title was to be engulfed in abject poverty.

All that Vinute, the daughter of Manjari (a prostitute from Battada Tore) aspired for was a release from her family profession; her only aspiration was to be married, to be considered a respectable woman. Vinute knew that it was difficult for daughters of mistresses to get husbands. Her marriage to Gaonkar, a widower with two children did bring her economic salvation, but it resulted in emotional suicide. Marriage became a 'walled-garden'. Later she became pro active. Her decision to take up a job helped her pursue the difficult path towards at least a partial fulfilment.

Chandri (Mey Managala Suliyalli) of the fourth generation having received English education is firm set on rejecting her family profession. Like Vinute of Bettada Tore, Chandri could not get mentally adjusted to the idea of trading her body. She shared her mind with Sharade, her friend:

Let, examination get over first. I will manage to get a job in any place away from here, be it Kundapur or Udupi. Probably the managers of some school might find a place for me. If she wants, my mother will follow me, if not, let her stay behind and carry on. (Mey Managala Suliyalli, p. 69).

Chandri's desire is to lead a "respectable life". Though Karanth has sympathy for mothers who cannot help hoping that their daughters are safe deposits, he has respect and appreciation for descendants who dream of a new life. Like the new woman, Chandri intensely desired to liberate herself and is shown to be moving towards an ambiguous kind of freedom.

Mey Managala Sulliyalli, examines failure and fulfilment in the lives of women who stand within and also outside the Institution of marriage. Manjula's (the protagonist of Mey Managala Sulliyalli) is of the opinion that the predicament of wedded wives is almost analogous to that of the mistresses. Though, a prostitute by virtue of her caste is permitted to explore possibilities of self fulfilment, she too has her limitations. She has to live separating her body and her mind. She has no right to dictate terms to the man who is in her arms only for a brief period. Wedded wives are helpless for they lack the mettle to satisfy their husbands. This has made them resign themselves to their fate. Men continue to run two households by the power of their money. Woman is just food to be possessed and consumed. Soole in T.P. Kailasam's play of the same title revolts against male aggression as she bitterly complains:

What are these fellows if they are not tyrants? You are his wedded wife but still you are a morsel for his passions…… I am a mistress, I am also a morsel for him…….you are his wedded wife, you are no better than a mistress, I am a mistress and my fate is equally miserable.

(T.P. Kailasam, Soole – Collected Works of T.P. Kailasam, Mysore: Institute of Kannada Studies, University of Mysore, 1987, p. 533)

In fact, Karanth's opinion about marriage is dualistic. He reveals his respect for conventional marriage when Bhavani consoles Manjula that Garati is not a word of abuse and one needs luck to earn the title of a respectable married woman.

Karanth is also critical of the orthodox mechanical set up with neither beauty nor life in it. It is a world of male domination and female oppression. Women are lonely and neglected. Woman is just chained to man. Her sphere of activity is limited. By being subjected to her biological destiny, she is forced into a narrow and restricted role. Her capacity for autonomous action is questioned by a male dominated world. To Rama Ithal of Marali Mannige, women are no better than dust. Without bothering to consult or even inform his first wife, he makes arrangements for his second marriage, Hebbar of Dhamarayana Samsaara settles the marriage of his daughter Saraswathi totally ignoring his wife Mahalakshmi. Bhagirathi is akin to a pair of slippers to her father in law in Sarasammana Samaadhi. Dr. Jayant in Onti Dani prefers to remain childless lest his children be a replica of their mother (Shalini), whom he thinks is an incarnation of stupidity. Marriage is a business transaction and hence Rukmini in Swapnada Hole is a cattle to her in-law's and Kaveramma an ox to Ramappa Adiga in Mey Managala Sulliyalli.

Ananda Raaya in Ileyamba reflects on this kind of marriage in which man is all fury and woman all agony,

It is a concept of the Indians that the wife is half the embodiment of the husband. But how far is this true? It is true only as long as the wife implicitly follows the husband's wishes. But once she touches his purse or questions his authority or ego she becomes a no body let alone being his better half.

(Shivaram Karanth, Ileyamba. Bangalore: IBH Prakashana, 1975, p 108).

To him if matrimonial happiness is a one way traffic it cannot be called married life. The wife may shrink

her own personality and become the slave of her husband simply because she fears societal expectations or the scriptural commandments. No body may blame such a wife. Scriptures may even praise her. But the kind of life she lives with her husband brings no honour to either of them.

To the outstripped and belittled Sunalini of Sarasammana Samaadhi, man is like a butcher in a slaughter house:

Family life runs smoothly when the woman is like a corpse without self respect. What does the husband want? His expectation is that the wife should offer her body as a sacrifice to his lust.

(Shivaram Karanth, Sarasammana Samaadhi, 1937: rpt. Bangalore: Rajalakshmi Prakashana, 1976, p)

It is this world of violence, exploitation, persecution and betrayal that makes Manjula observe that the life of a prostitute is better than that of a wedded wife:

Let the people go round the sacred fire seven times or seventy times. If this perambulation should have any meaning they should live like Duggi and Pamma full of inexpressible mutual affection. Instead with fire as witness the husband swears that he will do everything for his wife but in practice is utterly indifferent to her. If he can shout at her saying 'you woman come and attend to 'your child', is not my life much better? I need not swear by any code of conduct. Yet I was honest and loyal to my man. Is not my life much better than that of others who only make imposing oaths?

(Shivaram Karanth, Mey Managala Sulliyalli, p.156)

Is Manjula advocating that a woman be given the liberty to look for a Pamma? On the one hand conventional set up is shown to be life-killing and freedom to be life sustaining.

But the world of conventional marriage is not all that bleak and dismal. In the world of Appanna and Nagamma (Odahuttidavaru), Soora and Kali (Samikshe), Ganapathi Hegde and Lakshmi (Iddaru Chinte), Koojappa and Nagamma (Hettala Taayi), Gopalaiah and Shankari (Bettada Jiva), Mailarayya and Channamma (Ala Nirala), Manjappa and Sitamma (Kannadiyalli Kandata), Soora and his wife (Marali Mannige), Narayana Master and his wife (Mugida Yuddha), Choma and his wife (Chomana Dudi), Pamma and Duggi (Mey Managala Suliyalli), tolerance, sympathy, true love, understanding, trust, steadfastness, strength survive. Through them Karanth presents the theme of interdependence and oneness. They are exemplary couples for whom love is not a mere thrill or a passing pleasure. Understanding and forbearance are uppermost in these characters that represent different castes and strata of society. No distance or space between the two is seen. Their relationship is marked by solidarity, joy in life and renewal.

Narayana, the foster son of Gopalaiah and Shankari observes:

When I looked at that couple it appeared to me that they lived for each other and not living at the cost of one another

(Shivaram Karanth, Bettada Jiva, 1943; rpt. Puttur: Harsha Prakatanalaya, Ninth Print, p. 156)

They have exemplified the idea that harmony is life.

There are signs that Choma's family life was happy when his wife was alive. If his wife had not died, the family would have been livelier. These couples display friendship, love, mutual affection and profound understanding. Through them Karanth not only enlarges the understanding of the readers about life but also makes one realize what according to him are values that lead us to fulfilment in life.

In the course of her account Manjula in Mey Managala Sulliyalli has devoted a few pages to the old couple, Pamma and Duggi. This meeting was an eye opener to her. Like the Harijan couple Soora (70) and Kali (65) of Samikshe, Pamma and Duggi, though old in body are young in spirit. Duggi was fifty or sixty. Pamma was six years older. Kali, though younger was more shaky, emaciated than her husband. Duggi too like Kali not only looked older but was even blind. If Soora cooked, Kali ate. Pamma would be the gracious host and Duggi the well fed guest.

Though Kali and Duggi were broken in body, they do not feel deformed or decrepit, thanks to the kind support rendered by husbands who are older. Neither of the men cursed one's fate. They never begged but happily accepted whatever was offered. Soora's intense desire was that his wife pass away before him and it was answered. Being inseparable Duggi died on a Saturday and Pamma followed her the next day. Adult dignity coupled with childlike simplicity make them a happy innocent couple. With age, their relationship gets more solidified. It is an ideal love situation in which Eros and not Thanatos is the guiding spirit. The couple's love and affection for one another is so beautifully blended and so well nurtured that even when body had lost its lustre and beauty, their love had not waned. Soora and Pamma unlike Pai and Mahabala did not think that woman was for consumption. Since they made love to the women

in them and not to the mere body, communication was possible despite age. There is no question of the exploiter and the exploited. There is neither subordination nor domination. In their life, the masculine and the feminine have exquisitely blended and are subtly woven.

It is worthy of note that the language employed to describe Pai and Manjula's relationship in Mey Managala Suliyalli, reflects the aggression and domination of the hunter and the hunted. When there is a switch over to the old couple, language is soft, delicate, delightful mirroring as it were the inner sentiments of the characters portrayed.

Pamma's manner of handling his wife and their solidarity and capacity for mutual love stunned Manjula. It made her wonder if their relationship could be this tender in their old age, how contended and joyous they must have been in their youth. She had found in them the sweet kernel of true love. If promises were not kept up, Saptapadi to Manjula was a mere motion, a gesture, the formality of a hypocritical act. Loyalty could not be codified:

It is only when I saw Pamma and Duggi in their old age, I could understand how deeply satisfying love's ways could be. When I saw their loving ways, I realized that all the grace, the affection could not be had if you showered on them all the ornaments, costly saris or make up. Even my music would fail there. If love and affection are within the soul, they manifested themselves. How sweet and controlled must have been the life led by Duggi and Pamma. The result was that even when extreme age had squashed the last traces of physical attraction, their lives exuded great sweetness and fascination for each other. (pp. 154-155).

One night Manjula dreamt that Pamma and Duggi riding had reached the world of gods like young couple. And it seemed that even the Gods blushed to see the couple of such inexpressible beauty.

Not only did the old pair haunt her dream, but continued to haunt Manjula all through her life. It was her deep desire to find a Pamma in her own life.

SELECT BIBLIOGRAPHY

Karanth, Shivaram. Kanya Bali. 1923. Puttur: harsha Prakatanalaya, 1953.

---. Nirbhagya Janma. 1925. Kundapura: Vasantha Patrike.

---. Deva Dutaru. 1928. Bangalore: Rajalakshmi Prakashana, 1984.

---. Sarasammana Samadhi. 1937. Bangalore: Rajalakshmi Prakashana, 1976.

---. Marali Mannige. 1942. Rajalakshmi Prakashana, 1983.

---. Audaryada Urulalli. 1948. Bangalore: IBH Prakashana. 1988.

---. Mogapadeda Mana. 1948. Puttur: Harsha Prakatanaalaya, 1958.

---. Karulina Kare. 1949. Puttur: Harsha Prakatanaalaya, 1952.

---. Jaruva Dariyalli. 1952. Puttur: Harsha Prakatanalaya, 1962.

---. Battada Tore. 1953. Mangalore: Sharada Chapakhane, 1964.

---. Samikshe. 1958. Puttur: Harsha Prakatanalaya, 1964.

---. Nambidavara Naaka Naraka. 1958. Puttur: Harsha Prakatanaalaya, 1966.

---. Sanisvarana Neralinalli. Puttur: Harsha Prakatanaalaya, 1960.

---. Alida Mele. Puttur: Harsha Prakatanalaya, 1965.

---. Swapnada Hole. Puttur: Harsha Prakatanalaya, 1965.

---. Omti Dani. Puttur: Harsha Prakatanaalaya, 1966.

---. Mey Managala Suliyalli. 1970. Bangalore: Rajalakshmi Prakashana, 1984.

---. Ukkida Nore. Puttur: Harsha Prakatanalaya, 1970.

---. Kevala Manushyaru. Puttur: Harsha Prakatanalaya, 1971.

---. Dharmarayana Samsara. 1972. Bangalore: Rajalakshmi Prakashana, 1976.

---. Mujanma. IBH Prakashana, 1974.

---. Ade Uru, Ade Mara. Bangalore: Rajalakshmi Prakashana, 1977.

---. Gedda Doddastike. Bangalore: Rajalakshmi Prakashana, 1979.

---. Navu Kattida Swarga. Bangalore: Rajalakshmi Prakashana, 1980.

---. Nashta Diggajagalu. Bangalore: Rajalakshmi prakashana, 1983.

---. Amtida Aparanji. Bangalore: Rajalakshmi Prakashana, 1986.

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DESIGNING SCHOOL CURRICULUM USING MULTIPLE INTELLIGENCES APPROACH – A REVIEW ARTICLE

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Learning is the key process in human performance. Acquiring knowledge in our educational system is primarily through the curriculum designed by our educationists. Our education system is imparting the information through books with little or no interaction. However, few classrooms have modified the traditional teaching method in teaching the students, but not focused on the individual ability of learning. Even though many contemporary researchers and educationists are attempting in amending the schooling education system, it is not yet widely implemented in our country compare to the western countries. Among the schools which have espoused individual tailored curriculum method as according to the needs of the individual learners, Howard Gardner's Multiple Intelligences approach is a most commonly used method. Gardner has identified eight types of intelligences every individual possess, they are – Linguistic, Logical, Musical, bodily-kinesthetic, spatial, interpersonal, intrapersonal and naturalistic. The present study is aimed to find out the inculcating the Multiple Intelligences approach in designing the school curriculum. Initially a literature survey was carried out to collect research studies related to the influencing factor and multiple intelligences. Several research studies related to designing the curriculum based on the multiple intelligences approach were collected from various literature sources like, books, journals, online publications, etc. The review of the articles reveals that, designing the curriculum based on Multiple Intelligences i.e., according to the individual's educational needs have shown to improve the student's academic profile.

Keywords –Multiple Intelligences approach, curriculum, academic, inclusion

Educating and moulding today's youngsters is a real strive for teachers as well as parents. The educational reformers of varied disciplines such as education, psychology, research and policy-makers are all mapping a road for edification of tutoring method. Every child is a born star, however, we fail to discover that, a child is capable to stride to success. Hence, perceiving the prospective in formative years can lead to efficacious future.

Education has to be acquired by like and not by force. Teaching young minds by respecting their thinking capacity and learning differences can make the learning environment enjoyable. The Education commission has emphasized that education is the one and only instrument that can be used to bring about a change towards the social and economic betterment of India. India is a diverse nation with various cultures and traditions, and so the people's abilities and skills. There is a wide difference in the way each and every person procure, comprehend and recite the subject matter. To address this diversity, numerous research studies and case studies on educational reform have taken up by the researchers, educationist and psychologist.

One such recognised effective method in discovering the knowledge acquisition differences among the population is through Multiple Intelligences strategy. A theorist by name Howard Gardner (1983) begin to explore interest in human cognition, he establishment the Project on Human Potential in the late 1970s to 'assess the state of scientific knowledge concerning human potential and its realization'. The result was Frames of Mind (1983) Howard Gardner's first full-length statement of his Theory of Multiple Intelligences.

Dr. Howard Gardner theory challenged traditional beliefs in the fields of education and cognitive science. Gardner's theory argues that intelligence, particularly as it is traditionally defined, does not sufficiently encompass the wide variety of human abilities. In his conception, a child who masters multiplication easily is not necessarily more intelligent than a child who struggles to do so. Howard Gardner defined Multiple Intelligences as a set of abilities, talents or mental skills that all individuals possess to a greater or lesser extent. This theory included eight "modalities" that he identified as musical - rhythmic, visual - spatial, verbal - linguistic, logical - mathematical, bodily - kinesthetic, interpersonal, intrapersonal, and naturalistic.

NadiahMa'mun (1999) has comprehended that Multiple Intelligence approach tries to accommodate the need of the students in learning English based on their intelligences. In this case, the teacher is not only as a merely language teacher but also they have to be facilitators, observers, and lesson designers. What a classroom teacher should do, therefore, is to be able

to recognize and identify the strengths and talents of each of his/her students, then to accommodate the variation so that each student feels satisfied and facilitated to make self - improvements.

Multiple Intelligence approach is an efficient classroom strategy in discovering the learner's potential, to build on their strongest assets, exposing the students to variety of ways of learning, tuning their interests and needs, personal attention to each student, and making the learning environment enjoyable and dynamic.

Another article by Abdallah, Mahmoud Mohammad Sayed, (2008) sheds some light on the history of MI Theory and the traditional IQ tests to clarify the rationale underlying this new theory. The article highlights the effective MI applications and its implications in English Language Teaching.

Similarly, research with regard to MI inclusion in school curriculum in social studies, science and English subjects have reported in improving the academic achievement of students. Numerous studies were intended to find out the impact of multiple intelligence in the school curriculum. However, these studies don't reach to similar conclusions but, have reported the significance of academic enhancement using multiple intelligence approach. Some of the reviews in this context are discussed in the following pages.

2. AIM –To find out the effectiveness of Multiple Intelligences approach in designing school curriculum

3. OBJECTIVES

- To find out the effect ofteachingsocial studies curriculum using Multiple Intelligences method on student's achievement

- To discover the outcome of teaching science curriculum using Multiple Intelligences technique

- To discern the influence of Multiple Intelligences instruction for English curriculum on student's academic achievement

4. METHODOLOGY : Initially a literature survey was carried out to collect the research studies related to MI based approach in the subjects namely,social studies, science and English. The reviews related to this aspect were composed from various sources like books, journals, online publications, etc. The collected opinion artefacts were reviewed and were grouped under the following headings which are thendeliberated under results and discussions.

5. RESULTS AND DISCUSSIONS

5.3 Multiple Intelligences based Social Studies Curriculum

Geimer and Mitofsk(2001) carried out a research to improve student interest in social studies through the use of MI. This research was undertaken for the development and implementation of an intervention for improving students' interest and academic achievement in social studies. Various MI activities were incorporated such as songs of states dramas, murals, poetry, literature. The surveys and assessment post intervention strategies indicated an increase in student interest and academic achievements. Class discussions were strengthened through the evidence provided. Social studies seemed to have a remarkable impact on students.

Kale(2007) carried out a research on, 'A comparative study of the Effectiveness of the Multiple Intelligences – based teaching and traditional classroom teaching of a topic in history for Std IX.' Two divisions of 9th std from Ahilyadevi High school, Pune were chosen using the incidental sampling method. Various activities like slide show, games, use of mnemonic etc. were conducted for the experimental group. Achievement test was used to collect the data. Multiple Intelligences based teaching was more effective as compared to the traditional teaching method. Most of the students participated in the activities related to their predominant intelligence.

Wakchaure(2008) compared the effectiveness of Multiple Intelligences based teaching and traditional teaching of Geography for 7th standard students. Incidental sampling method was used in the research. Achievement test and opinionnaire was used for the data collection. 't' test was used to analyze the scores and the programme was found to be effective.

Bumen(2009) investigated possible differences between Multiple Intelligences theory and traditional teaching. In this research, the lesson "Citizenship and Human Rights" was chosen. The students were 112 of 8th grade. For data collection, achievement tests and attitude scale developed by the researcher were administered. The results show asignificant difference in tests including comprehension, application and total levels for the experimental group. Also, the experimental groups' final attitude score average was higher than the control group. Furthermore, there was a significant difference between the control and the experimental groups in the retention test, which clearly indicates that Multiple Intelligences implementations were more effective and stable in

learning.

5.3 Multiple Intelligences based on Science Curriculum

Goodnough(2001)conducted a study on "Multiple Intelligences Theory: A Framework for Personalizing Science Curricula". This case study reports on the experiences of a high school science teacher, Dave, as he explored multiple intelligences (MI) theory within the context of an action research group. The theory was used as a framework to make decisions about how he would structure learning experiences for his grade nine students in a science unit on space and astronomy. Through participation in the project, Dave believed he was able to offer his students a more student-centered, engaging science curriculum that catered to individual learning needs. Thus, the case provides insight into the nature of MI theory and how the framework of MI theory can be used to make science accessible to students and to assist them in achieving high levels of scientific literacy.

Esra, et.al.,(2006) conducted a study on, "Enhancing Learning Through Multiple Intelligences in Elementary Science Education", The goal of this research is to investigate whether there is a significant difference between multiple intelligence instruction and traditionally designed science instruction on 7th grade students' understanding of concept with the "The Structure of Material and Its Transformation" unit and attitudes toward science. Two classes, each with 27 students were randomly selected. The experimental group was instructed though MI strategies, whereas the control group was taught with traditional methods. The measurement instruments utilized were Chemistry Achievement Test and Science Attitude Scale. The results of this study reveals when compared to the traditional learning method, multiple intelligences theory created positive effects on students' success and attitudes toward science as a school subject.

Abdi, et.al.,(2013) conducted a study on "The Effect of Teaching Strategy Based on Multiple Intelligences on Students' Academic Achievement in Science Course". The purpose of this study was to investigate the effects of Teaching Strategy based on Multiple Intelligences on students' academic achievement in sciences course. Totally 40 students from two different classes (Experimental N=20 and Control N= 20) participated in the study. They were in the fifth grade of elementary school and were selected through multi-stage clustered sampling. The group which was assigned as experimental group was instructed through Teaching Strategy based on Multiple Intelligences whereas the other group was traditionally instructed. This experimental study lasted 8 weeks. To determine the effectiveness of Teaching Strategy based on Multiple Intelligences over common teaching method (traditional instruction), an achievement test about sciences which consisted of 30 items was administered. For the statistical analysis, Analysis of Covariance (ANOVA) was used. The results showed that students who were instructed through Teaching Strategy based on Multiple Intelligences were achieved higher score than the ones which were instructed through the traditional instruction.

5.3 Multiple Intelligences based on English Curriculum

Sefanur and Yesim(2014), this article reports a quasi-experimental quantitative study which investigated the effects of vocabulary teaching techniques based on Multiple Intelligence. For the study, two of the 11th grade classrooms were randomly assigned as an Experimental and a Control Group. Multiple Intelligence Inventory was applied to Experimental Group to identify their dominant intelligences and prepare classroom activities accordingly. Both groups were pre-tested at the beginning of the study by using a vocabulary test. In the Experimental Group vocabularies were taught through activities based on Multiple Intelligence theory, while in the Control Group they were taught by using traditional teaching techniques. Both of the groups were post-tested at the end of the study. In order to determine the long-term retention, the vocabulary test was applied again two weeks after the study. The data has been analyzed by ANCOVA using SPSS. The results of the study suggest that Multiple Intelligence Theory based activities have a significant effect on language learners' achievement and retention of English vocabulary.

Younas, et.al., (2015) conducted a study to show what is Multiple Intelligence Theory, its origin, how many types of multiple intelligences have and its role in learning English language. The researchers have used qualitative approach of research in this study. It was concluded that all the five intelligences studied in this article are very helpful and beneficial in learning English language.

Molaie(2016) conducted a study on a student's level of achievement is not solely influenced by the way he/she is taught, but by a nest of correlations, resulting in each individual being influenced by an immediate and a proximal environment. The human capability to act effectively in a nest of correlations

constitutes the modern definition of intelligence (Barrington 2007: 423) and precisely Gardner's Multiple Intelligences Theory (MIT). This article reflects on the results of a pilot study, carried out to investigate whether there is a relationship between MIT and language sustainability among learners taking an English course. 220 second-year science students were randomly chosen for two experimental groups (MIT-based teaching) and a control group (teaching based on their textbook). The main results showed a statistically significant difference between students' continuous assessment marks. Also, the results of students' final exam showed a statistically significant difference between the experimental and control groups.

6. CONCLUSION : The compilation of the research articles interpret that Multiple intelligences theory has a solid foundation in designing and learning the curriculum based on the student's strongest assets and talents. It is clearly stated in the reviews that there is a statistical significance differences between the students who learnt through Multiple Intelligences and who learnt through regular classroom teaching. Identifying the student's dominant intelligence helps them in better individualising in the classroom and society on the whole.

REFERENCES

Abdallah and Mahmoud Mohammad Sayed (2008) "Multiple Ways to be Smart: Gardener's Theory of Multiple Intelligences and its Educational Implications in English Teaching and Oral Communication", http://eric.ed.gov/?id=ED502634#

Ali abdi, SoosanLaei, HamzeAhmadyan (2013), conducted a study on "The Effect of Teaching Strategy Based on Multiple Intelligences on Students' Academic Achievement in Science Course", Universal Journal of Educational Research 1(4): 281- 284, http://www.hrpub.org

Bumen, N (2009), "The effects of implementation of the multiple intelligences theory supported by reviewing strategies on students' achievement attitude and retention", Unpublished doctoral dissertation. Hacettepe University, Ankara, Turkey. Retrieved on 1 Nov, 2011 from http://search.proquest.com/docview/358133981/abstract/543A653365867

George Geimer, Mitofsky, J &Peter, M. (2001), "Improving Student Interest in Social Studies through the Use of Multiple Intelligences", Master of Arts Action Research Project, Saint Xavier University and SkyLight Professional Development Field-Based Master's Program, http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=ED46092.

İskenderHakkıSarıgöz (2003), "Teaching English to Young Learners as a Foreign Language: Using the Multiple Intelligences Theory", Education and Science, Vol. 28, No 127 (52-56)

Kale, P (2008), "A comparative study of the effectiveness of Multiple Intelligences based Teaching and Traditional Classroom Teaching of a Topic in History for Std. IX (In Marathi)", Unpublished master's thesis, P.G Dept. of Education, SNDT Womens' University, Pune.

Karen Goodnough (2001), "Multiple Intelligences Theory: A Framework for Personalizing Science Curricula",Journal of School Science and Mathematics, Volume 101, Issue 4, April, Pages 180–193

Muhammad Younas, Ahmad Subhani and HafsaAkram (2015), "English Language Learning: A Role of Multiple Intelligence" Journal of English for Specific Purposes World, www.esp-world.info, Issue 46

NadiahMa'mun (1999), "The Use of Multiple Intelligence Approach in The Teaching of English for Young Learner", http://eprints.umk.ac.id/340/18/PROCEEDING_TEYLIN_2.138-144.pdf

SayenaMolaie(2016), "Language sustainability and the Theory of Multiple Intelligences", https://apliut.revues.org/5423?lang=en

SefanurAkçinve and YesimBektaşÇetinkaya (2014),"The effects of using activities based on multiple intelligence theory on 11th grade students' learning and retention of English vocabulary", http://webb.deu.edu.tr/baed/giris/baed/9_4.pdf

Ucak, Esra; Bag, Huseyin; Usak, Muhammet, (2006) "Enhancing Learning Through Multiple Intelligences in Elementary Science Education", Journal of Baltic Science Education, Issue 10, pg - 61-69. 9p

Wakchaure, S (2008), "A comparative study of the Effectiveness of the Multiple Intelligences – based teaching and traditional classroom teaching of a topic in Geography for Std.VII", Unpublished master's thesis, P.G Dept. of Education, SNDT Womens' University, Pune.

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POLITICAL PROMINENCE FOR WOMEN IN KARNATAKA STATE

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Women are the builders and molders of Nation's destiny. Though delicate and soft as lily,she has a heart, far strongerand holder than of man….she is the supreme inspiration for men onward march….she is, no doubt her commanding personality, neverthelessis grimly solemn" Rabindranath Tagore.

Ours is the largest Democracy in the world though the women folk constitute almost half of the population in our constitution.Our constitution guarantees the equal rights to women along with men, but due to various reasons her participation in politics and administrative policy making is very limited.

In the state of Karnataka, women constitution majority of the population women literacy in around 57.7 % unfortunately the representation given to women in various important posts, are negligible even then some women have been successfully crossed hurdles and reached their goals.

The Role of women in the freedom movement was unique in Karnataka both in pre Gandhian period and during National movement; women participated very actively and scarifiedtheir life for the cause of their motherland with the influence of Gandhiji. The leading women participants in the freedom movement in Karnataka were VimalabaiKundapur, Bellary Siddamma, T. Sunandamma, KamalammaChaltopadhya, SulochammaJais, YashodammaDasappa, Jaya Devi Tai Ligade and ShakuntalaKurtakoti, etc.,

After the independence, many women leaders joined politics and Congress Party become the minister of the cabinet rank in Karnataka ministers like Smt. YashodharaDasappa, Smt. Leeladevi Prasad, Smt. ManoramaMadvaraj, Smt. K S Nagaratnamma, Smt. Motamma, Smt.ChandraprabhaUrs, ShobhaKarandlache,Omashree and Smt.Basavarajeshwari, Smt. Margaret AlvaSmt.SarajiniMahishi and many more leaders have actively participated and played significant role in bothcentral and state politics.

The framers of the constitution perhaps believed that law would lead to social change and bring about equality between the genders.Articles 325 and 326 of theconstitution of India guarantees political equality,equal right to participationin politicalactivities and right to vote respectively,which is a honestcompared to U.S.A.In America till 1920,women did not get right to vote after many movements they secured their right.

The policy of reservation provided for women in promoting participation in the grass roots of democracy. Political empowerment for women is regarded as a key drive for economic and social movement. If women get political empowerment then they actively bring developments and changes pertaining to women folk. Political empowerment of women is empowerment of process. Political participation is a major path to women in the true sense of progress. The opportunities must be given for women to actively participate on decision making processes also provided.

In 1983 Karnataka government provided reservation for women in its three tier panchayat raj system. In the year 1993, the 73rdconstitutional amendment act was brought the reservation for women not less than 33% reservation for women in panchayat raj institutions in the rural areas. Similarly, the 74th constitutional amendment act introduced similar reservation for women in nagar palika and municipalities in towns and urban areas. With these constitutional amendments, over three million women are now actively participating in shaping the policies and programs of the country, though only at the local levels of governance.

Prior to the 73rd& 74th constitutional amendments only the state of Karnataka had reservation for women in institutions of local self-governance. The Janata Party government in Karnataka in 1991 passed a Bill to implement 25% reservation for women in local body elections, which is to be appreciated.

In this way Karnataka topsin the country in the case of reservationfor women in the panchayat raj institutions with women winning 43.7% of the seats in gram panchayat 40.2% in taluk panchayat and 36.4% in zilla panchayat elections.

The government of Karnataka the UN and Panchayat Raj and Rural Development Department in 2011, 14thDecember, they started to work together to empower elected women representatives in local governments in Karnataka. UN promoted women and the Government of India also encouraged them to become more vocal leaders in Panchayats and assert themselves in issues such as physical violence to women and local budgets to improve their area of politics.

On perusal of the women participation in loksabha since Independence it reveals that, under noted women MP's from Karnataka, theparliament house-however successful into the politics, but many of them had opportunity to get some portfolio in central government.

The below mentioned statistics shows that the number of women candidates contested and elected to Loksabha Seats from Karnataka

House	Women Elected	Party	Constituency	Union / State Ministers
1stLoksabha (1952-57)	-			-
2nd Loksabha (1957-62)	-			-
3rdLoksabha (1962-67)	Smt. SarojiniMahishi	Congress (I)	Dharwad North	-
4thLoksabha (1967-71)	Smt. SarojiniMahishi	Congress (I)	Dharwad North	Deputy Minister (Commerce)
	Smt. Sudha V. Reddy	Congress (I)	Madhugiri	-
5thLoksabha (1971-77)	Smt. SarojiniMahishi	Congress (I)	Dharwad North	State Minister (Tourism Civil Aviation)
6thLoksabha (1977-80)	Smt. Indira Gandhi	Congress (I)	Chikmagaluru	
	Smt. SarojiniMahishi	Congress (I)	Dharwad North	-
7thLoksabha (1980-84)	-	-	-	-
8thLoksabha (1984-89)	Smt. Basavarajeshwari	Congress (I)	Bellary	-
	Kum. D.K Taradevi	Congress (I)	Chickamagaluru	-
	Smt. Margaret Alva	Congress (I)	Mangalore	State Minister (Personal, Public Grievances & Pension)
9thLoksabha (1989-91)	Smt. Basavarajeshwari	Congress (I)	Bellary	-
10thLoksabha (1991-96)	Smt. Basavarajeshwari	Congress (I)	Bellary	State Minister (Women & Child Development)
	Kum. D.K Taradevi-Siddharth	Congress (I)	Chickamagaluru	State Minister (Health & Family Welfare)
	SmtChandraprabha	Congress (I)	Mysore	-
11thLoksabha (1996-98)	SmtRatnamalaSavnur	JD	Chikkodi – SC	State Minister (Planning & Implementation)
12thLoksabha (1998-99)	-	-	-	-
13thLoksabha (1999-2004)	Smt Margaret Alva	INC	Canara	-
	Smt. Sonia Gandhi	INC	Bellary	-
14tLoksabha (2004-09)	Smt. ManoramaMadvaraj	BJP	Udupi	-
	Smt. SriramesheTejaswini	INC	Kanakapura	-

15tLoksabha (2009-13)	Smt. J Shantha	BJP	Bellary ST	-
	Kum. DivyaSpandana (Ramya)	Congress (I)		
2013 by-election				
16thLokasabha 2013	Kum. ShobhaKarand-laje	BJP	Bangalore (North)	-

In the first,second, seventh and twelfth Loksabha Elections there was no women representation and in 3rd,4th, 6 th,13th,14th, 15thand 16thloksabhaelections no portfolio given to elected women candidates

Compared to other states Karnataka had given more opportunity to women to contest in Lokasabha many more of them would have benefited with the opportunity.

Ministers of State attach to Prime Minister and Cabinet Ministers

1. Smt. SarojiniMahishee
2. Smt. Basavarajeshwari
3. Smt. RatnamalaSavanur
4. Smt. SiddharthTaradevi
5. Smt. Margarate Alva

Even the legacy of Indira and Sonia Gandhi's has not helped the prospects of women in Karnataka. In 1978 Indira Gandhi choose Karnataka for her political rebirth. She contested and was elected from Chikkamaglur. Twenty one years later, her daughter in-law Smt. Sonia Gandhi successful contested and won the election in year 2009.

The 16thloksabha has a record in nos. of 61women elected representatives as compared to general elections of 15thLokSabha. However the figure from the 33% make that women reservation bill seems to be implemented. The bill is pending in loksabha after being passed in upper house of the parliament. In the 16thloksabha 28 members are elected from Karnataka, wherein Shoba Karandlaje is the only women representative from Karnataka and also total 12 members from Karnataka represent RajyaSabha only Smt. Nirmala Sitaram from BJP represents Karnataka.

The below table denotes the decline in women participation in politics.

The 14th Karnataka Legislative assembly consists of 224 members, and in this general election only 6 women candidates were elected and out of them only one women is selectedas cabinetminister.Alas,what a prejudiced Ministry?

After 69 years of independence, there has been no single women legislature not offered the position of Chief Minister of Karnataka.

We may observe the under mention listWomen Cabinet Ministers in Karnataka

1. Smt. Yashodhara Dasappa,Cabinet Minister for Social Welfare this Gandhian made news by resigning in 1969 in protest against the withdrawal of liquor prohibition.

2. Smt.Leeladevi R Prasad was Minister in Rama Krishna Hegde Government.

3. Smt. ManoramaMadwaraj was Minister in VeerendraPatil Government.

4. Smt. K.S. Nagarathnamma,she was the first women speaker of Karnataka assembly from 24/03/1972 to 17/03/1978 in DevarajUrs period

5. Smt. Motamma, women and welfare minister during the S M Krishna government during 1999-2004 and also first women to have become the leader of the opposition in the council.

6. Smt. ChandraprabhaUrs, was the Cabinet Minister,SocialWelfare,Sericulture and Excise.

7. Suma Vasanth was Mazurai minister in S M Krishna Period.

The below mentioned table shows the women candidates elected to Karnataka legislative assembly

Karnataka Assembly Elections	1957	1962	1967	1972	1978	1989	1994	1999	2004	2008	2013
Number of Women elected	13	18	5	0	8	10	7	6	6	5	6

8. Rani Satish Dy. Chairperson in 1994 in VeerappaMoily Government and Kannada and Culture minister in S M Krishna cabinet.

9. NafeesaFazal was minister of Science and technology/Indian systems of Medicine/Homeopathy in S M Krishna Period.

10. Smt. Bhagirathi Marulasiddana Gowda was Child and Women Welfare minister during theperiod ofDharam Singh.

11. ShobaKarandlge: In 2008 in B S Yadiurappas Government she was the minister for Rural development and Panchayat Raj. In 2010 she was the Power minister in the Jagadish SetterGovernment and also had additional Charge of the food and civil supplies department. Now she is the only women M P in the 16th Loksabha from Karnataka state.

12. Smt. Umashree – Got elected in the 14th legislative assemblyelections and she is cabinet minister for Women & Child Development, Empowerment of Differently abled & Senior citizens Dept. and Kannada & Culture.She is the only women cabinet minister in Sidramayyas Government.

Obstacles for womenparticipation inPolitics : FirstlyIlliteracy is one of the main hurdles in making women as political empowered.Lack of understanding they do not know about their basic concepts of political rights and unware about their rights in society.

Secondly Patriarchal context of India is also the reason for non-involvement in the political arena.

ThirdlyWomen not only have lack of awareness about their rights enshrined in Indianconstitution but also lack of political will.

FourthlyGender biased against women in politics

FifthlyLack of courage and sportive nature among women to enter politics and demand their share

SixthlyGeneral trend is not in favors of womento encourage participating and taking part in the political field

Motivation to be made to improve women participation in the political field such as

Firstly creating awareness among the women to enter politics,

Secondly pressuring the political parties to give adequate representations for women nominations in the elections to the state legislature and Parliament.

Thirdly Promoting women NGO's for training women activists so that they can enter politics at a later late

Fourthly If Economic empowerment given to women then she will become economically strong to enter politics.

FifthlyWomen ministers have typically been assigned to soft portfolios such as those related to Women and children, information and culture, social welfare,etc in the male dominated world of real politics. Other strong portfolios such as defense finance and others should be given to women.

SixthlyPolitical empowerment should be given to women,it's an essential component of programs aimed at empowering women,and it provides them the power to participate in decision making or policy making process.

SeventhlyLack of space for participation in political bodies has not only resulted in the presence of women in meager numbers in their decision making bodies but also has resulted in the neglect of issues and experiences in policy making concerned to women

Eighthlyimplementing the women reservation, it will give constitutional protection for women participation in politics.

"It is very difficult for women to make up her mind to enter politics. Once she makes up her mind to enter into politics then she has to prepare her husband, children and her family. Once she has overcome all these obstacles and applies for ticket then the male aspirants against whom she is applying, make-up all sorts oppositions about her. And after all this when her name goes to the party bosses, they do not select her name because they fear losing that seat".

The above quote of Smt. Sushma Swaraj, Union External Affairs Minister gives a glimpse of reality of that how women have to face so many problems and criticism while entering the politics.

Men and women have always equally shared their dedication towards the development of the nation. They have worked shoulder to shoulder with this make counter parts pre-independent and as well as post independent India.

Create an opportunity for equality and justice free from bias and prejudice irrespective of multi political parties "Empower Women"

References

• Statistical report on General Elections, 1997 to The Sixth Lok Sabha.

• "MLA's of Karnataka" Karnataka government, retrieved 26thFeburary 2009.

• Rajya Sabha members biographical sketches 1952 to 2014 (Rajyasabha website)

• Karanataka Pradesh Congress Committee website.. KPCC Bengaluru

• Suryanath Kamath - Karnataka Gazetteer Published in year 1986.

• Lok Sabha Members from Karnataka, Department of Personnel and Administrative Reforms, Govt. of Karnataka.

• News Papers

* Times of India

* The Hindu

WOMEN EMPOWERMENT IN INDIA: A CAREFUL ANALYSIS

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This paper attempts a careful analysis on women empowerment and identifies the issues and Challenges of Women Empowerment. Women empowerment is empowering the women to take their own decisions for their personal dependent. Empowering women is to make them independent in all aspects from mind, thought, rights, decisions by leaving all the social and family limitations. It is to bring equality in the society for both male and female in all areas like Education,Employment,Health, Economic development, participation in public life etc. Women empowerment is very necessary to make the bright future of the family, society and country. Today the empowerment of women has become one of the most important concerns of 21st century, but practically women empowerment is still an illusion of reality. In order to make the country fully developed, women empowerment is an essential tool.

The study concludes by an analysis that access to Education, Employment and Change in Social Structure are the enabling factors to Women Empowerment.

Key Words: Women empowerment,Country,Education,Employment.

According to the Government of India, "Empowerment means moving from a weak position to execute a power." It is the ability to direct and control one's life.

Education:Education of women in India has been a major issue for both the government and civil society, as the educated women play a very important role in the development of the country. India, at present has largest number of illiterates in the world. As we all know that education is must for everyone but unfortunately, in this male dominating society, the education of women has been neglected for a long time. Mostly people think that to spend money on daughters would be vain. Now, we see the change in people's mentality that they are worried about the future of their daughters and they are ready to give the same place to position their daughters as they want for their sons. But in rural areas, we see that there are negligible changes in rural people's thinking. A higher women literacy rate improves the quality of life both at home and outside home, by encouraging and promoting education of children, especially female children, and helps in reducing the infant mortality rate. It is true that empowerment can be gained with the help of education because it gives the knowledge of right and wrong, truth and lie.

Employment:In fact higher status for women employment and work performed by them in a society is a significant indicator of a nation's overall progress. Undoubtedly, without the active participation of women in national activities, the social, economic or political progress of a country will deteriorate and become stagnant. But ironically and tragically, women employees in general, are not taken very seriously by their superiors, colleagues, or society at large. Having a career poses challenges for women due to their family responsibilities. Traditionally Indian women had been home makers but in the recent decades, proper education and better awareness, in addition to the ever increasing cost of living has made them to go out and choose careers. In a patriarchal society like India it is still believed that a man is the primary bread winner of his family. Although Indian women have started working outside their homes but still they have a long way to go both culturally, socially and economically, to bring in positive attitudinal changes in the mind-set of people.

II. Literature review : Taxak (2013) studied the disparity in education across the socio economic spectrum in India. Sonowal (2013) studied the effect of the SC and ST women in the rural areas of Sonitpur district. He found that the status of women in the present society, attitude of parents and guardians towards girl education. Banerjee (2012) studied the empowerment of women through higher education. She concluded that the empowered women challenged the man in their workplace and were seen

in the powerful corporate positions. Kandpal et al (2012) studied the participation in community level female empowerment program in India increases participants physical mobility, political participation and access to employment. Murtaza (2012) examined the current status of women in higher education in GilgitBaltistan. He examined the challenges faced by the women were harassment at work places and work load. The parents didn't spend similar amount in educating their daughters as compare to their sons. Noreen and Khalid (2012) explored the possibilities and opportunities for women empowerment and how the participants in the study understand the role of higher education in empowerment of women at home and at work. They found out that the women should continue higher education and career by strategizing and acknowledging the support of their family members. Malik and Courtney (2011) studied that how higher education offers empowerment to women. The economic independence and increased standing with the family were the benefits of higher education. It also enabled the women to impact the discriminatory practices.

III. Objectives

There are two objectives of study:

1. To study the role of education as challenge in women empowerment : India has attained significant improvement in women's literacy which was 8.9 % in 1951, improved to 71.5 % as on 2015. As a result the male-female gap in literacy has narrowed down from 26.6% in 1981 to 12.7% in 2015. However, the Human Development Report-2015 observed that the population with at least secondary education (% age 25 and above) was only 32.6% for females as against 50.4% for males. Net Attendance Ratio at primary and upper primary levels in rural areas and in urban areas was found for females were completely low during 2012-13 .Net Attendance Ratio at higher secondary level for females was only 20.0% in rural areas and 39.0% in urban areas.

Inspite of the implementation of programmes like "SarvaSikshaAbhiyan", still 21.8% of the girl children (6-17 years age) were found out of schools. Although the gender differential in literacy has declined over time, the differential remains high even in the youngest age group among those 15-19 years of age, the percentage of females who are literate (74%) is 15%, which is less than the males (89%). The National Family Health Survery-3 (2012) observed that there are great disparities in literacy by wealth especially for women. The below figure 1 shows the literacy facts of women in INDIA.

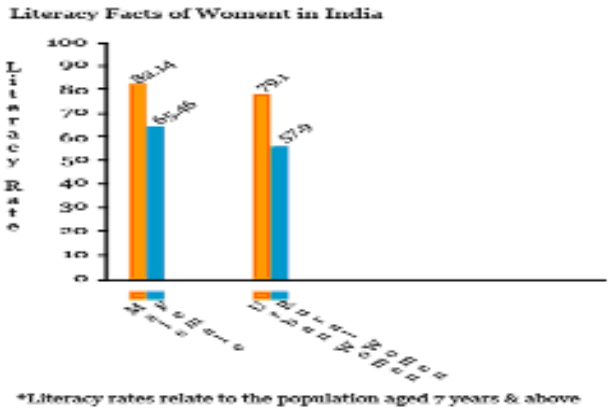

Figure 1.Showing the Literacy Facts of Women in India

2. To study the impact of employment in women empowerment : It is generally perceived that gender bias against working women starts right from the stage of recruitment. Most of the Indian men are not ready to accept that women are capable enough to work side by side with men in all the sectors, other than in a few limited ones like teaching, nursing and in clerical sectors. Their capabilities are generally underestimated as a result of which Indian women have a tendency to opt for less demanding jobs even if they are highly qualified. Women have the responsibilities to effectively manage their multiple roles in their domestic as well as professional lives. Men generally do not offer any help in the households work. This makes the life of working women extremely stressful.Employment can also be an important source of empowerment for women, particularly for cash and in the formal sector. Employment empowers women by providing financial independence, alternative source of social identity and exposure to power structures. The below table 1 shows the Percentage of Women and Men Employment.

Table. 1. Percentage of Women and Men age 15-49 Employment

By Residence and Age	All India	
	Women	Men
1. Residence:		
Urban	29.3	84.0
Rural	49.4	88.7
2. Age:		
15-19	33.4	50.4
20-29	38.5	90.3
30-39	50.6	99.0
40-49	49.7	98.5

IV. Suggestion : The status of Indian women has undergone considerable change. Though Indian women are far more independent and aware of their legal rights, such as right to work, equal treatment, property and maintenance, a majority of women remain unaware of these rights. There are other factors that affect their quality of life such as age of marriage, extent of literacy, role in the family and so on. In many families, women do not have a voice in anything while in several families; the women may have a dominating role. The result is that the empowerment of women in India is highly unbalanced and with huge gaps. Those who are economically independent and literate live the kind of life that other women tend to envy about. This disparity is also a cause for worry because balanced development is not taking place.

Focus areas of the Mission

• Access to health, drinking water, sanitation and hygiene facilities for women

• Coverage of all girls especially those belonging to vulnerable groups in schools from primary to class 12

• Higher and Professional education for girls/women

• Skill development, Micro credit, Vocational Training, Entrepreneurship, SHG development

• Gender sensitization and dissemination of information

• Taking steps to prevent crime against women and taking steps for a safe environment for women

V. Conclusion: The Empowerment of Women has become one of the most important concerns of 21st century not only at national level but also at the international level. Government initiatives alone would not be sufficient to achieve this goal. Society must take initiative to create a climate in which there is no gender discrimination and women have full opportunities of self decision making and participating in social, political and economic life of the country with a sense of equality. Education and Employment among women is the most powerful tool of attaining power in the society. Higher Education of women plays a very important role in releasing their energy and creativity and enabling them to meet the complex challenges of the present world. It helps in reducing inequalities and functions as a means for improving their status within the family and society. The higher education increases the women to take independent decisions, to reduce violence, women's ability to claim legal rights, participation in civic society, economic independence and many more. The biggest challenge before the Government and NGO's is to create awareness and sensitization among people of all levels, especially in rural areas, about the special needs of women and girls. Hence, the answer for the question "Are women really empowered in India" is nothing but "not yet to the desired level"

VI.References

[1] Baruah B. (2013) Role of Electronic Media in Empowering Rural.

[2] Dr. B. Nagaraja "Empowerment of women in India" 2013

[3]AmtulWaris and B. C. Viraktamath "Gender gaps and Women's Empowerment in India–Issues and Strategies". 2013

[4] VarshaKumari "PROBLEMS AND CHALLENGES FACED BY URBAN WORKING WOMEN IN INDIA". 2014

[5]ManavAggarwal "A study of challenge for women empowerment" .2014

[6]Dr. (Smt.) Rajeshwari M. Shettar" A study on issue and challenges of women empowerment in India".2015

WOMEN EMPOWERMENT

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Women Empowerment refers to the creation of an environment for women where they can make decisions of their own for their personal benefits as well as for the society. Freely live their life with a sense of self worth, respect and dignity. Have equal rights for social and economic justice, to make their own choices and decisions. Get safe and comfortable working environment. Have equal rights to participate in social, religious and public activities.

In empowerment of women the role of NGO's , Government rules for women empowerment , different barriers for women empowerment, different challenges for women empowerment and progress strategies for women empowerment.

While the world has achieved progress towards gender equality and women's empowerment under the Millennium Development Goals (including equal access to primary education between girls and boys), women and girls continue to suffer discrimination and violence in every part of the world.

Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world.

Providing women and girls with equal access to education, health care, decent work, and representation in political and economic decision-making processes will fuel sustainable economies and benefit societies and humanity at large.

Why need of women empowerment?

Reflecting into the " VedasPurana" of Indian culture, women is being worshiped such as LAXMI MAA, goddess of wealth; SARSWATI MAA, for wisdom; DURGA MAA for power.

Swami Vivekananda, one of the greatest sons of India, Quoted that. ""There is no chance for the welfare of the world unless the condition of women is improved, It is not possible for a bird to fly on only one wing. " Therefore, the inclusion of "Women Empowerment' as one of the prime goals in the eight Millennium Development Goals underscores the relevance of this fact. Thus, in order to achieve the status of a developed country, India needs to transform its colossal women force into an effective human resource and this is possible only through the empowerment of women.

"We cannot all succeed if half of this are held back."— Malala YousafzaïThere is no denying the fact that women in India have made a considerable progress in almost seven decades of Independence, but they still have to struggle against many handicaps and social evils in the male-dominated society. Many evil and masculine forces still prevail in the modern Indian society that resists the forward march of its women folk. It is ironical that a country, which has recently acclaimed the status of the first Asian country to accomplish its Mars mission in the maiden attempt, is positioned at the 29th rank among 146 countries across the globe on the basis of Gender Inequality Index. There has been amelioration in the position of women, but their true empowerment is still awaited.

The status of women in India particularly in rural areas needs to address the issue of empowering women. About 66% of the female population in rural area is unutilized. This is mainly due to existing social customs. In agriculture and Animal care the women contribute 90% of the total workforce. Women constitute almost half of the population, perform nearly 2/3 of its work hours, receive 1/10th of the world's income and own less than 1/ 100th the world property. Among the world's 900 million illiterate people, women outnumber men two to one. 70% of people living in poverty are women. Lower sex ratio i.e. 933, The existing studies show that the women are relatively less healthy than men though belong to same class. They constitute less than 1/7th of the administrators and mangers in developing countries. Only 10% seats in World Parliament and 6% in National Cabinet are held by women.

Women population constitutes around 50% of the world population. In western societies, the women have got equal right and status with men in all the walks of life. In India if the women social status is concerned, they are not treated as equal to men all the places. Women empowerment leads to decrease in domestic violence. Uneducated women are at higher risk for domestic violence than educated women. The paradoxical situation has such that she was sometimes concerned as Goddess and at other times merely as slave.

Principles and Methods for Women empowerment:

1. Creating a safe space: A safe space is a formal or informal place where women and girls feel physically and emotionally safe. The term 'safe,' in the present context, refers to the absence of trauma, excessive stress, violence (or fear of violence), or abuse[1]. It is a space where women and girls, being the intended beneficiaries, feel comfortable and enjoy the freedom to express themselves without the fear of judgment or harm. The key objectives of a safe space are to provide an area where women and girls can: • Socialize and re-build their social networks; • Receive social support; • Acquire contextually relevant skills; • Access safe and non-stigmatizing multi-sectorial GBV(Gender-Based Violence) response services (psychosocial, legal, medical); • Receive information on issues relating to women's rights, health, and services[2]. These spaces may take different names such as women centers, women community centers, or listening and counseling centers, to name a few. Women safe spaces are not the same as shelters or safe spaces at reception centers or one stop center.

2. Teach women to read: "If you educate a man, you educate a person but if you educate a women, you educate a nation", Mahatma Gandhi.

"Education of boy is the education of one person, but the education of girl is the education of entirely family", JawaharalalaNehru.

If you are illiterate, simple things like reading signs on a road, numbers on a phone, or directions on a medicine bottle, make daily life a struggle. So need to be teaching her to read and write in many rural areas in and out of the world.

"[When I was illiterate], I felt like I was blind. I began to see the world after coming to the library."

Education is the weapon which strengthen the personality and males one confident, education help in the mental development of women and a mentally satisfied and contended women is an asset to a family, society and nation and she can use her efficiency and potential in the right manner. Women can maintain a proper balance between physical health and mental health with good education. In a certain professions like medicine, social work, nursing care, teaching, they have proved better than men.

Education of a women[3] leads to a better family and ultimately an ideal society to a progressive nation. A progressive nation is one where all the people of the country in respective of sex, religion, caste , creed and color are economically, socially, culturally politically and through all thoughts are Independent.

3. Increase savings and income[5]: " Imagine you're a little girl. You're growing up. You practice as hard as you can, with girls, with boys. You have a dream. You fight, you work, you sacrifice to get to this stage. You work as hard as anyone you know. And then you get to this stage, and you're told you're not the same as a boy. Almost as good, but not quite the same. Think how devastating and demoralizing that could be." —Venus Williams,

KEY MESSAGES Women's economic empowerment is a prerequisite for sustainable development, propoor growth and the achievement of all the MDGs(-Millennium Development Goals) . Women's empowerment is about rights and equitable societies.

Investing in women's economic empowerment sets a direct path towards gender equality, poverty eradication and inclusive economic growth. Women make enormous contributions to economies whether in business, on farms as entrepreneurs or employees or by doing unpaid care work at home.

Economic empowerment is the capacity of women and men to participate in, contribute to and benefit from growth processes in ways that recognize the value of their contributions, respect their dignity and make it possible to negotiate a fairer distribution of the benefits of growth. Economic empowerment increases women's access to economic resources and opportunities including jobs, financial services, property and other productive assets, skills development and market information.

4. Teach job skills : When women are restricted tohouse work and prevented from leaving home, they can't contribute to the family income, making it difficult for families to escape the cycle of poverty.

The following methods really help women to learn job skills and seed business.

1. Stitching and sewing training: teach stitching of clothes.

2. Beautician training : Make up training one of the most growing area in these preset day

3. Early childhood care education training for women who wish to become preschool teachers.

4. Computers training courses: Most advantageous area for women empowerment and even for everyone.

5. Other income generating skills like beekeeping, mushroom farming, basket making, toys making etc., through training programs.

6. Workshops: a program where group of people engage in intensive discussion and activity on a particular subject or project.

- Gender rights and gender based violence
- Health workshops
- Adolescent health
- Malnutrition and anemia
- Reproductive health
- Technology for social development to help women make discussion of specific issue like health, legal rights with doctors and broadcast this information to ot her women in the community.
- Literacy programs for children utilize educational games toys, and audio-visual tools to teach early reading and numeracy skills.

5. Build self-esteem and confidence[6]: Confident people inspire confidence in others; their audience, their peers, their bosses, their customers, and their friends and gaining the confidence of others is one of the key ways in which a self confidence person find success.

"No can go back and start a new beginning, but anyone can start today and make a new ending"

6. Land and property rights[7]: There is a direct relationship between women's right to land, economic empowerment, food, security and poverty reduction. A gender approach to land rights can enable shifts in gender power relations and assure that all people, regardless of sex, benefit from, and are empowered by, development policies and practices to improve people right to land.

The centrality of women's land and property rights builds upon the increasing attention that the issue has received in recent years – despite their exclusion from the current MDG framework. In fact, women's land and property rights have been recognized in dozens of international human rights instruments and related standards. In 1997, the former United Nations Sub-Commission on the Promotion and Protection of Human Rights 4 adopted the first resolution by an international body directly addressing women's housing and land rights specifically, urging governments to:

- Take all necessary measures in order to amend and/or repeal laws and policies pertaining to land, property and housing which deny women security of tenure and equal access and rights to land, property and housing;
- Encourage the transformation of customs and traditions which deny women security of tenure and equal access and rights to land, property and housing;
- Adopt and enforce legislation which protects and promotes women's rights to own, inherit, lease or rent land, property and housing.

7. Internet tool for women empowerment: One of the innovations in recent years has been the use of internet as a form of new media., the creation of different websites that focus on women empowerment in terms of education , literacy , health , knowledge , lifestyle and many more areas have been proliferated. Today it is possible, to find anything related to empowerment by typing keyword searches using a reliable internet browser.

The growing access of the web in the late 20th century has allowed women to empower themselves by using various tools on the Internet. With the introduction of the World Wide Web, women have begun to use social networking sites like Facebook and Twitter for online activism.[8] Through online activism, women are able to empower themselves by organizing campaigns and voicing their opinions for equality rights without feeling oppressed by members of society.[9] For example, on May 29, 2013, an online campaign started by 100 female advocates forced the leading social networking website, Facebook, to take down various pages that spread hatred about women.[10]

In recent years, blogging has also become a powerful tool for the educational empowerment of women. According to a study done by the University of California, Los Angeles, medical patients who read and write about their disease are often in a much happier mood and more knowledgeable than those who do not.[11] By reading others' experiences, patients can better educate themselves and apply strategies that their fellow bloggers suggest.[11]

With the easy accessibility and affordability of e-learning (electronic learning), women can now study from the comfort of their homes.[12] By empowering themselves educationally through new technologies like e-learning, women are also learning new skills that will come in handy in today's advancing globalized world.

8 .Mass media for women empowerment : Mass media in India got its power in the middle of 90s. The newspaper, journal and magazines all combined started new edition and special volumes especially for women only. It covers women's health, education, and occupation, economic, political and social empowerment. This helped many women to participate in improving the weaker section of women. Organizing women as a group and movement is possible through the proper and effective communication. The increase of women education in India is by the joint effort of mass media. In all the newspapers, radio and television channels advertise the importance of women education. The programmes is visualized the consequences faced by the illiterate women.

Mass media is a powerful source which can create a massive change in the society. To empower the women and reduce the women morbidity such a powerful resource is required. The government and voluntary organization should joint with mass media related women health issues that can be very useful to reach the target. In simple mass media can try to give the knowledge to the rural women about the importance of health.

Barriers of Women Empowerment : There are many social hurdles which do not let women grow and develop even they have the sources and the brains and are very well capable of doing most of the work done by men.

Most of the hurdles to women empowerment and impartiality are deep-seated in the minds of people of some places and areas. Women have accepted it as a fact that they are of a lower class than men because this has been the point of view of many in the society. Many women know that wrong is being done but feel that there is no point in speaking against men. Men, administrators and NGOs are familiar with the good that women empowerment would do to the society they do not want to cause mayhem by changing the present situation and prefer these petty issues that govern their mind come in the way of development.

Many of the barriers to women's empowerment and equity lie ingrained in cultural norms. Many women feel these pressures, while others have become accustomed to being treated inferior to men.[13] Even if men, legislators, NGOs, etc. are aware of the benefits women's empowerment and participation can have, many are scared of disrupting the status quo and continue to let societal norms get in the way of development.[14]

Education: The female literacy rate is eventually improving but even then many young girls are not admitted in schools and even when they are educated for some time they are made to leave it before completing their basic primary education[4]. Even In the towns and cities the girls are made to leave even they are very good studies only because certain misunderstand.

Multiple roles that women hold: is another hurdle to leadership. In contrast to men, women's roles are traditionally based around family rearing, production (formal employment work as a secondary earner in the family) and community involvement (local community development duties). As a result, women have limited time to focus on career development

Global bias: The believe that men possess superior skills to women to better handle the demands of managerial roles. This means, with all other factors being equal, by virtue of gender only, a man will be greater qualified as a leader. This gender stereotyping influences human resources development decisions such as selection and recruitment, training and development, promotion, etc. Although there are no employment policies that explicitly discriminate women in the workplace, bias is still often an issue.

National culture and ideology. Gender ideology refers to attitudes regarding the appropriate roles, rights and responsibilities of men and women in society. Traditional gender ideologies emphasizes the value of distinctive roles for women and men where men fulfill their family roles through breadwinning activities and women fulfill their roles through homemaker and parenting activities.

Workforce participation: Earning wages or a salary are part of a modern phenomenon, one that developed at the same time as the growth of paid employment for men, but women have been challenged by inequality in the workforce. Until modern times, legal and cultural practices, combined with the inertia of longstanding religious and educational conventions, restricted women's entry and participation in the workforce. Economic dependency upon men, and consequently the poor socio-economic status of women, have had the same impact, particularly as occupations have become professionalized over the 19th and 20th centuries

Crimes against women: It includes rape, sexual assault, insult to modesty, kidnapping, abduction, cruelty by intimate partner or relatives, trafficking, persecution for dowry, dowry deaths, indecency, and Dating violence, emotional abuse, stalking, child marriage, acid throwing,Financial Constraints,Low Mobility etc.,There are many other obstructions to women empowerment like sex ratio, unsanitary conditions, and health issues.

International Organizations working for women empowerment

• Christian Women in Media Association – a non-profit organization

• Council of Women World Leaders — Membership of nearly all the world's current and former women presidents and prime ministers

• Equality Now – founded in 1992 to ensure gender equality and an end to violence against women.

• International Association of Women Police (established 1915)

• International Council of Women – founded in the year 1888, first international women's organization

• International Inner Wheel – Service Organisation by Women (founded 1920)

• International Women's Suffrage Alliance – major suffrage organization

• National Women's Political Caucus – Founded in 1972. NWPC recruits, trains and supports pro-choice women candidates for elected and appointed offices at all levels of government regardless of party affiliation.

• Nobel Women's Initiative – founded by women Nobel Peace Prize winners

• P.E.O. Sisterhood – Philanthropic organization with chapters in North America (organized 1869)

• Quota International – empowering women, children, deaf, hard-of-hearing, and speech impaired (founded 1919)

• Soroptimist International- Worldwide service-organisation for women (founded 1921)

• Third World Organization for Women in Science

• UNIFEM – United Nations Development Fund for Women (established 1976)

• UN Women (established 2010)

• Woman's Christian Temperance Union – Anti-alcohol movement (founded 1874)

• Women's Commission For Refugee Women and Children – Seeks to defend rights of refugee women, youth and children (organized 1989)

• Women's Environment & Development Organization – Advocates women's equality in global policy (created 1990)

• Women's International League for Peace and Freedom (WILPF) – Women's peace movement (created 1915)

• Women's International Zionist Organization – Founded in 1929 to provide community services in Mandate Palestine, now active in Israel and throughout the Jewish world

• Women's WorldWide Web (W4) – Empowering women and girls around the world (founded 2010).

Indian Women's Rights Organizations That Are Bravely Fighting For Change

Commit 2 Change: Seeks to provide education for orphaned girls and other at-risk young women in India. Commit2Change believes that education is one of the best avenues for young Indian girls to avoid cycles of poverty, provide better access to and information about nutrition, and greatly improve the entire country's GDP(gross domestic product).Sayfty:Emerged to equip women with tools that help keep them safe from acts of sexual violence, and educate women in matters of self-defense. While the ideal is that women would be free from the threat of physical violence without having to live in fear, organizations like Sayfty help to empower Indian women by equipping them with knowledge and tools that will help to keep them safe.WASH United: work to educate Indian communities about periods and menstruation, hoping to lessen the negative effects of the taboo surrounding periods, and help women and girls to have safe, hygienic periods.Sarvajal:Sarvajal is combining technology with humanitarian thinking to the Indian water crisis. Sarvajal brings "water ATMs" that dispense clean water at affordable costs to communities where water is scarce. Women on Wings:Poverty creates challenges for all of India's poor, but women and girls face child marriages, forced prostitution, or indentured servitude in order to escape the cycle of poverty. Creating sustainable methods of income for women has become the priority for many non-profit organizations including Women on Wings.ApneAap:Is a group dedicated to creating empowerment groups for Indian women. The groups provide a safe place for women to discuss their rights, and learn about options that can help keep them safe from a life of forced prostitution and sex slaving. ApneAap helps women to connect with another, share stories, and share opportunities for safe employment and education.

Many Government Schemes For Women Empowerment The Government programmes for women development began as early as 1954 in India but the actual participation began only in 1974. At present, the Government of India has over 34 schemes for women operated by different department and ministries. Some of these are as follows:

1. RastriaMahilaKosh (RMK) 1992-1993. 2. MahilaSamridhiYojana (MSY) October,1993. 3. Indira MahilaYojana (IMY) 1995. 4. Women Entrepreneur Development programme given top priority in 1997-98. 5. MahilaSamakhya being implemented in about 9000 villages. 6. Swayasjdha. 7. Swa Shakti Group. 8. Support to Training and Employment Programme for Women(STEP). 9. Swalamban. 10. Crèches/ Day care centre for the children of working and ailing mother. 11. Hostels for working women. 12. Swadhar. 13. National Mission for Empowerment of Women. 14. Integrated Child Development Services (ICDS) (1975), 15. Rajiv Gandhi Scheme for Empowerment of Adolescence Girls (RGSEAG) (2010). 16. The Rajiv Gandhi National Crèche Scheme for Children of Working Mothers. 17. Integrated Child Protection scheme (ICPS) (2009-2010). 18. Dhanalakahmi (2008). 19. Short Stay Homes. 20. Ujjawala (2007). 21. Scheme for Gender Budgeting (XI Plan). 22. Integrated Rural Development Programme (IRDP). 23. Training of Rural Youth for Self Employment (TRYSEM). 24. Prime Minister's RojgarYojana (PMRY). 25. Women's Development Corporation Scheme (WDCS). 26. Working Women's Forum. 27. Indira Mahila Kendra. 28. MahilaSamitiYojana. 29. Khadi and Village Industries Commission. 30. Indira PriyadarahiniYojana. 31. SBI's SreeShaki Scheme. 32. SIDBI's MahilaUdyamNidhiMahilaVikasNidhi. 33. NGO's Credit Schemes. 34. National Banks for Agriculture and Rural Development's Schemes .

CERTAIN NEW SCHEMES: 35. BetiBachaoBetiPadhao scheme. 36. Mahila police volunteers. 37. Nari Shakti Puraskar. 38. Awardees of Streeshaktipuruskar, 2014& Awardees of Nari Shakti puruskar.

The efforts of government and its different agencies are ably supplemented by nongovernmental organizations that are playing an equally important role in facilitating women empowerment. Despite concerted efforts of governments and NGOs there are certain gaps. Of course we have come a long way in empowering women yet the future journey is difficult and demanding.

WOMEN Leaders who achieved the best heights : Women are the backbone of family, society and country and no one can deny it. Some of the great women have proved this time to time by doing best efforts for the sake of our country throughout their life, and served many and also proved as great assets

to the nation even with many barriers and limitations, some of them are:

1. Mother Terrasa- the great social worker

2. Indira Gandhi- the first prime minister of India

3. Sarojini Naidu- famous as The Nightingale of India

4. KiranBedi- the first IPS officer in India

5. SainaNehwal and SaniaMirza- who have registered their name in golden words for playing sports of badminton and tennis respectively.

6. KalpanaChawla: The first Indian woman to go to space.

7. Every Indian mother : While there are several women who go on to perform well in their chosen fields outside their homes, there are many who sit at home and still own the world. The last, but definitely not the least, every Indian mother is an achiever we just cannot leave out.

The list of the influential women of modern India does not end here. There are several other women from different walks of life who hold the power to constantly inspire and influence the youth of India.

Iron chanuSharmila: Also called the Iron Lady of Manipur, she holds the record for the longest hunger strike.ChhaviRajawat: The first woman sarpanch in India with an MBA degree.SitaSahu: Won 2 Bronze medals at the 2011 special Olympics in Athens at the young age of 15. Sapper Shanti Tigga: A jawan in the Indian Army. Asha Roy: The fastest Indian on the track, setting a record at the National Open Athletics Championship in Kolkata in 2011.Arundhati Bhattacharya: The first woman to become the chairperson of the State Bank Of India (SBI). ReenaKaushalDharmshaktu: The first woman to reach the southernmost tip of the world, the South Pole, all in 38 days. Durga Shakti Nagpal :An IAS officer in the UP cadre. KunjaraniDevi : Most celebrated Indian woman in weightlifting.Indra Krishnamurthy Nooyi: The chairperson and CEO of the second largest food and beverage business in the world, Pepsi Co.Sports persons like boxer Mary Komm, Actresses like Madhuri dixit, AishwaryaRai, Nadita Das or ShabanaAzmi, writer Arundhati Roy, filmmaker GauriShinde, etc. do their bit to make nation a better place, The nation has also welcomed and accepted women from other countries, like Italy-born Sonia Gandhi who is now the President of Indian National Congress, as its own.,BarkhaDutt is an Indian television journalist and columnist, as well as the group editor with NDTV. MedhaPatkar: A social activist and reformer turned politician who is best recognized as the founder member of the famous Narmada BachaoAndolan to save the rivers and people of Gujarat. Tessy Thomas is the first woman scientist to lead a missile project in India. NirupamaRao, 64, from Kerala, is the Indian Foreign Service officer and former Indian Ambassador to the United States, SumitraMahajan is the current Speaker of LokSabha, Chitra Ramakrishna is the first woman Managing Director and Chief Executive Officer of India's leading stock exchange National Stock Exchange. KiranMazumdar-Shaw The chairperson of Bangalore-based biotechnology company Biocon Limited. She is also the chairperson of IIM Bangalore. Sudha Murthy is an Indian social worker and writer in Kannada and English. Badminton star P.V. Sindhu (silver), Wrestler Sakshi Malik (bronze) and gymnast , DipaKarmakar (creditable fourth) were the top stars among the Indian contingent at the Rio Olympics 2016. Present cabinet ministers SushmaSwaraj – Minister of External Affairs.UmaBharti – Minister for Water Resources, River Development and Ganga Rejuvenation ,SmritiZubinIrani – Minister of Human Resource Development, Maneka Gandhi – Ministry of Women and Child Development etc.,

Conclusion: The role of women outside the home has become an important feature of the social and economic life of the country and in the years to come this will become still more significant. From this point of view, greater attention will have to be paid to the problems of training and development of women. The education of girls, therefore, should be emphasized not only on grounds of social justice but also because it accelerates social transformation. Promoting women empowerment is a challenging task and it required multipronged efforts for a solution.

This burning issue is being aggravated by socio-economic, psychological and other factors most of which are age-old and deep-rooted in our society. Since the practice dies hard, social ethos and superstitions are emotionally surcharged, it is very difficult to tackle these problems easily. But with a strong determination, commitment, and involvement of people and organizations with philanthropic motive and a rational outlook, this problem can be solved and hurdled be overcome for promoting national rejuvenation and development.

References:

1. Creating Safe Space: Violence and Women's Writing- The novel and radical Feminist Imaginaries, Hard cover, Shreerekha Subramanian.

2. Women and Girls Safe Spaces, Syrian Crisis response in Jordan, Sexual and Gender-Based Violence Sub-Working Group, Jordan, August 2014.

3. Aggrawal JC (1995) 'Theory and principles of Edu-

cation', New delhi, vikas publication house Pvt Ltd.,

4. Sharma B.M and Sharma A.S (2007) Encyclopedia of education iIn 21st century, New Delhi.

5. Microfinance and women's empowerment: Rethinking 'best practice' Linda Mayoux, Independent Consultant.

6. Microfinance In India A tool for women empowerment Hardcover-2009 by Jayasheels (Author)

7. Women and Law: critical Feminist Perspectives(SAGE Law) Hardcover-9.by KalpanaKannabiran.

8. Sutton, J. & Pollock, S. (2000). "Online Activism for Women's Rights". Cyber Psychology & Behavior. 3 (5): 699–706. doi:10.1089/10949310050191700.

9. Churchyard, N. (2009). "The Question of Empowerment: Women's Perspective on Their Internet Use". Gender, Technology and Development. 13 (3): 341–363. doi:10.1177/097185241001300302.

10. McVeigh, T. (June 6, 2013). "Online Feminist activists of the digital age". Taipei Times.

11. Stephan, P. (August 13, 2013). "Breast cancer patients blog their blues away". breastcancer.about.com.

12. Radovic-Markovic, M.; Nelson-Porter, B. &Omolaja, M. (2012). "The new alternative women's entrepreneurship education: E-learning and virtual universities" (PDF). International Women Online Journal of Distance Education. 1 (2): 46–54. ISSN 2147-0367.

13. Nussbaum, Martha C. (1995). "Introduction". In Martha C. Nussbaum & Jonathan Glover. Women, Culture, and Development: A Study of Human Capabilities. Oxford: Clarendon Press. pp. 1–15. ISBN 9780198289647.

14. World Survey on the Role of Women In Development". Women's Control over Economic Resources and Access to Financial Resources, including Microfinance (PDF)(Report). New York: United Nations. 2009.

15. GOI(1986) National policy of education MHRD, New Delhi.

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THEME :-02

PATANJALEEYAM

Pyschospiritual and Philosophical Sciences

Sl No	Title of the Paper	Authors	Page No
1.	INFLUENCE OF GENDER ON ADOLESCENTS RESILIENCE SKILLS	Miss. Rohinie Raj J.J. Dr.Vijayalaxmi AHM	32 - 35
2.	DERMATOGLYPHICS- FINGER PRINT ANALYSIS	Dr. Noothan Rao	35 - 39

INFLUENCE OF GENDER ON ADOLESCENTS RESILIENCE SKILLS

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Adolescence is transition period and considered as most critical stage in one's life. The rapid changes in their biological, cognitive and social changes may lead to identity and role confusion among adolescents. Besides adapting to these changes, adolescents in this modern world also need to encounter new challenges on a daily basis, such as to fulfil the academic and social expectations from parents, school and peers, forming their own identity in the society as well as cope up with daily life challenges, and understand to maintain balanced emotions among relationships.

How successfully adolescents are able to cope with these environmental demands depends on their resilience skills. Resilience is an ability of an individual to bounce back to the challenges of life. Research on resilience clearly indicating that adolescents who fail to meet any of the above demands, results in school dropouts, drug abuse, lack of purpose, self harming, joining bad peer companies in adolescents. The research on the influence of demographic characteristic on resilience indicates differences among the different groups.

Therefore the present study was taken up to find out "Influence of Gender on Adolescents Resilience Skills" A total of 120 adolescents male and female in the age group of 14-16 years were identified for the study from C.B. Bandari Jain School Bangalore and Seventh day Adventist school Bangalore. The adolescents were further divided into experimental and control groups having 60 participants in each group. Gail M Wagnild et. Al., (1987) Resilience scale was used to elicit the information on resilience among adolescents. A basic data sheet was used, to collect information regarding demographic details. The data was concluded, tabulated and analyzed. Statistical analysis was done using ANOVA, Student t test(two tailed, independent), chi-square test, fisher exact test.

The experimental groups were exposed to an intervention programme for fostering resilience skills. The study concluded that, the intervention programme were very effective in increasing resilience skills among adolescents. A strongly significant difference in resilience skills was observed among the respondents with respect to gender.

Key words: Adolescents, Resilience

Adolescence is a developmental period of transition between childhood and adulthood that involves biological, cognitive and social changes Santrock (1993) and coping up with these changes leads adolescents toward Identity and role confusion (Erick Erikson).

Beside these changes, adolescents in this modern world also need to encounter new experiences on a daily basis, such as to form their own identity in the society, fulfil the expectations of parents and peers, cope up with daily life challenges, manage time for daily actives and understand to maintain balanced emotions among relationships.

When adolescents are not able to cope up with these daily life challenges, it may lead them towards unexpected social behaviours such us school dropouts, drug abuse, lack of purpose, self harming, joining bad peer companies etc.

However the research on resilience skills among adolescents clearly indicates that, the adolescents with good resilience skills are better equipped to face daily life challenges in a more positive way. The resilience skills can be learned. Therefore it is very important to teach the resilience skills among adolescents which help them to understand and face challenges and also helps them to realize that their life has a purpose and make them to feel important and a contributing member of the society.

Resilience is an ability of an individual to adapt to daily life challenges and act positively without harming self and society. It is the ability of an individual to bounce back to the challenges of life.

Blum 1998 , states that, coping with painful events and unpleasant emotions is a struggle for every human being. The ability to cope effectively with these events and emotions is termed as resilience.

The research on the resilience ability shows a positive association between demographic variables and resilience ability of a person

Hence the present study has made an attempt to give an intervention program to nurture resilience skills among adolescents and to find out the gender differential influence on resilience skills among them

METHODOLOGY : AIM: To find out the influence of intervention program on resilience skills among adolescents and specifically ascertain the differential

influence of gender among the adolescents.

OBJECTIVES:

- To assess resilience skills among adolescents.
- To administer the intervention program to nurture resilience skills.
- To find out the differential influence of gender in the intervention program in fostering resilience skills among the adolescents.
- To compare the pre and post test influence of intervention program among the experimental group adolescents.

Phase I – identification of appropriate tool

The tool identified and selected for the present study: -

Gail M. Wagnild& Heather M. Young, (1987) Resilience scale

Phase II – identification and selection of schools : Initially a survey of different schools offering coeducation in Bangalore was surveyed. The researcher personally met the management of these centres and explained the proposed research design to them. The institutions which showed the interest in the study were enlisted .The researcher needed different institute where similar respondents with similar socio-demographic characteristics to maintain homogeneity in the research.

The researcher felt that for this particular study, geographical location and logistic convenience have to be considered. When all other factors like keen interest in study, willingness to provide time and facilities, similar socio demographic among respondents etc were considered for conducting study, two schools were finalized. Among these schools, the management of C.B. Bandari Jain school, Sheshadri Road and S.D.A High school Horamavu showed keen interest . C.B. Bandari Jain school readily extended their infrastructure, time and equipment to the researcher for the research design to be carried, hence this school was selected as the experimental group . To avoid the spill over effect, S.D.A High School Horamavu which is situated far away from the experimental group school was selected as the control group. Both the schools were catering to middle income group students.

Phase III - selection of the sample : Since it is not feasible in the research to study the entire population, a sample or portion of finite population is taken as representation. A random sample of adolescent boys and girls studying in 8th standard was selected separately for the study from the two different groups identified in Phase II. Thus a total sample of 120 students studying in 8th standard, including both control and experimental group (60 +60) in the age group of 13 to 15 years was drawn. Initially an ice breaking session was held with the sample selected for the present study to establish a rapport. The researcher introduced herself and then explained the samples the purpose of her study.

EXPERIMENTAL GROUP : For the present study, a sample of 60 adolescent boys and girls, studying in class 8 of state syllabus from C.B. Bandari Jain School Sheshadri Road was drawn for the study.

CONTROL GROUP : The present study has 60 respondents as control sample. The control group sample was drawn from S.D.A High School hormavu which is far from the experimental group. This natural space ensures that the respondent stays in their own campus and would not stay very often into the experimental area. Researcher also ensured that, there is no spill over influence to these respondents from the experimental group. The control group did not receive any intervention program.

Phase IV – pre-test : The 120 adolescents identified in the previous phase, studying in 8th standard from both the schools were administered with inventory of Gail M. Wagnild& Heather M. Young, (1987) Resilience scale. The socio demographic information of the respondents was obtained using the simple questionnaire developed by the researcher.

Phase V – Implementation of the Intervention Program : The respondents in the experimental group received an interactive intervention program for 3 months. Initially an ice breaking session was held with respondents to establish a rapport.

The researcher assured the respondents, that the information obtained from them will truly be used for only the research work. Each session lasted on an average of 1 ½ -2 hours approximately. The session was based on the modules prepared by the researcher. Each session was concluded with the purpose, discussion, clarifications of the module and planning for the fourth-coming sessions. Home assignments were also given. The sessions were planned in contrast to the regular classroom setting. The adolescent's opinion was sought on seating arrangements and location of the sessions. By popular demand, the class room of the students was predominantly used for the sessions. The class room provided had ample seating space to conduct activities like role play pick and speak etc planned by the researcher.

Phase VI – Post test : The post test data collection was carried out for the experimental sample after the completion of the intervention program. The same tools used for the pre test data collection were re- ad-

ministered during the post test.

This phase of outcome evaluation enabled the researcher to assess the results and impact of the intervention program and also to determine to what extent the intervention program was effective in achieving the desired objectives of the present research. The same tool used for the data collection of experimental group was administered to control group to do the comparative study.

RESULTS AND DISUSSION

TABLE - 1 COMPARISON OF AGE DISTRIBUTION OF THE RESPONDENTS

AGE IN YEARS	Experimental group		Control Group	
	No	%	No	%
12-14	50	83.3	49	83.1
15-16	9	15.0	10	16.9
>16	1	1.7	0	0.0
Total	60	100.0	59	100.0
Mean ± SD	13.85±0.84	13.71±0.83		

An examination of Table 1 clearly shows that majority (83.3 %) of the respondents belonging to both experimental and control group respondents were between the age group of 12-14 years. The Mean ± SD of experimental group was 13.85±0.84, where as the control group was 13.71±0.83, indicating age distribution is statistically similar between the two groups.

TABLE -2 GENDER DISTRIBUTIONS OF RESPONDENTS

GENDER	Experimental group		Control Group	
	No	%	No	%
Male	30	50.0	30	50.0
Female	30	50.0	30	50.0
Total	60	100.0	60	100.0

The Table – 2 reveals that, the distribution of both male and female respondents belonging to both groups was equal (50.0% each), indicating gender distribution is similar between the two groups.

TABLE 3: COMPARISONS OF LEVELS OF PRE AND POST TEST RESILIENCE SCORE AMONG EXPERIMENTAL GROUP RESPONDENTS

Levels of resilience	Experimental group (n=60)			
	Pre -test		Post- test	
	No	%	No	%
Very high1 61- 175	5	8.33	15	25
High1 45 – 160	21	36.66	34	56.66
Moderately high131-145	22	35	7	11.66
Moderately low116- 130	4	6.66	1	1.66
Low 01 – 115	0	0	0	0
Very low 25 – 100	8	13.33	3	5

Table 3 shows the influence of intervention program on the Total resilience skills. The total resilience obtained by the respondents in the pre test and post test data was compared. It is observed from the table that, there is a significant difference between pre test and post test results among the respondents. In the post test results, the number of respondents have increased in the very high (25%) and high (56.66%) category of levels of total resilience, where as the number of respondents have been found to decrease, from moderately high (11.66%) to very low (1.66%) category of level of total resilience, indicating that the intervention program, has been very effective in nurturing resilience skills of the respondents.

TABLE 4: COMPARISONS OF LEVELS OF PRE AND POST TEST RESILIENCE SCORE AMONG MALE AND FEMALE RESPONDENTS OF EXPERIMENTAL GROUP

Levels of resilience	Experimental group (n=60)							
	Pre -test				Post- test			
	Male		Female		Male		Female	
	No	%	No	%	No	%	No	%
Very high1 61- 175	3	10.0	2	6.7	9	30.0	6	20.0
High 145 – 160	15	50.0	6	20.0	21	70.0	13	43.3

Moderately high131-145	11	36.7	11	36.7	0	0.0	7	23.3
Moderately low116- 130	1	3.3	3	10.0	0	0.0	1	3.3
Low 01 – 115	0	0.0	0	0.0	0	0.0	0	0.0
Very low 25 – 100	0	0.0	8	26.7	0	0.0	3	10.0

Table 4 shows the influence of intervention program on the Total resilience skills. The total resilience obtained by the respondents in the pre test and post test data was compared. It is observed from the data that, there is a significant difference between pre test and post test results among both male and female respondents. The post test data shows, compared to female respondents more number of male respondents was observed in very high and high categories (9%and 21% among male and 6% and13% among female). Where as in the other categories of levels of resilience none of the male respondents were observed, while 23.3% of the female respondents were observed in the moderately high category and a small percentage of them were observed in the moderately low (3.3%) and very low category (10%). These results clearly indicates there is a difference between male and female respondents in acquiring resilience skills.

CONCLUSION : The resilience intervention program was very effective in fostering the resilience skills among adolescents. The intervention program has brought significant improvement in the resilience skills among experimental group adolescents. A strongly significant difference in resilience skills was observed among the respondents with respect to gender.

REFERENCES

• Alexandra Hogan, Faraneh Vargha-Khadem,Fenella, Kirkham And Torsten Baldeweg (2005), "Maturation of action monitoring from adolescence to adulthood" Developmental Science

• Ann Masten , Jon Hubbard , Scott Gest , Auke Tellegen , Norman Garmezy And Marylouise Ramirez (1999), "Competence in the context of adversity: Pathways to resilience and mala adaptation from childhood to late adolescence". Volume 01 pp 143-169 Journal of Psychology

• Basow Susan And Rubin Lisa (1999), "Gender influences on adolescent development" American psychological association

• Daniel (2008), "A study on personal and family correlates of resilience among adolescents". Journal of clinical nursing

• Davila, Joanne; Hammen, Constance; Burge, Dorli; Paley, Blair; Daley, Shannon E.(1991), "Poor interpersonal problem solving as a mechanism of stress generation in depression among adolescent women". Journal of Abnormal Psychology, Vol 104(4)

• Dawn Goettler Eaker and Lynda Henley Walters (2003), "Resilience Processes in Adolescents: Personality Profiles, Self-Worth, and Coping". Journal of Adolescent Research July 2003 vol. 18 no. 4 347-362

DERMATOGLYPHICS- FINGER PRINT ANALYSIS

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Inborn potential + Acquired potential x Attitude = Genius potential. Knowing this leads to Happiness quotient. If we know by birth what we are good at, we can acquire those intelligences while growing and become genius in that field. Astrology, palmistry, finger print analysis, face reading help us to understand a person with his inborn qualities (good or bad). Handwriting analysis, art analysis, psychometrics tests help us to understand what the person acquired later on. If both gel, then the person is successful for sure.

The study of the ridge patterns on fingertips/palm is called Dermatoglyphics. Finger print patterns are established about 18 weeks after conception. Unlike the other lines on the hand, from then on they are fixed and unchanging. This, as we know, makes them very useful in the detection of criminals, also be useful in the detection of personality.

There are three basic types of fingerprint: the arch, the loop and the whorl with variations existing on each type. A person can have more than one type of fingerprint. TRI RADIUS: It is a meeting point of 3 directional curves which helps in distinguishing one type of fingerprint pattern from another.

LEFT HAND represents right brain activities. RIGHT HAND represents left brain activities THUMB represents Prefrontal lobe. INDEX FINGER represents Frontal lobe. MIDDLE FINGER represents Parietal lobe. RING FIN-

GER represents Temporal lobe. SMALL FINGER represents Occipital lobe.

What else we can findout through Dermatoglyphics science

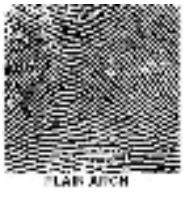
1. 9 multiple intelligences - (Logical-Mathematical, Linguistic, Musical, Intrapersonal, Interpersonal, Bodily-Kinesthetic, Visual-Spatial, Naturalistic, Existential).
2. Intelligence quotients (IQ-Intelligence quotient, EQ-Emotional quotient, AQ-Adversity quotient, CQ-Creative quotient, SQ-Spiritual quotient)
3. Preferred learning style – (Visual, Auditory, Kinesthetic capability)
4. Communication character – (Affective, Reflective, Cognitive, Critical)
5. Personality & Work Management style – (Realistic, Investigative, Artistic, Enterprising, Social, Conventional)
6. Intelligence classifications – (Analytical, Interactive, Introspective domains)
7. Brain – body / nervous – muscular co-ordination – (Fast, Normal, Average, Slow)

Knowing this leads to Happiness quotient. If we know by birth what we are good at, we can acquire those intelligences while growing and become genius in that field. Astrology, palmistry, finger print analysis, face reading help us to understand a person with his inborn qualities (good or bad). Handwriting analysis, art analysis, psychometrics tests help us to understand what the person acquired later on. If both gel, then the person is successful for sure.

The study of the ridge patterns on fingertips/palm is called Dermatoglyphics. Finger print patterns are established about 18 weeks after conception. Unlike the other lines on the hand, from then on they are fixed and unchanging. This, as we know, makes them very useful in the detection of criminals, but they can also be useful in the detection of personality. When more than one type of fingerprint pattern appears in a hand, their different characteristics will be blended in the personality. The number of fingers involved can give us an indication of the balance of that blend. E.g. a person with several fingers showing tented arches is likely to be considerably more stubborn than a person with just one.

There are three basic types of fingerprint: the arch, the loop and the whorl with variations existing on each type. A person can have more than one type of fingerprint. The more a certain pattern recurs, the more emphasis is placed on the trait it indicates.

Also, the finger a pattern appears on can have implications for the overall meaning. The position of the fingerprint pattern on the finger is also important. If the heart of the pattern appears above the centre of the phalange, then the energy expresses is more intellectual than practical. The lower down it is, the more the reverse is true.



THE ARCH

(1) Basic arch – this fingerprint indicates a practical and materialistic nature. People with arches as fingerprints are reserved but hardworking. They are not particularly good at team work, can be resistant to change and new technology but, dependable and loyal. They can be skeptical, hardhearted, insensitive and unemotional. On the index and middle finger, arches can reveal an inability to express oneself. Suitable occupations – anything that involves manual dexterity, builder, painter, surgeon, musician, laborer.

(2) Tented arch – Recognizable for the so-called "tent pole" that props the arch up. While they are similar in other respects to those who have basic arches, they are more impulsive and emotional. They are highly strung, creative, artistic and obsessive – but stubborn. Suitable career options – musician, artist, sculptor, surgeon, museum curator.

THE LOOP (Ulna)

(3) Basic loop – This is the most common fingerprint pattern. Basic loops point towards the thumb, with their base, or starting point, at the percussion side of the hand. People who have such fingerprints on their hands are generally mild tempered and straightforward, with a quick, lively and versatile mind. They are flexible and well suited for team work. They enjoy work and need variety at work. They find it difficult to assert themselves and supervise others effectively.

Career options: Committee worker, graphic designer, journalist, temporary work, court reporter etc.

(4) Reverse (or radical) loop – (less common).These loops are like basic loops, but they start and finish in the opposite direction. Owners share the same personal-

ity characteristics as those of basic loops, but they are more confident and less afraid to speak their mind. Though they are flexible, good with people and well suited to teamwork, they need constant stimulation to remain motivated; have no patience for repetitive or mundane tasks. Suitable occupations: Personal assistant to a high level executive, television researcher, personal manager, public relations.

THE WHORL

The three types of Whorls are the Spiral, the Bulls-eye/Concentric, and the Composite/Double Loop. The Spiral and Bulls-eye prints are quite similar in their interpretations, the latter giving slightly more focus. Anywhere on the hand the Whorls highlight and emphasize that particular region, making it an area of focus in the subject's life.

(5) Spiral whorl – People who have spiral whorls as their fingerprints are individualists with a strong, definite personalities. Potentially brilliant, they work best when self-employed. They can be inflexible and take time to take decisions, however, since they prefer to have ample time to reflect on matters. Suitable occupations: Business entrepreneur particularly in the field of Information Technology, startup companies, academic, scientists.

(6) Concentric /Bulls-eye Whorl – This fingerprint is a series of complete circles within each other. It is a much rarer pattern than the spiral whorl, but the characteristics it indicates are very similar. It is most commonly found on the index or ring fingers. A person with 10 such prints will have great potential but can be prone to stress. Suitable occupations: Mid level to High level management, financial analysts, economist, consultant physician.

(7) Composite/ Double Loop Whorl: Composite fingerprints look like two loops pulling in opposite directions. Often, they can look like the ancient Chinese yin-yang symbol. While these people are open minded and able to sympathize with others, they can be indecisive and even muddle-headed personalities. Suitable occupations: Mediator, Referee, Counselor, Judge, Magistrate, Diplomat, Negotiator, Career Advisor, Social Worker.

The Double Loop is perhaps the most misunderstood of all Dermatoglyphics markings. In general, interpret the Double Loop as you would the other Whorls, with one major difference: until the personality is developed there will be a strong tendency towards exaggeration, manipulation, and subversive actions in the area of life indicated. For example, a person with the Double Loop on both thumbs is likely in early life to use deceit to help assert their will over others. Owners of this print gravitate towards dramatic careers, and with daily effort can easily attain great renown.

(8) PEACOCK'S EYE: The peacock's eye fingerprint looks like a loop at first glance. On closer inspection however, we can see a whorl at the heart of the loop, like the eye on the peacock's tail. This fingerprint is very favorable, denoting as it does good luck and conferring protection on its owner. Suitable occupations: Should capitalize on their innate luckiness, take a few risks and perhaps go into business on their own, whatever their profession.

TRI RADIUS

It is a meeting point of 3 directional curves which helps in distinguishing one type of fingerprint pattern from another. An arch print does not have a tri-radius, a loop print has one and a whorl has two tri-radiuses. This tri radius is important in measuring our brain capacity/activity/intelligence. Distance between lines, distance between center point & tri-radius, number of lines and its concentration etc. are measured to come to following conclusions.

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LEFT HAND represents right brain activities such as emotional, intuitive, holistic, random, synthesizing, subjective, symbols and images. It can look at whole, get meaning and present possibilities.

RIGHT HAND represents left brain activities such as logical, sequential, rationale, objective, highly analytical, factual, fords and language. It looks at parts and can comprehend, form practical strategies.

THUMB represents Prefrontal lobe - anterior (front) portion of the frontal lobe which is called as Prefrontal Cortex of our brain which controls mental ability. It is like a receptionist (curious) who asks what, when, why, where, how. This finger represents self esteem and leadership quality. An intense person with confidence and executing behavior is a born leader.

INDEX FINGER represents Frontal lobe located at the front of the brain which handles thinking and imagination. It is like a store room of our brain where received information is stored like a filing section.

MIDDLE FINGER represents Parietal lobe located in the middle section of the brain which controls kinesthetic ability (motor skills, body movements & sense).

RING FINGER represents Temporal lobe located on the bottom section (sides) of the brain which controls auditory perception. It consists of audio, music, emotions, feelings, language ability, memory ability and understanding.

SMALL FINGER represents Occipital lobe located at the back portion of the brain which controls visual perception. It consists of visual identification/ interpretation/ observation/ appreciation, reading, art, aesthetic sense etc.

Dermatoglyphics analysis gives correct picture of brain mapping to understand one's potential to acquire the same. It also shows where our stress buster lies. Eg: if one is Intra person, giving him time & space to introspect is big help.

What else we can findout through Dermatoglyphics science

1. Brain–body/nervous–muscular co-ordination– (Fast, slow, Normal, Average)

2. Nine multiple intelligences - (Logical-Mathematical, Linguistic, Intrapersonal, Interpersonal, Bodily-Kinesthetic, Visual-Spatial, Musical, Naturalistic, Existential Intelligences).

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3. Intelligence quotients (IQ-Intelligence quotient, EQ-Emotional quotient, AQ-Adversity quotient, CQ-Creative quotient, SQ-Spiritual quotient)

4. Intelligence classifications – (Analytical, Interactive, Introspective domains)

5. Preferred learning style – (Visual, Auditory, Kinesthetic capability)

Visual Capability – Prefers to use graphics stimulation, graphs, flow-charts, reading and observation.

Auditory Capability – Prefers to use listening and discussion to learn. These people fit for our exam/ education system.

Kinesthetic Capability – prefers to use physical hands-on and practical activities to learn and understand.

6. Communication character – (Affective, Reflective, Cognitive, Critical)

Affective – Self discovery through modifications, organized and planned attitude, quite achiever, but thrive on appreciation.

Reflective – Open minded in nature, can absorb a lot of knowledge, need patience and well planned approach.

Cognitive – Take own initiatives to gain knowledge, are self centered in approach, need clear goals and time to take decisions.

Critical – Love challenging environments, good in self management, very competitive and critical by nature.

7. Personality & Work Management style – (Realistic, Investigative, Artistic, Enterprising, Social, Conventional)

Realistic – Practical, physical, hands-on, tool-oriented

Investigative – Analytical, intellectual, scientific, explorative

Artistic – Creative, original, independent, chaotic.

Social – Cooperative, supporting, helping, healing/ nurturing.

Enterprising – Competitive environments, leadership, persuading,

Conventional – Detail oriented, organizing, and clerical.

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THEME :-03

BHARATEEYAM

Sociocultural Sciences, Arts, Music and Natyasastra

Sl No	Title of the Paper	Authors	Page No
1.	SUSTAINABILITY OF TRADITIONAL INDIAN ANGARAKHA CLOTHING STYLE INTO MODERN CHOLI BY PATTERN TRANSFORMATION METHOD	Deepasri Prabhakar Sudhakar R	42 - 45
2.	ART THERAPY – " FREEDOM OF EXPRESSION "	Mrs. Asha	45 - 50
3.	NATYASASTRA: INDIAN THEORIES OF DANCE AND DRAMA	R.V. JYOTHSNA RASHMI.N	50 - 54
4.	MUSIC AND NATYASASTRA	RACHANA S, MEDAM NAGA SHARMILA, Patel Moodlachar H.S	54 - 56
5.	BEATBOXING	Sherlyn Priyadarshini Prem Venkataram. R	56 - 57
6.	BHARATHANATYAM-THE NATIONAL DANCE OF INDIA	Swarnashree Saikumar B K	58 - 61

ISSN 2250 - 3978 LILAVATI (PRINT)

SUSTAINABILITY OF TRADITIONAL INDIAN ANGARAKHA CLOTHING STYLE INTO MODERN CHOLI BY PATTERN TRANSFORMATION METHOD

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The theories of Clothing - the theory of protection, modesty, identity, individuality and adornment and satisfaction is relevant in all eras. The clothing styles of India have witnessed an immense progress and continuous transformation. As a diversified land, the clothing styles have been influenced by the foreign cultures carried by the invaders and the traders. Indian culture had witnessed the cross cultural effect at a very early stage. In the present scenario, the globalization has lead to vigorous transformation in the clothing styles of men and women. There is no more ethnic identity through clothing and this has proved the wide spread acceptability of other cultural clothing styles. The couture houses in the west are adapting Indian traditional clothing styles in their red carpet collection. Indian clothing culture has taken a rational route thereby enlivening its modesty, glamour and aestheticism. This paper focuses on two factors: 1) The sustainability of traditional clothing styles against the western clothing styles. 2) To develop an approach for the sustainability of the traditional clothing styles. A pre-market survey revealed that the young women of age 20 to 35 years prefer to wear western casuals and formals than the traditional attires. Based on this, a detailed study was carried out to understand the chronology of the a particular clothing style Angarakha, which was popular in almost all the parts of the country. An attempt was made to develop cholis for young and modern women, adapting to their prevailing fit and comfort ability needs. The basic Angarakha pattern was adapted to five different choli designs with varying details and style elements like asymmetric opening, decorative plackets, overlapping panels, flared sides and hemline, varying sleeve volumes, etc. These were worked on natural dyed fabrics to give it a more desi feel. The products were subjected to acceptability test amongst the target customers and a feedback was taken regarding the suitability of the new choli designs in terms of design, fit, fabric, aesthetics and comfort ability. The feedback gave an impetus to the approach taken for the sustainability of traditional clothing thereby exploring the design appeal of traditional Indian clothing styles.

Keywords: Aestheticism, angarakha, choli, pattern adaptation, sustainability.

The theories of Clothing - the theory of protection, modesty, identity, individuality and adornment and satisfaction is relevant in all eras. Clothing is one of the primary needs of humans and it has been evolving through ages under the changing climatic conditions, cultures and the changing needs of people. As a diversified land, the clothing styles have been influenced by the foreign cultures carried by the invaders and the traders. Indian culture has witnessed the cross cultural effect at a very early stage to an extent where it becomes difficult to differentiae the native clothing culture from the foreign cultures.

The predominant cults in India is believed to be Aryans and Dravidians. Aryans, who settled in the northern parts of the country were well built with prominent facial features and fair complexion. Dravidians were predominant in the southern part. They were comparatively short, more muscular and wheat to brownish in complexion. For generations, there was a remarkable difference in their clothing, in south, the draping styles were popular and in northern provinces draping styles slowly got transformed into stitched and semi- stitched clothing with tunics, divided leg panels and huge coats like robes. In the northern part, there was a remarkable shift in art and culture, due to the invasion of Persians, who traded and settled by marrying the native girls. Persians brought in many clothing styles which were new to natives. One of the clothing styles which had direct influence of Persians was the 'Angarakha' style. It is said to be a combination of two words, 'Ang' and 'Rakha' (Angrakha), which in Hindi language means that which protects the body. The style was said to be a unisex style worn both by men and women but primarily said to be worn by the warriors and soldiers. Subsequently, due to extreme climatic conditions it became a functional clothing to keep body warm and was worn by men, women and children, irrespective of their age. Even today, angarakha style is a traditional attire in Rajasthan, Gujarat, Uttar Pradesh and most of the northern states. The length, fullness, design and fabrics used has been changing with the changing times. Today, this beautiful style has become restricted only to special occasions and specific populations. The popularity is diminishing due to the influence of western clothing culture. There is no more ethnic identity through clothing and this has proved the wide spread acceptability of other cultural clothing styles. The couture houses in the west are adapting Indian traditional clothing styles in their

red carpet collection. Indian clothing culture has taken a rational route thereby enlivening its modesty, glamour and aestheticism. This paper focuses on two factors: 1) The sustainability of traditional clothing styles against the western clothing styles. 2) To develop an approach for the sustainability of the traditional clothing styles. A pre-market survey revealed that the young women of age 20 to 35 years prefer to wear western casuals and formals than the traditional attires. Based on this, a detailed study was carried out to understand the chronology of the a particular clothing style Angarakha, which was popular in almost all the parts of the country. An attempt was made to develop cholis for young and modern women, adapting to their prevailing fit and comfort ability needs. The basic Angarakha pattern was adapted to five different choli designs with varying details and style elements like asymmetric opening, decorative plackets, overlapping panels, flared sides and hemline, varying sleeve lengths and volumes, etc. These were worked on natural dyed fabrics to give it a more desi feel. The products were subjected to acceptability test amongst the target customers and a feedback was taken regarding the suitability of the new choli designs in terms of design, fit, fabric, aesthetics and comfort ability. The feedback gave an impetus to the approach taken for the sustainability of traditional clothing thereby exploring the eminent design appeal of traditional Indian clothing styles.

Methodology

The study was carried out in the following stages:

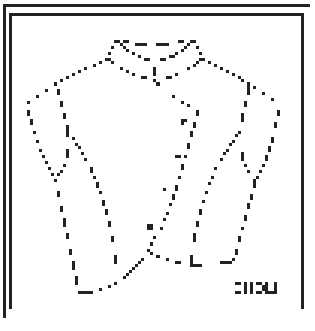
Phase 1 Pre - market survey : A pre-market survey was conducted to explore the prevailing trend in women's wardrobe and also their opinion and awareness about Angarakha style. Women of age group 20 to 35 years were approached, which included students, working women and home makers. The survey revealed that most of the women treated angarakha style as traditional style and out old-fashioned. Few expressed that the traditional angarakha styles are not comfortable to be worn to work places.

Phase 2 Product development : Based on the outcome of pre-market survey, a concept for product development was formulated. A range of angarakha styled choli designs were developed and five designs were selected for production. A basic angarakha pattern was created for bust size 34 inches. The basic pattern was adapted into five choli patterns using pattern adaptation technique. A 34 inches bust size bodice block was created. The pattern was tested for fit on 5 randomly selected women from the target group. Necessary alterations were made in order to achieve proper fit along with the desired design effect. The choli patterns were a combination of modified angarakha style with panels, princess line, yoke and varying sleeves. The typical overlapping style of angrakha was transformed into stylised opening in the choli. The cholis were made using brocades, cotton silk, silk and natural dyed cotton fabrics.

Phase 3 Market survey : A market survey was held to test the acceptability of newly developed cholis. A questionnaire was designed to collect feedback from the target customers in the areas of concept, design, fabric used, color concept, fit and comfort ability and over all aesthetic appeal.

Results and Discussions : The products were designed to suit the essential clothing line in women's wardrobe. The newly adapted angarakha styled cholis were very apt for today's fashion requirement. The cholis were evaluated in the areas of concept, design, fabric used, color concept, fit and comfort ability and over all aesthetic appeal.

Choli Design 1



It is a mid waist length choli with right side overlapping on the left panel in an asymmetric style. It has a short sleeve with princess line designed from armhole. The choli pattern fits well on the body contouring the bust till the mid waist. The choli has been made in brocade fabric which is rich in colour and texture.

CHOLI 1				
Parameters	**Fair**	**Good**	**Very good**	**Excellent**
concept	2	5	11	2
design	1	13	4	2
FABRIC	1	4	11	4
COLOR	1	3	9	7
fit & comfort	0	3	14	3
aesthetic value	0	2	9	9
Total	5	30	58	27

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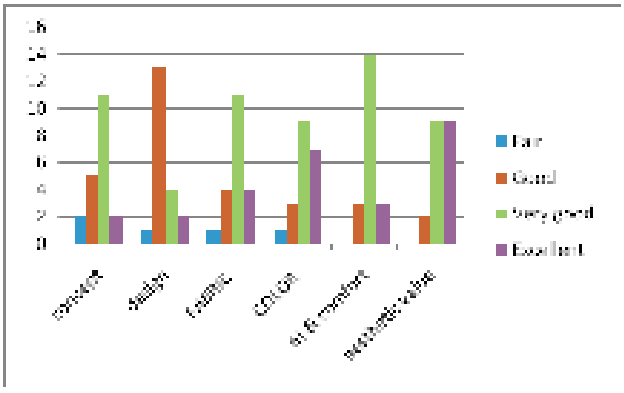
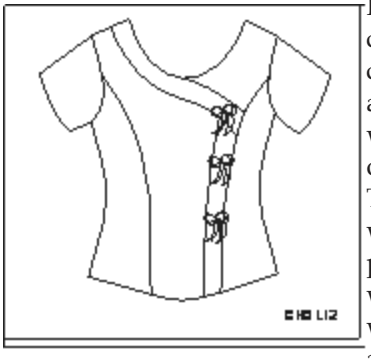
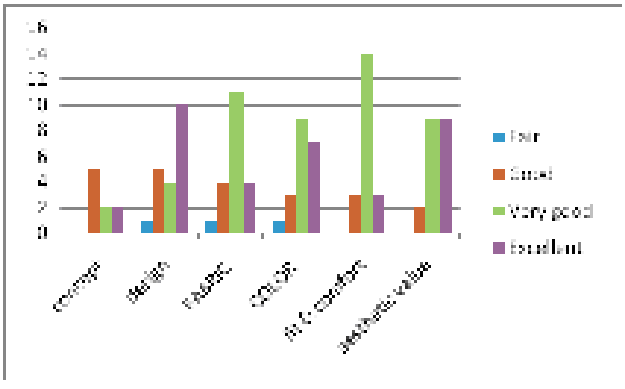


Choli Design 2

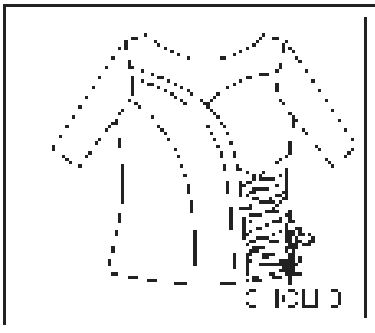


It is a low waist length choli adapted into a corset pattern. The angarakha feature was added along the opening at the front. The neck area along with the overlapping panel is decorated with embroidery work. The corset fit and the beauty of angarakha style gave a great workable fit for the choli.

CHOLI 2				
Parameters	**Fair**	**Good**	**Very good**	**Excellent**
concept	0	5	2	2
design	1	5	4	10
FABRIC	1	4	11	4
COLOR	1	3	9	7
fit & comfort	0	3	14	3
aesthetic value	0	2	9	9
Total	3	22	49	35

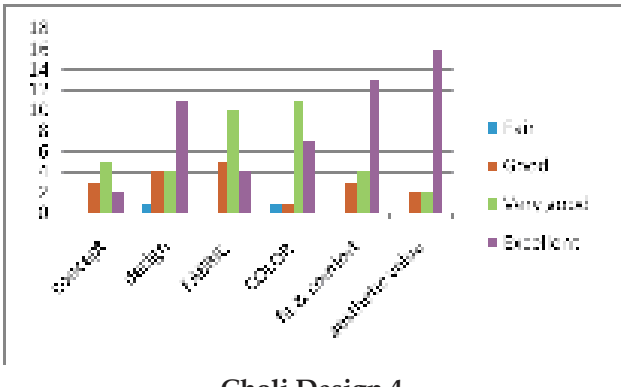


Choli Design 3

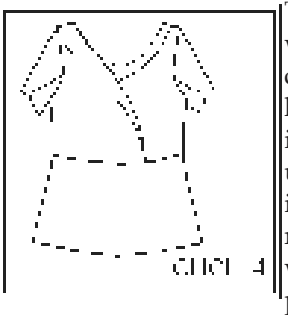


This choli design is inspired by the western blouse which is longer in length, ranging up to the lower hipline. The front section of the choli is designed with multiple style lines and panels along across bust, from armhole and the overlapping angarakha style line which was decorated with interlacing of cords on the left front panel. The design gave a hourglass look thereby contouring the upper torso gracefully.

CHOLI 3				
Parameters	**Fair**	**Good**	**Very good**	**Excellent**
concept	0	3	5	2
design	1	4	4	11
FABRIC	0	5	10	4
COLOR	1	1	11	7
fit & comfort	0	3	4	13
aesthetic value	0	2	2	16
Total	2	18	36	53



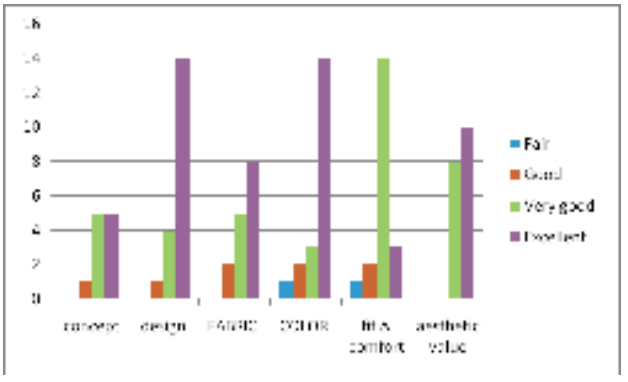
Choli Design 4



The design is more girly with flared hemline. The choli length ranges till the hipline. The choli is divided into two panels, where the upper part covering bust is designed with an angarakha pattern with fitted waistline. The waist down part is adapted to add fullness. It is combined with petal sleeve.

CHOLI 4				
Parameters	**Fair**	**Good**	**Very good**	**Excellent**
concept	0	1	5	5
design	0	1	4	14
FABRIC	0	2	5	8
COLOR	1	2	3	14
fit & comfort	1	2	14	3
aesthetic value	0	0	8	10
Total	1	8	39	54

The products were rated for their design value and aesthetics. The feedback of the target customers were assessed and plotted as graphs, as shown above.



Conclusion: Clothing are not just the covering means, they reciprocate culture, traditions and beliefs. It is a powerful tool for communication. Therefore it becomes imperative to restore, rejuvenate and revive those traditional clothing styles, by adapting them to current fashion needs. The study helped to explore the enchanting dominance of Indian traditional clothing styles like angarakha inspite of the impact caused due to globalization and cross-cultural effects. This can be one of the opportunity in fashion, for women to reach out to urban fashion, adapting through traditional and desi clothing styles.

ART THERAPY – " FREEDOM OF EXPRESSION "

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By its very nature we intuitively know that art is healing and therapeutic—but why? Is it the process itself, the actual act of making art that soothes our nerves and settles our brains? Is it the freedom of expression it allows us?

Among art therapists a dichotomy exists as to why art therapy works. Is the creative process itself the therapy? Or does the artwork act as a form of communication between the client and the therapist? From my experience, art therapy functions as a combination of these two perspectives, facilitating both catharsis and therapeutic expression.

The needs and abilities of the clients will often determine how the art process works and how the healing takes place. In some people the art will act to access the subconscious mind, uncovering new insights that can be discussed with the therapist. Some clients may have disabilities that create verbal challenges; for some it is too painful to talk about an "unspeakable" trauma or abuse. In these cases the art acts as a bridge, allowing clients to express themselves and tell their stories for the first time. In children, drawing with a specific topic work effectively both as a process of cathartic release and an expression of difficult emotions. Art therapy is quickly able to get us in touch with our intuition and subconscious mind, cutting through over-thinking and emotional defenses that have built-up over the years.

After Gujarat riots and Tsunami, The social service department of theNational Institute of Mental Health and Neurosciences, Bangalore used art Therapy to help children work through the trauma that they had experienced. Art Therapy gave children the opportunity to express their feelings, look at the impact it had on their lives, process the things and people they lost, and look to the future. When noticed the colours used in the drawings after Gujarat riots were predominantly red while tsunami drawings were blue.

As an artist, art therapist and counsellor I have been privileged to bear witness to the healing power of making art. I have experienced for myself the catharsis of becoming absorbed in a painting—my stress dissipating as I completely tune into the project at hand. As a therapist, I have seen clients make deep connections about themselves through exploring symbolism in their collage, painting and sculpture. I have watched my children become calmer and more focused while making crafts, drawing or scrapbooking.

Art therapy is psychosocial competency tool, when administered, can influence overall wellbeing to everyone who believes and practices art as a therapy.As an art therapist and counsellor, I have decoded people and problems through art. I have helped hundreds of children to overcome fears and failures, adults from stress and struggles and families from crumbling apart due to unresolved conflicts. I have witnessed transformation, growth and achievement in people when art opened a window to their subconscious.

Art therapy is intended to guide and assist overall well-being and investigate emotional states of a client. Art therapy is not a mere understanding of client; nor a set of instructions to teach art; but is a modality through which we try to analyse and heal a person by understanding his feelings and thoughts.

The purpose of this science, therefore, is to demonstrate the power of art in describing and healing the disorder of human mind; which might have been bottled-up and also hidden due to verbal barrier. People of all age, gender and race can be benefited by art therapy, as images stimulate emotions making mind and body respond to the process of art making.

In art therapy, therapy is the primary goal, and an art therapist must know who and what they are treating, and the procedure generally includes assessment and treatment. Art making heals and augments life by bringing out the thoughts and feelings while art helps one to bypass the communication barrier. Hence, though therapy is the goal, 'art' in art therapy and 'counselling' in psychotherapy respectively becomes the primary communication mode in the treatment.

There exist two distinct kinds of art therapies; 'art as therapy' and 'art psychotherapy', former believes that self-indulgence in art making for the purpose of pleasure is therapeutic by itself, whereas, the later believes in psychotherapeutic understandings, and relation between therapist and the client is apparent for healing.

Naumburg a psychologist in America started art therapy with the concept of releasing unconscious by expressing through art hence two parallel aspects of 'art as' and 'art in' therapy were instinctively developed. But most art therapists work with psychodynamic perspective, including psychoanalytic and object relations.

Naumburg around 1950's initiated art therapy courses and training seminars on graduation level in the art department for art professions. In 1973 Kramer, who extensively works on the concept of art as therapy, developed a master's of art in art therapy program and continued the trend. Hence art therapy in America was initiated and remained for a long time as a field of social science.

A Brief History of Art Therapy : For thousands of years art has been used as a tool for communication. Ithas been used as a means of group interaction, conflict resolution, diagnosis and self-expression. The therapeutic use of art has existed for centuries with a diversity that echoes the varieties of artistic experience and needs. It has been used as a symbolical vehicle to capture the inexpressible in an image. Art has endured through time as a means of healing power.

The British artist Adrian Hill coined the term art therapy in 1942. Hill, recovering from tuberculosis in a sanatorium, discovered the therapeutic benefits of drawing and painting while convalescing. He wrote that the value of art therapy lay in "completely engrossing the mind (as well as the fingers)…releasing the creative energy of the frequently inhibited patient", which enabled the patient to "build up a strong defense against his misfortunes". He suggested artistic work to his fellow patients. That began his art therapy work, which was documented in 1945 in his book, Art Versus Illness

One of the earliest recognized pioneers of art therapy in the United States is Margaret Naumberg who was born in New York City in 1882. Naumberg's primary identity was that of an educator who was next a psychotherapist and then an art therapist. She is often referred to as the founder of art therapy in the United States.

Certain intellectual and sociological developments in the late 19th and early 20th centuries fostered a climate in which Naumberg's ideas could find support. The child study movement, progressive education, more humane treatment of mental patients, the psychoanalytical theories of Freud and Jung helped set the stage for innovations to follow.

In 1915 Margaret Naumberg founded the Walden School in New York City. She believed that children thrive when they are encouraged to express themselves spontaneously through creative expressions

and find motivation to learn through the subjects that most interest them. Naumberg saw the importance of the inner life of a child as expressed through art forms as being as vital to a rich education as the pursuit of knowledge.

The seventies and eighties were formative years in the growth of art therapy as a separate profession. Primary partnerships with medicine and psychiatry resulted in jobs being created in mental health centers, medical centers, day treatment programs and substance abuse programs.

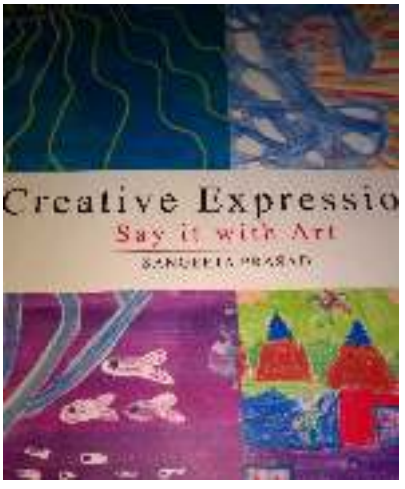
In the last decade there has been a revitalization of art therapy as an integral part of expanding social services and a new focus on the healing aspects of expressive arts. Art therapists are employed in school systems to address the needs of children with physical and learning disabilities.

Introducing Art in India : Benefits of art as life enhancing is widely accepted from time immemorial, such views exist all around the world as ancient understandings. There is a need for making Indians understand the benefits of art, which is especially useful for children who won't vent out their difficulties. Many parents do not acknowledge their child's disorder, and some feel annoyed when administrated to a psychologist, as though we are claiming the child to be mentally ill.

An epidemiological study conducted by Nimhans, Bangalore found that only about 37.5 percent of the parents were aware of their children having problem. A meta-analysis of psychiatric disorders in India concludes that the reporting system of disorders in child and adolescent are quite scarce. If such is the state of psychiatric disorders, problems in normal children like depression, and anxiety can be more neglected, ignored, or un-detected by parents, and this may lead to producing morbid society for the future. But art therapy can produce a comfortable and non-clinical atmosphere to the children and most welcoming for them to execute and produce something that describes their feelings and emotions. In India, art therapy is one where parents may not feel wrong when administrated to as against to psychiatrists, and children willingly may attend the art therapy sessions as it is more accommodating.

Only a handful of people in India are working towards art therapy, one such is renowned art therapist and authorDr. Sangeeta Prasad , her contributions to the field of art therapy and the efforts made towards bringing art therapy to India are immeasurable. Through her teachings, writings, and art therapy programs both in US and India she has worked with variety of populations.

Most welcomed latest publication is "Using Art Therapy with Diverse Populations, Crossing Cultures and Abilities", and it treatise on techniques of art therapy with distinct populations. India in its own realm of culture has lot of diversity from north to south and east to west, this within-cultural variation creates a flowery platform for art therapy with distinct population and would be great to explore. It would take many more years for art therapy to flourish here in India; in the meantime, it can be introduced as social science concept where we can understand the underpinnings of art therapy concepts theoretically. Also the concept of art as therapy can be experimented with groups of students, artists, families, and non-psychiatric patients.



Stages of Artistic Development in Children

Developmental Stage

1.Scribble (Ages 2-4)

*Disordered scribble

* Controlled scribble

Art Educational Goals

1. Development of gross and fine motor coordination
2. Introduction to the concept of colours
3. Introduction to writing skills
4. Promotion of awareness of ones surroundings
5. Promotion of interaction with outside world

Child begins to draw what it observes in the environment.

* Beginning of Human figures

* Scattered drawings

Art Educational Goals

1. Development of gross and fine motor coordination
2. Visual awareness
3. Sensory stimulation
4. Body awareness
5. Visual representation

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3.Schematic stage (Ages7-9)

* Schema of Human figures
* Sequential Drawings

Children begin to draw when they see. They form a schema (image) for particular object and repeat this image. They place these images in a pattern

Art Educational Goals

1. Visual awareness
2. Body awareness
3. Emotional involvement
4. Imaginative thinking

4.Realistic stage (Ages 9-12)

* Organized drawings
* Ability to understand abstracts
* Exhibit emotions

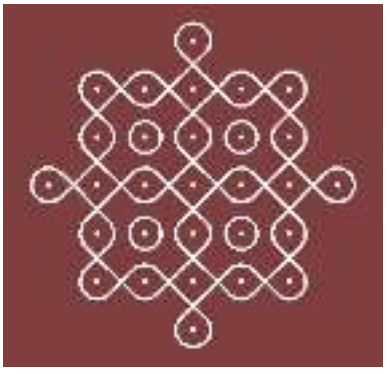
Art Educational Goals

1. Visual awareness
2. Tactile experiences
3. Cooperative ventures
4. Emotional expression
5. Body actions

Children at this stage find depicting what they see is important. They are interested in details and precision. Imagination and skill begin to come together in their art.

Art Therapy and Culture : Art as therapy can be useful in understanding and appeasing human behavior in an organizational environment, and it can affect the performance by motivating both internal and external perspectives of any individual who practices art therapy

Women in India from thousands of years have the practice of drawing geometrical patterns called Rangoli, it's not just an art, but many believe it to be a kind of stress buster, Similarly Mandala drawings are practiced in art therapy, portraying anything they wish within a circle. Carl Jung recognized this art form as "a representation of the unconscious self", hence, mandala art therapy is a source to represent and reflect one's soul.



Benefits of Art Therapy

Arts in healthcare.

In Staricoff (2004) accrued an enormous amount of 385 references from medical literature into her research report and concludes, different art form.

1.Induce physiological and psychological betterment in patients,

2. Helps fighting drug addiction,

3. Reduces the length of hospitalization,

4. Expands doctor-patient relation, improves mental healthcare,

5. Increasespractitioner's understanding of gender and cultural diversities.

Through art works adolescent's life circumstances can be understood by therapists, especially experiences which are hard and humiliating to reveal, and therapists can put in effort to safeguard the child from their difficult times.

People were psycho educated about the hazards of stress and anger management was thought through art therapy

Arts in business organizations : A study was conducted on quality of life of elderly females in a renowned company, people who had art education in early life were found with higher cognitive functions than the general female group.

Those who continued with their hobbies were found to have better quality of life and social activities with an overall positive attitude.

Thus, we can understand that, mere act of getting

involved in art making can be therapeutic, as Rubin (2005) says: "Art classes— taught by clinically sensitive teachers or art therapists—can also be therapeutic……...

Art exercises can be helpful in looking at both individual and interpersonal dynamics—as applicable to a staff group as to a family. Such workshops help employees to function more effectively in the work place, since art is a dramatic tool for clarifying interpersonal issues". Hence this aspect of art therapy can be introduced more easily than clinical art therapy where organizations can be benefited by the outcomes of art classes.

Arts in Educational organizations : Progressive educators emphasized on art benefits, that bring upon children's overall development, this development is continued in education till today

According to professor Caterall's study, students who were attending art classes and continued the hobby outside were better performers in standardized tests. Study conducted by Guggenheim museum suggests that: "Arts Education Increases Fundamental Literacy Skills in Elementary School Students" Put under test, number of possibilities children can come out with is immeasurable.

Several drawings made by children below five years, with given two circles. Their creativity represents the cognitive abilities they comprehend; we witnessed 3D face, teddy footsteps, clock and pendulum and many more that is difficult to think for a grown up. Though art is introduced in schools, the scope and importance of art needs to be increased in educational organizations.

Conclusion : Hopefully, artists, educators, psychologists, and organizations will welcome art therapy modality into their realms. Whether going to a psychologist or an art therapist, it can help your children to develop self-awareness and grow more positive insights.

Introduction to art therapy is a new avenue and less explored in India, although we have limited option; exploring with art is fun and potentially a healing one. Since painting and drawing brings out both chaotic and pleasure full feelings, maximum care should be taken to avoid experimenting with psychiatric patients; this introduction proposes only to provide free art sessions to students and working staff for motivation and empathy.

A basic knowledge of psychology is required to do any kind of experiments, hence, it is not suggested to provide directives or anything other than free art sessions to their clients, it's always better and sensible to have a psychologist along with if not an art therapist.

Both children and working class often experience anxiety threat and lacks the ability to manage stress, hence, introducing free art sessions would help the organizations by improving their individual's perspectives and coping skills. Many large organizations, like educational institutions, hospitals and companies, can develop positive relationships amongst their members and witness the impact of art therapy, which is easily accommodating. To participate in art therapy one need not be an artist, hence, just scribble and run the brushes, experience the therapeutic art that brings in deep satisfaction and understanding.

Art: A Wonderful Form of Therapy

Expressive art therapy is the use of creative arts as a form of therapy and is a fantastic field that has proven to work wonders in many people's lives. It can help someone express themselves, explore their emotions, manage addictions, and improve their self-esteem. It really helps children with developmental disabilities, however; art therapy is awesome because it can help anyone!

NATYASASTRA: INDIAN THEORIES OF DANCE AND DRAMA

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Natyasastra is a deep repository for Indian Performance studies. Attributed to Sage Baath, the authorship of the text is, arguably, dated back between BC 200 and AD 200. Written in Sanskrit, the text contains 6000 verse stanzas integrated in 36 Chapters discussing a wide range of issues in theatre arts including dramatic composition; construction of the playhouse; detailed analysis of the musical scales; body movements; various types of acting; directing; division of stage space; costumes; make-up; properties and musical instruments and so on. The aesthetic theory of rasa is central to the Natyasastra. The term is widely used in recent debates in aesthetics, philosophy, neuroscience and performance practice as a performative mode generating multiple layers of meaning and artistic experience. In the past several decades, in the theatre scholarship and practice in the West, we see the influence of the Natyasastra and rasa theory formulating several important intercultural theories and training methods. I must emphasise at this point that the anthology as a whole is an attempt to bring out the contemporary relevance of what the Natyasastra stands for and how this cultural specific 'code of practice' is equally flexible for redefinitions and reinterpretations for the demands and sake of aesthetic theories and artistic practice in recent times. The Natyasastra is millennia old, but the application of its discourse is 'universal' in many ways.

The Nātya Śāstra (Sanskrit: Nātyaśāstra) is a Sanskrit Hindutext on the performing arts.[1][2]The text is attributed to sage Bharata, and its first complete compilation is dated to between 200 BCE and 200 CE,[3][4] but estimates vary between 500 BCE and 500 CE.[5]The Natyashastra is Hindu text in the performing arts to host it, genres of acting, body movements, make up and costumes, role and goals of an art director, the musical scales, musical instruments and the integration of music with art performance. [6][7]

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The Nātya Śāstra is notable as an ancient encyclopedic treatise on the arts,[2][8] one which has influenced dance, music and literary traditions in India. [9] It is also notable for its aesthetic Rasa theory, which asserts that entertainment is a desired effect of performance arts but not the primary goal, and that the primary goal is to transport the individual in the audience into another parallel reality, full of wonder, where he experiences the essence of his own consciousness, and reflects on spiritual and moral questions.[8][10] The text has inspired secondary literature such as Sanskrit bhasya(reviews and commentaries) such as by the 10th century Abhinavagupta.[11]

THE ORIGIN OF INDIAN DANCE

The Nayta Shastra is the principal work of dramatic theory in the Sanskrit drama of classical India. It was written by the sage Bharata Muni. It is a set of precepts on the writing and performance of dance, music and theatre. While the Natyasastra primarily deals with stagecraft, it has come to influence music, dance, and literature as well. Thus, an argument can be made that the Natyasastra is the foundation of the fine arts in India.

The Natya Shastra was created in the beginning of Treta Yug by Brahma on the request of Indra and other devas as an object of diversion (Kridaniyaka). As the lower castes (Shudras) were not entitled to listen to the four Vedas (Sama, Yajur, Rig and Atharav), Brahma created the Natya Shastra as the fifth Veda which was open to all, irrespective of caste and creed.

Prior to the creation of the Natya Veda, Brahma entered a yogic trance in which he recalled the four Vedas. He drew the recitative (Paathya) from the Rig, songs (Geeta) from the Sama, histronic representation (Abhinaya) from the Yajur and sentiments (Rasa) from the Atharv.

When the Natya Veda was ready, the Gods expressed their inability to practise it, and Brahma passed it to Bharata Muni and his one hundred sons who were asked to practise it.

The dance was first seen at the Flag Festival of Indra to celebrate the victory of the Devas against the Daahavas.

Shiva learnt the Tandava (masculine) form of the dance, whereas Parvati, his consort learnt the Lasya (feminine) form.

ELEMENTS OF INDIAN DANCE

ABHINAYA: Abhinaya is common to all Classical Indian dances. Abhinaya is the expressional aspect of dance, or nritya . In contrast to this, Nritta is composed of only pure dance and will feature striking and aesthetic poses, but will have no expressional meaning and symbolism.

Abhinaya has been analysed in the Natya Shastra and has been categorised into four types . . .

Angika- or physical, using movements of every part of the body to convey meaning, with hastamudras (hand gestures), mandis (postures) and even the walk of the dancer.

Vachikabhinaya – or vocal/verbal, used formally today by members of the orchestra or supporting , non- dancing cast.

Aharyabhinaya – or external, expression , mood and background as conveyed by costume , make-up , ac-

These aspects are the four main constituents of the Natya Veda.

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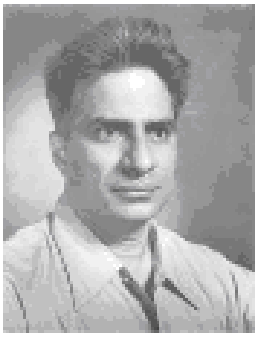
cessories and sets.

Satvikabhinaya - or psychological, shown by the eyes in particular and as a whole by the entire being of the performer, who feels the mood, the character and the emotion as emanating from the self, not as an act or practical presentation.

THE NAVARASAS : In addition , the navarasas, or nine emotions, give all dance a completeness that allows the dancer and the rasikas (audience) to experience the full beauty and meaning of the lyrics and the movements they are portrayed by. These emotions are expressed in the eyes, the face, subtle muscle shifts and the body as a whole. They are :

Hasya(happiness), krodha(anger), bhibasta(disgust), bhayanaka(fear), shoka(sorrow), veera(courage), karuna(compassion), adbhuta(wonder) and shanta(serenity)

THE ORIGIN OF DRAMA : The origin of the Indian theatre or rather folk theatre and dramatics can be traced to religious ritualism of the Vedic Aryans. This folk theatre of the misty past was mixed with dance, ritualism, plus a depiction of events from daily life. It was the last element which made it the origin of the classical theatre of later times. Many historians, notably D.D. Kosambi, Debiprasad Chattopadhyaya, Adya Rangacharaya, etc. have referred to the prevalance of ritualism amongst Aryan tribes in which some members of the tribe acted as if they were wild animals and some others were the hunters. Those who acted as animals like goats, buffaloes, reindeer, monkeys, etc. were chased by those playing the role of hunters and a mock hunt was enacted.



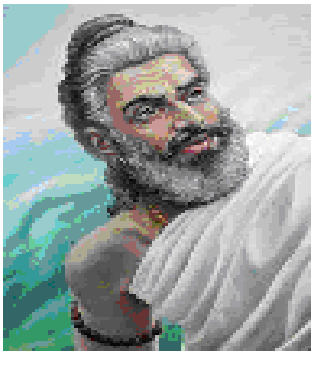
DD.Kosambi

Debiprasad Chattopadhayaya

Adya Rangacharya

In such a simple and crude manner did the theatre originate in India nearly 4000 years back in the tribal Aryans of Rig Vedic times. There also must have existed a theatrical tradition in the Indus valley cities, but of this we have no literary numismatic or any other material proof.

The origin of drama and the theatre has been told to us in an aptly dramatic manner by Bharatamuni, the author of Natyashastra an ancient Indian text on dance and drama. Bharatamuni is said to have lived around the 4th century but even he is not aware of the actual origin of the theatre in India.



Bharatamuni

He has cleverly stated in a dramatic manner that it was the lord of creation Brahma who also created the original Natyashastra (Drama). According to Bharatamuni, since the lord Brahma created the entire universe we need not question his ability in creating dramas. But Bharatamuni goes on to tell us that the original Natyashastra of Brahma was too unwieldy and obscure to be of any practical use. Hence, Bharatamuni, himself took up the task of making Natyashastra simple, intelligible and interesting.

Thus the Natyashastra of Bharatamuni was supported to be understood by lay people. So the Natyashastra of Bharatamuni is not the oldest text on dance and drama, as Bharata himself says that he has only simplified the original work of lord Brahma. The Natyashastra assumes the existence of many plays before it was composed, and says that most of the early plays did not follow the rules set down in the Natyashastra. But the Natyashastra itself seems to be the first attempt to develop the technique or rather art, of drama in a systematic manner. The Natya Shastra tells us not only what is to be portrayed in a drama, but how the portrayal is to be done.

Drama, as Bharatamuni says, is the imitation of men and their doings (loka-vritti). As men and their doings have to be respected on the stage, so drama in Sanskrit is also known by the term roopaka which means portrayal. According to the Natyashastra all the modes of expression employed by an individual viz. speech, gestures, movements and intonation must be used. The representation of these expressions can have different modes (vritti) according to the predominance and emphasis on one mode or another. Bharatamuni recognises four main modes viz., Speech and Poetry (Bharati Vritti), Dance and Music (Kaishiki Vritti), Action (Arabhatti Vritti) and Emotions (Sattvatti Vritti). Bharatamuni also specifies where and how a play is to be performed.

In ancient India plays were generally performed either in temple-yard or within palace precints. During public performances, plays were generally performed in the open. For such public performances, Bharatamuni has advocated the construction of a mandapa. According to the Natyashastra in the construction of a mandapa, pillars must be set up in four corners. With the help of these pillars a paltform is built of wooden planks. The area of the mandapa is divided into two parts. The front part, which is the back stage is called the ranga-shrishu. Behind the ranga-shirsha is what was called the nepathya-griha, where the characters dress up before entering the stage.

Bharatamuni has also specified that every play should have a Sutradhara which literally means 'holder of a string'. The Sutradhara was like the producer-director of today. Every play had to begin with an innovation of God. This invocation was called the poorvaranga. Even today, plays in Indian languages begin with a devotional song called Naandi. The Ramayana and the Mahabharata can be called the first recognised plays that originated in India. These epics also provided the inspiration to the earliest Indian dramatists and they do even today. One of the earliest Indian dramatists was Bhasa whose plays have been inspired by the Ramayana and Mahabharata. Bhasa's date cannot be definitely ascertained, but that he lived before Kalidasa is proved by the latter's reference to Bhasa as one of the early leading playwrights.

As Kalidasa lived in the 4th century, Bhasa should have lived in the early centuries of our era. Bhasa was a natural dramatist who drew heavily from the epics, but Kalidasa can be called an original playwright. Kalidasa has written many plays, some of which are;AbhijananShakuntalam, Kumarsambhavam, Meghadutam and Malavikagnimitram. Kalidasa was the court playwright at the Gupta court. He lived at Ujjaini, the capital of the Guptas and was for some days the Gupta Ambassador at the court of the Vakatakas at Amaravati where he wrote the play Meghadutam.

The next great Indian dramatist was Bhavabhuti. He is said to have written the following three plays viz. Malati-Madhava, Mahaviracharita and Uttar Ramacharita. Among these three, the last two cover between them the entire epic, Ramayana. Bhavabhuti lived around the 7th century A.D., when Sanskrit drama was on its decline, mainly due to the lack of royal patronage. The last royal patron of Sanskrit drama seems to be king Harshavardhana of the 7th century. Harshavardhana is himself credited with having written three plays viz. Ratnavali, Priyadarshika and Nagananda.

But nevertheless despite lack of patronage two more leading playwrights came after Bhavabhuti, they were Shudraka whose main play was the Mricchakatikam, and the second dramatist was Rajashekhara whose play was titled Karpuramanjari. But the decline of Sanskrit theatre is evident from the fact that while Mricchakatikam was in Sanskrit, the Karpuramanjari was in Prakrit which was a colloquial form of Sanskrit. Rajashekhara has himself said that he chose to write in Prakrit as the language was soft while Sanskrit was harsh. Sanskrit plays continued to be written upto the 17th century in distant pockets of the country, mainly in the Vijayanagara empire of the South. But they had passed their prime, the later

Sanskrit dramas are mostly imitations of Kalidasa or Bhavabhuti.

As in the case of the other fine arts, the Indian theatre has left its mark on the countries of South-east Asia. In Thailand, especially it has been a tradition from the middle ages to stage plays based on plots drawn from Indian epics. This had been so even in Cambodia where, at the ancient capital Angkor Wat, stories from the Ramayana and Mahabharata have been carved on the walls of temples and palaces. Similar, bas reliefs are found at Borobudur in Indonesia.

Thus, the Indian theatre has been one of the vehicles of enriching the culture of our neighbouring countries since ancient times.

REFERENCES

1] Ghosh, Manomohan. Natyasastra (2002), pp.1-2.

2]Emmie Te Nijenhuis (1974), pp. 3–4.

3] "Natyashastra"(PDF). Sanskrit Documents.

4]Tarla Mehta (1995), pp.5-6.

5] ML Varadpande(1990), History of Indian Theatre, Volume 1, Abhinav, pp.7.

6] Kale Pramod .The Theatric Universe: (a Study of the Natyasastra). Popular Prakashan.(1974)pp. 8-9

7] Kale Pramod .The Theatric Universe: (a Study of the Natyasastra). Popular Prakashan(1974). pp. 10-11

MUSIC AND NATYASASTRA

RACHANA S, MEDAM NAGA SHARMILA,& Patel Moodlachar H.S
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MUSIC: It is an expression of inner life, an expression of feelings through the technique of composition, according to the rules of a certain musical style. As expression, music affects the listener as well as the player. It liberates feelings , but it also demands on the part of the listener , receptiveness and an acquaintance with the style in question. This art of music was in vedic period itself in which SAMAVEDA represents the knowledge of songs or chants .Samaveda can also be said as veda of melodies and chants. There are varieties of music in india such as classical music , light classical music , folk music ,Indian pop music ,Hindustani music and carnatic music .Which has a history spanning millennia and developed over several eras. The study of music in culture is known as "ETHNOMUSICOLOGY".

NATYASASTRA: Bharata muni was an ancient Indian theatrologist and musicologist who wrote the natyasastra. It discusses a wide range of topics from issues of litreraryconstruction , to the structure of the stage to a detailed analysis of musical scales and movements and to the danceforms and its effect on the viewer . This natyasastra posits that drama originated because of the conflicts that arose in society . Basically natyasastra represents a conflict and a resolution .Which inspires the audience. The eight basic bhavas or emotions are love , pitty , anger , disgust , heroism , awe , terror and comedy . The natyasastra is considerd as the foundation of the fine arts in India. Dancing is closely related to drama . This classifies 13 positions of head , 36 of the eyes , 9 of the neck , 37 of the head and 10 of the body . Modern Indian dancers still dance according to the rules set forth in natyasastra.

1.1 Music of india : The music of India includes multiple varieties of Indian classical music, folk music, Filmi, and Indian pop. India's classical music tradition, including Hindustani music and Carnatic, has a history spanning millennia and developed over several eras. Music in India began as an integral part of socio-religious life.

1.2 Classical music : The two main traditions of Indian classical music are Carnatic music, which is found predominantly in the peninsular regions, and Hindustani music, which is found in the northern, eastern and central regions.The basic concepts of this music includes shruti(microtones), swaras (notes), alankar(ornamentations), raga (melodies improvised from basic grammars), and tala (rhythmic patterns used in percussion). Its tonal system divides the octave into 22 segments called shrutis, not all equal but each roughly equal to a quarter of a whole tone of Western music.

1.3 Hindustani music : The Hindustani music tradition diverged from Carnatic music around the 13th-14th centuries AD.[citation needed] The practice of singing based on notes was popular even from the Vedic times , Vedas are ancient religious text, were sung as Samagana and not chanted. Developing a strong and diverse tradition over several centuries, it has contemporary traditions established primarily in India but also in Pakistan and Bangladesh. In contrast to Carnatic music, the other main Indian classical music tradition originating from the South, Hindustani music was not only influenced by ancient Hindu musical traditions, historical Vedic phi-

losophy and native Indian sounds but also enriched by the Persianperformance practices of the Mughals. Classical genres are dhrupad, dhamar, khyal, tarana and sadra, and there are also several semi-classical forms.

1.4 Carnatic music : The word 'Carnaadagam' means 'old' in Tamil. As this music is from the very old days it was called carnatic music and not because of the south Indian state 'KARNATAKA'. The present form of Carnatic music is based on historical developments that can be traced to the 15th - 16th centuries AD and thereafter. It is said to have originated in the South India. Like Hindustani music, it is melodic, with improvised variations, but tends to have more fixed compositions. It consists of a composition with improvised embellishments added to the piece in the forms of Raga Alapana, Kalpanaswaram, Neraval and, in the case of more advanced students, RagamTalamPallavi (Raga, Tala, Pallavi). The main emphasis is on the vocals as most compositions are written to be sung, and even when played on instruments, they are meant to be performed in a singing style (known as gāyaki). There are about 7.2 million ragas (or scales) in Carnatic Music,[citation needed] with around 300 still in use today

1.5 Indian musical instruments : Indian musical instruments can be broadly classified according to the Hornbostel–Sachssystem into four categories: chordophones(string instruments), aerophones (wind instruments), membranophones (drums) and idiophones (non-drum percussion instruments).

1.6 Natyasastra:- The NātyaŚāstra (Sanskrit: , Nātyaśāstra) is a Sanskrit Hindu text on the performing arts. The text is attributed to sage Bharata, and its first complete compilation is dated to between 200 BCE and 200 CE, but estimates vary between 500 BCE and 500 CE.The NātyaŚāstra (Sanskrit: , Nātyaśāstra) is a Sanskrit Hindu text on the performing arts[1][2]. The text is attributed to sage Bharata, and its first complete compilation is dated to between 200 BCE and 200 CE,[3][4] but estimates vary between 500 BCE and 500 CE.The NātyaŚāstra (Sanskrit: , Nātyaśāstra) is a Sanskrit Hindu text on the performing arts. The text is attributed to sage Bharata, and its first complete compilation is dated to between 200 BCE and 200 CE, but estimates vary between 500 BCE and 500 CE.The NātyaŚāstra (Sanskrit: , Nātyaśāstra) is a Sanskrit Hindu text on the performing arts. The text is attributed to sage Bharata, and its first complete compilation is dated to between 200 BCE and 200 CE, but estimates vary between 500 BCE and 500 CE.[5] The NātyaŚāstra is notable as an ancient encyclopedic treatise on the arts, one which has influenced dance, music and literary traditions in India. It is also notable for its aesthetic Rasa theory, which asserts that entertainment is a desired effect of performance arts but not the primary goal, and that the primary goal is to transport the individual in the audience into another parallel reality, full of wonder, where he experiences the essence of his own consciousness, and reflects on spiritual and moral questions.The text has inspired secondary literature such as Sanskrit bhasya (reviews and commentaries) such as by the 10th century Abhinavagupta.[6]

2. Dance in India:- Dance in India comprises numerous styles of dances, generally classified as classical or folk. As with other aspects of Indian culture, different forms of dances originated in different parts of India, developed according to the local traditions and also imbibed elements from other parts of the country.

2.1 MAJOR FORMS :-

- Bharatanatyam
- Kathakali
- Kuchipudi

2.1.1 Bharatanatyam : Bharatanatyam is a major genre of Indian classical dance that originated in the Hindu temples of Tamil Nadu and neighboring regions. Traditionally, Bharatanatyam has been a solo dance that was performed exclusively by women, and expressed Hindu religious themes and spiritual ideas, particularly of Shaivism, but also of Vaishnavism and Shaktism.

2.1.2 Kathakali : Kathakali (katha, "story"; kali, "performance") is a highly stylized classical dance-drama form which originated from Kerala in the 17th century. This classical dance form is another "story play" genre of art, but one distinguished by its elaborately colorful make-up, costumes and face masks wearing actor-dancers, who have traditionally been all males.

2.1. 3 Kuchipudi : classical dance originated in a village of Krishna district in modern era Indian state of Andhra Pradesh It has roots in antiquity and developed as a religious art linked to traveling bards, temples and spiritual beliefs, like all major classical dances of India. In its history, the Kuchipudi dancers were all males, typically Brahmins, who would play role men and women in the story after dressing appropriatel

Reference :

[1] Katherine Young; Arvind Sharma (2004).Her Voice, Her Faith: Women Speak on World Religions. Westview Press. pp. 20–21. ISBN 978-0-8133-4666-3.

[2] Guy L. Beck (2012). Sonic Liturgy: Ritual and Mu-

sic in Hindu Tradition. University of South Carolina Press. pp. 138–139. ISBN 978-1-61117-108-2.

[3]Natalia Lidova (2014). "Natyashastra".Oxford University Press. doi:10.1093/obo/9780195399318-0071.

[4]Tarla Mehta (1995). Sanskrit Play Production in Ancient India.MotilalBanarsidass. ISBN 978-81-208-1057-0.

[5]Wallace Dace (1963). "The Concept of "Rasa" in Sanskrit Dramatic Theory". Educational Theatre Journal. 15 (3): 249. doi:10.2307/3204783.

[6]AnandaLal (2004). The Oxford Companion to Indian Theatre.Oxford University Press. ISBN 978-0-19-564446-3.

BEATBOXING

[1]SHERLYN PRIYADHARSHINI & [2]PREM VENKATRAM. R
[1]3rdsem, ECE, [2] 5thsem, ME, RLJIT, Doddaballapur-561203

Beatboxing(B boxing) is a form of vocal percussion involving the art of making drum machines by using one's mouth, lips, tongue and voice.

It may also involve vocal imitation of turntablism, and other musical instruments. Beatboxing today is connected with HIP HOP culture, often referred to as "the fifth element" of HIP HOP.

Additional influence may perhaps include forms of African traditional music in which performers utilize their bodies (clapping or stomping) as percussion instruments and produce sounds with their mouth by breathing loudly in and out, a technique used in beatboxing today.

The term "beatboxing" is derived from the mimicry of the first generation of drum machines then known as beatboxes. "Human beatboxing" in hip-hop originated in the 1980s.

Beatboxing is a form of vocal percussion primarily involving the art of mimicking drum machines using one's mouth, lips, tongue, and voice. It may also involve vocal imitation of turntablism, and other musical instruments. Beatboxing today is connected with hip-hop culture, often referred to as "the fifth element" of hip-hop.

Pre-History: The term "beatboxing" is derived from the mimicry of the first generation of drum machines,then known as beatboxes. "Human beatboxing" in hip-hop originated in the 1980s. Techniques similar to beatboxing have been present in many American musical genres since the 19th century. Additional influences may perhaps include forms of African traditional music, in which performers utilize their bodies (e.g., by clapping or stomping) as percussion instruments and produce sounds with their mouths by breathing loudly in and out, a technique used in beatboxing today.

Doug E. Fresh, the self-proclaimed first "human beatbox"

Modern Beatboxing: The Internet has played a large part in the popularity of modern beatboxing. Modern beatboxers will use their hand or another part of their body to extend the spectrum of sound effects and rhythm. Some have developed a technique that involves blowing and sucking air around their fingers to produce a very realistic record scratching noise. Today there is an increase in the variety in which we see beatboxing throughout musical culture. People have gone as far as adding beatboxing in with different instruments to create a completely different sound unlike any other. Artist Greg Patillo goes as far as adding in beatboxing while playing the flute.

World Records:

• According to the Guinness World Records, the current record for the largest human beatbox ensemble was set by Booking.com employees. The record involved 4,659 participants and was achieved by Booking.com employees together with beatboxers at the RAI Amsterdam in Amsterdam, Netherlands, on 10 December 2013 during their annual company meeting.

• The previous record for the largest human beatbox ensemble involved 1,246 participants and was achieved by VineethVincent,Christ University (India) in Bangalore, Karnataka, India, on 5 February 2011.

Vineeth Vincent of Christ University, Bangalore

Common Sounds and Imitations: Using beatboxing techniques, a skilled beat boxer has the ability to imitate many types of sounds including those of a classic drum set, turn table, electronic effects, trumpet, and electric guitar. Some of these sounds have two different iterations: one used while exhaling air while the other used while inhaling air, allowing the artist to continue practicing without having to take an actual breath.

BASIC BEATS

"B, T , Pfft, T, B, T , Pfft ,T"

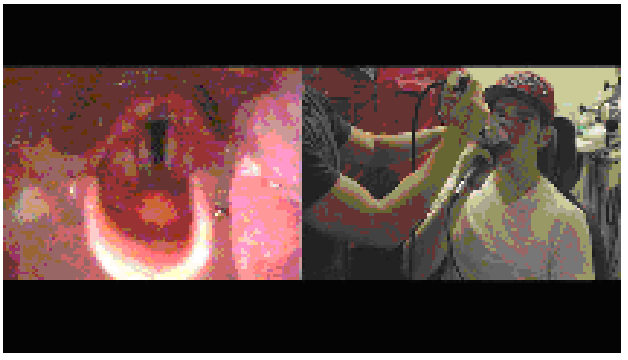
B = Bass kick
T = Hi-hat
Pfft = Snare Drums

Medical Research :

Beatboxing 'may be protective of vocal cords'

Using a flexible fiber optic endoscope, the researchers were able to see images of the vocal tracts of four male beatbox artists as they performed a variety of beatbox sounds. The endosope was threaded through the participants' noses and positioned above their vocal cords.

The researchers also used a camera to record the performances, meaning they were able to see which sounds were linked to certain vocal structures.



From this, the researchers discovered that the performers used their entire vocal tract to create a variety of sounds instead of using specific areas, meaning they were reducing their risk of injury to any certain area.

Beatbox India : Beatbox India is the first Indian website that works in the promotion of beat boxing in India. We manage,promote and cover beatbox battles across India.

Started in 2012 by a school boy Shubham Sharma from Dharamshala, Himachal Pradesh.Beatbox India (www.bbxindia.com) was launched as a blog for promoting beatbox in India, with Shubham working hard to build a reputation for the website, soon Beatbox India became a partner of www.swissbeatbox.com and was the first website to organize an online beatbox battle in India.

Later in 2014, Yashodhan Singh Rathore teamed up with Shubham Sharma for a relaunch of the website where Shubham manage all the work regarding events and contacts and Yashodhan act as the Webmaster for Beatbox India.

Conclusion: It's just a message to spread this beautiful art, where it doesn't require any instrument to play.It's just the right arrangement of vocal percussion sounds anytime anywhere.

BHARATHANATYAM-THE NATIONAL DANCE OF INDIA

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The Natyashastra is a Sanskrit Hindu text on the performing arts. The text is attributed to sage Bharata, and its first complete compilation is dated between 200 BCE and 200 CE, but estimates vary between 500 BCE to 500 CE.Natyashastra is an ancient encyclopedic art, one which has influenced on dance, music and literary traditions in India. It believed that the natyashastra is based upon much older natya sutras. Unfortunately there are no surviving copies of the natyasuthras so we have no way to know for sure. The root of the Sanskrit word Natya is Nat which means act, represent. The word shastra means precept, rules, manual, compendium, book or treatise, and is generally used as a suffix in the Indian literature context, for knowledge in a defined area of practice. It includes nine sentiments in it they are erotic, terrible, odious, comic, heroic, marvelous, pathetic, furious, peace.

"Bharatanatyam's theoretical foundations trace to the ancient Sanskrit text natyashastra". The term Bharata in Bharatanaytam, in the Hindu tradition, is not named after the famous performance art sage to whom the ancient NatyaShastra is attributed. The tradition states that the word Bharata is a mnemonic, consisting of "bha"–"ra"–"ta". The bha stands for bhava (feelings, emotions), ra stands for raga (melody, framework for musical notes), and ta stands for tala (rhythm). The term Natyam is a Sanskrit word for "dance". The compound word Bharatanatyam thus connotes a dance which harmoniously expresses "bhava, raga and tala".

Bharathanatyam is one of the most popular classical Indian dances. Bharathanatyam is more popular in south Indian states of Tamilnadu and Karnataka. Bharathanatyam dance is all most 2000years old.it is believed that bharathanatyam was revealed by lord brahma to bhrata, famous sage who then codified this sacred dance in a Sanskrit text called the natyashastra. The natyasharthra is one of the fundamental scripts[1]. It is one of the popular classical and traditional dances of India, originating from Balasaraswati which is nothing but diversification of Natya Yoga. Balasaraswati brings forth into the practice the spiritual semblance through synchronized physical and emotional body movements. Bharathanatyam has rich history of the style almost dating back to 2000 years. It is inspired from the sculptures of the ancient temple of Chidambaram.

The origin of Bharatnatyam is in Thanjavoor of Tamil Nadu[2]. The alternative name of Bharatnatyam is Daasiyattam. Earlier, Devdasis performed the natya in the ancient temple. The Devdasis were women who lived their life as dancer and worship to god by paying obeisance through their dance. The traditional form passed from the one generation of Devdasis to another, generation by generation. As the dance form entered into the royal courts, the dancers were soon begin to be called as Rajanartakis, who had the expertise to perform the royal courts. Rajanartakis slowly became the royal concubines[3]. It is dance form which makes use of the combination of bhava, raga, tala, and natya. It was not solely made for the purpose of seeking pleasure, but in fact, the fabulous dance form had an embodiment of several cosmic relationships and expressions (bhava) emanating from all the worlds. The dance form is pristine and has immense knowledge wherein most ignorant of the individuals will also learn. Bharathanatyam also emerged as the means to entertain kings and the courts by freely expressing all the moods and passions. The dance was created in the manner wherein, the mediocre, the noble as well as the mean would take on different types of forms and bring in revolutionary changes. As Nataraja (lord of dance shown in Figure1) shiva represents apocalypse and ccreation as he dances away the illusory world of maya transforming it into power and enlightenment.

Figure1: Nataraja statue.

BHARATHANATYAM HAS MYTHOLOGICAL ASSOCIATION:

"IT MUST BE REMEMBERED THAT IT WAS LORD SHIVA'S TANDAV THAT IS THE ORIGIN OF THE BHARAT NATYAM. LORD SHIVA WAS ATHLETIC, AND THE TANDAV IS A DANCE WHICH IS LIKE A FULL-FLEDGED EXERCISE ..."

Lord Brahma created Panchama, or the 5 Veda or

Natya Veda by seeping the information and references from four Vedas, namely Pathya (words) of Rigveda, Abhinaya (communicative elements of the body movements) of Yajurveda, Geetham (music and chant) of the Samaveda, and finally, the Rasam (vital sentiment and emotional elements) of Atharvaveda. Brahma later handed Natya Veda to revered holy man named Bharata to write and then spread the writings in the material world.Bharathanatyam It was known as "Daasiyattam" since performed by Devadasies in temples of Tamil Nadu long ago. The name 'Bharathanatyam' is derived from three basic concepts of Bhava, Raga and Thaala[4]. The modern Bharatanatyam was systematically regularized by well known 'Thanjavoor Brothers', Ponnayya, Chinnayya, Sivanandam and Vativelu.The dance is performed in the stage as Nritham, Nrithyam and Natyam. Bharatanatyam is based on the theories of the books 'Natyasaasthram' and 'AbhinayaDarpanam'. The dance form is based on 'Adavu' (steps) and 'Hasthamudra' (hand gestures). There are 64 basic 'Adavu' and they are divided into 9 parts, on which 'Thattadavu', 'Naatadavu', 'Kuthithumettadavu', 'Mandiadavu', 'Sarikkal' and 'Thattumettu' are very important. Communication is done through 'bhavabhinaya' (facial expression) and 'hasthamudra' (hand gestures). The performance starts with the prayers to God Ganapathi and worship of NatarajaMoorthi.

HOW BHARATHANATYAM IS PERFORMED: Every movement of Bharatanatyam dance is unique and dynamic, having its own originality. Every movement of dancer is rhythmic caused as the result of simultaneous stamping of the feet, jump, pirouettes, and positions where the knees touch the floor forming a sophisticated pattern. The main feature of Bharatanatyam is that the dancer tends to make beautiful straight lines or triangles as like geometrical angles. The dancer makes different weaves of a series. The dance form is always performed with knees of dancers bent. The artist will always make the movements of his/her body in the form of triangles. The step of the dance demands maintenance of equilibrium of body weight and lower limbs. Another special feature of Bharatanatyam is the movements of the eyes, which harmonize and emphasize the body movements. Bharatanatyam costumes for women bear close resemblance to the traditional Indian sari, but certainly it is not a single piece of cloth.The attire used in Bharatanatyam makes use of different combinations of dresses stitched with each other. This customized ethnic wear help to dancer easy to wear, and flawless steps. The special costume there many plated pieces, colorful and zari borders involved which enhance dancer's beauty. The most necessary part in Bharatanatyam costume is the pair of anklets (salangai in Tamil, ghungroo in Hindi). The anklets make rhythmic sound while dancer hit their feet at the floor. These anklets made dace audible. Dancer make up also plays crucial role to enhance the physical appeal. The dancer puts on red dye on finger tips, circle on palm and lines in feet. Applying the balanced make up will eventually make everything look more attractive.

COSTUMES: The costumes of a Bharatanatyam dancer resembles a Tamil Hindu's bridal dress. It consists of a tailor fitted brilliantly colored Sari, with a special pleated cloth stitched that falls in front and opens like a hand fan when she flexes her knees or performs footwork. The Sari is worn in a special way, wrapping the back and body contour tightly, past one shoulder and its end then held by a jewelry belt at the waist[5]. She is typically adorned with jewelry,outlining her head or hair, on ear, nose and neck. Her face has appropriate makeup; eyes lined and ringed by collyriumwhich help viewers see her eye expressions[6].To her ankles, she wraps one or more leather straps of jingling bells. Her hair is tied up in the traditional way, often braided in with fragrant flowers (veni or gajra). The fingers and feet outlines may be partially colored red with henna, a costume tradition that helps the audience more easily view her hand gestures as shown in Figure2.

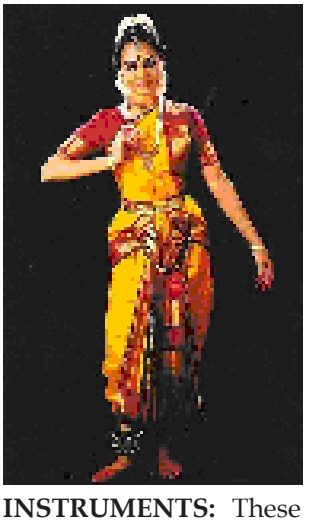

Figure2: costumes of bharathanatyam dance.

INSTRUMENTS: These include, the mridangam (drum), nagaswaram (long pipe horn made from a black wood), the flute, violin and veena (stringed instrument traditionally associated with Saraswati, the Hindu goddess of the learning). Tamil, Telugu, Kannada and Sanskrit are traditionally used in BharataNatyam.Bharatanatyam is supplied by background carnatic music style. Music is composed for dance items integrate rhythmic patterns (talas) and melodies (ragas) which would otherwise gel with

the theme of dance. The main instruments that are required are shown in Figure3.

Figure3: Instruments of Bharathanatyam

SYMBOLISH: Bharatanatyam, like all classical dances of India, is steeped in symbolism both in its abhinaya (acting) and its goals. The roots of abhinaya are found in the Natyashastra text which defines as that which aesthetically arouses joy in the spectator, through the medium of actor's art of communication, that helps connect and transport the individual into a super sensual inner state of being. A performance art, asserts Natyashastra, connects the artists and the audience through abhinaya (literally, "carrying to the spectators"), that is applying body-speech-mind and scene, wherein the actors communicate to the audience, through song and music. Drama in this ancient Sanskrit text, thus is an art to engage every aspect of life, in order to glorify and gift a state of joyful consciousness.The hand and finger movements are shown in Figure4.

Figure4: mudras of Bharathanatyam

BHARATHANATYAM ARTISTS:

1. PriyaMurali
2. SucharitaDatta
3. Ganga Thampi
4. A. Janardhanan
5. Smt. ShalyVijayan
6. RenjithBabu C.
7. The Dhananjayans
8. Parvathi Ravi Ghantasala
9. FumikaKawaharada
10. J. Suryanarayana Murthy
11. Bobby Joseph
12. RumyaShanker
13. Deepa Lakshmi
14. Lakshmi N. Pillai
15. Swarna
16. RadhaMarar
17. UmaPalamPulendran
18. GayathriSubramaniam
19. RashmiJoji John
20. Shweta Nair
21. KalaimamaniSailaja
22. SapnaPatil

IMPORTANCE: BharataNatyam is an art which consecrates the body…. The dancer, who dissolves its identity in rhythm and music, makes her body an instrument, at least for the duration of the dance, for the experience and expression of the spirit.The traditional order of BharataNatyam recital viz. alarippu, jatiswaram, varnam, padams, tillana and the shloka is the correct sequence in the practice of this art, which is an artistic Yoga, for revealing the spiritual through the corporeal.According to Mumbai-based paediatricorthopaedic and spine surgeon Dr Ashok Johari, the lateral gliding movement of the neck, commonly used in Bharatanatyam, helps treat children born with torticollis, in which the head is tilted to one side. "It is now a standard manoeuvre in physiotherapy," says DrJohari. He has made a presentation on the link between dance and therapy at the Scoliosis Research Society of

America.The dance form also has great impact on mental and emotional well-being. NaliniPrakash, a US based dance/movement therapist for instance, uses dance and movement in her work with individuals who have mental illness. "I have used elements of Bharatanatyam, like the navarasas to work with some of my patients who struggle with impulse control and anger management," she says.

MODERN REVIAL: Unfortunately over the years the visibility of Indian classical dancing has been diminishing. "One of the reasons why classical arts are not very popular is because people have stopped relating to them. People are not willing to invest time and effort into it", says dancer-proprietor RachnaSinha. Youngsters are willing to take two months training of exotic dances like salsa and rumba but 2-3 years for a "dance" seems to be unreasonable. We will compare the past of Bharatanatyam with its present, and make a guess of what is it going to be like in the future. There can be no way to predict the future without understanding the past and the present. To understand the developments, you should have a basic understanding of the 4 Yuga's. Remember: Kali Yuga officially ended just 50 years ago. Most people have lost the sense of the sacred. Spirituality and religion are no longer relevant to people's life.Since the sacred music and the dance offerings prescribed by the Shastras, such as Agama Shastra, were recently conveniently replaced by the rice and sweets offerings, we can pretend to ignore that another prescribed offering, asana, started to be conveniently interpreted as "seating of the idol". Curiously, the degraded Hindu pseudo priests, grown fat and ugly beyond all reasonable dimensions, managed to convince hundreds of millions of idiots that the changes in the SodasaUpachara rituals were…. holy. As holy as the holy McDonnalds.

CONCLUSION: Certainly! We must understand that traditional dance forms that are more than 2000 years old cannot and must not be allowed to pass into oblivion forever. True, the majority of youth today have digressed towards modern dance forms. Hence arises the need to create awareness and genuine interest in the minds of these young people, so that they are able to enjoy classical dance performances in the real sense of the term.Apparently thousands of young people are heavily into non-classical dances; but there is no dearth of real talent and latent qualities in many individuals, who will religiously carry forward the traditions in future……

REFERENCE LINKS:

1. Banerjee, tProjesh (1983). Indian Ballet Dancing. New Jersey: Abhinav Publications. p. 43.

2. Bharata-natyam Encyclopædia Britannica. 2007.

3. Williams 2004, pp. 83-84, the other major classical Indian dances are: Kathak, Kuchipudi, Odissi, Kathakali, Manipuri, Cchau, Satriya, Yaksagana and BhagavataMela.

4. Peter J. Claus; Sarah Diamond; Margaret Ann Mills (2003). South Asian Folklore: An Encyclopedia. Routledge. p. 136. ISBN 978-0-415-93919-5.

5. AnjaniArunkumar (1989). Compositions for Bharatanātyam: A Soulful Worship of the Divine. BharatiyaVidyaBhavan. pp. xxi–xxii.

6. P. K. Ravindranath (1980). Bhavam, ragam, talam, natyam: a hand-book of Indian dance. SavitaDamodaranArengetraSamiti. p. 75.

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THEME :-04

KAUTILEEYAM

Economics, Political Sciences, Management & Arthashastra

Sl No	Title of the Paper	Authors	Page No
1.	INFANTICIDE TO FEMALE FOETICIDE : MISSING WOMEN FROM PAST TO PRESENT	Dr. Meherjyoti Sangle	64 - 67
2.	THE ROLE OF CHRISTIAN INSTITUTIONS IN THE DEVELOPMENTS OF THE DALIT CHRISTIAN WOMEN IN KOLAR DISTRICT	Saritha kumari M.	67 - 73
೩.	**ಮೈಸೂರಿನ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರ ಬಿರುದು 'ರಾಜರ್ಷಿ' ಬಗ್ಗೆ ವಿವೇಚನೆ**	ಡಾ॥ ಬೆಂ.ಶಾ. ಶ್ಯಾಮಲಾ ರತ್ನಕುಮಾರಿ	೭೩ – ೭೮

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INFANTICIDE TO FEMALE FOETICIDE : MISSING WOMEN FROM PAST TO PRESENT

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Sex selection abortions - Female foeticide is one of the extreme and the worst form of violence against women. It is a social problem that is now spreading unchecked across the world. Female foeticide is not only an offence but also it is a crime that reflects the cruelty of the cold blooded mind set up of the family and ultimately of the society. Missing women term has emerged of the product and the effect of all types of discriminations of the women and girls in terms of their "the Right to Life."

In the 19th and 20th century, there were a regular practice of the infanticide in India. Female foeticide is not a new issue but the form and nature of foeticide has changed due to modern and advanced medical science and technology in 1990s.

This paper evaluates the term of missing women in reference to infanticide to female foeticide. It focuses the historical link of the social evil custom. It examines the act of foeticide crime under the medico and legal procedures.

Infanticide was the traditional custom in India. British had come to know of female

infanticide in 1789. It was continued in the 19th and 20th century. The Census Reports till 1931 and the archival data pointed out the specific regions and specific castes had the practice of Infanticide. The British identified other high-caste communities as practitioners in north, western and central areas of the country. It shows an alarmingly low ratio of female children compared to male children in Gujarat, Punjab, Rajputana (now in Rajasthan) and United Province (now in Uttar Pradesh).1 The practice of female infanticide was common among the Kutch, Kehtri, Nagar, Bengal, Miazed, Kalowries and Sindh in colonial India. It was not uncommon that parents threw a child in the Ganges river as a sacrificial offering. The castes with a much lower proportion of female children compared to males were: Lewa Patidars and the Rajputs in Gujarat the then part of Bombay Presidency; Jats, Rajputs, Khutris and Moyal Brahmins in undivided Punjab; Rajputs and Jats in Rajputana (now Rajasthan); Ahirs, Jats, Rajputs and Gujars in the United Provinces (now Uttar Pradesh).2 The causes behind the female infanticide custom had indicated the poverty, the dowry, births to unmarried women, deformed infants, famine, lack of support services and maternal illnesses such as postpartum depression.

Female Infanticide Prevention Act, 1870 : British tried to prevent but it was so deep rooted in society so that British with the help of Indian reformer and Christian missionaries sought to prevent it and Female Infanticide Act was passed in British India in March 1870,also called Act VIII of 1870. It was a legislative act passed to prevent murder of female infants. It was initially applicable to the territories of Oudh, North-Western Provinces, and Punjab. The Act authorized the Governor General to extend the law to any other district or province of the British Raj at his discretion.

The Act VIII of 1870 created a police force to maintain birth, marriage and death registers, to conduct census of the district at its discretion, enforce a special tax on the district to pay for the expenses and entertainment of said police officers.3 The Act also stipulated a prison sentence of six months or a fine of thirty thousand rupees, or both, on anyone who disobeyed or obstructed the police officers enforcing the Act.

Section 6 of the Act allowed the police officer to seize a child from any person he suspects may neglect or endanger any female child, as well as force collect a monthly fee from that person.4 After the act, patriarchal Indian society started to neglect of female infants deliberately. Therefore the alarming female Neonatal 5 mortality ratio was high among 0 to 1 years in later half of 20th century.6 Though causes of infant mortality was varies such as medical, accidental, environmental, socio-economic causes, war, medicine and biology, economic conditions, malnutrition and cultural. There are circumstances where a number of developing countries and in India to breed a culture where situations of infant mortality such as favouring male babies over female babies are the norm.7

Gender favouritism : Historically in India, males have had higher infant mortality rates than females in 19th and 20th centuries. The difference between male and female infant mortality rates have been dependent on environmental, social, cultural and economic conditions. More specifically, males are biologically more vulnerable to infections and condi-

tions associated with prematurity and development in comparison to female babies. Genetic components results in newborn females being biologically advantaged when it comes to surviving their first birthday.8 As infant mortality rates showed a decrease on a global level, the gender most affected by infant mortality changed from males experiences a biological disadvantage, to females facing a societal disadvantage. A country's ethnic composition, homogeneous versus heterogeneous explain social attitudes and cultural practices. 9

Before 1970, the reasons for male infant mortality were due to infections, and chronic degenerative diseases, poverty. However, since 1970, certain cultures emphasizing males has led to a decrease in the infant mortality gap between males and females. Also, medical advances have resulted in a growing number of male infants surviving at higher rates than females due to the initial high infant mortality rate of males. 10

The discrimination against the girl child is systematic and pervasive enough to manifest in many demographic indices for the country.

The Medical Termination of Pregnancy (MTP) Act, 1971 : Measures has taken to control mortality rate of women from illegal and or induced abortions in Independent India by introducing the Medical Termination of Pregnancy (MTP) Act, 1971. It specified for which an abortion legally perform and kind of facilities in which they can be carried out. The stipulated conditions are such that abortion performed by trained doctors and untrained dais who are not registered in facilities. They were not specifically approved for abortion services are termed illegal. While the intention is to provide women with safe, legal, timely abortion services, given the stringent nature of the Medical Termination of Pregnancy Act, many safe abortions may be classified as not legal.

Abortion can be legally availed if a pregnancy carries the risk of grave physical injury to a women, or endangers her mental health or when pregnancy result from a contraceptive failure or from rape or is likely to result in the birth of a child with physical or mental abnormalities. However, the technologies that help detect abnormalities in the unborn child can also identify the sex of the foetus at no extra cost or effort.

AMNIOCENTESIS- TECHNOLOGY MISUSED : The All India Institute of Medical Science (AIIMS), New Delhi was introduced the first method for detecting congenital deformities in a foetus in India in 1975. Methods to detect deformities in the foetus such as amniocentesis, chorion villus biopsy and now most popular and easily handled by most medical personnel ultrasound sonography by the mid 1980s. It was being largely misused to determine the sex of the foetus.11 Once the sex of the foetus has determined, if it is a female foetus, it is aborted.12 In Maharashtra, Punjab, and Haryana the sex selection tests has widely used and became extremely popular and has led to a mushrooming of private clinics which perform the tests all over the country.

Yet, National Family Health Survey-II (1998-99) found that 13 per cent of the pregnant women self reported having gone for prenatal sex determination during the last pregnancy, amounting to about 3.6 million women having access to the technology.13

MISSING WOMEN: The term "Missing Women" was first used by the Nobel Prize winner Amartya Sen in 1990s. Sen estimated there were as many as 100 million missing women. Amartya Sen, the economist observed that the demographic deficit of women affecting mainly Asia and North Africa went against biological trends.14 Therefore, Sen argued, the primary cause for unequal sex ratios is discriminatory treatment rooted the cultural preference for boys.15

The discrimination against the girl child is systematic and pervasive enough to manifest in many demographic indices for the country. In India, the 2011 Census found a worrying trend in child sex ratios with only 914 females for 1,000 males, a drop from 927 in 2001. The number of selective abortions of girls rose from 3.1 to 6 million in the 2000s. Missing women are a matter of concern in the broader South Asian region, Social Institutions and Gender Index.16 As per the Indian Census 2011 report, the sex ratio of India (females per 1000 males) is as follows: Average India sex ratio – 933, Rural sex ratio – 946, Urban sex ratio – 900, State with highest female sex ratio – Kerala – 1058, State with lowest female sex ratio – Haryana – 861. Thus, we arrive to a conclusion that female foeticide is a devil in itself.

Other estimates by United Nation Family Planning Association (2012) based on 2010 demographic surveys found that the number of missing women was even higher at 117 million.

A quarter century later, the 2014 Social Institutions and Gender Index (SIGI) findings are close to Sen.'s that over 90 million women are missing around the world. 80% of these missing women are from India and the People's Republic of China.17 The 2014 Social Institutions and Gender Index (SIGI) defines missing women as the "shortfall in the number of women in sex ratios for ages 0-4, (5-9, 10-14, 15-64, 65+) relative to the expected number if there were no sex-selective abortions, no female infanticide or

similar levels of health care and nutrition" 18

FEMALE FOETICIDE : Though historically, infanticide was practised in specific caste and communities but later in the 20th and 21st centuries, Female foeticide became a social crisis that transcends in all caste, class and communities in India. Female foeticide--the selective abortion is the elimination or the killing of the female foetus in the womb itself by misusing the advancement of medical technology in many parts of India. It is an outcome of the gradual degradation in women's position due to socio-economic and political factors.

Girls are not only faced gender discrimination in this culture, they are even denied the right to be born. Daughters are treated as a social and economic burden. Female foetuses are selectively being aborted after pre-natal sex determination, thus denying a girl's 'RIGHT TO LIFE'.

CAUSES OF FEMALE FOETICIDE : Though the root cause of the gender biased and patriarchal norms but other socio-cultural, religious and economic causes are deep rooted in the Indian society. The primary motivation for son bias can be financial. Many societies indeed consider boys as a lifelong economic resource, while girls are seen as a liability.19 People generally thought that the cost of the test and related abortion is much lower than the cost of providing dowry and other life-long presentations to a daughter after marriage. An advertise of an abortion clinic in India called parents to "Pay 50 rupees now to save 50,000 rupees later" 20

Socio-cultural factors associated with the son can be associated with higher social prestige. In the context of this, Women's right to take the decision has violated due to either pressurized by family or themselves can be under tremendous family and social pressure to give birth to a son, facing threats of violence, rejection or death if they fail to do so.21

According to Manmohan Sharma as a activists in Punjab pointed out: "women are conditioned by social norms and they do not have independent views, they tend to ditto what the husbands say or think and this is considered as proper behaviour for ideal wives-.22

Sex-selective abortions has many issues around this practice. Women, who had virtually no decision-making power to abort a female foetus, apparently accepted whatever was desired by her conjugal family, including husbands. They simply accepted and went along with the decision made for them by others.

PRE- NATAL DIAGNOSTIC TECHNIQUES [PNDT] ACT OF 1994 : In view of this, the Indian government, responding to the petition made by non- governmental organizations and women's groups, passes an act prohibiting the practice of pre-natal diagnosis of sex of the foetus. Under the Act, individual practitioners, clinics or centres cannot conduct tests to determine the sex of the foetus or inform the couples about it before the passing of the Pre- Natal Diagnostic Techniques (PNDT) Act in 1994, it was evident that clinics conducting sex determination tests had mushroomed in many towns in the states in the north- western belt. The open advertisements have now disappeared but the lucrative practice seems to flourish unabated by simply going underground as evident from the continued decline in the sex ratio of children 0-6 years of age.

FEMALE FOETICIDE- A CRIME : Female foeticide is an abuse to women and it is a crime or an offence in India. It shall be tried criminally under the Indian Penal Code section 312 IPC, 313 IPC, 314 IPC, 315 IPC, 316 IPC. few are mentioned here.

SECTION- 312 Indian Penal Code: Anyone causing miscarriage is unless done in good faith to save the life of pregnant woman is liable to imprisoned for 3 to 7 years.

Section 313 - Indian Penal Code: If the miscarriage is cased without consent of woman the person concerned is liable for imprisoned for life or 10 years.

CONCLUSION : In recent decades, there has been a threatening figure that shows decrease in the child sex ratio of (0-4 years) in India due to access to technological advances of ultra sonography and India's relatively liberal laws on abortion and misuse of the pre-natal diagnostic techniques.

Infanticide, Sex seletion-female foeticide has affected the crisis of the less number of girls compared to boys. It created the crisis of the missing women.

What is the impact or effect of missing women? Where high numbers of women are missing, there is a potential for a demographic crisis as men are unable to find female partners. This can result in social unrest, sexual violence and increased trafficking of girls and young women.23

Notes and References

1. Census of India, 1891; Census of India, Bombay Presidency including Sind, Bombay, 1882; Census of India, 1901, vol. 7, 9, 10, Times of India Press, Bombay, 1901.

2. Ibid.

3. Section 2-4 of The Unrepealed General Acts of the Governor General in Council, p. PA 166 at Google

Books on http://en.wikipedia.org/wiki/Female_Infanticide_Prevention_Act_1870 cite_ note -4.

4. Section 6 of The Unrepealed General Acts of the Governor General in Council, p. PA 166 at Google Books on http://en.wikipedia.org/wiki/Female_Infanticide_Prevention_Act_1870 cite_ note -4.

5. Neonatal death is occurred 0 to 28days often attributed to inadequate access to basic medical care, during pregnancy and after delivery. This accounts for 40–60% of infant mortality in developing countries.

6. Post neonatal mortality is the death of children aged 29 days to one year.By and large, the causes of female infant death during post natal phases are the preference of male child. so mothers did not feed to female infant and did not handle with care. See for more reference and discussion on this in Meherjyoti Sangle, "Women's Health Care and Women Physicians in the Bombay Presidency (1886-1947)" unpublished Thesis, S.N. D. T. Women's University, 2011.

7. Ibid.

8. Sangle, op. cit.

9. Fuse, K., "Gender imbalance in infant mortality: a cross-national study of social structure and female infanticide", Social Science Medicine, 62(2): 2006, p. 360-74.

10. cited Drevenstedt, G. L., "The rise and fall of excess male infant mortality", Proc. Natl. Academic Science, U. S. A., 2008, 105 (13): 5016-21 Bibcode:2008PNAS. . 105.5016D online references accessed on May, 2016.

11. Veer, Udai, Crime against Women, Anmol Publication, New Delhi, 2004, p. 219.

12. Mehta, Swati and Jayna Kothari, " It's A girl! Pre-natal sex selection and the Law", Lawyers Collective, November, 2000.

13. Ibid. Jha et. al, 2006

14. Indeed, when they receive the same care, infant boys are normally more vulnerable to mortality than girls. It has discussed in the text.

15. Amartya Sen used the phrase, 1990, 1992, "More than 100 million Women are Missing" New York Review of Books, December, 1990; Along with his academic collaborator Jean Dreze, Professor Sen proposed and popularised the concept of "missing women" - estimated to exceed 100 million round the world - which has given us a new way of understanding and mapping the problem, Frontline, vol. 18, Oct. 27 - Nov. 09, 2001; 'Missing women: Social inequality out weights women's survival advantage in Asia and North Africa, British Medical Journal, 1992, 304, pp. 587-88.

16. South Asian region, Social Institutions and Gender Index on SIGI website, Accessed on June, 2016.

17. The Organization of Economic Co-operation and Development OECD Development Centre, 2014, Accessed on June 2016.

18. Ibid.

19. Organisation for Economic Co-operation and Development, OECD, 2012, Accessed on June 2016.

20. Jones and al, 2010.

21. WHO, 2011.

22. An Activist in Punjab, 1999.

23. OECD, 2012; United Nation Family Planning Association, 2012.

THE ROLE OF CHRISTIAN INSTITUTIONS IN THE DEVELOPMENTS OF THE DALIT CHRISTIAN WOMEN IN KOLAR DISTRICT

"ಕೋಲಾರ ಜಿಲ್ಲೆಯ ದಲಿತ ಕ್ರೈಸ್ತ ಮಹಿಳೆಯರ ಬೆಳವಣಿಗೆಯಲ್ಲಿ ಕ್ರೈಸ್ತ ಸಂಘ–ಸಂಸ್ಥೆಗಳ ಪಾತ್ರ"

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During the age of Europeans enlistment the christian missionaries came to India, it major aim spirit of christianity. The Indian society formed based on caste hierarchy society because the low caste people totally affected socio-economic inferior life, this situation missionaries used for his aim. There are spread not only christianity but also enter the social welfare activities, specifically there are started in education and hospitality institutions. In this institutions admit first time to all the caste people particularly Dalit women. It's one of the turning points of Dalit Christian women socio-economical empowerment.

In 19th century many missionaries entered into Karnataka, Christianity is also one of the oldest religion of India. Though Jesus Christ established one religion strongly it split into several sects in the course of time. The Protestent have rallied together under the church of south India they were different at the time they came to Karnataka. Belonging to Basel mission, Wesley mission, Marthoma, Syrin, Episcopal Methodist and Pentecost

were the various names under which they severed in the fields of education and medicine and other spheres and contributed to the welfare of human communities in context of women in Kolar district.

It's a great role of christian institutions for the development of Dalit Christian women. In India castism is a vital role in lower class, in society economicaly, socialy they were very back because there was a famine at that time many of children lost there perents and they became orphan, some suffering from diseases and there is no shelter to live, in this critical situation many independent missionaries entered in kolar district. As same time one of England independent missionary came to India, Miss.Anstey, E.P. Raise, R.A. Hickling, Dr. Gramham, J. Kence, Rev. Hollister,Miss. F.F. Fisher, Miss. Griffin R.N, Dr. E.A. Semonds and others work for the depressed women in the society. Before Independence of India and after Independence of India the condition of the dalit women were very worrest they totally neglected in the society, many of them facing problem specialy the Dalit women no one take the care of them,socialy economicaly, literary very back.The missionaries take the care of them and they encouraged step by step. Missionaries developed awareness about Independence self economic independence through christian institution, many of them became independent, self employees. India was a branch of the women foreign missionary society. The action of the society at home in April 1870 assuming support of the orphanage and all the work among women had released energies and quickened hope for Indian redemtion. Through orphanage many girls had been rescued from starvation, child marriage, ignorence and a host of other evils had received loving care, a knowledge of christ and fitting for happy useful living.

ಪೀಠಿಕೆ:– ಭಾರತೀಯ ಸಾಮಾಜಿಕ, ಆರ್ಥಿಕ, ಶೈಕ್ಷಣಿಕ ಕ್ಷೇತ್ರದಲ್ಲಿ ಕ್ರೈಸ್ತ ಸಂಘ–ಸಂಸ್ಥೆಗಳ ಕಾರ್ಯ ವೈಖರಿಯನ್ನು ಕಡೆಗಣಿಸುವಂತಿಲ್ಲ. ಹಿಂದಿನಿಂದಲೂ ಕ್ರೈಸ್ತ ಸಂಘ–ಸಂಸ್ಥೆಗಳು ಉತ್ತಮ ಸ್ಥಾನವನ್ನು ಉಳಿಸಿಕೊಂಡು ಬಂದಿದೆ. ಹಾಗೆಯೇ ಕೋಲಾರ ಜಿಲ್ಲೆಯಲ್ಲಿಯೂ ಕ್ರೈಸ್ತ ಸಂಘ–ಸಂಸ್ಥೆಗಳ ಮೂಲಕ ಶಿಕ್ಷಣ ವಿಧಾನಗಳು ಹಾಗೂ ವೈದ್ಯಕೀಯ ಸೇವೆಗಳು ಬಹು ಸಂಖ್ಯಾತರ ಪ್ರೀತ್ಯಾಧರಗಳಿಗೆ ಕಾರಣವಾಗಿದೆ. ಕ್ಷಾಮ, ಸಾಂಕ್ರಾಮಿಕ ರೋಗ ಹಾಗೂ ಮತ್ತಿತ್ತರ ಕಾರಣಗಳಿಂದಾಗಿ ತೆಲುಗು ಮತ್ತು ತಮಿಳು ಅಸ್ಪೃಶ್ಯರು ಆರ್ಕಾಟ್, ಚಿತೂರು ಮತ್ತು ಸೇಲಂ ಕಡೆಗಳಿಂದ ಬಂದು ಕೆ.ಜಿ.ಎಫನಲ್ಲಿ ನೆಲೆಸಿದರು. ಹೀಗೆ ವಲಸೆ ಬಂದವರನ್ನು ಕ್ಯಾಥೋಲಿಕ್ ಮತ್ತು ಪ್ರಾಟೆಸ್ಟೆಂಟ್ ಮಿಷನರಿಗಳು ಅವರಿಗೆ ಆಶ್ರಯ ನೀಡಿದರು. ಸರ್ಕಾರದಿಂದಲ್ಲೂ ನೆರವನ್ನು ಪಡೆದು ಅನೇಕರಿಗೆ ಜಮೀನುಗಳನ್ನು ಹಂಚಿದರು ಹಾಗೆಯೇ ಅವರನ್ನು ಸಾಮಾಜಿಕವಾಗಿ, ಆರ್ಥಿಕವಾಗಿ ಹಾಗೂ ಧಾರ್ಮಿಕವಾಗಿ ಮುಂದುವರೆಯಲು ಪ್ರಯತ್ನಿಸಿದರು. 1795ರಲ್ಲಿ ಲಂಡನ್ ಮಿಷನ್ ಶೈಕ್ಷಣಿಕ ಸಂಸ್ಥೆಗಳು ಹಾಗೂ ವೈದ್ಯೆಕೀಯ ಕೆಲಸ ಕಾರ್ಯಗಳ ಮೂಲಕ ಪ್ರವೇಶಿಸಿ ಇಲ್ಲಿನ ಕಷ್ಟ ಜೀವನವನ್ನೇ ಸಂತೋಷದಿಂದಲ್ಲೇ ಸ್ವೀಕರಿಸಿ, ಕಡು ಬಿಸಿಲು, ದೂಳು, ಮಣ್ಣಿನ ರಸ್ತೆ, ಆಹಾರ ವ್ಯತ್ಯಾಸಗಳು, ವಾಹನ ಸೌಲಭ್ಯಗಳ ಅಭಾವ, ಜನತೆಯ ವಿರೋಧದ ನಡುವೆ ನೆಲೆಸಿ ಅಂದು ಜನರಲ್ಲಿ ಆಳವಾಗಿ ಬೇರೂರಿದ್ದ ಜೀತ ಪದ್ಧತಿ, ಜಾತಿ ಪದ್ಧತಿ, ಕಿತ್ತು ತಿನ್ನುವ ಬಡತನ, ಅನಕ್ಷರತೆ, ಮೂಢನಂಬಿಕೆಗಳು, ತಪ್ಪು ಗ್ರಹಿಕೆಗಳು ಹಾಗೂ ಮುಗ್ಧರು ಅನುಭವಿಸುತ್ತಿದ್ದ ಶೋಷಣೆ, ದೌರ್ಜನ್ಯಗಳಿಂದ ಮುಕ್ತಗೊಳಿಸುವ ಸಲುವಾಗಿ ಮಿಷನರಿಗಳು ಕೋಲಾರ ಜಿಲ್ಲೆಯ ಅನೇಕ ಭಾಗಗಳಲ್ಲಿ ನೆಲೆಸಿದರು.

ದಲಿತ ಕ್ರೈಸ್ತರು ಲಂಡನ್ ಮಿಷನರಿ ಸೊಸೈಟಿಯ ಸೇವೆಯ ಫಲದಿಂದಾಗಿ ಕ್ರೈಸ್ತರಾಗಿದ್ದರು. ಈ ಸಂಸ್ಥೆ 1810ರ ನಂತರ ಕೋಲಾರಜಿಲ್ಲೆಯನ್ನು ತನ್ನ ಕಾರ್ಯಕ್ಷೇತ್ರವನ್ನಾಗಿ ಮಾಡಿಕೊಂಡಿತು. ಜಾನ್ ಹ್ಯಾಂಡ್ಸ್ ಮೊದಲಾದ ಪುರೋಗಾಮಿಗಳಿದ್ದ ಈ ಸಂಸ್ಥೆ ಕರ್ನಾಟಕದಲ್ಲಿಯೇ ಅತ್ಯಂತ ಉತ್ತಮ ಸಂಸ್ಥೆ ಎಂಬ ಹೆಗ್ಗಳಿಕೆಗೆ ಪಾತ್ರವಾಗಿತ್ತು. ಪ್ರಾರಂಭದಲ್ಲಿ ಅನಾಥಾಶ್ರಮ ಹಾಗೂ ಶಾಲೆಯನ್ನು ಆರಂಭಿಸಿದರು. ಬಡ ಜನರು ಸಾಲದ ಬೇನೆಯಲ್ಲಿಯೇ ಸಿಕ್ಕಿ ಬೀಳುವುದನ್ನು ತಪ್ಪಿಸಲು ಲಂಡನ್ ಮಿಷನ್ ಸೊಸೈಟಿಯು ಸಹಕಾರಿ ಆರ್ಥಿಕ ಸಂಸ್ಥೆಯೊಂದನ್ನು ಪ್ರಾರಂಭಿಸಿತು. ಲಂಡನ್ ಮಿಷನನ ಪ್ರಗತಿಪರ ಸುಧಾರಣೆಗಳಿಗೆ ಇದೊಂದು ಉದಾಹರಣೆ. ಈ ಸಂಸ್ಥೆ ಜನರ ಆರ್ಥಿಕ–ಸಾಮಾಜಿಕ ಅಭಿವೃದ್ಧಿ ಕಡೆಗೆ ಗಮನಕೊಟ್ಟಿತು.

ಕ್ಯಾಥೋಲಿಕ್ ಸಭೆಯ ಮಿಷನರಿಗಳು ಕೋಲಾರ ಜಿಲ್ಲೆಯ ಅನೇಕ ಭಾಗಗಳಲ್ಲಿ ದಲಿತ ಕ್ರೈಸ್ತ ಮಹಿಳೆಯರಿಗೆ ಹಾಗೂ ಹಿಂದುಳಿದ ಜಾತಿಯ ಜನರ ಅಭಿವೃದ್ಧಿಗಾಗಿ ಅನೇಕ ಶಾಲಾ–ಕಾಲೇಜು, ಆಸ್ಪತ್ರೆ, ಮಹಿಳೆಯರಿಗಾಗಿ ಕನ್ಯಾ ಸ್ತ್ರೀಯರ ಮಠಗಳನ್ನು ಸ್ಥಾಪಿಸಿದರು. ಹಾಗೆಯೇ ಪ್ರಾಟೆಸ್ಟೆಂಟ್ ಮಿಷನರಿ ಸಂಸ್ಥೆಗಳಾದ ವೆಸ್ಲಿಯನ್ ಮಿಷನರಿ ಸೊಸೈಟಿ, ಚರ್ಚ ಆಫ್ ಇಂಗ್ಲೆಂಡ ಜಿನಾನ್ ಮಿಷನ್, ವೆಸ್ಲಿಯನ್ ಮೆಥೊಡಿಸ್ಟ್ ಮಿಷನ್, ಎಲ್.ಎಂ.ಎಸ್. ಮಿಷನ್, ಬಾಸೆಲ್ ಮಿಷನ್, ಮಾರ್ಥೋಮಾ ಹಾಗೂ ಲೂಥರನ್ ಮಿಷನ್ ಹೀಗೆ ಅನೇಕ ಪಂಗಡಗಳ ಪ್ರಾಟೆಸ್ಟೆಂಟ್ ಮಿಷನರಿಗಳು ಕರ್ನಾಟಕದ ಬಹುತ್ತೇಕ ಭಾಗಗಳಲ್ಲಿ ದಲಿತರು ಬುಡಕಟ್ಟು ಜನಾಂಗದವರು ಮತ್ತು ಹಿಂದುಳಿದ ಜಾತಿಗಳ ಜನರ ಮಧ್ಯೆ ಅನೇಕ ಜನೋಪಾಯ ಕಾರ್ಯಗಳನ್ನು ಆರಂಭಿಸಿದರು. ಕೋಲಾರದ ಸ್ಥಳಗಳಲ್ಲಿ ಪ್ರಾಟಸ್ಟೆಂಟ್ ಪಂಗಡದ ಕ್ರೈಸ್ಥರಲ್ಲಿ ಬಹು ಸಂಖ್ಯಾತರು ದಲಿತರಾಗಿದ್ದಾರೆ. ಹಿಂದುಳಿದವರು ಮತ್ತು ಮುಂದುವರಿದ ಜಾತಿಯವರು ಕ್ರಮವಾಗಿ ನಂತರದ ಸ್ಥಾನದಲ್ಲಿದ್ದಾರೆ.

1881ರಲ್ಲಿ ಚಿಕ್ಕಬಳ್ಳಪುರ ಹಾಗೂ ದೊಮ್ಮಸಂದ್ರಗಳಲ್ಲಿ ವೆಸ್ಲಿಯನ್ ಮಿಷನರಿಗಳು ನೆಲೆಸಿದ್ದರು. 1885ರಲ್ಲಿ ಮೆಥೋಡಿಸ್ಟ್ ಚರ್ಚ ಇನ್ ಸದರನ್ ಏಷ್ಯಾ ಮಿಷನ್ನವರು ಕೋಲಾರ ಜಿಲ್ಲೆಯಲ್ಲಿನ ಪರಿಶಿಷ್ಟ ಜಾತಿಯ ಜನರು ಕ್ರೈಸ್ತ ಧರ್ಮವನ್ನು ಸ್ವೀಕರಿಸಿದ್ದರು. ಹೆಚ್ಚಿನ ಜನ ಕೆಳವರ್ಗದವರಾಗಿದ್ದರಿಂದ ಶಿಕ್ಷಣಕ್ಕಿಂತ ಉದ್ಯೋಗ

ಕಡೆ ಹೆಚ್ಚು ಗಮನ ಅರಿಸಿದರು. ಆದರೂ ಸಾವಿರಾರು ವಿದ್ಯಾರ್ಥಿಗಳು ಕ್ರೈಸ್ತ ಶಿಕ್ಷಣ ಸಂಸ್ಥೆಗಳಲ್ಲಿ ಶಿಕ್ಷಿತರಾದರು. 1886ರ ಆಗಸ್ಟ–ಸೆಪ್ಟೆಂಬರ್ ತಿಂಗಳಲ್ಲಿ ಶಿಡ್ಲಘಟ್ಟದ ಕ್ರೈಸ್ತರು ಅಲ್ಲಿನ ಸಿಹಿ ನೀರಿನ ಬಾವಿಯ ನೀರನ್ನು ಬಳಸಬಾರದೆಂದು ಆ ಊರಿನ ಉನ್ನತ ವರ್ಗದವರು ತಡೆಹಾಕಿದರು. ಆಗ ನವ ಕ್ರೈಸ್ತರಾಗಿದ್ದಂತಹವರು ದಿವಾನರಿಗೆ ದೂರು ಕಳುಹಿಸಿದರು. 1893ರಲ್ಲಿ ಹಿಂದೂಗಳು ಕ್ರೈಸ್ತರಾದಾಗ ಅವರು ತಮ್ಮ ಹಳೆ ಹಕ್ಕುಗಳಿಂದ ವಂಚಿತರಾಗುವಂತಿಲ್ಲ ಎಂಬ ತೀರ್ಮ ಹೊರಡಿಸಿತು. ಹೀಗೆ ಅಂದು ಸರ್ಕಾರವು ಕ್ರೈಸ್ತ ಮಿಷನರಿಗಳು ಮಾಡುವ ಸುಧಾರಣಾ ಕೆಲಸಗಳನ್ನು ಗೌರವಿಸುತ್ತಿತ್ತು.

ಮೆಥೋಡಿಸ್ಟ್ ಚರ್ಚ ಇನ್ ಸದರನ್ ಏಷ್ಯಾ ಮಿಷನ್ 1885ರಲ್ಲಿ ಕೋಲಾರ ಜಿಲ್ಲೆಯಲ್ಲಿ ವಿಶೇಷವಾದ ಕೆಲಸವನ್ನು ಮಾಡಿದೆ. ಜಿಲ್ಲೆಯಲ್ಲಿನ ಪರಿಶಿಷ್ಟ ಜಾತಿಯ ಜನರನ್ನು ಬಹುಸಂಖ್ಯೆಯಲ್ಲಿ ಇವರು ಕ್ರೈಸ್ತ ಮತಕ್ಕೆ ಕರೆತಂದರು. ಕರ್ನಾಟಕದ ಇಡೀ ಪ್ರಾಟಸ್ಟೆಂಟ್ ಸಮಾಜದ ಅರ್ಧದಷ್ಟು ಇದ್ದರು. ಬಹುಸಂಖ್ಯಾತರಾದ ಪ್ರಾಟಸ್ಟೆಂಟರಿಗೆ ಶಾಲಾ ಕಾಲೇಜು, ಆಸ್ಪತ್ರೆಗಳನ್ನು ನಿರ್ಮಿಸಿದರು. ಇಲ್ಲಿನ ಜನ ಕೆಳವರ್ಗದವರಾದ್ದರಿಂದ ಶಿಕ್ಷಣ ಕ್ಷೇತ್ರದಲ್ಲಿ ಸ್ವಲ್ಪ ಮಟ್ಟಿಗೆ ಹಿನ್ನಡೆ ಉಂಟಾಯಿತು. ಈ ಸಂಸ್ಥೆಯಲ್ಲಿ ಹೆಚ್ಚಾಗಿ ಹಳ್ಳಿಯ ಜನರೆ ಇದುದ್ದರಿಂದ ಅವರಲ್ಲಿ ನಿಜವಾದ ಪ್ರೀತಿ, ವಿಶ್ವಾಸ, ನಂಬಿಕೆ ಎದ್ದು ಕಾಣುತ್ತಿತ್ತು. ಆರ್ಥಿಕತೆಗಿಂತ ಆತ್ಮೀಕತೆಯಲ್ಲಿ

ದಲಿತ ಕ್ರೈಸ್ತ ಮಹಿಳೆಯರ ಬೆಳವಣಿಗೆಯಲ್ಲಿ ವೈದ್ಯಕೀಯ ಸೇವೆಗಳ ಪಾತ್ರ

ಲಂಡನ್ ಮಿಷನರಿ ಸೊಸೈಟಿಯು ದಕ್ಷಿಣ ಭಾರತದಲ್ಲಿ ಅನೇಕ ಸಂಘ ಸಂಸ್ಥೆಗಳನ್ನು ಸ್ಥಾಪಿಸುವುದರ ಮೂಲಕ ಉತ್ತಮ ಸ್ಥಾನವನ್ನು ಹೊಂದಿದೆ. 1892ರಲ್ಲಿ ಜಿಲ್ಲಾ ಮಿಷನರಿಯಾಗಿ ಬಂದ ರಾಬರ್ಟ ಅಂಡರ್‌ಸನ್ ಹಿಕ್ಲಿಂಗ್ ಅವರು ಚಿಕ್ಕಬಳ್ಳಾಪುರ ಸಿ.ಎಸ್.ಐ ಮಿಷನ್ ಆಸ್ಪತ್ರೆಯ ನಿರ್ಮಾತೃ. ವೈದ್ಯಕೀಯ ಸೌಲಭ್ಯಗಳ ಕೊರತೆಯಿಂದ ಬಹಳಷ್ಟು ಮಂದಿ ಮಹಿಳೆಯರು ಮತ್ತು ಮಕ್ಕಳು ಸಾವನ್ನಪ್ಪುತ್ತಿದ್ದುದನ್ನು ಅವರು ಅಂದು ಮನಗಂಡಿದ್ದರು. ಆ ಕಾಲಘಟ್ಟದಲ್ಲಿ ಸಾಂಕ್ರಾಮಿಕ ರೋಗಗಳಾದ ಪ್ಲೇಗ್, ಕಾಲರಾ ಮತ್ತು ಮಲೇರಿಯಾ ಇತ್ಯಾದಿ ಮಾರಕ ಕಾಯಿಲೆಗಳಿಂದ ಜನತೆ ತತ್ತರಿಸಿ ಹೋಗಿದ್ದರು. ಸಮಾಜದಲ್ಲಿ ಶೂದ್ರರಿಗೆ ಯಾವುದೇ ಸ್ಥಾನಮಾನವಿಲ್ಲದ ಅವಧಿಯಲ್ಲಿ ಅವರ ಬೇನೆ ಸಂಕಷ್ಟಗಳಿಗೆ ಕಿವಿಗೂಡುವ ಎದೆಗಾರಿಕೆಯನ್ನು ಅಂದು ಗುರುತಿಸುವ ಲಕ್ಷಣಗಳು ಅತೀ ವಿರಳವಾಗಿತ್ತು. ಶೂದ್ರ ಎಂದರೆ ಸಮಾಜದಿಂದ ಹೊರಗಡೆ ಹಿಡುವ ಪ್ರಯತ್ನದಲ್ಲಿದ್ದ ಅವಧಿಯಲ್ಲಿ ಅವರ ಈ ಯಾತನೆಯನ್ನು ಕಂಡು ಮನನೊಂದ ರಾಬರ್ಟ ಹಿಕ್ಲಿಂಗ್ ತಾನು ವೃತ್ತಿಯಲ್ಲಿ ವೈದ್ಯನಲ್ಲದಿದ್ದರೂ ಜನರ ಜೀವವನ್ನು ಉಳಿಸುವ ಸಲುವಾಗಿ ಲಂಡನನಿಂದ ಔಷಧಿ ಮತ್ತು ಚಿಕಿತ್ಸಾ ಸಲಕರಣೆಗಳನ್ನು ತರಿಸಿಕೊಂಡು ವೈದ್ಯಕೀಯ ಚಿಕಿತ್ಸೆಗೆ ಮುಂದಾದರು. ಹಿಕ್ಲಿಂಗ್ ತಮ್ಮ ಪತ್ನಿಯೊಡನೆ ಮಾರಕ ರೋಗಗಳಿಂದ ಬಳಲುತ್ತಿದ್ದ ರೋಗಿಗಳ ಮನೆಗೆ ಭೇಟಿ ನೀಡಿ ಅವರಿ ಅಗತ್ಯವಾದ ಆಹಾರ, ಔಷಧಿ, ವಸ್ತ್ರಗಳನ್ನು ನೀಡುತ್ತಿದ್ದರು ಎಂದು ಅಲ್ಲಿ ದಲಿತ ಕ್ರೈಸ್ತ ಮಹಿಳೆಯಾದ ಶಾಂತಮ್ಮ ಮಾಹಿತಿ ನೀಡಿದ್ದಾರೆ.

1907ರಲ್ಲಿ ಮಿಷನರಿಗಳು ಕೋಲಾರದ ದಕ್ಷಿಣ ಭಾಗಕ್ಕೆ ಇರುವ ಸುಮಾರು 8 ಎಕ್ಕರೆ ಜಮೀನಿನಲ್ಲಿ ಒಂದು ಆಸ್ಪತ್ರೆಯನ್ನು ಕಟ್ಟಲು ನಿರ್ಧರಿಸಿದರು. ಈ ಕಟ್ಟಡವನ್ನು ಇಂಡಸ್ಟ್ರಿಯಲ್ ಶಾಲೆಯ ಗಾರೆ ಮತ್ತು ಮರಗೆಲಸದವರ ಸಹಾಯದಿಂದ ಕಟ್ಟಲಾಯಿತು. ಈ ಕಟ್ಟಡವನ್ನು ಆಗಿನ ಬಿಷಪ್ ಆಗಿದ್ದ 'ತೋಬರ್ನ ಕೋವನ್ ಮೆಮೋರಿಯಲ್ ಆಸ್ಪತ್ರೆ' ಎಂದು ನಾಮಕರಣ ಮಾಡಿ 1909 ಜುಲೈ 3ರಂದು ಬಿಷಪ್ ಜೆ.ಇ ರಾಬಿನಸನ್ ರವರು ಪ್ರತಿಷ್ಠಾಪಿಸಿದರು. ಎಂ.ಡಿ. ಲೂಯಿಸ್ ರವರು ಪ್ರಮುಖ ಮೆಲ್ವಚಾರಕರಾಗಿ ಆಸ್ಪತ್ರೆಯ ಬೆಳವಣಿಗೆಯಲ್ಲಿ ತೊಡಗಿಸಿಕೊಂಡರು. ಆಸ್ಪತ್ರೆಯ ಸೇವೆಯು ಅಂದು ಕೋಲಾರಿನ ಸುತ್ತ ಮುತ್ತಲಿನ ಶ್ರೀನಿವಾಸಪುರ, ಮುಳಬಾಗಿಲು, ಬೇತಮಂಗಲ ಬಂಗಾರಪೇಟೆ ಹಾಗೂ ಗ್ರಾಮಗಳಿಗೂ ವ್ಯಾಪಿಸಿತು. ಅನಾಥಾಲಯದಲ್ಲಿರುವ ಮಕ್ಕಳ, ನಗರದ ಬಡ ಜನಗಳ ಹಾಗೂ ಮುಖ್ಯವಾಗಿ ಹಿಂದುಳಿದ ವರ್ಗದ ಮಹಿಳೆಯರ ಚಿಕಿತ್ಸೆಗಾಗಿ ಇ.ಐ.ಸಿ.ಎಂ. ಮಿಷನ್ ಆಸ್ಪತ್ರೆಯನ್ನು ಅಂದು ಮಿಷನರಿಗಳು ಸಮಾಜಕ್ಕೆ ನೀಡಿದ ಸೇವೆಯಾಗಿತ್ತು. 1911ರಲ್ಲಿ ನರ್ಸಿಂಗ್ ಶಾಲೆಯು ಪ್ರಾರಂಭವಾಯಿತು. ಅನೇಕ ದಲಿತ ಹಣ್ಣು ಮಕ್ಕಳು ನೋಂದಾಣಿಯನ್ನು ಪಡೆದರು. ಸ್ವಲ್ಪ ಮಟ್ಟಿಗೆ ಅವರ ಆರ್ಥಿಕ ಪರಿಸ್ಥಿತಿ ಬಲಾಯಿತು ಮಿಸ್ ಬರ್ಡ, ಮಿಸ್ ಡಾರ್ಲಿಂಗ್ ಮತ್ತು ಅನೇಕರು ದಲಿತ ಕ್ರೈಸ್ತ ಮಹಿಳೆಯರ ಮೇಲೆ ಪ್ರಭಾವ ಬೀರಿದರು.

ಚಿಕ್ಕಬಳ್ಳಾಪುರದಲ್ಲಿ ಆಸ್ಪತ್ರೆಯೊಂದನ್ನು ಸ್ಥಾಪಿಸಿ ಅನೇಕ ರೀತಿಯ ಕಾಯಿಲೆ ಮತ್ತು ಇತರೆ ಅನಾರೋಗ್ಯದಿಂದ ಬಳಲುತ್ತಿರುವ ಜನರಿಗೆ ಅಗತ್ಯವಿರುವ ಚಿಕಿತ್ಸಾ ಸೌಲಭ್ಯ ಕಲ್ಪಿಸುವ ಸಲುವಾಗಿ 6ನೇ ನವೆಂಬರ್ 1909ರಲ್ಲಿ ಆಸ್ಪತ್ರೆಗಾಗಿ ಶಿಲನ್ಯಾಸವನ್ನು ನೇರವೇರಿಸಿ 1913ರ ಫೆಬ್ರವರಿ 26ರ ರಂದು 60 ಹಾಸಿಗೆಗಳನ್ನು ಹೊಂದಿರುವ ಆಸ್ಪತ್ರೆಯು ಅಂದಿನ ಕೋಲಾರ ಜಲ್ಲಾಧಿಕಾರಿಯಾಗಿದ್ದ ಪಿ. ಎಪ್. ಬೌರಿಂಗ್ ಅವರಿಂದ ಉದ್ಘಾಟಿಸಲ್ಪಟ್ಟಿತು. ಡಾ. ಓ. ವಿ. ಕ್ಯಾಂಪ್ ಬೆಲ್ ಮತ್ತು ಡಾ. ಫ್ಲೋರೆನ್ಸ್ ಕ್ಯಾಂಪ್ ಬೆಲ್ ಅವರು ಚಿಕ್ಕಬಳ್ಳಾಪುರ ಸಿ.ಎಸ್.ಐ. ಆಸ್ಪತ್ರೆಗೆ ನೇಮಕಗೊಂಡ ಸ್ಥಳೀಯ ಹೆಣ್ಣು ಮಕ್ಕಳ ಚಿಕಿತ್ಸೆಗೆ ಒಳಪಡುವಂತೆ ಮಾಡಿದರು ಅನೇಕರು ಮರಣಕರವಾದ ವ್ಯಾಧಿಯಿಂದ ಪಾರಾದರು.

ಪ್ರಥಮ ಭಾರತೀಯ ವೈದ್ಯಾಧಿಕಾರಿ ಡಾ. ಇ. ರಾಜರತ್ನಂ ನೇಮಕಗೊಂಡು ಸುತ್ತ ಮುತ್ತಲಿನ ಗ್ರಾಮಗಳಲ್ಲಿ ಪ್ರಥಮ ಚಿಕಿತ್ಸೆಗಳ ಅರಿವನ್ನು ಮೂಡಿಸುವ ಕಾರ್ಯಕ್ರಮಗಳನ್ನು ಕೈಗೊಂಡು ಅನೇಕರಲ್ಲಿದ್ದ ಮೂಡನಂಬಿಕೆಗಳನ್ನು ಹೊರಹಾಕಲು ಪ್ರಯತ್ನಿಸಿದರು. ಪ್ರಸವ ವೇದನೆಯನ್ನು ಅನುಭವಿಸುವ ಹೆಣ್ಣು ಮಕ್ಕಳು ಸಮಯಕ್ಕೆ ಸರಿಯಾಗಿ ಚಿಕಿತ್ಸೆಯನ್ನು ಹೊಂದದೆ ಮರಣ ಹೊಂದುವ ಅನೇಕರನ್ನು ಉಳಿಸುವಲ್ಲಿ ಈ ಚಿಕಿತ್ಸಾ ಘಟ್ಟಕಗಳು ಉತ್ತಮ ಕಾರ್ಯವನ್ನು ನಿರ್ವಹಿಸಲು ಸಹಕಾರಿಯಾದವು. ಡಾ. ಆರ್. ಲೆಸ್ಲಿ ರಾಬಿನ್ ಸನ್ ಹಾಗೂ ಅವರ ಧರ್ಮ ಪತ್ನಿ ಬೆಟ್ಟಿ ರಾಬಿನ್ ಸನ್ ರವರು ವೈಧ್ಯಾಧಿಕಾರಿಯಾಗಿ ನೇಮಕಗೊಂಡು ಮುಖ್ಯವಾಗಿ

ಹೆಣ್ಣು ಮಕ್ಕಳಗಾಗಿಯೇ ಹೆಚ್ಚು ಶ್ರಮವಹಿಸಿದರು. ಮೂವತ್ತು ಮೂರು ವರ್ಷಗಳ ಕಾಲ ನಿಸ್ವಾರ್ಥ ಸೇವೆ ಸಲ್ಲಿಸಿದ್ದಾರೆ. ಚಿಕ್ಕಬಳ್ಳಾಪುರದಿಂದ ಪ್ರಾರಂಭವಾದ ವೈದ್ಯಕೀಯ ಸೇವಾ ಕಾರ್ಯಗಳು ಅಂತ ಅಂತವಾಗಿ ಸುತ್ತ ಮುತ್ತಲಿನ ತಾಲ್ಲೂಕಿನ ಕೇಂದ್ರಗಳಾದ ಗೌರಿಬಿದನೂರು, ಬಾಗೇಪಲ್ಲಿ, ಶಿಡ್ಲಘಟ್ಟ, ಚಿಂತಾಮಣಿ ಹಾಗೂ ಗ್ರಾಮಗಳಗೂ ಅನೇಕ ಕ್ರೈಸ್ತ ಮಿಷನರಿ ಸಂಸ್ಥೆಗಳ ಮೂಲಕ ವ್ಯಾಪಿಸಿತು.

ದಲಿತ ಕ್ರೈಸ್ತ ಮಹಿಳೆಯರ ಬೆಳವಣಿಗೆಯಲ್ಲಿ ಶೈಕ್ಷಣಿಕ ಸಂಘ–ಸಂಸ್ಥೆಗಳ ಪಾತ್ರ; ಹೆಚ್ಚಿನ ಕ್ರೈಸ್ತ ದಲಿತರಿಗೆ ಶಿಕ್ಷಣ ಪ್ರಜ್ಞೆ ದೊರೆಯಲು ಕ್ರೈಸ್ತ ಧರ್ಮ ಸ್ವೀಕಾರವೇ ಕಾರಣವಾಗಿದೆ. ವಿದ್ಯೆ ಮತ್ತು ಕ್ರೈಸ್ತ ವಿಶ್ವಾಸ ಎನ್ನುವುದು ದಲಿತರ ಅನುಭವ ಮತ್ತು ನಂಬಿಕೆ. ಕ್ರೈಸ್ತ ದಲಿತರಲ್ಲಿ ಪ್ರತಿರೋಧ ಭಾವನೆ, ಸೆಟೆದು ನಿಲ್ಲುವ ಭಾವನೆ ಸಹ ಬಂದಿದ್ದು ಕ್ರೈಸ್ತ ನಂಬಿಕೆಯ ನೆಲೆಯಿಂದಲೇ. ಒಂದು ಜನಾಂಗದವರು ಸಾಧಿಸುವ ಪ್ರಗತಿಯನ್ನು ಆ ಜನರಿಗೆ ದೊರೆಯುತ್ತಿರುವ ಶಿಕ್ಷಣದ ಮೇಲೆ ಅವಲಂಭಿಸಿದೆ. ಶೇಕಡ 30% ರಷ್ಟು ಮಂದಿ ದಲಿತ ಕ್ರೈಸ್ತರು ಅಕ್ಷರಸ್ಥರಾಗಿದ್ದಾರೆ. ದಲಿತ ಕ್ರೈಸ್ತ ಸಮುದಾಯದ ಶಿಕ್ಷಣ ತೀರ ಕೆಳ ಮಟ್ಟದಲ್ಲಿರುತ್ತದೆ. ಅದು ಅತೀ ತೀವ್ರಗತಿಯಲ್ಲಿ ಕುಸಿಯುತ್ತಿದೆ. ಕಾರಣ ಅವರ ಬಡತನವೇ ಆಗಿದೆ.

ಕ್ರ. ಸಂ.	ಸಾಕ್ಷರರ ಸಂಖ್ಯೆ	ಕುಟುಂಬಗಳ ಸಂಖ್ಯೆ	ಶೇಕಡವಾರುಗಳಲ್ಲಿ
1.	ಒಂದು	41	39%
2.	ಎರಡು	29	27%
3.	ಮೂರು	16	15%
4.	ನಾಲ್ಕು	13	12%
5.	ಐದು	02	02%
6.	ಆರು	04	04%
7.	ಏಳು	01	01%
8.	ಒಟ್ಟು	106	100%

ದಲಿತ ಕ್ರೈಸ್ತರಲ್ಲಿ ವಿದ್ಯಾಭ್ಯಾಸದ ಮಟ್ಟ ಸಾಮಾನ್ಯವಾಗಿ ಅತೀ ನಿಕೃಷ್ಟವಾಗಿದೆ. ಅದರಲ್ಲೂ ಸ್ತ್ರೀಯರ ವಿದ್ಯಾಭ್ಯಾಸದ ಮಟ್ಟ ತೀರ ಹಿಂದುಳಿದಿದೆ. ಮಹಿಳೆಯರಿಗೆ ವಿದ್ಯಾಭ್ಯಾಸ ಪಡೆಯುವ ಅವಕಾಶ ಬಹಳ ಕಡಿಮೆ. ಶೈಕ್ಷಣಿಕ ಕ್ಷೇತ್ರದಲ್ಲಿ ಮಿಷನರಿಗಳು ಅನಾಥಾಶ್ರಮ ಹಾಗೂ ಶಾಲೆಗಳನ್ನು ಸ್ಥಾಪಿಸುವುದರ ಮೂಲಕ ಉತ್ತಮವಾದ ಕೊಡುಗೆಯನ್ನು ನೀಡಿದ್ದಾರೆ. 1886ರ ಮಾರ್ಚ ತಿಂಗಳಲ್ಲಿ ಶಿಡ್ಲಘಟ್ಟದಲ್ಲಿ ಇಂಗ್ಲೀಷ್ ಮಾಧ್ಯಮದ ಶಾಲೆಯನ್ನು ಪ್ರಾರಂಭಿಸಿದರು. ಪಂಚಮರು ತಿರಸ್ಕಾರಕ್ಕೆ ಒಳಗಾಗಿದ್ದವರ ಪರಿಸ್ಥಿತಿಗಳನ್ನು ಗಮನಿಸಿದ ಮಿಷನರಿಗಳು 1892ರ ನವೆಂಬರನಲ್ಲಿ ಪಂಚಮ ಕುಟುಂಬಗಳಿಗೆ ಸೇರಿದ ಮಕ್ಕಳಗಾಗಿಯೇ 'ಪಂಚಮ ಶಾಲೆ'ಯನ್ನು ಉದ್ಘಾಟಿಸಿದರು. 1892ರಲ್ಲಿ ಎಚ್ ಹಾಲಿಸ್ಟರ್ ದಂಪತಿಗಳು ಮೇಲ್ವಿಚಾರಕರಾಗಿ ಇಲ್ಲಿನ ಜನರ ಅಭವೃದ್ಧಿಗೋಸ್ಕರ ಒಂದು ಎಜುಕೇಷನಲ್ ಕೇಂದ್ರವನ್ನು ಸ್ಥಾಪಿಸಿದರು. ವಿದ್ಯಾರ್ಥಿಗಳು ಅರ್ಧ ದಿನವನ್ನು ಶಾಲೆಯಲ್ಲಿಯೂ ಅರ್ಧ ದಿನವನ್ನು ಇಂಡಸ್ಟ್ರಿಯಲ್ ಶಾಲೆಯಲ್ಲಿಯೂ ಕಳೆದು ತಮ್ಮ ಜ್ಞಾನ ಮತ್ತು ಉದ್ಯೋಗದ ಅನುಭವವನ್ನು ಹೆಚ್ಚಿಸಿಕೊಳ್ಳುತ್ತಿದ್ದರು. 1893ರ ಏಪ್ರಿಲ್ 5ರಂದು 'ವಿಂಟರ್ ಭಾಥಮ್ ಲೆಕ್ಚರೆ ಹಾಲ್ ನಿರ್ಮಿಸಿದರು. ನಂತರ 'ಲಂಡನ್ ಮಿಷನ್ ಪ್ರೈಮರಿ ಸ್ಕೂಲ್' ಎಂಬುದಾಗಿ ಮುಂದುವರಿಯಿತು. ಅನೇಕ ಹೆಣ್ಣು ಮಕ್ಕಳು ಶಿಕ್ಷಣ ಪಡೆಯಲು ಶಾಲೆಗೆ ಸೇರಿದರು.

1893ರಲ್ಲಿ ಎಫ್. ಮಾಸ್ಕಲ್, 1897ರಲ್ಲಿ ಎಫ್.ಎಫ್. ಫಿಷರ್ ಇಬ್ಬರು ಡಿಕೆನ್ಸ್ ಬಾಲಕಿಯರ ಶಾಲೆ, ಬೋಡಿಂಗ್ ಮತ್ತು ಹಳ್ಳಿಗಳ ಶಾಲೆಗಳ ಮೇಲ್ವಿಚಾರಣೆಯನ್ನು ವಹಿಸಿಕೊಂಡರು. 1933–34ರ ಅವಧಿಯಲ್ಲಿ ರಾಯಚೂರು, ಗುಲ್ಬರ್ಗ, ಗದಗ್, ಬೀದರ್ ಮೊದಲಾದ ಸ್ಥಳಗಳಿಂದ ಬಾಲಕಿಯರನ್ನು ಕರೆತಂದು ಸ್ಥಳೀಯ ಶಾಲೆಗಳಿಗೆ ಸೇರಿಸಿ ಶಿಕ್ಷಣ ನೀಡಿದರು. ಹೆಣ್ಣು ಮಕ್ಕಳು ವಸತಿ ಗೃಹದಲ್ಲಿದ್ದು ಪ್ರೌಢಶಾಲಾ ಶಿಕ್ಷಣವನ್ನು ಮುಗಿಸಿ ಸರ್ಕಾರಿ ಕಾಲೇಜಿನಲ್ಲಿ ಉನ್ನತ ವ್ಯಾಸಾಂಗ ಮಾಡಿದರು. 1838ರಲ್ಲಿ ಬಾಲಕರ ಶಾಲೆಯನ್ನು ಬಾಲಕಿಯರ ಸೇರಿಸಿ ಕೊ–ಎಜುಕೇಷನ್ ಶಾಲೆಯಾಗಿ ಪರಿವರ್ತಿಸಿದರು. ಹೀಗೆ ಶೈಕ್ಷಣಿಕ ಸಂಸ್ಥೆಗಳು ಸಮಸ್ಯೆ ಸಂಕಷ್ಟಗಳಲ್ಲಿಯೂ, ಏರುಪೇರುಗಳ ನಡುವೆಯೂ ಬಡವರ ಬೆಳವಣಿಗೆಗಾಗಿ ಉತ್ತಮವಾದ ಕೊಡುಗೆಗಳನ್ನು ನೀಡುತ್ತಾ ಸಾಗಿದೆ. ಕ್ರೈಸ್ತ ಮಿಷನರಿ ಸಂಘ–ಸಂಸ್ಥೆಗಳ ಮೂಲಕ ಅನೇಕ ವಿಧವಾದ ನೆರವನ್ನು ಪಡೆದ ದಲಿತ ಕ್ರೈಸ್ತ ಮಹಿಳೆಯರು ಸಮಾಜದಲ್ಲಿ ಉನ್ನತವಾದ ಸ್ಥಾನವನ್ನು ಪಡೆದ ಕೆಲವರು ದೇಶ ವಿದೇಶಗಳಲ್ಲಿ ವಿವಿಧ ಹುದ್ದೆಗಳಲ್ಲಿ ತಮ್ಮ ಕಾರ್ಯವನ್ನು ನಿರ್ವಹಿಸುತ್ತಿದ್ದಾರೆ.

ದಲಿತ ಮಹಿಳೆಯರು ದಲಿತರಲ್ಲೇ ದಲಿತರು ಎಂಬುದು ಒಂದು ಹೇಳಿಕೆ. ದಲಿತ ಕ್ರೈಸ್ತ ಸ್ತ್ರೀ ಜಾತಿ ಪದ್ಧತಿಯಿಂದಾಗಿ ಅನೇಕ ವಿಧವಾದ ಸಂಕಷ್ಟಗಳಿಗೆ ಒಳಗಾಗುತ್ತಿದ್ದರು. ಮಹಿಳೆಯರು ಲಿಂಗ ಭೇದ ದೆಸೆಯಿಂದ ಇನ್ನಷ್ಟ ದಬಾಳಿಕೆಗೆ ಒಳಗಾಗಿದ್ದಾರೆ. ಅವರು ಇಡೀ ಸಮಾಜದಿಂದ ಶೋಷಣೆಗೊಳಗಾಗುವದು ಮಾತ್ರವಲ್ಲ ತಮ್ಮ ಸ್ವಂತ ಸಮುದಾಯದವರಲ್ಲಿ ಪ್ರತೀ 1000 ಪುರುಷರಿಗೆ 968 ಸ್ತ್ರೀಯರಿದ್ದಾರೆ. ಅದರಲ್ಲೂ ಸ್ತ್ರೀಯರ ಜೀವನ ಮಟ್ಟವನ್ನು ಸ್ರಚಿಸುವ ಒಂದು ಮುಖ್ಯ ಜನಸಂಖ್ಯೆಯಲ್ಲಿ ಲಿಂಗಾನುಪಾತವಾಗಿದೆ. ಅಧ್ಯಯನಕ್ಕೊಳಪಟ್ಟ ಕ್ಷೇತ್ರದಲ್ಲಿ ಕಂಡು ಬಂದ ಈ ಅನುಪಾತವು ಅಲ್ಲಿನ ಸ್ತ್ರೀಯರು ಎದುರಿಸುವ ಕಠಿಣ ಪರಿಸ್ಥಿತಿಯನ್ನು ಸೂಚಿಸುತ್ತದೆ. ದಿನಗೂಲಿ ತುಂಬ ಕಡಿಮೆ ದೊರಕುವ ಇಲ್ಲಿನ ಸನ್ನಿವೇಶದಲ್ಲಿ ಸ್ತ್ರೀಯರಿಗೆ ದೊರಕುವ ದಿನಗೂಲಿ ಇನ್ನಷ್ಟು ಕಡಿಮೆ ಒಟ್ಟು 82% ರಷ್ಟು ಪುರುಷ ಕೃಷಿ ಕಾರ್ಮಿಕರಿಗೆ ದೊರೆಯುವ ದಿನಗೂಲಿ ರೂ. 9ರಿಂದ 12ರವರಗೆ, ಆದರೆ 86% ರಷ್ಟು ಸ್ತ್ರೀ ಕಾರ್ಮಿಕರಿಗೆ ದೊರೆಯುವ ದಿನಗೂಲಿ ರೂ. 5ರಿಂದ 8ರವರಗೆ. ತಃಖ್ತೆಯಲ್ಲಿ ತೋರಿಬರುವ ಲಿಂಗ ಭೇದವನ್ನು ಸೂಚಿಸುತ್ತದೆ. ದಿನಗೂಲಿಯ ಮಟ್ಟಿಗೆ ಎಲ್ಲಾ ದಲಿತ ಕ್ರೈಸ್ತರ ಪರಿಸ್ಥಿತಿಯೂ ಶೋಚನೀಯವಾಗಿದೆ. ಅದರಲ್ಲೂ ಸ್ತ್ರೀಯರ ಪರಿಸ್ಥಿತಿಯು ಸಹ ತೀರಾ ಶೋಚನೀಯ ಮಾತ್ರವಲ್ಲ ಪಕ್ಷಪಾತದಿಂದ ಕೂಡಿದೆ ಎಂಬುದು ಈ ಕೆಳಗಿನ ತಃಖ್ತೆಯ ಮೂಲಕ ತಿಳಿದುಕೂಳ್ಳಬಹುದು.

ದೊರೆಯುವ ದಿನಗೂಲಿ ಪುರುಷರು ಮತ್ತು ಮಹಿಳೆಯರು

ಕ್ರ..ಸಂ.	ದಿನಗೂಲಿ	ಪುರುಷರು	ಮಹಿಳೆಯರು
1.	ರೂ.5ರಿಂದ ರೂ.8	03	72
2.	ರೂ.9ರಿಂದ ರೂ.12	72	26
3.	ರೂ.13ರಿಂದ	25	12

ದಲಿತ ಕ್ರೈಸ್ತ ಮಹಿಳೆಯರ ಸಾಮಾಜಿಕ ಸ್ಥಿತಿಗತಿಗಳು : ಸಾಮಾನ್ಯವಾಗಿ ಕ್ರೈಸ್ತರ ಸಾಮಾಜಿಕ ಹಾಗೂ ಆರ್ಥಿಕ ಜೀವನ ಮಟ್ಟ ಸಾಧಾರಣ ಮಟ್ಟದಲ್ಲಿತು. ಸಾಧಾರಣವಾಗಿ ಜನಸಂಖ್ಯಾನುಸಾರವಾಗಿ ಬಲಿಷ್ಠವಾಗಿರುವ ಜಾತಿ/ಸಮುದಾಯಗಳು ಸಾಮಾಜಿಕ ಹಾಗೂ ಆರ್ಥಿಕವಾಗಿ ಪ್ರಬಲ ತಾಗಿರುವುದಿಲ್ಲ. ಈ ಪ್ರಭಲತೆ ಹೆಚ್ಚಾಗಿ ಕೆಳಮಟ್ಟದಲ್ಲಿಯೇ ಇರುತ್ತದೆ. ಹೆಚ್ಚಿನ ಹಳ್ಳಿಗಳಲ್ಲಿ ಕೆಳ ಜಾತಿಯವರು ಆಧಿಕ ಸಂಖ್ಯೆಯಲ್ಲಿದ್ದರೂ ಸಾಮಾಗಿಕವಾಗಿ ಆರ್ಥಿಕವಾಗಿ ಅವರು ಕೆಲವೇ ಹಳ್ಳಿಗಳಲ್ಲಿ ಮಾತ್ರ ಪ್ರಬಲರು. ಬೇಡರು, ಮಾದಿಗರು ಮೊದಲಾದ ಜಾತಿ ಉಪಜಾರಿಗಳನ್ನು ಒಳಗೊಂಡಿರುವ ಅಸ್ಪೃಶ್ಯರು ಸಂಖ್ಯಾ ಬಲದಿಂದ ಹೆಚ್ಚಾಗಿದ್ದರೂ ಎಲ್ಲಾ ಕಡೆಗಳಲ್ಲಿ ಅವರ ಸ್ಥಿತಿ ಬಹಳ ಶೋಚನೀಯವಾಗಿತ್ತು. ಇಂತಹ ಸ್ಥಿತಿಯಲ್ಲಿ ದಲಿತ ಕ್ರೈಸ್ತರ ಸ್ಥಿತಿಯೂ ಶೋಚನೀಯವಾಗಿತು ಎಂಬುದನ್ನು ಈ ಕೆಳಗಿನ ಅಂಶಗಳಿಂದ ತಿಳಿದುಕ್ಕೂಳ್ಳಬಹುದು.

ವಸತಿ:– ಕ್ರೈಸ್ತ ದಲಿತರಲ್ಲಿ ಶೇ 95 ರಷ್ಟು ಕುಟುಂಬದವರು ಗುಡಿಸಲುಗಳಲ್ಲಿ ವಾಸಿಸುತ್ತಿದ್ದರೆ ಉಳಿದ 5% ರಷ್ಟು ಜನರ ಮನೆಗಳು ಸಿಮೆಂಟ್ ಮತ್ತು ಹೆಂಚುಗಳನ್ನು ಹೊಂದಿತು. ದಲಿತರು ವಾಸಮಾಡುವ ಗುಡಿಸಲುಗಲು ಸಾಮಾನ್ಯವಾಗಿ ಮಣ್ಣಿನ ಗೋಡೆ, ಹುಲ್ಲು ಅಥವಾ ಮಣ್ಣು ಮತ್ತು ಮರದ ಛಾವಣಿಯನ್ನು ಹೊಂದಿರುವ ಕೇವಲ ಒಂದು ಕೋಣೆಯ ಮನೆ. ಕೋಣೆಯ ಒಂದು ಮೂಲೆಯಲ್ಲಿ ಅಡಿಗೆ ಮಾಡುವ ಸ್ಥಳವಾದರೆ ಉಳಿದ ಜಾಗ ವಾಸಕ್ಕೆ, ಮಲಗಲು ಮತ್ತು ಊಟಕ್ಕೆ ಮೀಸಲು. ಆ ಮನೆಗಳಲ್ಲಿ ದನಕರುಗಳನ್ನು ಸಹ ಕಟ್ಟಿರುತ್ತಾರೆ. ಅಲ್ಲಯೇ ಬಚ್ಚಲು ಮನೆ ಇರುತ್ತಿತ್ತು. ಬಹಿರ್ದೆಸೆಗಾಗಿ ಜನ ಹೆಚ್ಚಾಗಿ ಹೊಲಗಳಲ್ಲಿ ಹೊಗುತ್ತಿದ್ದರು. ಹೆಣ್ಣು ಮಕ್ಕಳ ಸ್ಥಿತಿ ಹೇಳತೀರದು. ಸಾಮಾನ್ಯವಾಗಿ ಹೆಣ್ಣು ಮಕ್ಕಳು ಹೆಚ್ಚಾಗಿ ಸಾಂಕ್ರಾಮಿಕ ರೋಗಗಳಿಗೆ ಒಳಗಾಗುತ್ತಿದ್ದರು. ಕ್ಷಯ ರೋಗ ಮತ್ತು ಕುರುಡುತನವು ಯಾವಾಗಲು ಅವರನ್ನು ಕಾಡುತ್ತಿತ್ತು.

ವಿದ್ಯುಚ್ಛಕ್ತಿ:– ಹೆಚ್ಚಿನ ದಲಿತ ಕ್ರೈಸ್ತರ ಗುಡಿಸಲುಗಳಲ್ಲಿ ಅವಿಭಕ್ತ ಕುಟುಂಬಗಳೇ ಹೆಚ್ಚಾಗಿದ್ದವು. ಗುಡಿಸಲುಗಳು ಸರಿ ಯಾದ ಕಿಟಕಿ ಬಾಗಿಲುಗಳನ್ನು ಹೊಂದಿರುವುದಿಲ್ಲ ಗಾಳಿ, ಬೆಳಕು, ಹೊಗೆ ಹೋಗುವ ವ್ಯೆವಸ್ಥೆಗಳು ಶೋಚನೀಯವಾಗಿರುತ್ತಿತ್ತು. ಶೇ 14% ರಷ್ಟು ದಲಿತ ಕ್ರೈಸ್ತ ಕುಟುಂಬಗಳು ಮಾತ್ರ ತಮ್ಮ ಮನೆಗಳಿಗೆ ವಿದ್ಯುಛಕ್ತಿ ಸೌಕರ್ಯವನ್ನು ಪಡೆದಿರುತ್ತವೆ.

ಸಾಮಾಜಿಕ ದಮನ:– ದಲಿತ ಕ್ರೈಸ್ತರು ತಮ್ಮ ಬಾಳನುದ್ದಕ್ಕೂ ವ್ಯಾಪಕವಾಗಿ ಶೋಷಣೆಗೆ ತುತ್ತಾಗುತ್ತಾ ಬಂದಿದ್ದಾರೆ. ಸಮಾಜಿಕ ನಿರ್ಭಂಧಗಳು ವಿವಿಧ ರೀತಿಯ ಶೋಷಣೆ, ಬಲತ್ಕಾರ, ಪಕ್ಷಪಾತ, ಕಿರುಕುಳ, ಜಾತೀಯ ದೌರ್ಜನ್ಯ ಇವುಗಳೆಲ್ಲವು ಇವರಿಗೆ ದಿನನಿತ್ಯದ ಆಹಾರ ವಿದ್ದಂತೆ. ದಲಿತ ಕ್ರೈಸ್ತರು ಒಂದು ರೀತಿಯಲ್ಲಿ ಅಪ್ರಕಟಿತ ಸಾಮಾಜಿಕ ಬಹಿಷ್ಕಾರಕ್ಕೆ ಒಳಗಾಗಿದ್ದಾರೆ. ಅನೇಕ ಸಾಮಾಜಿಕ ನಿರ್ಬಂಧಗಳಿಂದಾಗಿ ಅವರು ಮರ್ಯಾದೆಯಿಂದ ಧೈರ್ಯದಿಂದ ತಲೆಯೆತ್ತಿ ಬದುಕುವಂತಿಲ್ಲ. ಎಲ್ಲರಂತೆ ಆತ್ಮ ಗೌರವದಿಂದ ಸ್ವತಂತ್ರರಾಗಿ ಬದುಕುವ ಅವಕಾಶಗಳೇ ಇಲ್ಲದ್ದಂತ್ತಿದ್ದರು. ದಲಿತ ಕ್ರೈಸ್ತರು ಅನಧಿಕೃತವಾಗಿ ಅನೇಕ ನಿರ್ಭಂಧಗಳಿಗೆ ಒಳಗಾಗಿದ್ದರು.

ಹೋಟೆಲುಗಳಿಗೆ ಪ್ರವೇಶ ನಿರಾಕರಣೆ:– ಉಪಹಾರ ಗೃಹಗಳಿಗೆ ಪ್ರವೇಶ ಮಾಡಲು ಅನುಮತಿ ನಿರಾಕರಿಸುವುದು ಈ ದೇಶದ ಕಾನೂನಿಗೆ ವಿರುದ್ಧ ಹಾಗೂ ಅದೊಂದು ಶಿಕ್ಷಾರ್ಹ ಅಪರಾಧವು ಸಹ. ದಲಿತ ಕ್ರೈಸ್ತರಿಗೆ ಉಪಹಾರ ಗೃಹಗಳಿಗೆ ಪ್ರವೇಶ ಮಾಡಲು ಅನುಮತಿ ನೀಡಲು ಮಾಲೀಕರುಗಳಿಗೆ ಮನಸ್ಸಿಲ್ಲವಾದರೂ ತಮಗೆ ಆಗುವ ವ್ಯಾಪಾರವನ್ನು ಮಾತ್ರ ಸ್ವಲ್ಪವು ಕಳೆದು ಕೊಳ್ಳಲು ಅವರು ಸಿದ್ಧರಿಲ್ಲ. ಇದಕ್ಕಾಗಿ ಚಹದಂಗಡಿಯ ಹೊರ ಬದಿಯ ಒಂದು ಮೂಲೆಯಲ್ಲಿ ಕೆಲವು ಅಲ್ಯುಮಿನಿಯಮ್ ಲೋಟಗಳನ್ನು ಇವರಿಗಾಗಿ ಇಟ್ಟಿರುತ್ತಾರೆ. ಇಲ್ಲಿಯೂ ಸಹಾ ದಲಿತರು ದೂರ ನಿಂತಿರಬೇಕು. ಅಷ್ಟೇ ಅಲ್ಲ ಅವರು ಉಪಯೋಗಿಸುವ ಅಲ್ಯುಮಿನಿಯಮ್ ಲೋಟವನ್ನು ಸಹಾ ಅವರು ನೇರವಾಗಿ ಮುಟ್ಟುವಂತಿಲ್ಲ. ಅಲ್ಲಿ ಬರಯವ ದಲಿತ ಗಿರಾಕಿಯು ಆ ಲೋಟವನ್ನು ಹಿಡಿದಿಕೊಂಡು ಅಂಗಡಿಯ ಹೊರಗೆ ನಿಲ್ಲಬೇಕು. ಕಾಫಿ ಅಥವಾ ಚಹಾವನ್ನು ಸುರಿಯುತ್ತಾರೆ. ಚಹಾ ಕುಡಿದ ಬಳಿಕ ಆತ ಆ ಲೋಟವನ್ನು ತೊಳೆದು ಅಂಗಡಿಯ ಹೊರಗಿನ ಮೊಲೆಯಲ್ಲಿ ಇಡಬೇಕು. ಇಂತಹ ಕಠಿಣ ಪರಿಸ್ಥಿತಿಯನ್ನು ನಗರಗಳಲ್ಲಿ ಕಾಣಲು ಸಾಧ್ಯವಿಲ್ಲ, ಆದರೆ ಕೆಲವು ಹಳ್ಳಿಗಳು ಇಂತಹ ಪರಿಸ್ಥಿತಿಯಿಂದ ಇನ್ನು ಮುಕ್ತವಾಗಿಲ್ಲ.

ಇಂತಹ ಪರಿಸ್ಥಿತಿಗೆ ಕಾರಣವನ್ನು ಹುಡುಕುವಾಗ ಬಡತನ ಪ್ರಮುಖವಾಗಿರುತ್ತದೆ. ಬಡತನಕ್ಕೆ ಹೆಚ್ಚಾಗಿ ಬಲಿಯಾಗುವವರು ಹೆಣ್ಣು ಮಕ್ಕಳು, ಹೆಣ್ಣು ಮಕ್ಕಳಿಗೆ ವಿದ್ಯಾಭ್ಯಾಸವು ಅಗತ್ಯವಿಲ್ಲ, ವಿದ್ಯಾಭ್ಯಾಸ ಕೊಟ್ಟರೆ ವರದಕ್ಷಿಣೆ ಸಮಸ್ಯೆ ಉಂಟಾಗುತ್ತದೆ, ಮದುವೆಯ ನಂತರ ಗಂಡನ ಮನೆಗೆ ಹೋಗುವುದರಿಂದ ವಿದ್ಯಾಭ್ಯಾಸ ಅಗತ್ಯವಿಲ್ಲ, ಅವರ ವಿದ್ಯಾಭ್ಯಾಸದಲ್ಲ ನಮಗೆ ಆಸಕ್ತಿಯಿಲ್ಲ, ಹುಡುಗಿಯರು ಮನೆಯಲ್ಲಿಯೇ ಕೆಲಸ ಮಾಡಬೇಕು.

ಕರ್ನಾಟಕದ 36% ದಲಿತ ಕ್ರೈಸ್ತರು ಹೆಣ್ಣು ಮಕ್ಕಳ ವಿದ್ಯಾಭ್ಯಾಸಕ್ಕೆ ಪರಂಪರಾಗತ ಕಾರಣ ನೀಡಿ ಅಸಡ್ಡೆ ವ್ಯಕ್ತಪಡಿಸಿದ್ದಾರೆ. ದಲಿತ ಕ್ರೈಸ್ತರಲ್ಲಿ ಶೇ4% ಮಂದಿ ಜಾತಿ ಭೇದವು ಮಹಿಳೆಯರ ನಿರಕ್ಷರತೆಗೆ ಕಾರಣವೆಂದು ಹಾಗೂ ಕಲಿಯಲು ಯಾವ ಉತೇಜನವೂ ದೊರೆಯದಂಥಾ ಶಾಲಾ ಪರಿಸರದಲ್ಲ, ಜಾರಿ ಭೇದವೂ ಇದ್ದರೆ, ದಲಿತ ಕ್ರೈಸ್ತ ಮಕ್ಕಳಲ್ಲಿ ವಿದ್ಯಾಭ್ಯಾಸದ ಆಸಕ್ತಿಯೇ ಕುಂದಿಹೋಗುತ್ತದೆ.

ದಲಿತ ಕ್ರೈಸ್ತರಲ್ಲಿ ಅಪ್ರಾಪ್ತ ವಯಸ್ಸಿನಲ್ಲಿ ವಿವಾಹ ಮಾಡುತ್ತಿದ್ದರು.

ಇಂತಹ ವಿವಾಹವನ್ನು ತಡೆಯಲು ಕ್ರೈಸ್ತ ಸಭೆಗಳು ಪ್ರಯತ್ನಿಸುತ್ತಿದ್ದರು. ದಲಿತ ಕ್ರೈಸ್ತರ ಪ್ರಕಾರ ವೃತುಮತಿಯಾದ ಹೆಣ್ಣು ಮಗಳಿಗೆ ಬೇಗನೆ ವಿವಾಹ ಮಾಡುತ್ತಿದ್ದರು. ಅವರು ದಾರಿ ತಪ್ಪದಂತೆ ಕಾಪಾಡಲು, ಬಲತ್ಕಾರಗಳಂದ ತಪ್ಪಿಸಲು, ಒಂದು ಪದ್ಧತಿ ಎಂದೂ, ಹೊಲದಲ್ಲಿ ದುಡಿಯುವಾಗ ಗಂಡು ಮಕ್ಕಳು ಇರುತ್ತಾರೆಂದು, ಹುಡುಗನ ಮನೆಯವರು ಕೇಳುತ್ತಿದ್ದಾರೆಂದು, ಒಳ್ಳೆಯ ಸಂಬಂಧ ಒದಗಿ ಬಂದಿದೆ ಎಂದೂ, ಆರ್ಥಿಕ ದುಸ್ಥಿತಿ ಹೀಗೆ ಅನೇಕ ಕಾರಣಗಳಂದ ದಲಿತ ಕ್ರೈಸ್ತರು ಅಪ್ರಾಪ್ತ ವಯಸ್ಸಿನಲ್ಲಿ ವಿವಾಹ ಮಾಡುತ್ತಿದ್ದರು. ಆದರೆ ಹೀಗ ಇಂತಹ ವಿವಾಹಗಳು ಗುಪ್ತವಾಗಿ ಅಲ್ಲಲ್ಲಿ ನಡೆಯುತ್ತಿದೆ.

ಅಪ್ರಾಪ್ತ ವಯಸ್ಸಿನಲ್ಲಿ ವಿವಾಹವಾದ ಹೆಣ್ಣು ಮಕ್ಕಳು ನಾನಾ ವಿವಿಧವಾದ ರೋಗಗಳಿಗೆ ಬಲಿಯಾಗಿದ್ದಾರೆ. ಅಸ್ತಮಾ, ಕ್ಷಯ, ಕ್ಯಾನ್ಸರ್,ರಕ್ತಸ್ರಾವಹೀಗೆಅನೇಕರೋಗಗಳಿಗೆಒಳಗಾಗುತ್ತಿದ್ದರು. ಹಳ್ಳಿಗಳಲ್ಲಿರು ಆರೋಗ್ಯ ಕೇಂದ್ರಗಳು ಉತ್ತಮವಾದ ಚಿಕಿತ್ಸೆಯನ್ನು ಕೊಡಲು ವಿಫಲವಾಗಿವೆ. ಅವರಲ್ಲಿರುವ ಮೂಡನಂಬಿಕೆಗಳಂದಾಗಿ ಮಾಟಮಂತ್ರಗಳಗೂಳಗಾಗಿ ತಮ್ಮ ಪ್ರಾಣವನ್ನೇ ಕಳೆದುಕೊಳ್ಳುತ್ತಿದ್ದರು. ಸರ್ಕಾರದಿಂದ ಸಿಗುವ ಗರ್ಭನಿರೋಧಕಗಳಾದ ಟ್ಯೂಬೆಕ್ಟಮಿ, ಲ್ಯಾಪ್ರಸ್ಕೊಪಿ ಮತ್ತು ವಾಸೆಕ್ಟಮಿಗಳನ್ನು ಕೆಲವರು ಉಪಯೋಗಿಸಿಕೊಂಡಿದ್ದಾರೆ ಆದರೆ ಕೆಲವರಿಗೆ ಅದರ ಅರಿವು ಇಲ್ಲದೆ ಅನೇಕ ರೋಗ ರುಜಿನೆಗಳಿಗೆ ಒಳಗಾಗಿದ್ದಾರೆ. ಗಂಡು ಸಂತಾನವನ್ನು ಪಡೆಯುವ ದೃಷ್ಟಿಯಿಂದ ಅನೇಕರು ಗರ್ಭನಿರೋಧಕಗಳನ್ನು ಬಳಸಿಕೊಂಡಿಲ್ಲ ಎಂಬ ಹೇಳಿಕೆಗಳನ್ನು ನೀಡಿದ್ದಾರೆ. ಇಂತಹ ಪರಿಸ್ಥಿತಿ ಕೆಳ ವರ್ಗಕ್ಕೆ ಮಾತ್ರ ಸೀಮಿತವಾಗಿರದೆ ಎಲ್ಲಾ ವರ್ಗಗಳ ಸಮಸ್ಯೆಯಾಗಿದೆ.

ಕ್ರೈಸ್ತ ಮಿಷನರಿ ಸಂಘ–ಸಂಸ್ಥೆಗಳ ಮೂಲಕ ಕೋಲಾರ ಜಿಲ್ಲೆಯನ್ನು ಪ್ರವೇಶ ಮಾಡಿದ ಅನೇಕ ಮಿಷನರಿಗಳು ಕೋಲಾರ ಜಿಲ್ಲೆಯ ಬೆಳವಣಿಗೆಯಲ್ಲಿ ಪ್ರಮುಖ ಪಾತ್ರ ವಹಿಸಿದ್ದಾರೆ. ಬರಗಾಲದ ಅವಧಿಯಲ್ಲಿ ಜನತೆ ಅಗತ್ಯ ವಸ್ತುಗಳಗಾಗಿ ತತ್ತ–ರಿಸುವಾಗ ಅವರಿ ಗಂಜಿ ಕೇಂದ್ರಗಳ ಮೂಲಕ ಅನೇಕರನ್ನು ಸಾವಿನಿಂದ ಪಾರುಮಾಡಿದರು ಹಾಗೆಯೇ ಬರಗಾಲದಿಂದ ತಂದೆ ತಾಯಿಗಳನ್ನು ಕಳೆದು ಕೊಂಡ ಮಕ್ಕಳಗಾಗಿ ಅನಾಥ-ಾಲಯವನ್ನು ಆನೆಸ್ಟಿಯವರು ನಿರ್ಮಿಸಿದರು. ಹೆಣ್ಣು ಮಕ್ಕಳು ಹಾಗೂ ಗಂಡು ಮಕ್ಕಳು ನೆರವನ್ನು ಪಡೆದರು. ಅನಾಥಾ ಮಕ್ಕಳಗಾಗಿ ಕೋಲಾರ ಹಾಗೂ ಸುತ್ತಮುತ್ತಲಿನ ತಾಲ್ಲೂಕುಗಳಲ್ಲಿ ಶಾಲೆಗಳನ್ನು ಪ್ರಾರಂಭಿಸಿದರು ಇದರಿಂದ ಅನೇಕರು ಶಿಕ್ಷಿತರಾದರು.

ಕೋಲಾರಿನ ಹಾಗೂ ಸುತ್ತಮುತ್ತಲಿನ ಜನತೆಯು ಅನೇಕ ವಿಧವಾದ ಅನಾರೋಗ್ಯಕ್ಕೆ ಒಳಗಾಗಿ ಸಾವನ್ನಪ್ಪುತ್ತಿದ್ದರು, ಮುಖ್ಯವಾಗಿ ಮಹಿಳೆಯರು ತಮ್ಮ ಪ್ರಸವದ ವೇಳೆಯಲ್ಲಿ ಅನೇಕರು ಮರಣವನ್ನು ಹೊಂದುತ್ತಿದ್ದರು, ಇವುಗಳಂದ ಜನರನ್ನು ಉಳಸುವ ಸಲುವಾಗಿ ಮಿಷನರಿಗಳು 'ಇ.ಟಿ.ಸಿ. ಎಂ ಮಿಷನ್' ಆಸ್ಪತ್ರೆಯನ್ನು ಕೋಲಾರಿನ ಸುತ್ತಮುತ್ತಲ್ಲಿನ ತಾಲ್ಲೂಕು ಹಾಗೂ ಗ್ರಾಮಗಳ ಜನತೆಗಾಗಿ ನಿರ್ಮಿಸಿದರು. ಬಂಗಾರಪೇಟೆಯಲ್ಲಿ ಸ್ಥಾಪಿಸಲ್ಪಟ್ಟ 'ಟ್ಯಾಬಲೆಟ್ಇಂ–ಡಸಸ್ತ್ರಿ'ಯೂ ಕೋಲಾರ ಜಿಲ್ಲೆಯ ಜನತೆಗೆ ಮಾತ್ರ ಔಷಧಿಗಳ ಬಳಕೆಯಾಗದೆ ಇಡೀ ದಕ್ಷಿಣ ಭಾರತದ ಜನತೆಯ ಬಳಕೆಯ ಕೇಂದ್ರವಾಗಿ ಕಾರ್ಯನಿರ್ವಹಿಸಿತು. ಹೆಣ್ಣು ಮಕ್ಕಳಗಾಗಿ ಸ್ಥಾಪಿಸಲ್ಪಟ್ಟ ನರ್ಸಿಂಗ್ ಶಾಲೆಯಿಂದ ಅನೇಕ ಹೆಣ್ಣು ಮಕ್ಕಳು ನರ್ಸಿಂಗ್ ಶಾಲೆಯಲ್ಲಿ ತರಬೇತಿಯನ್ನು ಪಡೆದು ಇನ್ನಿತರೆ ಆಸ್ಪತ್ರೆಗಳಲ್ಲಿ ದಾದಿಗಳಾಗಿ ಸಮಾಜದ ಉಳತಿಗಾಗಿ ದುಡಿದು ಆರ್ಥಿಕ ಸ್ವಾವಲಂಬನೆಯನ್ನು ಸಾಧಿಸಿದ್ದಾರೆ. ನರ್ಸಿಂಗ್ ಶಾಲೆ ಮೂಲಕ ಪ್ರಾರಂಭವಾದದ್ದು ಇಂದು ಅನೇಕ ವಿಭಾಗಗಳನ್ನು ಒಳಗೊಂಡ ಒಂದು ಪ್ರತಿಷ್ಟಿತ ವೈದ್ಯಕೀಯ ಸಂಸ್ಥೆಯಾಗಿ ಜಿಲ್ಲೆಯಲ್ಲಿ ಇಂದಿಗೂ ಉತ್ತಮವಾದ ಕಾರ್ಯವನ್ನು ನಿರ್ವಹಿಸುತ್ತಿದೆ.

ಇವುಗಳ ಜೊತೆಗೆ ಕುಶಲ ಕೈಗಾರಿಕೆಗಳಾದ ಮರಗೆಲಸ, ಹೊಲಿಯುವ ಕೆಲಸ, ಬೆತ್ತದ ಕೆಲಸಗಳು ಮಾತ್ರವಲ್ಲದೆ, ಗಾರೆ ಕೆಲಸ, ಇಟ್ಟಿಗೆ ಕೆಲಸ, ಸೌದೆ ಕಡಿಯುವುದು, ತೋಟದ ಕೆಲಸದಲ್ಲಿ ಮಕ್ಕಳಿಗೆ ತರಬೇತಿ ನೀಡುವುದು. ಕೋಲಾರ ಜಿಲ್ಲೆಯಲ್ಲಿ ಪ್ರಾಟೆಸ್ಟಂಟ್, ಕ್ಯಾಥೋಲಿಕ್ ಸಭೆಗಳ ಮೂಲಕ ಪ್ರಾರಂಭವಾದದ್ದು ಇಂದು ಮೂವತ್ತು ಮೂರು ಸಭಗಳಾಗಿ ಬೆಳೆದಿದೆ. ಉದಾಹರಣೆಗೆ ಬ್ರದರ್ ಚರ್ಚ, ನ್ಯೂ ಲೈಫ್, ಎಫ್. ಎಂ.ಬಿ, ಹೆವರ್ರಿ ಹೂಮ್ ಕ್ರೂಸೈಡ್, ಬೆತೆಲ್ ಚರ್ಚ, ಸೆವೆನತ್ ದೇ ಚರ್ಚ, ಬೇತೇಲ್ ಚರ್ಚ, ಬ್ರದರನ್ ಚರ್ಚ, ಪೌಂಟೆನ್ ಆಫ್ ಲೈಫ್ ಮಿನಿಸ್ಟ್ರಿ, ಬೇತ್ಲಹೇಮ್ ಚರ್ಚ, ಕಲ್ವಾರಿ ಅಸಂಬಲಿ ಚರ್ಚ, ದಹಿಸುವ ಆಗ್ನಿ, ಬ್ರದರ್ ಅಸೆಂಬಲಿ ಹೀಗೆ ಅನೇಕ ಸಭೆಗಳು ಬೆಳೆದಿವೆ. ಈ ಸಭೆಗಳು ಕೋಲಾರ ಜಿಲ್ಲೆಯಲ್ಲಿ ಜನರಲ್ಲಿ ಸಾಮಾಜಿಕ ಹಾಗೂ ಆರ್ಥಿಕವಾಗಿ ಪ್ರಬಲರಾಗುವಂತೆ ಅವರಿ ಶಿಸ್ತು, ಸಂಯಮ, ದುಡಿದು ಜೀವನ ನಡೆಸುವ ಮಾರ್ಗವನ್ನು ಬೋಧಿಸುತ್ತಾ ಸಮಾಜದಲ್ಲಿ ಉತ್ತಮ ಸ್ಥಾನ ಮಾನವನ್ನು ಪಡೆಯುವಂತೆ ನಡೆಸುತ್ತಿದೆ.

1. ಪರಾಮರ್ಶನ ಗ್ರಂಥಗಳು;

2. A sunand raj. Glimpses of the Methodist church, Kolar, 1977.

3. H. S. Krishnaswamy Iyengar. Avolokana- A compendiuna on karnataka heitage world kannada confference directorate of karnataka and culture, Bangalore, 1985.

4. Rev. J.E. Scott. History of fifty years, Madras, M,E. Press 1906.

5. John T. And Ruth Seamands. Engineered for Glory, USA, Francis Asbury society, Inc.

6. Roger E. Hedlund. The oxford Encyclopaedia of South Asian Christianity, Vol-1, Oxford University press.

7. SOZO. ETCM, hundred years of dedicated health care, kolar,2016.

೮. ಡಾ. ಗಾಡ್ವಿನ್ ಶರಿ. ದಲಿತ ಕ್ರೈಸ್ತರು, ಸಿಜರ್ಸ್(ಸಿ.ಐ.ಎಸ್. ಆರ್.ಎಸ್) ಬೆಂಗಳೂರು, 1997.

9. ವೈ. ಮರಿಸ್ವಾಮಿ. ದಲಿತ ಕ್ರೈಸ್ತರಿಗೆ ಮೀಸಲಾತಿ ಯಾಕೆ?, ಆಶೀರ್ವಾದ್ ಪ್ರಕಾಶನ, ಬೆಂಗಳೂರು,1998.

10. ಡಾ. ಆನಂದ್ ತೇಲ್ತುಂಬ್ಡೆ (ಅನು. ನಾ. ದಿವಾಕರ), ಜಾಗತೀಕರಣ ಮತ್ತು ದಲಿತರು, ಲಡಾಯಿ ಪ್ರಕಾಶನ, ಗದಗ, 2013.

11. ಡಾ. ಪ್ರೇಮಾ ಕುಂದರ್ಗಿ, ಡಾ. ಲೀಲಾವತಿ ದೇವದಾಸ್. ಚಿಕ್ಕಬಳ್ಳಾಪುರದ ಸಿ.ಎಸ್.ಐ. ಸಭೆಯ ರೋಚಕ ಗಾಥೆ, ಚಿಕ್ಕಬಳ್ಳಾಪುರ, 2006.

12. ಕರ್ನಾಟಕದ ಪರಂಪರೆ ಸಂಪುಟ–2 ಪ್ರಕಾಶಕರು, ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ, ಬೆಂಗಳೂರು,1992.

13. ಬಿ. ಎಸ್. ತಲವಾಡಿ. ಕರ್ನಾಟಕ ಕ್ರೈಸ್ತರ ಇತಿಹಾಸ, ಕನ್ನಡ ಕ್ಯಾಥೋಲಿಕರ ಸಂಘ, ಬೆಂಗಳೂರು,1989.

ಮೈಸೂರಿನ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರ ಬಿರುದು 'ರಾಜರ್ಷಿ' ಬಗ್ಗೆ ವಿವೇಚನೆ

ಡಾ॥ ಬೆಂ.ಶಾ. ಶ್ಯಾಮಲಾ ರತ್ನಕುಮಾರಿ
ಬೆಂಗಳೂರು

ರಾಜರಿಗೆ ಬಿರುದುಗಳು ಇರುವುದು ಸರ್ವೇ ಸಾಮಾನ್ಯವಾದ, ಸರ್ವರಿಗೂ ವಿದಿತವಾದ ವಿಷಯವಾಗಿದೆ. 'ಬಿರುದು' ಎಂದರೆ ನಿಘಂಟಿನ ರೀತ್ಯಾ ಸ್ತುತಿ, ಹೊಗಳಿಕೆ, ಗೌರವಸೂಚಕ ಹೆಸರು, ಕೀರ್ತಿ ಪ್ರತಿಷ್ಠೆಗಳ ಸೂಚಕವಾದ ವಿಶೇಷ ಅಭಿಧಾನ ಎಂದರ್ಥ. ಬಿರುದುಗಳನ್ನು ರಾಜರ ಗುಣ–ಸ್ವಭಾವ, ರೂಪ, ಶೌರ್ಯ, ಧರ್ಮಪಾರಾಯಣತೆ, ದಾನಪರತೆ, ತ್ಯಾಗಪರತೆ, ರಾಜ್ಯಭಾರ ನಿಪುಣತೆ, ವಿದ್ವತ್ತು ಜ್ಞಾನ ಕುಶಲಕಲೆ ಲಲಿತಕಲೆಗಳಿಗೆ ಪೋಷಕತೆ, ಪ್ರಜಾರಂಜಕತೆ, ಪ್ರಜಾ ಕಲ್ಯಾಣಪರತೆಗಳನ್ನು ಅನುಲಕ್ಷಿಸಿ ನೀಡಲಾಗಿರುತ್ತದೆ. ಆಯಾ ವಿಷಯಕ್ಕನುಗುಣವಾಗಿ ರಾಜರ ಬಿರುದುಗಳನ್ನು ಪ್ರಿಯಾಭಿಧಾನ, ಶೌರ್ಯಾಭಿಧಾನ, ಶ್ರೇಷ್ಠತಾಭಿಧಾನ, ಪೋಷಕಾಭಿಧಾನ, ಭಕ್ತ್ಯಾಭಿಧಾನ, ಸೌಂದರ್ಯಭಿಧಾನ ಎಂದು ವರ್ಗೀಕರಿಸಲಾಗುತ್ತದೆ. ಶಾಸನಗಳಲ್ಲಿ, ಕಾವ್ಯಗ್ರಂಥ–ಗಳಲ್ಲಿ, ನಿರೂಪಗಳಲ್ಲಿ ಜಯಪತ್ರಗಳಲ್ಲಿ ಈ ವೈವಿಧ್ಯಪೂರ್ಣ ಬಿರುದುಗಳಿಗೆ ಉದಾಹರಣೆಗಳು ವಿಪುಲವಾಗಿ ದೊರಕುತ್ತವೆ. ನಿದರ್ಶನಾರ್ಥವಾಗಿ ಹೇಳಬೇಕೆಂದರೆ ರಾಜರ ಅಧಿಕಾರದ ವ್ಯಾಪ್ತಿಯನ್ನು ಸೂಚಿಸುವ ಮಹಾರಾಜ, ರಾಜಾಧಿರಾಜ, ರಾಜಪರಮೇಶ್ವರ ಭುಜಬಲ ಚಕ್ರವರ್ತಿ, ಸಾಮ್ರಾಟ; ಶೌರ್ಯದ ಅಭಿದಾನ ಬಿರುದುಗಳಾದ ಅರಿರಾಯವಿಭಾಡ, ಅರಿಕುಲಪ್ರಳಯಾಂತಕ, ಬಾಧಿಪ್ಪಕಲಿಗೆ ಕಲಿಯುಗ ವಿಪರೀತನ್, ಮಲೆಪರೊಳ್ ಗಂಡ, ಅರಿರಾಯರ ಗಂಡ, ವೈ–ರಿಕುಲ ಪ್ರಚಂಡ, ಕಾಲಯಮ ದಾನದಲ್ಲಿ ಕರ್ಣ, ತ್ಯಾಗದಲ್ಲಿ ಶಿಬಿ, ಸತ್ಯಸಂಧತೆಯಲ್ಲಿ ಹರಿಶ್ಚಂದ್ರ; ಪೋಷಕರು ಸೂಚಕವಾಗಿ ಆಶ್ರಿತಜನ ಸಂರಕ್ಷಕ, ಕಲ್ಪವೃಕ್ಷ, ದೀನಾಹ್ಲಾದಕರ, ದೀನಬಂಧು ಸೌಂದರ್ಯಾತಿಶಯಸೂಚಕವಾಗಿ ಅಭಿನವ ಕಾಮದೇವ, ನಿರುತಸ್ಮರ, ರಟ್ಟಕಂದವಿ ಭಕ್ತ್ಯಾಭಿಧಾನಸೂಚಕವಾಗಿ ಪರಮ ಭಾಗವತ, ಪರಮ ಮಾಹೇಶ್ವರ, ರಾಮವಿಪಂಕಜಭ್ರಮರ, ಚಾಮುಂಡೇಶ್ವರಿಕೃಪಾಪೋಷಿತ, ವಾಸಂತಿಕಾ ದೇವಿಲಬ್ಧವರ ಪ್ರಸಾದ, ಇತ್ಯಾದಿ.

ಪ್ರಸ್ತುತ ಪ್ರಬಂಧದಲ್ಲಿ 'ರಾಜರ್ಷಿ' ಎಂಬ ಬಿರುದಿನ ಬಗ್ಗೆ ವಿವೇಚಿಸಲಾಗುತ್ತದೆ. ರಾಜರ್ಷಿ ಎಂಬ ಬಿರುದು ರಾಜ–ತ್ವವನ್ನೂ ಋಷಿತ್ವವನ್ನೂ ಮೈಗೂಡಿಸಿಕೊಂಡ ರಾಜರಿಗೆ ಮಾತ್ರ ಅನ್ವಯವಾಗುವ ವಿರಳೂ ವಿಶಿಷ್ಟವೂ ಆದ ಬಿರುದಾಗಿದೆ. ಆದುದರಿಂದ ರಾಜತ್ವ ಎಂದರೇನು? ಋಷಿತ್ವ ಎಂದರೇನು? ಎಂಬುದನ್ನು ವಿವೇಚಿಸುವುದು ಅತ್ಯವಶ್ಯವಾಗುತ್ತೆ.

'ರಾಜ' ಶಬ್ದವು 'ರಾಟ್' ಎಂಬ ಧಾತುವಿನಿಂದ ನಿಷ್ಪನ್ನವಾಗಿದೆ. ರಾಟ್ ಎಂದರೆ ಆಳುವುದು ಅಥವಾ ಆಳ್ವಿಕೆ ನಡೆಸುವುದು ಎಂದರ್ಥ. ಆಳುವುದು ಎಂದರೆ ಧರ್ಮ ಅರ್ಥ ಕಾಮ ಮೋಕ್ಷ –ಎಂಬ ಚತುರ್ವಿಧ ಪುರುಷಾರ್ಥಗಳ ಫಲವನ್ನು ಸಾಧಿಸುವುದು. ಇದನ್ನು ಸಾಧಿಸುವವನೇ ರಾಜ. ಪೃಥ್ವೀ ಪರಿಪಾಲನೆ ಮತ್ತು ಪ್ರಜಾಸಂರಕ್ಷಣೆಯ ಕಾರ್ಯಗಳನ್ನು ಯಥೋಚಿತವಾಗಿ ತನ್ನ ಕರ್ತವ್ಯಗಳೆಂದು ರಾಜನು, ಮಂತ್ರಿ, ಜನಪದ, ಕೋಶ, ದುರ್ಗ, ಸೇನೆ, ಮಿತ್ರ ಎಂಬ ಅಂಗಗಳೊಡಗೂಡಿಕೊಂಡು ಸಪ್ತಾಂಗ ರಾಜ್ಯದ ನೇತೃತ್ವವನ್ನು ವಹಿಸಿಕೊಂಡು ಸಾಧಿಸುತ್ತಾನೆ. ಇದನ್ನೇ ರಾಜನ ರಾಜ್ಯಭಾರ, ರಾಜ್ಯಾಧಿಕಾರ, ರಾಜ್ಯವಾಳುವುದು ಎಂದು ಹೇಳುವುದು. ಈ ಬಗ್ಗೆ ರಾಜ್ಯಶಾಸ್ತ್ರ ವಿಶಾರದನಾದ ಆಚಾರ್ಯ ಕೌಟಿಲ್ಯನ ಹೇಳಿಕೆ ಇಂತಿದೆ.

'ರಾಜಾ ಏವ ರಾಜ್ಯಂ' – ರಾಜನೇ ರಾಜ್ಯ

'ಪ್ರಜಾ ಸುಖೇ ಸುಖಂ ರಾಜ್ಞಃ ಪ್ರಜಾನಾಂ ಚ ಹಿತೇ ಹಿತಮ್ ।
ನಾತ್ಮಪ್ರಿಯಂ ಹಿತಂ ರಾಜ್ಞಃ ಪ್ರಜಾನಾಂ ತು ಪ್ರಿಯಂ ಹಿತಮ್ ॥'

ಪ್ರಜೆಗಳ ಸುಖವೇ ರಾಜನ ಸುಖ ಪ್ರಜೆಗಳಹಿತವೇ ರಾಜನ ಹಿತ, ಅದಲ್ಲದೆ ರಾಜನಿಗೆ ಸ್ವತಃ ಪ್ರಿಯವಾದುದೂ ಹಿತವಾದುದೆಂಬುವುದೂ ಇಲ್ಲ.

ಧರ್ಮಶಾಸ್ತ್ರಕಾರ ಅತ್ರಿ (ಮುನಿ) ರಾಜಧರ್ಮ ಎಂದು ರಾಜರಿಗೆ ದುಷ್ಟ ಶಿಕ್ಷಣ ಸುಜನ (ಶಿಷ್ಟಜನ)ರ ಪೂಜೆ, ಕೋಶ ಸಂಪ್ರವೃದ್ಧ, ಅರ್ಥಿ ಜನರಲ್ಲಿ ನಿಷ್ಪಕ್ಷಪಾತ ಮತ್ತು ರಾಷ್ಟ್ರರಕ್ಷೆ ಎಂಬ ಐದು ಕರ್ಮ ಅಥವಾ ಕರ್ತವ್ಯಗಳೆಂದು ವಿಧಿಸುತ್ತಾ ಬೌದ್ಧ ಜಾತಕಗಳು ರಾಜರಿಗೆ ದಾನಪರತೆ, ನೈತಿಕತೆ, ತ್ಯಾಗಪರತೆ, ಸತ್ಯ ಸಂಧತ್ತೆ ಕ್ಷಮಾಪರತೆ, ಆತ್ಮನಿರಾಕರಣೆ (ನಿಸ್ವಾರ್ಥತೆ), ಅಹಿಂಸೆ, ಸಹನೆ (ತಾಳ್ಮೆ), ಕೋಮಲ ಸಹಿಷ್ಣುತೆ – ಎಂಬ ಹತ್ತು ವಿಧದ ಕರ್ತವ್ಯಗಳನ್ನು ವಿಧಿಸುತ್ತವೆ.

'ರಾಜ' ಶಬ್ದವು 'ರಂಜ್' ಎಂಬ ಧಾತುವಿನಿಂದಲೂ ನಿಷ್ಪನ್ನವಾಗಿದೆ. 'ರಂಜ್' ಎಂದು ರಂಜಿಸುವುದು ಅಥ–

ವಾ ಆನಂದವನ್ನುಂಟು ಮಾಡುವುದು. ರಾಜನು ಪ್ರಜೆಗಳಿಗೆ ಪ್ರಿಯದರ್ಶನನಾಗಿದ್ದು ಅವರಿಗೆ ರಕ್ಷಣೆ ಪೋಷಣೆ, ಪ್ರೋತ್ಸಾಹ, ಪುರಸ್ಕಾರ ನೀಡಿ ಅವರಿಗೆ ಆನಂದದಾಯಕನಾಗುತ್ತಾನೆ. ಅದನ್ನೇ ಕಾತ್ಯಾಯನನ್ನು ಈ ರೀತಿ ಸೂತ್ರೀಕರಿಸಿದ್ದಾನೆ:

ರಾಜನು ಅಸಹಾಯಕರ ರಕ್ಷಕನೂ, ಗೃಹರಹಿತರಿಗೆ ಗೃಹವೂ, ಅಪುತ್ರಕರಿಗೆ ಪುತ್ರನೂ ಅನಾಥರಿಗೆ ನಾಥನೂ ತಬ್ಬಲಿಗಳಿಗೆ ತಾಯ್ತಂದೆಯೂ ಆಗಿರುತ್ತಾನೆ. ರಾಜನು ತನ್ನ ಪ್ರಜೆಗಳ ಪ್ರಾಣ ಮತ್ತು ಸಂಪತ್ತನ್ನು ಹೊರಗಿನ ಶತ್ರುಗಳಿಂದ ಯುದ್ಧಮಾಡಿ ಜಯಿಸಿ ರಕ್ಷಿಸಬೇಕು. ಅಲ್ಲದೆ ಆಂತರಿಕ ಶತ್ರುಗಳಾದ ದುಷ್ಟ ಹಾಗೂ ಭ್ರಷ್ಟ ಅಧಿಕಾರಗಳ ಕಿರುಕುಳ, ಪೀಡೆಗಳಿಂದಲೂ ರಕ್ಷಿಸಬೇಕು. ಅದಕ್ಕಾಗಿ ಯೋಗ್ಯ ಸಮಥರ್ೆ ಧರ್ಮನಿಷ್ಠ ರಾಜನಿಷ್ಠ ಹಾಗೂ ಪ್ರಜಾನಿಷ್ಠರಾದ ಅಧಿಕಾರಿಗಳನ್ನೂ ಮಂತ್ರಿಗಳನ್ನು ಆಯ್ಕೆ ಮಾಡಿ ನೇಮಿಸಬೇಕು. ಅವರಿಗೆ ಅವರವರ ಕಾರ್ಯನಿರ್ವಹಣೆಗೆ ಬೇಕಾದ ಅಧಿಕಾರ, ಸ್ವಾತಂತ್ರ್ಯಗಳನ್ನು ನೀಡುವುದರ ಮೂಲಕ ಪ್ರಜೆಗಳ ಸಂಕಷ್ಟ, ಸಮಸ್ಯೆಗಳನ್ನು ಸಕಾಲದಲ್ಲಿ ಯಥೋಚಿತವಾಗಿ ಪರಿಹರಿಸಲು ಸೂಕ್ತ ವ್ಯವಸ್ಥೆ ಮಾಡಲು ಅವರಲ್ಲಿ ವಿಶ್ವಾಸವಿಟ್ಟು ಉತ್ಸಾಹ ತುಂಬಿ ಕಾರ್ಯರತರನ್ನಾಗಿ ಮಾಡಬೇಕು. ಸಮಾಜದಲ್ಲಿ ಪ್ರಬಲರು ದುರ್ಬಲರನ್ನು ತುಳಯಲು ಸದಾ ಹವಣಿಸುತ್ತಿರುತ್ತಾರೆ. ಇದು ಹಿರಿಯ ಮೀನು ಚಿಕ್ಕ ಮೀನನ್ನು ನುಂಗುವ ಮತ್ಸ್ಯನ್ಯಾಯದ ಪರಿಸ್ಥಿತಿಯುಂಟು ಮಾಡುತ್ತದೆ. ಇಂತಹ ಅನ್ಯಾಯ ಮತ್ತು ಅವ್ಯವಸ್ಥೆಯನ್ನು ನಿವಾರಿಸಲು ಸದಾ ಜಾಗೃತನಾಗಿದ್ದು ದುಷ್ಟನಿಗ್ರಹ ಕಾರ್ಯವನ್ನು ತನ್ನ ದಂಡಾಧಿಕಾರದಿಂದ ಕೈಗೊಳ್ಳಬೇಕು. ದಂಡನೆಯು ತಪ್ಪುಗಳನ್ನು ಮಾಡದಂತೆ ತಡೆಯುವುದಕ್ಕಾಗಿ ಹಾಗೂ ತಪ್ಪಿತಸ್ಥರನ್ನು ಸರಿ ದಾರಿಗೆ ತರುವುದಕ್ಕಾಗಿ ಇರಬೇಕೇ ಹೊರತು ದ್ವೇಷವನ್ನು ಹುಟ್ಟಿಸಬಾರದು, ಕೊಲ್ಲುವ ಅಂತಿಮ ಶಿಕ್ಷೆಯೂ ಆಗಬಾರದು. ಎಲ್ಲ ಧರ್ಮದವರನ್ನೂ ಸಮಾನವಾಗಿ ಕಂಡು ಅವರವರ ಧರ್ಮನಿಷ್ಠೆಯನ್ನು ಗೌರವಿಸಿ ಪ್ರೋತ್ಸಾಹಿಸಬೇಕು. ಎಲ್ಲ ಜಾತಿವೃತ್ತಿಗಳಿಗೂ ನೆರವು ನೀಡಿ ಪ್ರಗತಿ ಸಾಧಿಸುವಂತೆ ನೋಡಿಕೊಳ್ಳಬೇಕು. ಎಲ್ಲದಕ್ಕಿಂತ ಮೇಲಾಗಿ ಸ್ವಧರ್ಮ (ರಾಜಧರ್ಮ) ಮತ್ತು ಸಮಾನಧರ್ಮ (ಮಾನವಧರ್ಮ) ಗುಣಗಳಾದ ಸತ್ಯ, ಅಹಿಂಸೆ, ಶೌಚ ಅಥವಾ ಪಾವಿತ್ರತೆ, ನೀತಿಪರತೆ, ನೈತಿಕ ಸಂಯಮಯುತ ಜೀವನ ನಿಸ್ವಾಥರ್ೆತೆ, ಮುಂತಾದವುಗಳನ್ನು ಸ್ವತಃ ಆಚರಿಸುತ್ತಾ ಪ್ರಜೆಗಳೂ ಆ ರೀತಿ ತಮ್ಮ ಜೀವನವನ್ನು ನಡೆಸಲು ಆದರ್ಶಪ್ರಾಯ ವ್ಯಕ್ತಿಯಾಗಬೇಕು. ಇಂತಹ ಆದರ್ಶಗಳನ್ನು ನಡೆಸುವ ರಾಜನ ಪ್ರಭಾವ ಎಲ್ಲರ ಮೇಲೂ ಸದಾ ಕಾಲದಲ್ಲೂ ನೆಲೆಗೊಳ್ಳುವುದು. ಆದುದರಿಂದಲೇ 'ಯಥಾ ರಾಜಾ ತಥಾ ಪ್ರಜಾಃ' (ರಾಜನಂತೆ ಪ್ರಜೆಗಳು), 'ರಾಜಾ ವಿಶಿಷ್ಟ ಕಾಲಸ್ಯ ಕಾರಣಮ್' (ರಾಜನೇ ಕಾಲದ ವಿಶಿಷ್ಟತೆಗೆ ಕಾರಣ) ಎಂಬ ನಾಣ್ನುಡಿಗಳು ಬಳಕೆಯಲ್ಲಿವೆ. ಈಗ ರಾಜನ ಬದಲು ಆಡಳಿತ ನಡೆಸುವ ಸರ್ಕಾರಕ್ಕೆ ಈ ಮಾತುಗಳು ಅನ್ವಯಿಸುತ್ತವೆ. ಪ್ರಜೆಗಳೇ ಸರ್ಕಾರದ ಚಾಲಕರಾಗಿರುವ ಈ ಕಾಲದಲ್ಲಿ ಅವರಿಗೇ ರಾಜನ ಕರ್ತವ್ಯಗಳೂ ರಾಜಧರ್ಮದ ಗುಣ, ನಿಯಮಗಳೂ ಪ್ರಸ್ತುತವಾಗುತ್ತವೆ.

ಇನ್ನು 'ಋಷಿತ್ವ'ದ ಬಗ್ಗೆ ವಿವೇಚಿಸೋಣ. ಋಷಿ ಪದದ ಉತ್ಪತ್ತಿ ಧಾತುವು 'ರಶ್' ಅಥವಾ 'ರಶಸ್'. ಮನಸ್ಸನ್ನು ಅಂತರ್ಮುಖಗೊಳಿಸಿ ತನ್ನ ಶರೀರದ ಮೂಲಕವೇ ತನ್ನನ್ನು ಮತ್ತು ಬ್ರಹ್ಮಂಡ (ಯೂನಿವರ್ಸ್–ವಿಶ್ವ)ವನ್ನು ಅರಿಯುವ ಕ್ರಿಯೆಯೇ ಋಷಿತ್ವ ಅಂತಹ ವ್ಯಕ್ತಿಯೇ ಋಷಿ. ಅದನ್ನೇ 'ಋಷಿಃ ದರ್ಶನಾತ್' ಎಂದು ವ್ಯಾಖ್ಯಾನಿಸಲಾಗಿದೆ. 'ಋ' ಎಂದರೆ ಸರ್ವ ದಿಕ್ಕುಗಳನ್ನು ಪ್ರತಿನಿಧಿಸುವ ಸ್ವರಾಕ್ಷರ 'ಷ' ಶಕ್ತಿಯನ್ನು ಪ್ರತಿನಿಧಿಸುವ ಅವರ್ಗೀಯ ವ್ಯಂಜನಾಕ್ಷರ. ಷ ಎಂದರೆ ಶಯನ ಅಥವಾ ವಾಸ. ಇ ಎಂದರೆ ಒಳಗೆ. ಹೀಗೆ ಯಾವ ಜೀವಾತ್ಮನು ಸರ್ವವ್ಯಾಪಿಯಾಗಿ ತಪಸ್ಸಿನ ಮೂಲಕ ಬ್ರಹ್ಮಂಡವನ್ನೇ ಆವರಿಸಿ ಎಲ್ಲಾ ಜ್ಞಾನವನ್ನು ಅತೀಂದ್ರಿಯ ದೃಷ್ಟಿಯಿಂದ ಸಾಕ್ಷಾತ್ಕರಿಸಿಕೊಂಡು ದರ್ಶಿಸಿದನೋ, ಅವನೇ ಋಷಿ. ದರ್ಶನ ಕ್ರಿಯೆಯೇ ಋಷಿ ಧಾತುವಿನಿಂದ ನಿಷ್ಪನ್ನವಾಗಿ ವೇದ 'ವಿದ್' ತಿಳಿವು, ಜ್ಞಾನ ಎಂಬ ಅರ್ಥವನ್ನು ಕಒಡುವ ವೇದಗಳು ದರ್ಶನ, ವೇದಗಳ ದರ್ಶನ ಮಾಡಿದವರ ಹೆಸರೇ ಋಷಿಗಳು ವೇದಗಳು ಸಾರ್ವಕಾಲಿಕವಾಗಿರುವಂತೆ ಋಷಿಯೂ ಸಾರ್ವಕಾಲಿಕ ವೇದ ಎಂದು ಮಾನವನ ಶರೀರದಲ್ಲಿ ಹರಿಯುವ ಪ್ರಾಣ. ಈ ಹರಿಯುವ ಪ್ರಾಣವನನು ಶಬ್ಧದಲ್ಲಿ ಹೇಳಿದಾಗ, ಆ ಶಬ್ಧಗಳಿಗೆ ವೇದಮಂತ್ರಗಳು ಎಂದು ಹೇಳಲಾಗುತ್ತದೆ. ಪ್ರಾಣವನ್ನು ನಾದವೆಂದೂ ಕರೆಯುವುದುಂಟು. ಪ್ರಾಣರೂಪಿನಾದವನ್ನು ದರ್ಶನ ಮಾಡಿ ಶಬ್ಧದಲ್ಲಿ ಹೇಳಿದಾಗ ಅದರ ಶ್ರವಣದಿಂದ ವೇದಮಂತ್ರಗಳು ತಿಳಯಲ್ಪಟ್ಟವು. ಇದೇ ವೇದ ದರ್ಶನ.

ವೇದಗಳನ್ನು ಭಾಷೆಯಿಂದ ಅಧ್ಯಯನ ಮಾಡಕೂಡದು, ಬದಲಿಗೆ ವೇದಗಳನ್ನು ಭಾಷ್ಯ ಅಂದರೆ ಛಂದೋಬದ್ಧವಾದ ಶಬ್ಧವನ್ನು ಮಾನವನ ಭಾಷೆಯಲ್ಲಿ 64 ಅಕ್ಷರಗಳ ಮೂಲಕ ಅಧ್ಯಯನ ಮಾಡಬೇಕು. ಅಕ್ಷರಗಳು ಪರಮಾತ್ಮನ ಕಾರ್ಯವನ್ನು ಹೇಳುವ ಶಬ್ಧಗಳು. ಅಕ್ಷರಗಳು ಶಬ್ಧಕ್ಕೆ ಮೂಲ, ಶಬ್ಧವು ಒಂದು ಶಕ್ತಿ. ಶಕ್ತಿಯಿಂದ ಕಾಲಗತಿಯಲ್ಲಿ ಕ್ರಿಯೆಗಳು ಆಗುತ್ತವೆ. ಶಕ್ತಿಯು ಅನೇಕ ಪ್ರಕಾರವಾಗಿವೆ (ಪರಮಾಣು, ಬೆಳಕು, ವಿದ್ಯುತ್ತಿನ ಅಲೆ, ಶಾಖ, ರಾಸಾಯನಿಕ ಕ್ರಿಯೆ) ವೇದ ದರ್ಶನ ಮಾಡಲು ಅಥವಾ ಬ್ರಹ್ಮಾಂಡ ಜ್ಞಾನವನ್ನು ಪಡೆಯಲು ಅಯಸ್ಕಾಂತ ಸರ್ವ ದಿಕ್ಕಿನಲ್ಲಿ ಯಾನ ಮತ್ತು ಏಕ ಕಾಲದಲ್ಲಿ ಶಯನಮಾಡಬೇಕು. ಹೀಗೆ ಸರ್ವದಿಕ್ಕಿನಲ್ಲಿ ಪ್ರಯಾಣ ಮಾಡಿ ಶಯನ ಮಾಡಿ 64 ಅಕ್ಷರಗಳನ್ನು (ಸ್ವರ, ವ್ಯಂಜನ ಅರಿತುಕೊಳ್ಳುವ ಸಾಮರ್ಥ್ಯ ಹೊಂದಿರುವವರೇ ಋಷಿಗಳು. ಆದುದರಿಂದ ವೇದ ಮಂತ್ರಗಳಲ್ಲಿ ಬರುವ ಋಷಿ ಪದವು ಪ್ರಯಾಣದ ಪಥವನ್ನೂ ಸೂಚಿಸುತ್ತದೆ. ಹೀಗೆ ಋಷಿಗಳು ವೇದ ಮಂತ್ರಗಳನ್ನು ಛಂದೋಬದ್ಧವಾಗಿ ರಚಿಸಿ ವೇದದರ್ಶನ ಮಾಡಿಸುವ ಕ್ರಿಯೆಗಳ ಪಥಪ್ರದರ್ಶಕರೂ ಆಗಿದ್ದಾರೆ.

ಋಷಿ ಕ್ರಿಯೆಯಲ್ಲಿ ದೇವರ್ಷಿ, ರಾಜರ್ಷಿ, ಮಹರ್ಷಿ, ಬ್ರಹ್ಮರ್ಷಿ ಎಂಬ ನಾಲ್ಕು ಹಂತಗಳಿವೆ.

ದೇವ ಎಂದರೆ ಪಂಚಭೂತಾತ್ಮಕವಾದ ಶರೀರ. ಯಾರು

ಶರೀರದಿಂದ (ಭೌತಿಕಶಕ್ತಿ) ಶೂದ್ರತ್ವದಿಂದ ಎಲ್ಲಾ ವರ್ಣಾಶ್ರಮಗಳನ್ನು ದಾಟಿ ಪರಬ್ರಹ್ಮ ತತ್ವದ ಶಕ್ತಿ (ಪರಮಾತ್ಮ) ಯ ಎಡೆಗೆ ಹೋಗಿ ತಲುಪುತ್ತಾರೋ ಅವರೇ ದೇವರ್ಷಿ (ದೇವ+ಋಷಿ) ಎನ್ನಿಸುವರು ಉದಾ: ದೇವರ್ಷಿ ನಾರದ.

ಶರೀರಕ್ಕೆ ರಾಜ ನರಮಂಡಲ ಯಾರು ನರಮಂಡಲದಿಂದ (ಬೌದ್ಧಿಕ ಶಕ್ತಿ) ಪರಬ್ರಹ್ಮ ತತ್ವ್ವದ ಶಕ್ತಿಯ ಹಂತಕ್ಕೆ ಹೋಗಿ ತಲುಪುವವರೋ ಅವರೇ ರಾಜರ್ಷಿ (ರಾಜ+ಋಷಿ). ಇವರು ಇಂದ್ರಿಯಗಳ ಮೇಲೆ ಅಂದರೆ ಶರೀರದ ಮೇಲೆ ನಿಯಂತ್ರಣವನ್ನು ಸಾಧಿಸಿರುವ ಜನಕರೆನಿಸುತ್ತಾರೆ. ಆದ್ದರಿಂದ ಆಧ್ಯಾತ್ಮಿಕ ಚರ್ಚೆಗಳು ಜನಕರಾಜನ ಆಸ್ಥಾನದಲ್ಲಿ ನಡೆಯುವುದು ಮತ್ತು ಬ್ರಹ್ಮತ್ವವನ್ನು ಸಿದ್ಧಾಂತ ಮಾಡಿ ಪ್ರತಿಷ್ಟೆಗೊಳಿಸಲಾಗುವುದು ಉದಾ: ವಿಶ್ವಾಮಿತ್ರ.

ಮನಸ್ಸನ್ನು ಗೆದ್ದು ಮನೋಬಲದಿಂದ ಬ್ರಹ್ಮತತ್ವ್ವವನ್ನು ಹೊಂದುವವರೇ ಮಹರ್ಷಿ (ಮಹತ್ + ಋಷಿ) ಎನಿಸುತ್ತಾರೆ. ಉದಾ: ಕಶ್ಯಪ ಮಹರ್ಷಿ.

ಆತ್ಮಬಲದಿಂದ ಬ್ರಾಹ್ಮಣನಾಗಿ ಪರಿಪೂರ್ಣ ಜ್ಞಾನವನ್ನು ಹೊಂದಿ ಬ್ರಹ್ಮತತ್ವ್ವದೆಡೆಗೆ ಸಾಗಿ ಇಚ್ಛೆಯಲ್ಲಿ ಆತ್ಮಲೋಕದಲ್ಲಿ ನಿವಸಿಸುತ್ತಾರೋ ಅಂತಹ ಶ್ರೇಷ್ಠ ಮಾನವರು ಬ್ರಹ್ಮರ್ಷಿಗಳು ಎಂದೆನಿಸಿಕೊಳ್ಳುತ್ತಾರೆ ಉದಾ: ವಸಿಷ್ಠರು.

ಈ ಮೇಲಿನ ನಾಲ್ಕು ಹಂತಗಳಲ್ಲಿರುವ ಋಷಿ ಕ್ರಿಯೆಗಳಲ್ಲಿ ಐತಿಹಾಸಿಕವಾಗಿ ಲೌಕಿಕವಾಗಿ ಮಾನವರಿಗೆ ಅತ್ಯಂತ ಪ್ರಸ್ತುತವಾಗುವುದು ರಾಜರ್ಷಿ ಹಂತ. ಹೀಗೆ ಪರಿಗಣಿಸಲು ಮುಖ್ಯ ಕಾರಣವೆಂದರೆ ಇಂದಿನ ಬೌದ್ಧಿಕ ಯುಗದಲ್ಲಿ ಮಾನವಕೋಟಿಯ ಅಭ್ಯುದಯವನ್ನು ಪ್ರಗತಿಯನ್ನು ಸಾಧಿಸಲು ರಾಜತ್ವ ಮತ್ತು ಋಷಿತ್ವದ ಗುಣ ಸಾಮರ್ಥ್ಯಗಳನ್ನು ಮೈಗೂಡಿಸಿಕೊಂಡ ರಾಜ ಎಂದರೆ ಆಡಳಿತಾಧಿಕಾರ ನಡೆಸುವ ವ್ಯಕ್ತಿಗಳಿಂದಲೇ ಸಾಧ್ಯವಾಗುತ್ತದೆ. ಆಧುನಿಕ ಕಾಲದಲ್ಲಿ ರಾಜರಿಗೆ 'ರಾಜರ್ಷಿ' ಎಂಬ ಬಿರುದು ಇರುವುದು ತೀರ ವಿರಳವಾಗಿದೆ. ಹಾಗಿದ್ದರೂ 20ನೇ ಶತಮಾನದ ಪ್ರಥಮಾರ್ಧದಲ್ಲಿ 1902ರಿಂದ 1940ರವರೆಗೆ ಮೂವತ್ತೆಂಟು ವರ್ಷಗಳ ಕಾಲ ಯಶಸ್ವೀ ಆಳ್ವಿಕೆ ನಡೆಸಿದ ಮೈಸೂರು ರಾಜ್ಯದ ರಾಜರಾಗಿದ್ದ ಶ್ರೀ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರಿಗೆ ಮಹಾತ್ಮಾ ಗಾಂಧೀಜಿಯವರೂ ಮತ್ತು ಮೈಸೂರು ರಾಜ್ಯದ ಜನತೆಯೂ ನೀಡಿದ್ದ 'ರಾಜರ್ಷಿ' ಬಿರುದು ಗಮನ ಸೆಳೆಯುತ್ತದೆ ಮತ್ತು ಆ ಬಿರುದಿನ ಸಾರ್ಥಕ್ಯದ ವಿವೇಚನೆ ಪ್ರಸ್ತುತವೆನಿಸುತ್ತದೆ. ಶ್ರೀಮನ್ಮಹಾರಾಜ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು ಮೈಸೂರು ರಾಜ್ಯವನ್ನು ಕ್ರಿ.ಶ. 1902ರಿಂದ 1940ರವರೆಗೆ 38 ವರ್ಷಗಳ ಕಾಲ ಆಳ್ವಿಕೆ ನಡೆಸಿ ಮೈಸೂರು ಸಂಸ್ಥಾನವನ್ನು ಸಮಕಾಲೀನ ಭಾರತೀಯ ರಾಜ್ಯಗಳಲ್ಲಿಯೇ 'ಮಾದರಿ ಸಂಸ್ಥಾನ', ಪ್ರಗತಿಶೀಲ ಪ್ರಜಾನುರಾಗಿ ಧರ್ಮಪ್ರಭುತ್ವವುಳ್ಳ 'ರಾಮರಾಜ್ಯ' ಎಂಬ ಖ್ಯಾತಿಗೆ ಪಾತ್ರವಾಗುವಂತೆ ಮಾಡಿದರು. ಆದ್ದರಿಂದಲೇ ಆಧುನಿಕ ಮೈಸೂರು ರಾಜ್ಯದ ಇತಿಹಾಸದಲ್ಲಿ ಸುವರ್ಣಯುಗದ ಕರ್ತರಾದರು.

1881ರಲ್ಲಿ ಅಂದಿನ ಭಾರತದಲ್ಲಿದ್ದ ಬ್ರಿಟಿಷ್ ಸರಕಾರವು ಮೈಸೂರು ರಾಜ್ಯದ ಆಡಳಿತವನ್ನು ಬ್ರಿಟಿಷ್ ಕಮೀಷನರುಗಳ ಬದಲಾಗಿ ಮೈಸೂರಿನ ಒಡೆಯರ ರಾಜ ಮನೆತನಕ್ಕೆ ಪುನರ್ ವಹಿಸಿಕೊಟ್ಟು ರಾಜರಿಗೆ ಆಡಳಿತದಲ್ಲಿ ನೆರವು ನೀಡಲು ದಿವಾನರನ್ನು ನೇಮಿಸುವ ಅಧಿಕಾರವನ್ನೂ ನೀಡಿತು. ಅದರಂತೆ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು ಸಮರ್ಥರು, ಪ್ರಗತಿಶೀಲರೂ, ದೂರದರ್ಶಿಗಳೂ, ಮೇಧಾವಿಗಳೂ, ನಿಸ್ಪೃಹರೂ, ರಾಜ ಮತ್ತು ರಾಜ್ಯನಿಷ್ಠರೂ ಆದ ಸರ್ ಪಿ.ಎನ್. ಕೃಷ್ಣಮೂರ್ತಿ (ದಿವಾನ್ ಪೂರ್ಣಯ್ಯನವರ ಮೊಮ್ಮಗ) 1902–06, ವಿ.ಪಿ. ಮಾಧವರಾವ್ – 1906–09, ಟಿ. ಆನಂದರಾಯರು – 1909–12, ಸರ್ ಎಂ.ವಿಶ್ವೇಶ್ವರಯ್ಯ – 1906–19, ಟಿ. ಆನಂದರಾಯರು – 1909 – 12, ಸರ್ ಆಲ್ಬಿಯನ್ ರಾಜಕುಮಾರ್ ಬ್ಯಾನರ್ಜಿ – 1922 – 26, ಸರ್ ಮಿರ್ಜಾ ಇಸ್ಮಾಯಿಲ್ – 1929 – 41 – ಇವರುಗಳನ್ನು ತಮ್ಮ ದಿವಾನರಾಗಿ ನೇಮಿಸಿ ಅವರ ಸಲಹೆ, ಸಹಕಾರಗಳಿಂದ ಮೈಸೂರು ರಾಜ್ಯದ ಸರ್ವತೋಮುಖ ಪ್ರಗತಿಯನ್ನು ಸಾಧಿಸಿದರು. ನಾಲ್ವಡಿ ವಿಧೇಯಕ ಸಭೆಯ ಸ್ಥಾಪನೆ (1908), ಅರ್ಥಸಾಧಕ ಸಭೆಯ ಪ್ರಾರಂಭ (191..), ಕೃಷ್ಣರಾಜಸಾಗರ ಜಲಾಶಯದ ಪ್ರಾರಂಭ, ಬೆಂಗಳೂರಿನಿಂದ ಚಿಕ್ಕಬಳ್ಳಾಪುರ –ಕೋಲಾರ ಮಾರ್ಗವಾದ ಬೌರಿಂಗ್‌ಪೇಟೆ (ಬಂಗಾರುಪೇಟೆ)ಗೆ ರೈಲುಮಾರ್ಗ, ಶಿಂಷಾ, ಶರಾವತಿ ಜೋಗ್ ವಿದ್ಯುತ್ ಸ್ಥಾವರ ಮೈಸೂರು ಬ್ಯಾಂಕ್, ಮೈಸೂರು ವಿ.ವಿ. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್, ಛೇಂಬರ್ ಆಫ್ ಕಾಮರ್ಸ್ ಟಾಟಾ ವಿಜ್ಞಾನ ಸಂಸ್ಥೆ, ಪಾಲಿಟೆಕ್ನಿಕ್ ಸಂಸ್ಥೆ, ಭದ್ರಾವತಿ ಕಬ್ಬಿಣ, ಪೇಪರ್ ಕಾರ್ಖಾನೆ, ಗಂಧದೆಣ್ಣೆ ಕಾರ್ಖಾನೆ, ಬೆಂಕಿಪಟ್ಟಣ, (ಶಿವಮೊಗ್ಗ) ರಸಗೊಬ್ಬರ (ಬೆಳಗೊಳ) ಸಕ್ಕರೆ (ಮಂಡ್ಯ) ಕಾರ್ಖಾನೆ, ಚನ್ನಪಟ್ಟಣದಲ್ಲಿ ರೇಷ್ಮೆ ಕೈಗಾರಿಕೆ, ಬೆಂಗಳೂರಿನಲ್ಲಿ ಹೆಚ್.ಎ.ಎಲ್. ಕೃಷ್ಣರಾಜಸಾಗರ ಅಣೆಕಟ್ಟು, ಬೃಂದಾವನ ಉದ್ಯಾನವನ, ವಾಣಿವಿಲಾಸ ಸಾಗರ, ವಾಣಿ ವಿಲಾಸ ಪ್ರೌಢಶಾಲೆ, ವಾಣಿವಿಲಾಸ, ಮಿಂಟೋ, ವಿಕ್ಟೋರಿಯಾ ಆಸ್ಪತ್ರೆಗಳು, ಕೃಷ್ಣರಾಜೇಂದ್ರ ಹಾಗೂ ವಾಣಿವಿಲಾಸ ಸೇತುವೆಗಳು, ಕೃಷ್ಣರಾಜೇಂದ್ರ ಮಾರುಕಟ್ಟೆ, ಪುಟ್ಟಣ್ಣಚೆಟ್ಟಿ ಪುರಭವನ, ಲಾಲ್‌ಬಾಗ್, ಕಬ್ಬನ್‌ಪಾರ್ಕ್, ಲಾಲ್‌ಬಾಗ್‌ನಲ್ಲಿ ಪ್ರತಿವರ್ಷ ಫಲಪುಷ್ಪ ಪ್ರದರ್ಶನ (ಬೆಂಗಳೂರಿನಲ್ಲಿ) ಮೈಸೂರಿನಲ್ಲಿ ದಸರಾ ವಸ್ತುಪ್ರದರ್ಶನ, ಮೈಸೂರು ಇನ್ಶೂರೆನ್ಸ್ ಕಂಪೆನಿ, ಅಪೆಕ್ಸ್ ಬ್ಯಾಂಕ್, ಮೈಸೂರು ಮಹಾರಾಜಾ ಮತ್ತು ಮಹಾರಾಣಿ ಬಾಲಿಕಾಶಾಲೆ, ಅರಮನೆಯಲ್ಲಿ ರಾಯಲ್ ಶಾಲೆ, ಸಂಗೀತಶಾಲೆ.

1922ರಲ್ಲಿ ಆಚಾರ್ಯ ಬ್ರಜೇಂದ್ರನಾಥ್ ಸೀಲ್ ಸಮಿತಿಯ ಶಿಫಾರಸ್ಸಿನ ಮೇರೆಗೆ ಪ್ರಜಾಪ್ತಿನಿಧಿ ಸಭೆ ಮತ್ತು ನ್ಯಾಯ ವಿಧಾಯಕ ಸಭೆಗೆ ಸಂವಿಧಾನಾತ್ಮಕ ಬದಲಾವಣೆಗಳು, ಮೈಸೂರು ಮದ್ರಾಸ್ ಸರಕಾರಗಳ ನಡುವೆ ಕಾವೇರಿ ನದಿ ನೀರಿನ ಹಂಚಿಕೆಯ ಬಗ್ಗೆ ಒಪ್ಪಂದ ಮುಂತಾದವು ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು ತಮ್ಮ ಆಡಳಿತದಲ್ಲಿ ಪ್ರಗತಿಶೀಲ ಪ್ರಜಾಭಿವೃದ್ಧಿಯ ಕ್ರಮಗಳನ್ನು ಕೈಗೊಂಡು ಕೀರ್ತಿಶಾಲಿಗಳಾದ ಹಾಗೆಯೇ ಪೋಷಕತ್ವ ಕರ್ತವ್ಯಗಳನ್ನೂ ಉನ್ನತ ಮಟ್ಟದಲ್ಲಿ ಸುಗಮವಾಗಿ ನಿರ್ವಹಿಸಿದರು. ವಿದ್ಯೆ, ಸಂಗೀತ, ನೃತ್ಯ, ಶಿಲ್ಪ

ವಾಸ್ತುಕಲೆ ವಿಜ್ಞಾನ, ಆರೋಗ್ಯ ಸಾಧನೆಗಳಿಗೆ ಪ್ರೋತ್ಸಾಹ ಪೋಷಣೆ ಹಾಗೂ ನೆರವುಗಳನ್ನು ಯಥೇಚ್ಛವಾಗಿ ನೀಡಿದರು.

ಸಂಸ್ಕೃತ ಕೇವಲ ಬ್ರಾಹ್ಮಣರ ಸೊತ್ತಲ್ಲವೆಂದೂ ಎಲ್ಲ ವರ್ಗದ ಜನರೂ ಸಂಸ್ಕೃತ ಭಾಷೆ, ವಿದ್ಯೆ ಕಲಿಯಬೇಕೆಂದು ತಮ್ಮ ತಂದೆ ಚಾಮರಾಜ ಒಡೆಯರ ಹೆಸರಿನಲ್ಲಿ ಬೆಂಗಳೂರಿನಲ್ಲಿ ಮಹಾವಿದ್ಯಾಲಯವನ್ನು ತೆರೆದರು. ಸಂಸ್ಕೃತ ಉಪಾಧ್ಯಾಯರ ವೇತನವನ್ನೂ (ನೂರು ರೂಪಾಯಿಗಳಿಗೆ) ಗಮನಾರ್ಹವಾಗಿ ಹೆಚ್ಚಿಸಿದರು. ವಿದ್ವಾಂಸರನ್ನು ಪುರಸ್ಕರಿಸಿದರು. ಮೈಸೂರು ಸಂಸ್ಕೃತ ಪಾಠಶಾಲೆಯ ಪರೀಕ್ಷೆಗಳಲ್ಲಿ ಉತ್ತೀರ್ಣರಾದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪ್ರ...ಗಳನ್ನು ದಸರಾ ಉತ್ಸವದ ಸಂದರ್ಭದಲ್ಲಿ ಸ್ವಹಸ್ತದಿಂದ ನೀಡುತ್ತಿದ್ದರು. ಬನಾರಸ್ ಹಿಂದೂ ವಿಶ್ವವಿದ್ಯಾಲಯದ ಪ್ರಥಮ ಛಾನ್ಸಲರ್ ಆಗಿ ಪ್ರಥಮ .. ಪ್ರಧಾನ ಸಮಾರಂಭದಲ್ಲಿ ಅಧ್ಯಕ್ಷತೆ ವಹಿಸಿ ಭಾಷಣ ಮಾಡಿದರು. ಅದರ ಬೆಳವಣಿಗೆಗಾಗಿ ಉದಾರವಾಗಿ ಧನಸಹಾಯ ನೀಡಿದರು.

ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾಲಯವನ್ನು ಸ್ಥಾಪಿಸಿ ಅದರಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಗಾಗಿಯೇ ಪ್ರತ್ಯೇಕ ಅಧ್ಯಯನ ವಿಭಾಗವನ್ನು ನೆಲೆಗೊಳಿಸಿದರು. ಟಿ.ಎಸ್. ವೆಂಕಣ್ಣಯ್ಯ, ಬಿ.ಎಂ.ಶ್ರೀ, ಕುವೆಂಪು, ತೀನಂಶ್ರೀ ಮುಂತಾದ ಕನ್ನಡ ಪ್ರಾಚಾರ್ಯರು ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯದ ಶಿಕ್ಷಣವನ್ನು ಉಚ್ಚಶ್ರೇಣಿಯಲ್ಲಿ ನೀಡುವಂತಾಯಿತು. ಪ್ರಾಚ್ಯಂವಿದ್ಯಾಂ ಇಲಾಖೆಯೂ ಮೈಸೂರಲ್ಲಿ ಸ್ಥಾಪನೆಗೊಂಡು ಇತಿಹಾಸ, ಪುರಾತನಗಳಲ್ಲಿ ಶ್ರೇಷ್ಠ ಮಟ್ಟದ ಸಂಶೋಧನಾ ಕಾರ್ಯ ಹಾಗೂ ಗ್ರಂಥ ರಚನೆ, ಪ್ರಾಚೀನಗ್ರಂಥ ಸಂಗ್ರಹ ಕಾರ್ಯಗಳೂ ಭರದಿಂದ ಸಾಗಲು ಅನುವಾಯಿತು. ಬಿ.ಎಲ್. ರೈಸ್, ಆರ್. ಶಾಮಾಶಾಸ್ತ್ರಿ, ಆಖು. ನರಸಿಂಹಾಚಾರ್ಯ ಮುಂತಾದ ವಿದ್ವಾಂಸರು ಈ ಇಲಾಖೆಯ ಮುಖ್ಯಸ್ಥರಾಗಿ ಶಾಸನಗಳ ಸಂಗ್ರಹ, ಸಂಶೋಧನೆ ಮತ್ತು ವರದಿಗಳ ಸಿದ್ಧಪಡಿಸುವಿಕೆಯಲ್ಲಿ ಪ್ರದರ್ಶಕರಾದರು.

ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು ಮೈಸೂರಿನ ನಾಲ್ವರು ಸಂಗೀತ ಮಹಾರಾಜರಲ್ಲಿ ಒಬ್ಬರೆಂದು ಪರಿಗಣಿಸಲ್ಪಟ್ಟಿದ್ದಾರೆ. (ಇತರ ಮೂವರು ಒಡೆಯರೆಂದರೆ–ಮುಮ್ಮಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು, ಚಾಮರಾಜ ಒಡೆಯರು ಫಿ, ಜಯಚಾಮರಾಜ ಒಡೆಯರ್, ಸ್ವತಃ ಸಂಗೀತಗಾರರಾಗಿದ್ದು ವೀಣೆ, ಕೊಳಲು, ಪಿಟೀಲು, ಮೃದಂಗ, ನಾಗಸ್ವರ, ಸಿತಾರ, ಪಿಯಾನೋ ಮತ್ತು ಸಾಕ್ಸೊಫೋನ್ – ಈ ಎಂಟು ವಾದ್ಯಗಳ ವಾದಕರಾಗಿದ್ದರು. ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರಿಗೆ ಸಂಗೀತ ಗುರುಗಳಾಗಿದ್ದವರು. ಸಂಗೀತದ ಶಾಮರಾಯರು, ವೀಣೆ ಶೇಷಣ್ಣ, ವೀಣೆ ಶಾಮಣ್ಣನವರು. ಯಾವುದಾದರೊಂದು ಕೃತಿಯನ್ನು ನುಡಿಸಿ ಹಾಡುವುದನ್ನು ಒಮ್ಮೆ ಕೇಳಿದರೆ ಸಾಕು, ಅದನ್ನು ಕೆಲವೇ ನಿಮಿಷಗಳಲ್ಲಿ ಕಲಿತುಕೊಂಡು ಪಿಟೀಲಿನ ಒಂದೇ ತಂತಿಯಲ್ಲಿ ಅಭ್ಯಾಸ ಮಾಡಿ ನುಡಿಸುವ ಸಾಮರ್ಥ್ಯವನ್ನು ಪಡೆದಿದ್ದರು. ಸಂಗೀತದಲ್ಲಿ ಶೃತಿ, ಸ್ವರ, ರಾಗ, ತಾಳ, ಲಯ, ಭಾವಗಳಲ್ಲಿ ಯಾವುದರಲ್ಲೇ ಆಗಲಿ, ಎಷ್ಟೇ ಸೂಕ್ಷ್ಮವಾದ ವ್ಯತ್ಯಾಸಗಳೋ ತಪ್ಪುಗಳೋ ಆದಾಗ ಅವರಿಗೆ ಕೂಡಲೇ ತಿಳಿಯುತ್ತಿತ್ತು. ಲೋಪದೋಷಗಳನ್ನು ಆಯಾ ವಿದ್ವಾಂಸರಿಗೆ ಪ್ರತ್ಯೇಕವಾಗಿ ಕರೆಸಿಕೊಂಡು ಮೃದುವಾಗಿ ಸೂಚ್ಯವಾಗಿ ತಿಳಿಯಪಡಿಸುತ್ತಿದ್ದರು. ತಿರ್ಯಕ್ ಸ್ವರ ಶ್ರೇಣಿಗೆ ಊರ್ಧ್ವಾಧಃ ಸ್ವರ ಶ್ರೇಣಿಯನ್ನು ಮೇಳೈಸುವ ಪ್ರಯೋಗವನ್ನು ನಡೆಸಿದರು. ಅಂಬಾ ವಿಲಾಸದಲ್ಲಿ ಸಂಗೀತ ಶಾಲೆಯಿದ್ದಿತು. ಕರ್ನಾಟಕ ಸಂಗೀತವೇ ಅಲ್ಲದೆ ಹಿಂದೂಸ್ಥಾನೀ ಸಂಗೀತ ಮತ್ತು ಪಾಶ್ಚಿಮಾತ್ಯ ಸಂಗೀತಗಳಲ್ಲೂ ಒಡೆಯರಿಗೆ ಆಸಕ್ತಿ ಮತ್ತು ಪರಿಶ್ರಮ ಇದ್ದಿತು. ಬರಖತುಲ್ಲಾಖಾನ್, ಗೋಹ ಜಾನ್ ರಸೂಲನ್‌ಬಾಯಿ ಆಲ್ಲಾಭಕ್ಷ, ಇನಾಯ್‌ಖಾನ್, ಜಮಾಲ್‌ಖಾನ್, ಪದ್ಮಾವತೀ ಸಾಲಗ್ರಾಂ, ಜಾನೀಬಾಯಿ, ಫೈಯಾಜ್ ಖಾನ್, ಪಟ್ಟಂ ಸುಬ್ರಹ್ಮಣ್ಯಂ ಅಯ್ಯರ್, ರಾಮನಾಥ್ ಶ್ರೀನಿವಾಸೈಯ್ಯಂಗಾರ್, ಪೆರಿಯ, ಚಿನ್ನ ವೈದ್ಯಂನಾಥ ಭಾಗವತರ್, ಮೈಸೂರು ವಾಸುದೇವಾಚಾರ್ಯ, ವೀಣೆ ಶಿವರಾಮಯ್ಯ, ಹರಿಕೇಶನಲ್ಲೂರು ಮುತ್ತಯ್ಯ ಭಾಗವತರೂ, ಜಾವಳಿ ಚಂದ್ರಶೇಖರಶಾಸ್ತ್ರಿ, ಕೊಪ್ಪರಂ ಅಪ್ಪಾವು ಶೆಟ್ಟರು, ನಂಜನಗೂಡು ಶ್ರೀಕಂಠಶಾಸ್ತ್ರಿ, ಗಿರಿಭಟ್ಟರ ತಮ್ಮಯ್ಯ, ಪಿಟೀಲು ವಾದಕ ಎ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ, ಗಾಯಕ ಬಿ.ಎಸ್. ರಾಮಯ್ಯರ್, ಬಿಡಾರಂ ಕೃಷ್ಣಪ್ಪ, ಕೃಷ್ಣರಾಜ ಒಡೆಯರ ಕೃಪಾಪೋಷಿತರಾದ ಆಸ್ಥಾನದ ಸಂಗೀತಕಾರರೂ, ವಾಗ್ಗೇಯಕಾರರಲ್ಲಿ ಪ್ರಮುಖರು. ಅರಮನೆಯ ಅಂಬಾವಿಲಾಸ ತೊಟ್ಟಿಯಲ್ಲಿ, ಕರೇಕಲ್ಲು ತೊಟ್ಟಿಯಲ್ಲಿ ಗೌರಿ ಗಣೇಶ ಹಬ್ಬ, ನವರಾತ್ರಿ ಹಬ್ಬದ ಸಂದರ್ಭದಲ್ಲಿ ಸಂಗೀತಕಾರ್ಯಕ್ರಮಗಳು ನಡೆಯುತ್ತಿದ್ದವು. ಪ್ರತಿಭೆಯುಳ್ಳ ವಿದ್ವಾಂಸರುಗಳನ್ನು ಗುರುತಿಸಿ ಅವರಿಗೆ ಗಾಯಕ ಶಿಖಾಮಣಿ, ಗಾನವಿಶಾರದ, ವೈಣಿಕ ಶಿಖಾಮಣಿ, ಸಂಗೀತರತ್ನ, ಸಂಗೀತಶಾಸ್ತ್ರ ವಿಶಾರದ, ವೈಣಿಕಪ್ರವೀಣ, ಎಂಬ ಬಿರುದುಗಳನ್ನು ಶಾಲುಜೋಡಿ, ಖಿಲ್ಲತ್ತು ಗಂಡಭೇರುಂಡ ಹಾಗೂ ಚಾಮುಂಡೇಶ್ವರಿ ರತ್ನಖಚಿತ ಚಿನ್ನದ ಪದಕಗಳನ್ನಿತ್ತು ಗೌರವಿಸಲಾಗುತ್ತಿದ್ದಿತು.

ಕರ್ನಾಟಕ ಮತ್ತು ಪಾಶ್ಚಿಮಾತ್ಯ ಸಂಗೀತಗಳ ವಿದ್ವಾಂಸರು ಹಾಡಿ ನುಡಿಸುವ ಅಪರೂಪವೂ ಉತ್ತಮವೂ ಆಗಿದ್ದ ಸಂಗೀತ ರಚನೆಗಳನ್ನು ಸ್ವರಲಿಪಿಯಲ್ಲಿ ಬರೆಸಿ ಸಂಗ್ರಹಿಸಲು, ಗ್ರಾಮಾಫೋನ್ ಸಂಗೀತ ತಟ್ಟೆಗಳ ಸಂಗ್ರಹ ಅರಮನೆಯಲ್ಲಿ ಮೊದಲಾದುದು ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯವರಿಂದಲೇ. ಕರ್ನಾಟಕದಲ್ಲಿ ಮೊಟ್ಟಮೊದಲ ಬಾರಿಗೆ ಆಸ್ಥಾನ ವಿದ್ವಾಂಸರನ್ನೂ ಒಳಗೊಂಡಂತೆ ಒಂದು ಸಂಗೀತ ಸಮ್ಮೇಳನವನ್ನು ನಂಜನಗೂಡಿನಲ್ಲಿ ಏರ್ಪಡಿಸಿದುದೂ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರೇ. ಇವರು ಬೆಂಗಳೂರು ಅರಮನೆ ಮುಂದಿನ ಮೈದಾನದಲ್ಲಿ 1927ರಲ್ಲಿ ಪಾಶ್ಚಿಮಾತ್ಯ ಸಂಗೀತ ವಿಭೂತಿ ಪುರುಷ ಬೇಥೋವನ್ನನ ಆರಾಧನಾ ಮಹೋತ್ಸವವನ್ನೂ ಏರ್ಪಡಿಸಿದರು. 1918ರಲ್ಲಿ ಕರ್ನಾಟಕ ಬ್ಯಾಂಡನ್ನು ರಚಿಸಿದರು. ಪ್ರಥಮ ಬಾರಿಗೆ ವೆಂಕಟಯ್ಯನವರು ಈ ಬ್ಯಾಂಡಿನ ಮೊದಲ ಮಾಸ್ತರರು. ಇದರಲ್ಲಿ ಇಂಡಿಯನ್ ಆರ್ಕೆಸ್ಟ್ರಾವನ್ನು ಅಳವಡಿಸಿದರು.

ಮುಮ್ಮಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರ್ ತೆಂಕುತಿಟ್ಟಿನ ಒಂದು ಯಕ್ಷಗಾನ ಕಲಾಮಂಡಲಿಯನ್ನು ಧರ್ಮಸ್ಥಳದಿಂದ ಮೈಸೂರಿಗೆ ಕರೆತಂದು ಬಿಡಾರ ಮಾಡಿಕೊಟ್ಟರು. ಈ ಕಲಾವಿದರಿಗೆ ಬಿಡಾರದವರೆಂದೇ ಮುಂದೆ ಅಡ್ಡ ಹೆಸರಾಯಿತು. ಅದೇ ರೀತಿಯ ಹೆಸರೇ ಬಿಡಾರಂ ಕೃಷ್ಣಪ್ಪ (ಸಂಗೀತಗಾರ)ನವರದು.

ಅದೇ ಅರಮನೆಯ ನಾಟಕ ಕಂಪೆನಿಯಾಗಿ ಪರಿಷ್ಕೃತಗೊಂಡು ನಾಲ್ವಡಿಯವರ ಕಾಲದಲ್ಲಿ ಕಂಪೆನಿಯ ಕಲಾವಿದರಿಗೆ, ನೌಕರ–ರಿಗೆ ಸಂಬಳ ಹೆಚ್ಚಿಸಲಾಯಿತು. ಆಹಾರ್ಯ (ವೇಷಭೂಷಣ) ದಲ್ಲಿ ಕಾಲವೈಯಧಿಕರಣ್ಯವನ್ನು ತಪ್ಪಿಸಿ ಆಯಾ ಪಾತ್ರಕ್ಕೆ ಉಚಿತವಾದ ಸಹಜ ಉಡುಪು, ಅಲಂಕಾರಗಳಿರಬೇಕೆಂದು ಕಟ್ಟಳೆ ಮಾಡಲಾಯಿತು.

ನಾಲ್ವಡಿಕೃಷ್ಣರಾಜಒಡೆಯರುಕರ್ನಾಟಕದದೇವಾಲಯಗಳಲ್ಲಿದ್ದ ದೇವದಾಸಿ ಪದ್ಧತಿಯ ರದ್ದುಗೊಳಿಸಿದರು. ಆದರೆ ದೇವಾಲಯಗಳಲ್ಲಿ ನರ್ತನ ಸೇವೆಯನ್ನು ಬಲಗೊಳಿಸಿದರು. ಅರಮನೆಯಲ್ಲಿದ್ದ ನರ್ತಕಿಯರ, ವಾದ್ಯಮೇಳದವರ ಸಂಖ್ಯೆಯನ್ನು ಅವರಿಗೆ ನೀಡಲಾಗುತ್ತಿದ್ದ ಸಂಭಾವನೆ, ಸಂಬಳವನ್ನೂ ಹೆಚ್ಚಿಸಿದರು. ಆಸ್ಥಾನದಲ್ಲಿ ಐದು ನರ್ತಕಿ ತಂಡಗಳಿದ್ದವು. ಅವುಗಳೆಂದರೆ ಬಳ್ಳಾಪುರದ ಭವಾನಮ್ಮ, ಜಟ್ಟಿತಾಯಮ್ಮನ ಶಿಷ್ಯೆ ವೆಂಕಟಲಕ್ಷ್ಮಮ್ಮ, ಮಾಝಾರು ತಾಯಕ್ಕ, ಮೈಸೂರಿನ ಜಯಲಕ್ಷ್ಮಮ್ಮ ಅಲಿಯಾಸ್ ರಾಜಮ್ಮ ಹಾಗೂ ತಿಮಕುಂಡಲು ಚಂದ್ರವದನಮ್ಮನವರ ತಂಡಗಳು. ಬಲರಾಮಯ್ಯ ಪುಟ್ಟಸ್ವಾಮಯ್ಯ ಪಿಟೀಲು ಪಕ್ಕವಾದ್ಯವನ್ನೂ ಖಂಡೇ ದಾಸಪ್ಪ ತಬಲವನ್ನು, ಮದ್ದಳೆ ತಿಮ್ಮಯ್ಯ, ಚೆಲುವಯ್ ಮೃದಂಗವನ್ನೂ ಶ್ರುತಿಭೈರಪ್ಪ ತಂಬೂರಿಯ ಪಕ್ಕವಾದ್ಯ ಹಿಮ್ಮೇಳ ನೀಡುತ್ತಿದ್ದರು. ಪಕ್ಕವಾದ್ಯ ಹಿಮ್ಮೇಳದವರನ್ನು ನರ್ತಕಿಯರೇ ತಮ್ಮ ಸ್ವಂತ ಖರ್ಚಿನಲ್ಲಿ ಪ್ರದರ್ಶನದ ಸಂದರ್ಭಗಳಲ್ಲಿ ಕರೆತರಬೇಕಾಗಿದ್ದಿತು. ಆಸ್ಥಾನದಲ್ಲಿ ನಡೆಯುತ್ತಿದ್ದ ನೃತ್ಯಕಾರ್ಯಕ್ರಮಗಳು ಭಕ್ತಿರಸಪ್ರಧಾನವಾಗಿರ ಬೇಕಾಗಿದ್ದಿತು. ನೃತ್ಯಕ್ರಮದಲ್ಲಿ ವಿಭಿನ್ನ ಗುರುಪರಂಪರೆಗಳನ್ನು ಅಳವಡಿಸಿ ಏಕರೂಪತೆಯನ್ನು ತರುವ ಪ್ರಯೋಗಗಳನ್ನು ಕೈಗೊಳ್ಳಲಾಗುತ್ತಿದ್ದಿತು.

ಹೀಗೆ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು ಕಲಾಭಿಜ್ಞರಾಗಿ, ಸಂಗೀತಶಾಸ್ತ್ರಜ್ಞರಾಗಿ ರಸಋಷಿಗಳಾಗಿ ರಾಜರಿಗೆ ವಿಧಿಸಲಾದ ಪ್ರಜಾರಂಜನೆಯ ಕರ್ತವ್ಯಗಳನ್ನು ಯಥೋಚಿತವಾಗಿ ನಿರ್ವಹಿಸಿದ ರಾಜಪ್ರಭುಗಳಾಗಿ ಕೀರ್ತಿಪಡೆದರು.

ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು ದೈವಭಕ್ತಿ, ಭೂತದಯೆ, ಸದಾಚಾರವರ್ತನೆ, ಸಂಪ್ರದಾಯ ಶೀಲತ್ವ, ಅತ್ಮಪರಿಶುದ್ಧತೆ, ಗುರುಜನರಲ್ಲಿ ನಮ್ರತೆ, ವಿದ್ವಜ್ಜನ ಮಮತೆ, ಸರ್ವಜನರಿಗೂ ಸುಲಭ ಲಭ್ಯತೆ, ಗಾಂಭೀರ್ಯ, ರಾಜಧರ್ಮ ಪರಾಯಣ–ತೆ, ಮಂತ್ರಾಲೋಚನ ಮಗ್ನತೆ, ಲೋಕಾರಾಧನ ತತ್ಪರತೆ, ಸದಾಸದ್ವಿವೇದನೆ, ಸಂಯಮಪರತೆ, ವಿವೇಕಯುತ ಕಾರ್ಯನಿರತತ್ವ ಮುಂತಾದ ಸದ್ಗುಣಗಳ ಖನಿಯಾಗಿದ್ದುದ–ರಿಂದ ಜನತೆ ಅವರನ್ನು ಜನಕ ಮಹಾರಾಜ ಯುಧಿಷ್ಠಿರಾದಿ ರಾಜರ್ಷಿಗಳ ಪಂಕ್ತಿಯಲ್ಲಿ ಸ್ಥಾನ ನೀಡಿ ತಾವು ಧನ್ಯತೆ ಪಡೆದರು. ಪ್ರಜೆಗಳಲ್ಲೂ ರಾಜಕೀಯ ನ್ಯಾಯದೃಷ್ಟಿ, ಯುಕ್ತಾಯುಕ್ತ ಪರಿಜ್ಞಾನ, ಸ್ವಕರ್ತವ್ಯನಿಷ್ಠೆ, ಸ್ವಪ್ರಯತ್ನ ಬುದ್ಧಿ, ದೇಶಹಿತೈಕವಿವೇಚನೆ, ಐಕ್ಯತಾಭಾವನೆ ಮೊದಲಾದ ಸದ್ಗುಣಗಳೂ ಸದ್ಭಾವನೆಗಳೂ ಬೆಳೆದುಬರುವಂತೆ ತಾವೇ ಆದರ್ಶವಾಗಿ ನಿಂತು ಪ್ರೇರಣೆ, ಮಾರ್ಗದರ್ಶನ ಹಾಗೂ ಅವಕಾಶ ನೀಡಿದರು. ಸನಾತನ ಧರ್ಮದ ನವೋದಯದ ನವಯುಗದ ಪ್ರತಿಪಾದಕರಾದ ರಾಮಕೃಷ್ಣ ಪರಮಹಂಸ, ಸ್ವಾಮಿ ವಿವೇಕಾನಂದರ ವೇದಾಂತ ಧರ್ಮ ಪಂಥಕ್ಕೆ ಹಾಗೂ ತರುಣ ಸನ್ಯಾಸಿ ತತ್ತ್ವನಿಷ್ಠೆ ಪೋಷಿಸುವ ರಾಮಕೃಷ್ಣ ವಿದ್ಯಾರ್ಥಿಗೃಹವನ್ನು ಮೈಸೂರಿನಲ್ಲಿ ಸ್ಥಾಪನೆ ಮಾಡಿಸಿ ಆಶ್ರಯ ನೀಡಿದರು. ಹೀಗೆ ಸ್ವಧರ್ಮ ಮತ್ತು ಸಮಾನ ಧರ್ಮಗಳನ್ನು ಪೋಷಿಸಿದರು.

ರಾಜರ್ಷಿಯ ಪ್ರಧಾನ ದ್ಯೋತಕ ಧರ್ಮನಿಷ್ಠೆ. ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು ಸ್ವತಃ ಧರ್ಮಾವತಾರರೆನಿಸಿದ್ದರು. ತಮ್ಮ ದಿನಚರಿಯಲ್ಲಿ ಸಾಂಪ್ರದಾಯದಂತೆ ಸಂಧ್ಯಾವಂದನೆ, ದೇವಮಂದಿರಗಳಲ್ಲಿ ನಿತ್ಯನೈಮಿತ್ತಿಕ ಪೂಜೆ ಉತ್ಸವ ಕೈಂಕರ್ಯಗಳು, ಅರಮನೆಯಲ್ಲಿ ಸಾಂಪ್ರದಾಯಿಕ ವ್ರತಗಳು, ದಸರಾ, ವರ್ಧಂತಿ ಉತ್ಸವಗಳು, ಬ್ರಾಹ್ಮಣರಲ್ಲಿ ಮತ್ತು ಆಚ–ಾರ್ಯರಲ್ಲಿ ವಿನಯಪೂರ್ವಕ ಗೌರವಾದರ; ಧಾರ್ಮಿಕ ತೀರ್ಥಕ್ಷೇತ್ರಗಳಾದ ಕೈಲಾಸ, ಮಾನಸ ಸರೋವರ, ಕಾಶಿ ಮುಂತಾದೆಡೆ ಪರ್ಯಟನೆ, ಸಂಸ್ಕೃತ ವಿದ್ಯಾಪ್ರಸಾರ; ಪರಮತ ಸೌಹಾರ್ದತ, ಚಿತ್ತಸಮುನ್ನತಿ, ಔದಾರ್ಯ ಇವೇ ಮೊದಲಾದ ಆದರ್ಶಗಳನ್ನು ಪಾಲಿಸಿದರು. ತಮ್ಮ ಆಂಗ್ಲ ಗುರುಗಳಾದ ಫ್ರೇಜರ್, ಆಂಗ್ಲ ಅಧಿಕಾರಿಗಳಾಗಿದ್ದ ಲಾರ್ಡ್ ಕರ್ಜನ್, ಮಿಂಟೊ ರೀಡಿಂಗ್, ಐವಿನ್, ರೋಮನ್ ಕ್ಯಾಥೋಲಿಕ್ ರಾಯಭಾರಿ, ಮಹಾರಾಣಿ ವಿಕ್ಟೋರಿಯಾ ಚಕ್ರವರ್ತಿಗಳಾದ ಎಡ್ವರ್ಡ್, ಜಾರ್ಜ್ ಪ್ರಿನ್ಸ್ ಆಫ್ ವೇಲ್ಸ್ ಮುಂತಾದವರೊಡನೆ ಪ್ರೀತಿ ವಿಶ್ವಾಸಾದರದಿಂದ ನಡೆದುಕೊಂಡು ಅವರೆಲ್ಲರ ಮೆಚ್ಚುಗೆಗೆ ಪಾತ್ರರಾಗಿದ್ದರು. ತಮ್ಮ ಮುಸ್ಲಿಂ ಸಹಪಾಠಿ ಸ್ನೇಹಿತ ಸರ್ ಮಿರ್ಜಾ ಇಸ್ಮಾಯಿಲರನ್ನು ದಿವಾನರನ್ನಾಗಿ ನೇಮಿಸಿಕೊಂಡು ತಮ್ಮ ಸರ್ವಧರ್ಮ ಸಮನ್ವಯತಾ ನೀತಿಯನ್ನು ಎತ್ತಿಹಿಡಿದರು.

ವೈಯಕ್ತಿಕ ಜೀವನದಲ್ಲೂ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು ಪರಿಶುದ್ಧತೆ, ನೈಷ್ಟಿಕತೆಗಳನ್ನು ಕಾಯ್ದುಕೊಂಡು ಬಂದರು. ಶ್ರೀರಾಮಚಂದ್ರನಂತೆ ಏಕಪತ್ನಿವ್ರತಸ್ಥರಾಗಿದ್ದರು. ರಾಜಮಾತೆ ಕೆಂಪನಂಜಮ್ಮಣ್ಣಿ ವಾಣಿವಿಲಾಸ ಸನ್ನಿಧಾನ ಅವರ ಆಜ್ಞಾಧಾರಕರಾಗಿದ್ದರು. ಆದರ್ಶಪುತ್ರರಾಗಿದ್ದರು. ಸೋದರರೂ ಯುವರಾಜರೂ ಆದ ಕಂಠೀರವ ನರಸಿಂಹರಾಜ ಒಡೆಯರನ್ನು ಜೀವನ ಪರ್ಯಂತ ಭ್ರಾತೃವಾತ್ಸಲ್ಯದಿಂದ ನಡೆಸಿಕೊಂಡರು. ಈ ಸೋದರಪ್ರೇಮವನ್ನು ಕಂಡ ಜನತೆ ಇವರನ್ನು ಆಧುನಿಕ ರಾಮ–ಲಕ್ಷ್ಮಣರೆಂದೇ ಕರೆದರು.

ಈ ಮೇಲಿನ ವಿವರಣೆಗಳಿಂದ ಮೈಸೂರಿನ ಮಹಾರಾಜರಾದ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರು ರಾಜಧರ್ಮನಿಷ್ಠ ಪ್ರಜಾಸುಖಸಾಧನಾ ನಿಷ್ಠ ಪ್ರಜಾರಂಜಕ ಪ್ರಜಾನುರಾಗಿ ಶ್ರೇಷ್ಠ ರಾಜರೂ ಹಾಗೂ ಸಂಪ್ರದಾಯನಿಷ್ಠ, ಸುಗುಣಸಂಪನ್ನತಾನಿಷ್ಠ, ಸರ್ವಧರ್ಮ ಸಮಪೋಷಕತಾನಿಷ್ಠ, ಆತ್ಮಸಂಯಮಿ ಬ್ರಹ್ಮನಿಷ್ಠ ಜ್ಞಾನವೈರಾಗ್ಯ ನಿಷ್ಠ ಋಷಿಸಮಾನ ರಾಜರೂ ಆಗಿದ್ದು 'ರಾಜರ್ಷಿ' ಎಂಬ ಬಿರುದಿಗೆ ಸತ್ಪಾತ್ರರಾಗಿದ್ದರು ಎಂಬುದನ್ನು ದೃಢವಾಗಿ ಪ್ರತಿಪಾದಿಸಬಹುದಾಗಿದೆ. ಇಂತಹ ರಾಜರನ್ನು ಪಡೆದ ಮೈಸೂರು ರಾಜ್ಯದ ಜನತೆ ಇಂದಿಗೂ ತಮ್ಮ ಧನ್ಯತಾಭಾವವನ್ನು ವ್ಯಕ್ತಪಡಿಸುತ್ತಾ ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯರನ್ನು ಪ್ರೀತ್ಯಾದರದಿಂದ ಸ್ಮರಿಸುತ್ತಾರೆ.

ಆಕರ ಗ್ರಂಥಗಳು :

1. 'ಶ್ರೀಮನ್ನಾಲ್ವಡಿ ಕೃಷ್ಣರಾಜ ಒಡೆಯವರ ಚರಿತ್ರೆ' – ಎಲ್.ಸ್ವಾಮಿರಾವ್ ಸುವರ್ಣ ಸ್ವಾತಂತ್ರ್ಯೋತ್ಸವ ಮಾಲಿಕೆ, ಪ್ರಕಟಣೆ : ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್ತು, 2003.

2. 'ಮೈಸೂರಿನ ನಾಲ್ವರು ಸಂಗೀತರಾಜರು', – ಡಾ॥ ರಾ. ಸತ್ಯನಾರಾಯಣ, ಮಹಾಮಹೋಪಾಧ್ಯಾಯರು ಬ್ರಹ್ಮವಿದ್ಯಾ (ರಿ.) ಶ್ರೀವಿದ್ಯಾ ಪ್ರತಿಷ್ಠಾನ ಅರಸು ಜನಾಂಗ, ಮೈಸೂರು, 2006.

3. 'ಪ್ರಸಂಗ–4' – ಮಾಸ್ತಿ ವೆಂಕಟೇಶ ಅಯ್ಯಂಗಾರ್ ಜೀವನ ಕಾರ್ಯಾಲಯ, ಬೆಂಗಳೂರು, 1967

4. 'ಮಾನವನಲ್ಲಿ ಋಷಿತ್ವ' – ಭಾಗ–1, – ಶೇಷಾದ್ರಿ ಎಸ್. ಕೈಪ ಸಂಹಿತಾ ಪ್ರಕಾಶನ, ಪಶ್ಚಿಮ ಆಂಜನೇಯ ಗುಡಿ ಬೀದಿ, ಬಸವನಗುಡಿ, ಬೆಂಗಳೂರು – 4, 2012.

5. 'ರಾಷ್ಟ್ರಕೂಟ ರಾಜ್ಯ' – ಡಾ॥ ಬೆಂ.ಶಾ. ಶ್ಯಾಮಲಾ ರತ್ನಕುಮಾರಿ ಅವರ (ಅಪ್ರಕಟಿತ ಪಿಹೆಚ್.ಡಿ. ಸಂಶೋಧನಾ ಗ್ರಂಥ)

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DHANVANTAREEYAM

Health, Medical Sciences & Ayurveda

Sl No	Title of the Paper	Authors	Page No
1.	SUN'S RAYS AS THERAPY : A PREVIEW	S. Renganayaki	81 - 84
2.	RASA TANTRA : RASA- BALACING EMOTIONS THROUGHT AROMA OIL	Dr.Jamuna	84 - 86
3.	NUTRITIONAL STATUS AND DIETARY PATTERN OF WOMEN FROM NANJANGUD TOWN OF MYSORE	Prabhavathi S.N Shilpa N & Hemalatha M.S	86 - 91
4.	HEALTH IN HANDWRITING – A SCIENTIFIC ANALYSIS	Dr. Noothan Rao	91 - 96
5.	"HEALING CURRENT"- HOLISTIC HEALTH THROUGH PSYCHONEUROBICS	Mrs. Madhuri Anand	97 - 101
6.	HEALING BODY WITH MUDRAS	Rajani B R & Poorvaja B	101 - 104
7.	AN INSIGHT TO BRAIN GYM EXERCISES AND ITSOUTCOME	Poorvaja B & Rajani B R	104 - 106
8.	OPTIMAL HEALTH THROUGH AYURVEDA	Kodidela Sri Divya Pothuru Thilak Naidu	107 - 109
9.	MANAGEMENT OF BIOMEDICAL WASTE	Kavya S.R & Hemalatha B.R	110 - 113
10.	USES OF TULASI IN AYURVEDA	Teja Y K & Rajith S	113 - 116

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SUN'S RAYS AS THERAPY : A PREVIEW

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Worship of Sun as an authentic, visible form of the divine Absolute is as mysterious as the universe, ever since its creation.The upäsanä of Sürya is an intimate element in our daily lives. Our scriptures stand testimony to worship of Surya for alleviating the physical as well as psychological illnesses even from Åg Vedic era.

Many maladies are cured with the chanting of Sürya çlokas, homa and herbal medicines. Surya is the celebrated physician for the ailments of the eye.Jyotisa and AyurvedicPhysicians prescribe special puja to suryafor the persons who have any kind of affliction of their eyes. One of the most important and noteworthy of the celebrations of Aditya or Surya is the Surya Sataka of Mayurakavi. He highlights surya in his Suryasatakam as प्रसन्नां दृष्टिंदाता gives clear sight । णआदित्यः चक्षुर्भुत्वा अक्षिणी प्राविशत् (vedic lines). He gives light to our pupil to view the world,क्ष चक्षुषामञ्जनं यद् dispels defects in the eyes, अहनां ज्यायः बीजम् Brings days and nights.

व्यापन्नर्तुर्न कालो व्यभिचरति फलं नौषधीर्वृष्टिरिष्टा
नेष्टैस्तृप्यन्ति देवा नहि वहति मरुन्निर्मलाभानि भानि ।
आशाः शान्ता न भिन्दत्यवधिमुधयो बिभ्रति क्ष्माभृतः क्ष्मां
यस्मिंस्त्रैलोक्यमेवं न चलति तपति स्तात्स सूर्यः श्रिये वः ॥
सूर्यशतकम् -८७

Valmiki Ramayana, the AdiKavya,describes Agastya initiating Sri Ramachandra

in the AdityahådayaStotra as a means of ensuring success in war with Ravana.

सर्वमङ्गल माङ्गल्यं सर्वपाप प्रणाशनं ।
चिन्ताशोक प्रशमनं आयुर्वधनं उत्तमं ॥

The sun, the wind and the moon together constitute the causes of time, season , taste (in drugs and diets), Vitiation of dosas and bodily strength. During the period of emission (Visarga) the power of the sunis restrained by various factors like time ,clouds etc. Thus the sun is relatively weak , the weaker the sun , the stronger is the moon, so the moon shines with its full force during this period.

One has to do Surya Namaskarameveryday to get good health. It is also laid down that Suryanamaskara and Aruna chanting should be undertaken whenever there is any serious illness afflicting any member of the family and mitigation of the suffering of the person sought earnestly. This is based upon the knowledge of the solar rays that vary with the seasons. The intensity of the sun is different at various times of the day. The ingredients of the rays are different accordingly. The four seasons- summer, Spring, Autumn and Winter have rays that vary with each of the seasons. Hence the potency as well as the properties varywith each season. Ancient Indians possessed a deep knowledge about this and accordingly they structured the diet and activity for every season. Proper regimen of diet prevents any ailment as also mitigates existing diseases following the pattern of solar radiation.

Importance of Sun in seasons and Dietetics : Carakawas one of the greatest Seers of ancient India who specialized in sciences of life. His treatise is considered as the most authoritative and exhaustive work in Ayurvedic science with special reference to the fundamental principles of medicine. This paper broadly draws from Caraka Samhita in presenting the effects of Sun in determining the diet according to seasons.

तस्याशिताद्यादाहाराद्बलं वर्णश्च वर्धते ।
यस्यर्तुसात्म्यं विदितं चेष्टाहारव्यपाश्रयम् ॥
चरक सम्हिता । वखल ॥१ । चहा ॥वा। सलखका ३ ॥

Enhancement of strength and lustreincluding happiness etc is caused by the maintenance of the equilibrium of tissue elements. Knowledge of suitable diet and regimens can be possible if one knows about seasons which are caused by the sun. The northward movement of the sun and its act of dehydration bring about three seasons beginning from late winter to summer. The southward movement of the sun and its act of hydration give rise to the other three seasons beginning to with rainy to early winter.

AYANA	SEASONS	MONTHS in Hindu Calendar	Months in English Calendar
Uttarayana - Period of dehydration	Sisira - late winter,	Magha, Phalguna	January to March
	vasantha - spring	Caitra, Vaisakha	March to May
	Grisma - Summer	Jyaistha, Asadha	May to July

Daksinayana - Period of hydration	Varsha - rainy season	Sravana, Bhadrava	July to September
	Sarat - Autumn	Assvina - Karthika	September to November
	Hemanta - Early winter	Margasirsa - Pausa	November to January

Effect Of Adana Kala On Body : The period of Adana (Dehydration) consists of three seasons - late winter , spring and summer. The drying effect of the sun and winds go on increasing progressively during this period. Physical weakness during this period is not only by the sun and winds but also by the production of dryness of the atmosphere as well as by the enhancement of the bitter, astringent and pungent taste.

Effect OfVisarga Kala On Body : वर्षाशरद्धेमन्तेषु तु दक्षिणाभिमुखेऽर्के कालमार्गट्टवातवर्षाभिहतप्रतापे शशिनि चाव्याहतबले माहेन्द्रसलिलप्रशान्तसन्तापे जगति अरूक्षा रसाः प्रवर्धन्तेऽम्ललवणमधुरा यथाक्रमं तत्र बलमुपचीयते नृणामिति ॥

चरक सम्हिता । vol.1, cha.vi, sloka 7.

During the rainy season, autumn and winter,the sun moves towards the south and its power (of heating) is slackened by various factors viz, the time, the course, storm and rain but moon is not affected by these. The earth is relieved of its heat by rain waters. Human beings progressively grow in strength. Generally people are susceptible to weakness during adana (dehydration) gain strength during visarga season. Hence effects of the sun in different seasons will leave impact on tastes and body strength.Hence dietetics and regimen for each season is important for maintaining equilibrium for our body/ It is stated in the Vishnu purana.

यत्तु मेट्टैः समुत्सृष्टं वारि तत् प्राणिनां द्विज ।
पुष्णात्योषधयः सर्वा ङ्जीवनायामृतं हि तत् ॥ १९
तेन वृद्धि परां नीतः सलिलेनौषधिगणः ।
साधकः फलपाकान्तः प्रजानां द्विज जायते ॥ २० ॥

विश्नु पुरानम् Book 2, cha.IX.19-20

The water , which the clouds step upon earth is ambrosia of living beings because it gives fertility to the plants which are support of their existence., By this all vegetables grown, mature and become means of sustaining life. The sun is a source of nourishment of life.

SEASONS AND DIET : Our Vedic seers have explained the effects of seasonal changes will bring to the living beings and how we can adapt and protect our life to get rid of diseases. They have prescribed food and diet according to the seasons.

1. Winter Season : During the cold winter the digestive power of human beings possessing good health is enhanced due to cold wind, it is capable of digesting any food stuff irrespective of his heaviness and the quantity. When it does not get proper fuel, the digestive fire affects the nutritive fluids, resulting in the vitiation of vata having chillness.

Recommended foods : Untuous , sour, salty juices of the meat of aquatic and marshy animals which are fatty, meat of burrow dwelling animals, Madira and sindhu types of wine and honey.

स यदा नेन्धनं युक्तं लभते देहजं तदा ।
रसं हिनस्त्यतो वायुः शीतः शीते प्रकुप्यति ॥ १० ॥
तस्मात्तुषारसमये स्निग्धाम्ललवणान् रसान् ।
औदकानूपमांसानां मेद्यानामुपयोजयेत् ॥

चरक सम्हिता । vol.1, cha.vi, sloka 10,11.

Cow's milk, cane juice, fat oil, new rice, and hot water during the winter increase life span.Massage , unction, application of oil on the head, underground resident, inner heated apartment of the building, wearing heavy and warm clothes, besmearing body with aguru, and food and drink which are light are to be avoided. Intake of gruel is to be avoided.

Winter is the best season for good health unless heavy food is taken, the digestive process cannot function properly the vata is cold by nature and its contact with external cold wind during winter renders it liable to be vitiated. This can be neutralized only by the intake of heavy food which provides sufficient heat and adequate nutrition to the tissues.

हेमन्तशिशिरौ तुल्यौ शिशिरेऽल्पं विशेषणम् ।
रौक्ष्यमादानजं शीतं मेट्टमारुतवर्षजम् ॥ १९
तस्माद्धैमन्तिकः सर्वः शिशिरे विधिरिष्यते ।

चरक सम्हिता । vol.1, cha.vi, sloka 19,20ab.

Avoid taking foods having pungent, bitter and astringent tastes, cold diets and drinks.

DietecticsFor Spring : Accumulated Kapha is liquefied by the heat of the sun which disturbs the power of digestion and causes many diseases.

Avoid heavy, unctuous, sour and sweet diets and daytime sleep. Should besmear body with candana and aguru. Food consisting of barley and wheat,meat of sarabha, sasa(rabbit), ena (antelope), drink should be unpolluted sidhu and mrdvika types of wines.

वसन्ते निचितः श्लेष्मा दिनकृद्भाभिरीरितः ।
कायाग्निं बाधते रोगांस्ततः प्रकुरुते बहून् ॥ २२

चरक सम्हिता । vol.1, cha.vi, sloka 22.

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Dietetics For Summer

मयूखैर्जगतः स्नेहं ग्रीष्मे पेपीयते रविः।
स्वादु शीतं द्रवं स्निग्धमन्नपानं तदा हितम्॥ २७ ॥
चरक सम्हिता। vol.1, cha.vi, sloka 22.

During summer the sun evaporates the moisture of the earth by its rays. Intake of seat,cold,liquid and unctuous diets and drinks is prescribed. Intake of Mamtha(groat mingled with cold water and ghee) along with sugar, ghee and milk along with Sali rice does not suffer from any disease. Avoid Alcholic drinks.

DietecticsFor Rainy Season : Our body which was weakened during the period of dehydration is further weakened due to the vitiation of vata and other dosas during the rains. It is further weakened by the gas coming out of the earth, rainfall, increase of acidity in water. Hence moderate diet is recommended. Old barley, wheat and Sali rice along with the meat of arid animals and vegetable soup., Drink Madhvika or arista type of liquor, pure rain water or water from the well or pond boilled and cooled mixed with litte honey.

Intake of sour,salty and unctuous diet will serve as an effective antidote to the vitiation of vata during the rainy season.

अग्निसंरक्षणवता यवगोधूमशालयः।
पुराणा जाङ्गलैर्मांसैर्भोज्या युषैश्च संस्कृतैः॥ ३८
चरक सम्हिता। vol.1, cha.vi, sloka 38.

When it is too cold due to heavy rains with the storm, the sour and salty diets are required as they are exceedingly useful in overcoming the vitiating of vata which is the most harmful of all.

Dietetics For Autumn : The autumn is preceded by the rainy season. Thus our body exposed to cooling effects of the sun get exposed to the scorching rays the sun causes vitiation of pitta.

Only light food is recommended. Sweet,light,cold and bitter foods and drinks which are potentialities to alleviate pitta are to be taken in proper quantity when there is good appetite.

Avoid taking sun-bath,fat,oil and meat of aquatic and marshy animals and alkaline salt preparationsand curd in food. Avoid day time sleep. The water exposed to the heat of the sun during the daytime and to the cooling rays of the moon during night which is known as "Hamsodaka" is as beneficial as nectar for the purpose of bathing drinking and swimming, The word "hamsodaka" has two connotations Hamsa stands for the sun and moon, so the water is purified by the rays of the sun and the moon. Purification of food is here by inclined.

हंसोदकमिति खयातं शारदं विमलं शुचि।
स्नानपानावगाहेषु हितमम्बु यथाऽमृतम्॥४७
चरक सम्हिता। vol.1, cha.vi, sloka 47.

Our physical body is the vehicle to elevate us to the higher plane that is to realize the power of supreme truth. We get strength and power from the sunwhich is thesource of transforming from one energy to another energy, The sun, with earth and moon nourishes the complete eco system with its multifarious rays. Thus suryanamaskar helps us to keep our vibrancy and receptivity of maintaining our health perfectly. It has great power to energize and warm during the cold and winter day. It is a comprehensive exercise which benefits our mental,emotional, physical and spiritual well being. It is obeisance to the sun God who is our protector and visible God. It is should be normally done in dawn, chanting 12 Mantras along with 12 asanas accompanied with specific breathing pattern. The sun is the symbol of light, radiance, clarity and consciousness. These 12 postures, if performed with special concentration on each chakra in our body will provide calmness of nerves, good blood circulation, digestive power, mental stability and spiritual development.

The twelve postures are structured in keeping with the physiology of humans and accompanied with breathing techniques. Some have exhalation while others are done while inhaling and retaining air. They are Urdva namaskara or namaskara mudra with anjalihasta, hastauttasana, padahasta, ardha candrasana, parvatasana, astangasana, bhujangasana, sasankasana, parvatasana, ardha candrasana, padahastasana and hastauttasana. Some of the asanas are repetitions. Each of these postures are to be perfected for total benefit, accompanied by their breathing technique. While these postures stretch different body-parts, it also exercises the internal organs. The mantras help in sending vibrations to these organs. Thus a conglomerate result is obtained by the doer.

Position	Mantra	Concentrate
1	Om MiträyaNamah	Anahatacakra
2	Om RavayeNamah	Visuddhicakra
3	Om Süryaya Namah	Manipuracakra
4	Om BhäraveNamah	Anahatacakra
5	Om KhägayaNamah	Sahasraracakra
6	Om PuñnaNamah	whole body
7	Om Hiranyagabhäya	svadåstanacakra
8	Om MarécayeNamah	Sahasarasacakra
9	Om SavitreNamah	Anahatacakra
10	Om ArkayaNamah	Manipuracakra
11	Om AdityäyaNamah	Viñudhicakra
12	Om BhaskärayaNamah	Anahatacakra

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ABSORPTION OF VITAMIN - D : While doing these Surya Namaskaras, facing the Sun in the early morning, the entire body absorbs sunlight, which helps to activate Vitamin D in the body, very rare in our food we consume. Vitamin D is vital forabsorbing Calcium properly from the food that we eat.

Vitamin D is called Sunshine Vitamin, It is suggested to supply a protective effect against diseases like Cancer, Type I Diabetes and Skin diseases . The Sun's rays provide ultra violet (UVB) energy, which the skin uses for making Vitamin D. without this Sunshine Vitamin the body cannot absorb the Calcium it ingests, so it depletes Calcium from bones, increasing the risk of Osteoporosis and fractures.

This is also described in the AditiyaHrudayam. The 'Pingalä '- rising sun who is in yellow colour enters in the PingalaNadi as air and connects the Jiva with himself and gives energy. He is also called dvädaçätman Lord of 12 months and 12 Nadis.

So 12 postures of Surya Namaskaras which are done facing the early morning Sun will activate Vitamin D, for healthier bones and healthy Body.

In modern times people are engrossed in work that they neglect physical health by sleeping late and getting up late. When do people get time to see the rising Sun or the setting Sun and benefit from its rays ? We need not go to doctors who prescribe a big list of tests which swallow our hard earned money if we realize that great seers of India have prescribed medicines in the form of exercises. In the Gita, Lord Krishna States – "The light of the sun, that illuminates the entire solar world, and that which shines in the fire know that light to be mine".

यथा प्रकाशयत्येकः कृत्स्नं लोकमिमं रविः।
क्षेत्रं क्षेत्री तथा कृत्स्नं प्रकाशयति भारत॥

(Bhagavatgita, 13th cha.v.33)

Hence Suryanamaskaram is a single remedy for various diseases. This exercise along with chants and pranayama will certainly maintain our body and mind very healthy.

नमः पूर्वायगिरये षश्चिमायाद्रयेनमः

our pranams to the Lord who rises in the East and who is also Antaryamin.

हृद्रोगं मम सूर्य हरिमाणं च नाशय।

Remove my heart disease and take from me the yellow hue (indicates to another disease in which the body becomes yellow.

RASA TANTRA : RASA- BALACING EMOTIONS THROUGHT AROMA OIL

Dr.Jamuna's
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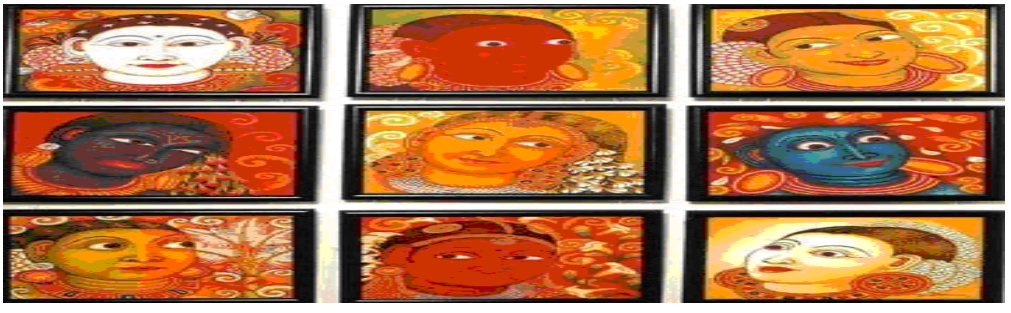
The ancient Vedic tradition of Rasa Tantra defines 'RASA' as the 'essence of emotions' It recognises 9 emotions
Srngâram - LOVE,
Hâsyam - JOY,
Raudram - ANGER,
Kâruryam - SADNESS,
Bîbhatsam - DISGUST,
Bhayânakam - FEAR,
Vîram - COURAGE,
Adbhutam - WONDER,
Úântam - PEACE ,
Balance your emotions with the science of aromatherapy. Navarasa or 9 emotions need balancing according to the age old Vedic science of Rasa Tantra



Knowing the emotions and being aware of the changes in our consciousnesses helps us be in good health. Be Balanced. Be Natural.

Medicinal Aromatherapy :utilizes therapeutic grade essential oils to treat physical, emotional, and mental disorders. Essential oils are the pure natural elements derived from plant life. Essential oils can be used to bring the body into balance so that it can heal more quickly - often without the side effects of pharmaceuticals. While essential oils are effective on their own, they can also work in collaboration with conventional medicine

With the guidance of a certified Medicinal Aromatherapist, you can use essential oils to help build your immune system, think more clearly, breathe more deeply, improve digestion, heart and general health ailments. Essential oils can be used to treat specific conditions whiling improving your mood and calming your mind.

The mystics of the Vedic times believed, the right formula for incense had the power to attract the positive universal energy and would usher inauspiciousness and an obstacle free celebration. incense Breathe in pure conscious bliss with the tranquil aroma oil

Knowing the emotions and being aware of the changes in our consciousnesses helps us be in good health.

A sensual blend to simulate your senses For ecstasy & bliss, add a few drops to water in an aroma diffuse

Rose (Rosa damascena), rose is the moody mare's oil, it increases feelings of self love and self respect and is best for those who harbour resentful anger, or whose emotions have been hurt, it works well in combination with yarrow for past abuse.

Peppermint (Mentha piperita) –this is the best oil for those who are defensive of their space, it is also for those who lack tolerance and flexibility 'let go' of stubbornness and fixed resistance" Everlast (Helichrysum italicum) this is good for deeply bruised emotions and a festering anger that is unexpressed.

Roman chamomile (Anthemis nobilis) soothes and pacifies, particularly good for youngsters and those who have childish tantrums or who have learnt that anger gets them attention.

Lavender (Lavandula angustifolia)- is especially good for pent up annoyance and restless irritability.

Benzoin (Styrax Benzoin): this also releases past trauma and is good for those who react angrily because they are trying to cut themselves off from their body

Bergamot (Citrus bergamia)- this is good for mood swings, sudden outbursts of rage, those who react angrily when challenged and a sense of frustration

Orange (Citrus sinensis) – is also good for explosive anger, which is often the outcome of frustration and a lack of confidence

Grapefruit (Citrus paradisi)– good for those who swallow their anger and close down, often they over eat.

people are content with things and when they are content they are happy and the feeling of joy also abounds.

CONCLUSION: We believe through experience, the anecdotal proof offered by untold people using essential oils, historical use of certain oil and the limited scientific research already undertaken, that essential oils and aromatherapy can be most beneficial to your health.

It must be understood that since essential oils as such can not be patented,

.Aromatherapy may help improve some of the effects of the pain such as sleep disturbance, joint and muscle mobility, whilst helping you to relax and feel better. Achieving one or more of these things, can help people to cope better with pain on a day to day basis& help to come out of dis comfort.

Acknowledgement: Time goes by so swiftly that it has been 12 years since I started working on essential oils. Regardless of easing pain / menstrual cramps that female so troubled with, or treating idiopathic thrombocytophenia purpura [ITP] AUTISM ,NEUROLOGICAL DISORDERwhich a lot of people suffers, these have taken up my life. The process is intresting but seeing the clients /patient's thank-you notes/ease from dis comfort everything was made worth it. I'll back on , in the worlds of natural therapies,MEDICINES & ESSENTIAL OIL

References:

Aromatherapy Workbook UK:Thorsons

ShirleyAromatherapy for Health his article discusses the main types of aromatherapy chemical compounds which are found in the essential oils of plants

1. "500 Formulas for Aromatherapy" by Schiller and Schiller

2. "The Little Giant Encyclopedia of Aromatherapy" by Schiller and Schiller

3. ""The Fragrant Mind Aromatherapy for Personality, Mind, Mood, and Emotion" by Valerie Ann Worwood

4. "Aromatherapy An A-Z" by Patricia Davis

5. "Aromatherapy for Vibrant Health and Beauty"

by Roberta Wilson

6. "Aromatherapy through the Seasons" by Judith Fitzsimmons and Paula M Bousquet

7. "Advanced Aromatherapy The Science of Essential Oil Therapy" by Kurt Schnaubelt, Ph.D.

8. "Aromatherapy Companion" by Victoria H Edwards

9. "The Encyclopedia of Aromatherapy" by Chrissie Wildwood.

10. "The Encyclopedia of Essential Oils" by Julia Lawless

11. "The Complete Book of Essential Oils and Aromatherapy" by Valerie Ann Worwood

12. "The Illustrated Encyclopedia of Essential Oils" by Julia Lawless

13. "Aromatherapy for Health Professionals" by Shirley and Len Price

14. Aromatherapy for the Healthy Child" by Valerie Ann Worwood

15. "Aromatherapy for Dummies" by Kathi Keville

16. "The Aromatherapy Book" by Jeanne Rose

17. "Aromatherapy Handbook for Beauty, Hair and Skin Care" by Erich Keller

18. "Making Aromatherapy Creams & Lotions" by Donna Maria

19. "Essential Oil Safety - A Guide for Health Care Professionals" by Robert Tisserand and Tony Balacs

20. "The Aromatherapy Practitioner Reference Manual" by Sylla Sheppard-Hanger

21. "Practical Aromatherapy for Home and Garden Decoder"

22. "Aromatherapy Decoder"

Ref:Indian tradition of chemistry & chemical technology.by Prof.A.R.vasudev murthy prasun kumar mishra Publish:samskrita bharati

Bibilography:Rasaratna samuchaya by vagbhataD. joshi (indian journal of history of science),indian national academy –New delhi-1992

History of chemistry in ancient &Medieval India by sen P.C.Ray.Indian chemical society, Calcutta,1956

Indian science & Technology in the Eighteenth Century Some contemporary European Accounts,

Dharmpal,Impex India,Delhi=1971.

- Marma Points and the Practice of Yoga
- by Dr. David Frawley
- From the book Ayurveda and Marma Therapy by Frawley, Ranade and Lele (Lotus Press) .
- Marma vimarsha by Vaidya Vishal .ma Nannel-pune -2003
- Studies of Indian litreture Pune : Prof. P K.Gode Collected Works Publication Committee

NUTRITIONAL STATUS AND DIETARY PATTERN OF WOMEN FROM NANJANGUD TOWN OF MYSORE

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Women are vulnerable to malnutrition, for social and biological reasons, throughout their life-cycle. The nutritional status of women is influenced by multiple factors such as age, education, job, economic level, family status, residence nutrient intake, metabolism, and extent of utilization of absorbed nutrients. Women have different life style and workloads for which they might have different fitness level as well as different health status. Housewives are engaged in their households' works where as the working women are engaged with professional works in their respective field. In the present investigation, an attempt was made to determine the nutritional status and dietary pattern of women from Nanjangud town of Mysore district. A total of 50 female subjects (25-housewives, 25 working women) in the age group of 25-50 years were recruited for the study. A pretested structured questionnaire was used to elicit personal and specific information pertaining to the study. The findings revealed that higher proportion of women from both the groups were following mixed diet pattern. Anthropometric parameters indicated that house wives were found to have higher mean body weight as well as mean BMI than working women. The differences were statistically significant between house wives and working women. Statistically significant differences were also noted for mean nutrient intake of energy, protein, fat, carbohydrate, iron calcium and fiber. This result clearly confirms that house wives were at risk for developing obesity. Hence, housewives need to watch out the amount and type of food they consume as well as about physical activity to maintain healthy body weight.

Key words: BMI, nutritional status, nutrition knowledge, dietary recall.

The health and nutritional status of an Indian female is known to have strong association with their status in the society. This could be due to the reason that most communities follow patrilineal social structure which in turn has strong influence on gender differences ((Askonic and Kirchengast 2012). The available information on the women's nutritional status is likely to be related to their nutritional status during pregnancy and lactation and its impact on delivery and child bearing functions. Women play multiple roles in a family; as mothers and housekeepers. Equally important is their role played as wage earners, agricultural producers, nutrition providers etc. they also play an essential role in the acquisition of food, its preparation, storage and distribution. However, very often they are susceptible to develop malnutrition. Poor nutritional status among women is known to begin in infancy and would continue throughout their life time if proper care is not taken (Chatterjee 1990; Desai 1994). Deficiency of energy, protein, micronutrients like vitamin A. iron and iodine are the most well recognized health consequences observed among adult females. Hence, it is important to concentrate on the proper nutrition of females throughout their life cycle. This in turn would contribute to lead a much healthier life which enables her to pursue multiple household responsibilities.

Offering better nutrition for women would also help to achieve well being of her family also. At the same time it is also important to provide increased resources for imparting nutrition programme to women to increase their knowledge regarding nutrition, to improve access to food in a more secured manner along with ensuring better preparation, preservation, handling and distribution of foods. In today's world the health profile is changing rapidly. This could be due to rapid nutrition transition occurring in most of the developing countries (Popkin 1994). National Family health survey (2007), conducted a nationwide survey regarding the changing health profile of women. Information collected through household survey could be utilized to understand the dietary patterns of women. This is also beneficial to assess whether the nutritional requirements are met or not. BMI is the well recognized anthropometric indicator which can be used not only for assessing nutritional status but can also be used to estimated the socioeconomic situation especially in developing countries like india (Khongsdier 2002, Tungdim and Kapoor 2001). The objective of the present investigation was to determine the nutritional status and dietary pattern of housewives and working women from Nanjanagud town.

METHODOLOGY : In this study, a total of 50 females (25- housewives and 25 working women) were selected randomly. The study was conducted in Nanjanagud town. The baseline information collected included age, height, weight, education and food pattern through a face-to face interview with the subjects of the study. Body weight was measured using an electronic weighing balance and recorded to the nearest of 0.5kg. Height was measured using a mounted tape. Body mass index (BMI) was then calculated as weight in kg divided by the square of height in meters. Waist circumference and mid upper arm circumference (MUAC) were recorded according to Jellieff (1966). Dietary assessment was done using food frequency and dietary intake survey by 24 hr recall method. At the time of data collection the participants were asked to report and recall the amount of food they had consumed in a day. nutrient content was calculated based on food composition table for Indians. Percent adequacy was also computed based on dietary guidelines for Indians. The frequency of consumption of various foods was evaluated using a questionnaire which consisted of a list of foods and the subjects were asked to report their frequency of intake of each food item. Data were analyzed and reported as mean ± SD for all measurements using computer software. Levels of significance were determined by t-test.

RESULTS AND DISCUSSION

Table 1. Age –wise distribution of the subjects (%)

Age	Housewives (n=25)	Working women (n=25)
25-30	12	20
31-35	20	32
36-40	32	8
41-45	20	28
46-50	16	12

Data pertaining to age-wise distribution of the study population is given in table 1. As can be observed from the table, majority of the subjects (32%) among housewives were falling in the age range of 36-40 years, followed by an equal percentage of subjects (20%) in the age group of 31-35 and 41-45 years respectively. While among working women, a highest proportion of individuals (32%) were in the age group of 31-35 years. About 28% of the individuals were shown to be in the age group of 41-45 years. Comparatively very small percentage (8%) of subjects were in the age group of 36-40 years.

Table 2. Demographic profile of the subjects (%)

Characteristics	House wives	Working women
Religion		
Hindu	92	88
Christian	8	8
Muslim	-	4
Others	-	0
Family structure		
Nuclear	48	64
Joint	40	16
Extended	12	20
Education		
SSLC	36	48
PUC	24	12
Degree	20	32
Master degree	20	8
Occupation		
Clerical	-	52
Assistants	-	36
Peons	-	12
Monthly income		
5000-10,000	36	16
11000-15,000	32	20
16,000-20,000	20	40
Above 20,000	12	24
Type of diet		
Vegetarian	24	56
Mixed	76	44
Number of meals per day		
3	42	48
4	24	22
5	34	30

Table 2 indicates demographic characteristics of the study population. The results showed that the study population consisted of a highest percentage of (92%) individuals belonging to Hindu religion and only 8% were Christians. Details about structure of family indicated that about 48 and 64% of subjects from house wives as well as working women category were belonging to nuclear family. A considerably small percentage of subject's i.e, 12 and 20% were reported to live in extended families. While the percentage of subjects living in joint families was higher (40%) for house wife category. Majority (76%) of the subjects in the hose wife category were following mixed pattern of diet. While among working women category a comparatively higher proportion of subjects (56%) were vegetarians as against 44% of the subjects who were following mixed diet.

Educational status indicated that a vast majority of subjects (36 and 48%) from both the groups had studied up to SSLC. Among housewives, about 24% of the subjects were responded to have studied up to PUC. An equal percentage of subjects (20%) were found to be degree and master degree holders. Information on the economic status revealed that, among housewives a highest proportion of individuals (36%) belonged to low income group followed by a small proportion (12%) of subjects falling into higher income category and middle income groups (8%) respectively.

Table 3. Anthropometric measurements

Anthropometric measures	Housewives	Working women
Height (cm)	154.28 ± 3.87	162.08 ± 4.4
Weight (kg)	82.96 ±3.89	71.5 ± 5.13
BMI (kg/m2)	33.34 ± 1.98	27.24 ±1.39
MUAC (cm)	29.84 ± 2.49	24.97± 4.68
WHR	0.92 ± 0.03	0.85 ± 0.16

The mean anthropometric measurements of subjects are shown in table 3. The results revealed that a slightly higher mean body weights were recorded among housewives. The mean BMI of subjects among housewives was 33.34 ±1.98kg/m2 which was comparatively higher than the values observed for working women (27.24 ± 1.39 kg/m2). Body mass index can be a usedful tool to assess individual and community nutritional status (Bailey and Ferro-Luzzi 1995). According to the 2nd national family health survey the estimated mean body mass index for women in the age group of 15-49 years is 20.3. Here in the present investigation much higher BMI values were noted among both the groups. This could increase their risk of developing various lifestyle related diseases. A higher WHR ratio was also noted among housewives.

Table 4. Mean nutrient intake

Nutrients	Mean intake		p-value
	House wives	Working women	
Protein (g)	65.5 ±7.85	54 ±9.39	< 0.0001***

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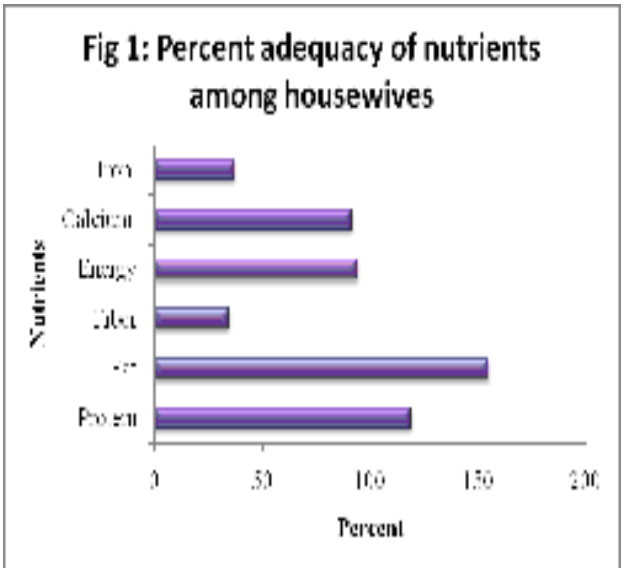
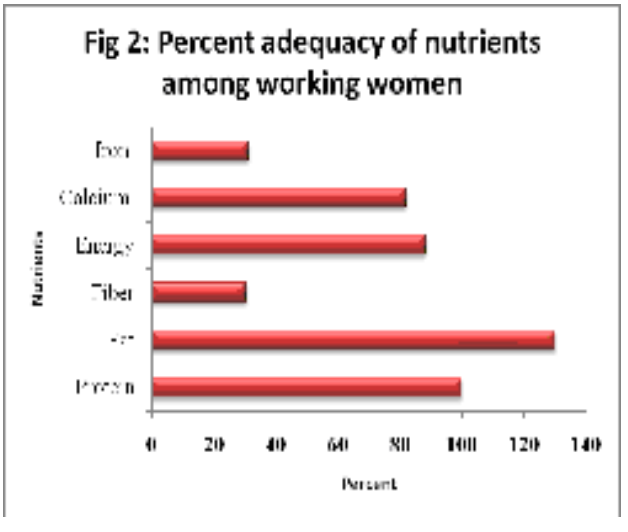
Fat (g)	68 ±12.42	56 ±11.79	0.002**
Fiber	8.55 ±1.22	7.61± 1.25	0.015*
Energy	2100 ±285	1969 ±187	0.047*
Calcium	548.05 ±20.99	491.3 ±70.84	0.001**
Iron	13.05± 1.82	10.92± 1.09	< 0.0001***

Dietary intake of major nutrients by all the subjects was determined using 24 hr recall method of survey and the details are presented in table 4. The mean protein intake was found to be sufficient among working women category. While among housewives it was above the recommended level. Mean fat intake was shown to be slightly higher for both the groups. Fiber intake was extremely low. Housewives indicated a mean intake of 8.55 ± 12.4. Whereas for working women the mean value was much lesser with 7.61 ±1.2g /day. The energy intake was comparatively higher for subjects belonging in housewives category (2100 ± 285 Kcal) with slightly lower intake encountered among working women (1969 ± 187 Kcal). Calcium intake was found to be slightly below the recommended level. Iron intake was found to be satisfactory among housewives (13.05 ± 1.82) and for working women it was observed to be extremely low with a total mean intake of 10.92 ± 1.09g/day. Statistical analysis indicated extremely significant differences with respect to protein and iron intake. The remaining nutrients also exhibited mild to moderate level of significant differences.

Study conducted by Udaya lakshmi and Babitha (2014). on dietary intake and nutritional status of women in rural Guntur district has reported that, the intake of all the nutrients was found to be lower than the RDA. The percet adequacy of calories and protein were 94.3 and 89.09 respectively. Other nutrients like B complex vitamins in diet was in the range of 50-77% the diets of the subjects were encountered to have deficient amounts of nutrients particularly vitamin A (36%) and Iron (47.4%). This could be attributed to the poor consumption of green leafy vegetables as well as fruits.





The analysis of percent adequacy of various nutrients for both housewives and working women is presented in fig 1 and 2. The analysis indicated that among house wives energy intake was adequate. Protein consumption was above the recommended level. While among working women, the computed value was well within the normal range. Fat intake was more for both the groups. Calcium intake was found to be adequate for both housewives as well as working women (91.3 and 81.88%). Iron consumption was found to be the least for both the groups which accounted for 37.2 and 31.2% respectively for both housewives and working women. Fiber consumption was extremely low with a computed percent adequacy of 34.2% for housewives and 30.4% for working women.

Table 5: Food frequency categorized as mean number of subjects using daily

Type of food	Average intake		Type of food	Average intake	
	House wives	Working women		House wives	Working women
Cereals and millets			**Roots and tubers**		
Rice	25	25	Carrot	4.66	6.5
Wheat	13.3	22.4	Potato	5.8	4.2
Ragi	14.4	8	Onion	24.8	22.6
Pulses			Ginger	4.8	8.6
Red gram dhal	16.8	13.3	**Milk and milk products**		
Black gram dhal	4.4	10.2	Milk	25	25
Bengal gram dhal	18.2	12.6	Curd	9	4.1
Green gram dhal	3.2	2.2	Butter milk	8	18.3
Green leafy vegetables			Ghee	14.6	4.6
Spinach	5.2	5.4	Butter	4.6	5.6
Mint	4.8	4.6	**Sugar and jaggery**		
coriander	6	5.3	Sugar	25	25
Vegetables			Jaggery	6.8	4.2
Beans	12.4	8.7	**Fruits**		
Brinjal	8.5	3.7	Banana	14.4	18.4
Radish	15.4	10.2	Sweet lime	6.8	12.2
Ridge gourd	13.8	20.4	Water melon	2.8	5.9
Bottle gourd	22.8	16.9	Grapes	10.4	14.7
			Pomegranate	5.4	18.6
Non-vegetarian foods			**Bakery items**		
Meat	20.3	5.6	Cake	5.7	9.6
Chicken	4.8	5.6	Puffs	6.8	4.8
Egg	4.6	5.3	cookies	12.5	18.8
Fish	5.2	4.6	**Beverages**		
Fried foods			Coffee	5.7	6
Bajji	5.6	7.6	Tea	5.3	10.8
Bonda	6.6	6.9	Fruit juice	4.4	10.9
Vada	12.6	8.8	Carbonated drinks	7.8	14.6

The food frequency data of subjects computed as average intake per day is presented in table 5. The results revealed that among the cereals, rice and wheat were found to be consumed more frequently among both the groups. Among dhals red gram dhal as well as Bengal gram dhal were reported to be used frequently by both the groups. Other dhals such as black gram dhal and green gram dhal was said to have been used very rarely. Consumption of all green leafy vegetables among both the groups was noticed to have lesser frequencies. Vegetable consumption indicated that bottle gourd, ridge gourd and radish were the most commonly and frequently used ones. Onion was reported to be used very often by majority of the subjects and others were being used less frequently. Milk product such as ghee was seemed to be used in moderation among housewives. Whereas the butter milk consumption among working women was shown to be used most frequently. Fruit consumption was observed to be in moderation for both the groups. A non vegetarian food like meat was found to be used in higher frequencies among housewives. Information on fried food intake showed that they were being used less frequently. The average

consumption of bakery products was noticed to be comparatively higher for working women. Beverages like coffee and tea were reported to be used by a very small percentage of subjects. Fruit juice and cola beverages were rarely used by the housewives.

CONCLUSION : The study brought out certain important inferences. Subjects belonging to housewives category indicated to have higher anthropometric measurements. This situation if continues for a long time coupled with higher calorie intake and sedentary life style would push the individual towards developing life threatening diseases. This would bring down their overall capacity to pursue multiple household tasks. Dietary data showed very low consumption of fruits and vegetables and are susceptible to have low immunity. Emphasis should be given for balanced diet with a minimum amount of physical activity for maintaining healthy body weight and long term health and well being.

REFERENCES

1. Udaya lakshmi K and Babitha B (2014). Dietary intake and nutritional status of women in rural Guntur district. Biolife, 2(4), 1120-1124.

2. Bailey, K.V.; Ferro-Luzzi A. (1995), Use of Body Mass Index of Adults in Assessing Individual and Community Nutritional Status, Bulletin of World Health Organization, 73:673–680.

3. Popkin B.M. The nutrition transition in low income countries; an emerging crisis. Nutr. Rev, 52; 285-98.

4. NFHS. National Family health survey (NFHS-2). 1998-99. Mumbai international institute for population sciences. 2000.

5. Chatterjee M (1990). Indian women. Their Health and Economic productivity. World Bank Discussion Papers, 109, Washington, D.C: World Bank.

6. Desai Sonalde (1994). Gender Inequality and Demographic Behaviour, India. New York: The Population Council.

7. Askovic B, Kirchengast S. (2012) Gender differences in nutritional behavior and weight status during early and late adolescence. Anthropol Anz 69:289-304.

8. Derrick B. Jelliffe (1966). The assessment of the nutritional status of the community. World health organization, Geneva.

9. Gopalan C, Ramasastri and Balasubramanian S.C. (2002). Nutritive value of Indian foods. National institute of nutrition, Indian council of medical nutrition.

10. Khongsdier R. (2002) Body mass index and morbidity in adult males of the War Khasi in Northeast India. Eur J Clin Nutr 56:484-489.

11. Tungdim MG, Kapoor AK. (2001) Nutritional status and chronic disease among the adult tribal population of Northeast India. Open Anthropol J 3:188-191.

HEALTH IN HANDWRITING – A SCIENTIFIC ANALYSIS

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Have you noticed that when you try to write while you are unwell, your grip on the pen softens, your pressure on the paper diminishes and the movement of strokes becomes unsteady?

You might have noticed the changes in your handwriting, this but would not have tried to analyze why it happened. It happens because handwriting traces disturbances in neuro-muscular coordination, and the way strokes flow out of writing instrument gives away a great deal about the health condition. But that is not all. You may be surprised to know that the warnings can come through your handwriting much before your body starts exhibiting visible symptoms of a particular ailment.

What health issues can be found out through handwriting analysis – Mental & physical ailments, physical pain, surgery marks, psychosomatic diseases, learning difficulties, neuro & muscular problems, heart ailments, infections, sensory organs problems (eye sight, hearing, skin etc.) cancer, diabetes, blood pressure, hypertension, ulcers, cists, tumors, liver cirrhosis, cholesterol, addictions, suicidal tendency, depression, bone problems, stroke, stomach troubles, hormonal issues, problems in reproductive system, sexual issues, OCD, ADHD, stammering, phobias, fears, trauma, guilt and related diseases can be identified in one's handwriting. List goes on and there is scope for much deeper research in this area.

Handwriting Samples are collected from various areas like UP, Jarkhand, Hindupur, Ananthpur, Bengaluru, Mangaluru, foreign countries and also from various walks of life (Hospitals, Schools, Colleges, Family gatherings, Clubs, Orphanages, NGOs, Old age homes, Corporate Organizations, Companies etc.)

Here one can identify/understand the root cause of any ailment and accordingly treatment can be given. Best

part is, by changing your handwriting in a scientific way you can change your personality, thinking patterns and cure many ailments from the root and you can live a healthy life. Every day writing certain patterns, affirmations in a healthy handwriting can actually help you to lead a healthy life.

DISEASES AFFECTING HANDWRITING – (Where research has been done already)

1.BODILY ILLS:-

CARDIOVASCULAR DEFICIENCIES: Extremely light, spasmodic pressure combined with broken and altered strokes. The script is difficult to read. Jerks, skips, pressure points are common.

LOW BLOOD PRESSURE: Light pressure, occasional ink filled vowels, few t crossings, some letters are unfinished.

HIGH BLOOD PRESSURE: The specific sign is precise and easy to detect: thin or broken strokes appear suddenly in stems and loops. Also resting dots all over the space indicate high BP.

EXCESSIVE CHOLESTEROL LEVEL: Too much cholesterol in the blood raises blood pressure and puts a strain on the heart. Spasmodic pressure, broken strokes, and plunging baselines. Altered letters and overlapping strokes make the script difficult to read. To summarize, these are the aspects of handwriting which may indicate cardiovascular deficiency and related other issues:

• Extremely light, irregular pressure, trembling and shaking script.

• Very meandering baseline combined with broken strokes.

• Baseline plunging downward, letters plunging suddenly downward below baseline. Altered shapes and letters.

• Superfluous dots inside the strokes, letters, words, or lines, also resting dots.

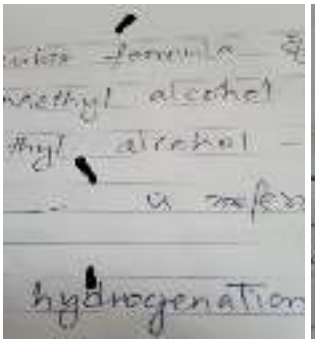
• The letter o in a heart shape. Vowels and loops filled with ink.

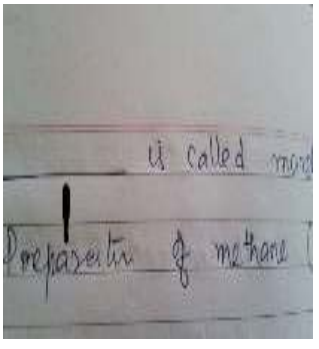
Several of these factors relate to illness as a general aspect of the writer. The most specific signal is the heart shaped o, which often appears in the script of people who know they have heart disease. If the writer is in doubt about your interpretation of cardiovascular deficiency, urge him or her to have a blood pressure or cholesterol checkup.

• Written by 43 year old IT guy 2 days before death by massive heart attack & reduced oxygen to brain. No cholesterol & no earlier symptoms of high BP. He is regular with walking regime. Had work related stress which led to high

BP. He neglected clues & didn't go to doctor. Here first writing shows lot of resting dots which means high BP (here may be 170+) Resting dot means dots outside the writing where they are not required/ supposed to be.

• See the pain dot in letter "a" in second picture which denotes pain in hand/shoulder says high BP & affected heart. Conditions must have aggravated in 2 days without medication & led to death. High BP is silent killer. Check handwriting for these type of resting dots to help control BP.





LUNGS/THROAT/THORASIC AREA & THYROID :– letter c or e will be spoiled or ink filled. These letters represent the area above diaphragm up to mouth. Surgery marks also come in these letters. Thickening & weakness in the upper loops also an indicator. Formation of letter "e" is distorted and varying slant also indicate thyroid disease

CANCER: Like the number one killer, heart disease, cancer may be strongly influenced by a person's temperament and habits, among them eating and drinking patterns, reactions to stress and smoking. Psychologically it is proven that unresolved resentment leads to cancer.

Handwriting undergoes brutal changes, which are easiest to spot if you have access to samples of the script written when the person was healthy. In general you will note that the following aspects are intensified in the script of people suffering from cancer:

•weak, even limp, pressure, round shapes and garlands

• Descending baseline, end strokes and letters plunging below the baseline.

•Difficult to read script: twisted strokes and letters in all zones, broken strokes, and altered letters, currugative writing.

• Heavy I dots. Ink filled ovals, (ink filled c indicated lung cancer)

• Strong resentment strokes, uneven blood flow

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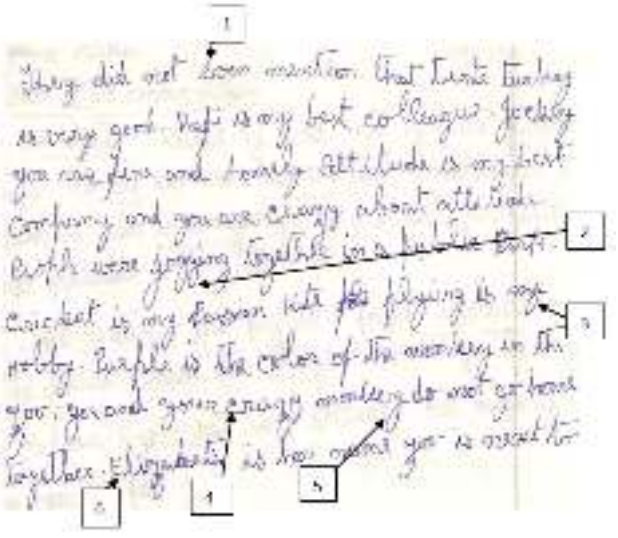


1. Pain Dot – surgery mark
2. Uneven lower loops – uneven limbs
3. Bent lower loop – back pain
4. Ink filled c – cancer affected lung area
5. Skip or uneven pressure
6. Small capitals – low self esteem

In the above sample the top right portion of the "e" sows pain dots that could be as a result of mastectomy on the right side. Ink filled "c" shows cancer affected lung area. She had severe arthritis problem too.

LIVER DISEASE: The liver one was thought to be a factor in determining a person's temperament. Considering its influence on digestion and excretion and on the manufacture of blood sugar from the food we eat, the liver undoubtedly does contribute to our feelings of well being. Liver problems may manifest themselves in headaches, fever, heartburn, or even vomiting. Bad breath is another common symptom. Of course, these symptoms apply to many diseases. Likewise, the characteristic handwriting features of liver diseases are common to other ailments. The following aspects will appear in the script:

• Light, irregular pressure, thread letters and connections. Pasty script with altered and/or ink filled letters. Strokes become thicker toward the baseline

• Cirrhosis of the liver – often a disease of alcoholics, cirrhosis (fibrosis of the liver) can prove fatal. A characteristic trembling appears mainly in vertical handwriting strokes.

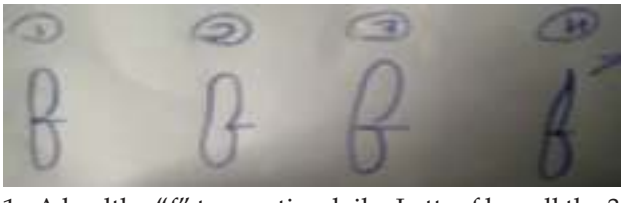
• Rigid/square formation in the middle zone, pain dots in middle zone etc.

ULCERS: Psychological states such as prolonged anxiety can affect the digestive tract by stimulating excess digestive fluids, which eat away parts of the lining of the stomach or small intestine. The result is an ulcer. Ulcers are painful, and the handwriting shows it. Some letters plunge below the descending baseline. Twisted, altered and covered strokes abound. If in the healthy state a person's script shows a progressive slant, it suddenly will shift to a straight or even a backward slant. Gradually the writing speed will slow. Curiously, the pressure generally will be regular and strong. Often we see twisted, angular, back-slanting strokes in the lower-zone loops. Since these strokes are typical of vengeful traits in the personality, the old adage that hate "eats away" at people rings of truth.

Angular writing – angles at the base line and horizontal, rigid/square formation in the middle zone, pain dots in middle zone etc. may indicate ulcers or liver cirrhosis .

DIABETES: Level of blood sugar has a direct effect on the neurological system. Hypoglycemia (low blood sugar) has more of an effect than hyperglycemia. (High blood sugar). Tremor commonly seen. Variable pressure more blobs and rests, smudges in the top portion of middle zone. A cut mark, hook or danglers in the letter "o" or "a" indicates problem in digestive system. It may be stomach or intestine infection, hunger, gas, acidity, ulcers, or simple indigestion.

Letters affected are – small case a, o, middle portion of letter d, f, q



1 - A healthy "f" to practice daily. Letter f has all the 3 zones & represents entire body. Imagine a body with narrow waist. Ideal body shape.

2 - Wider middle zone - accumulated fat around belly. Symptoms of diabetes or other digestive problems. One of my clients had severe diabetes issue, taking insulin injections. She had this f & struggled so much to correct f & connected o patterns. Whichever area we have issues, it is difficult to write those patterns or letters representing them. If we persist & write it properly, we get result. Same with this lady. From insulin injection she went back to medicine of lower dosage.

3 - Open & wider f - same as above. Here energy is leaking.

4 - Retraced, pointed upper loop is very dangerous.

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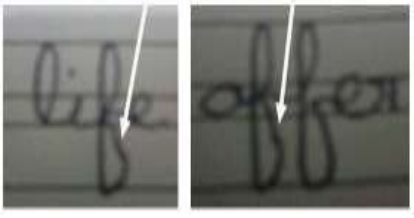
Blood supply to brain is sharp (imagine a sharp curve of a river which cuts the hard rock also) - may lead to headache, stroke, maniac behavior, psychological problems, hair fall & other issues of hair & scalp.

• We identity brain problems in children by these kind of pointed retraced upper loops in any letter & light writing. It can be LD, ADHD, Autism, Down's syndrome, and retardness, so on....

JOINT AND BONE DISEASE: Bone disease may be organic or result from physical injury. Arthritis, or inflammation of the joints, affects millions. The most obvious graphic signal of joint or bone problems are a twisted stroke in the middle and lower zones. Distorted writing, weak lower zone.



Excessive yoga in a day caused pain in thigh area which is showing like dent and pain dot.

If a lower loop of same letters next to each other varies in size then it says height difference of two limbs (left leg and right leg). It may also indicate stiff neck or lower back problem which may result in affected limbs.

STROKE: High blood pressure, cold environment, low sugar level, pressure in the brain may cause stroke.

It is observed that most left slant writers are prone to stroke as they bottle up their emotions which explodes one day resulting in stroke. Weak ego and many defense mechanisms also present in the writing.

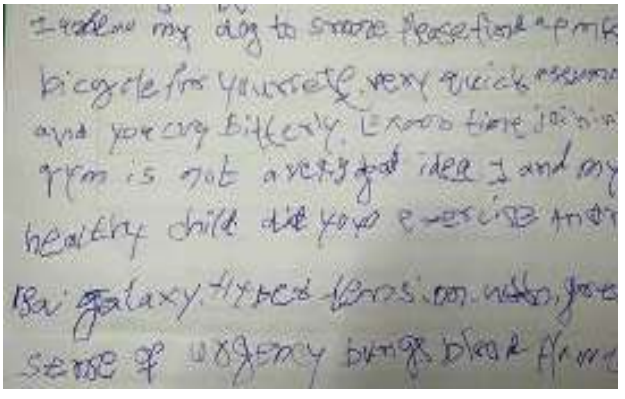
MIGRAINE HEAD ACHE: Reasons – Sexual frustration/guilt, hyper/stagnated liver activities, blockage in breathing, excessive pressure on vision (computer/T.V)

Extreme light pressure, resentment/ repression, frustration/guilt, affected middle zone area and upper loops.

2. NEUROLOGICAL ISSUES:

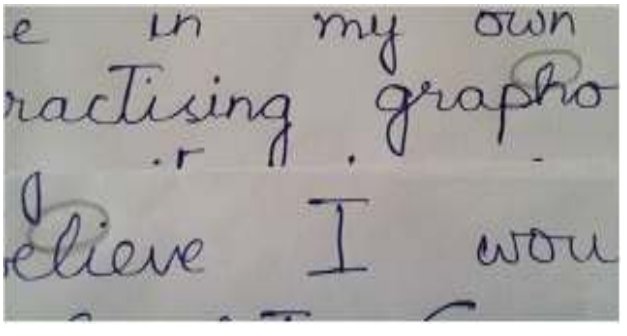
PARKINSON'S DISEASE: A degeneration of cells within the brain area called the Substantia Nigra. This causes decrease in the production of the neurotransmitter – dopamine. Results in interference of motor control.

Handwriting difficulties are one of the earliest symptoms appearing up to 10 – 15 years before other symptoms show up. Size and speed of writing observed – also trembling strokes. Micrographic (decrease in size of letters that is often progressive along a line and down the page)



This is a sample of Cerebral Damage patient. See the difficulty in forming rhythm.

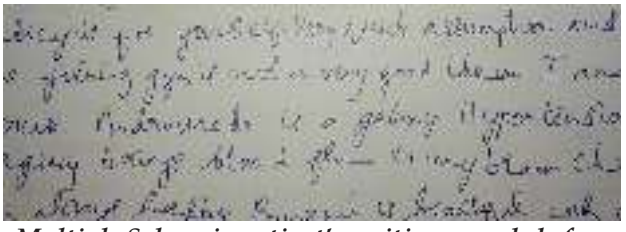
EPILEPSY: fading or flyaway strokes (upper zone). Varying pressure – think of electrical charge where for a second it stops. See the fractured dent in upper loop which indicated pulling pain in forehead in the sample below. I warned her of possible epileptic attack & same night she had epileptic attack.



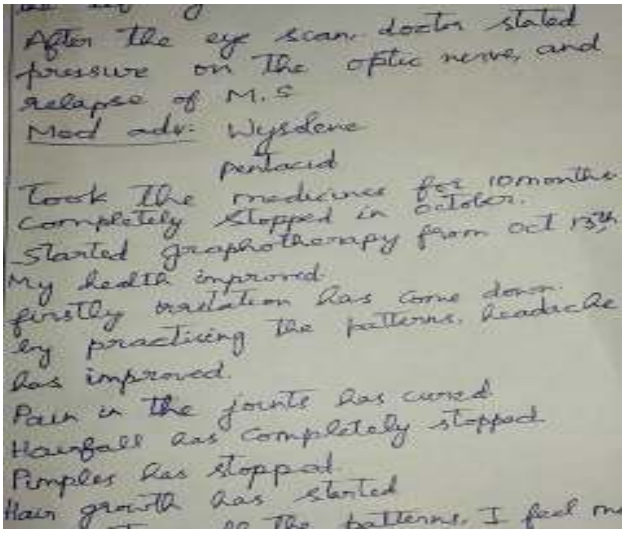
MULTIPLE SCLEROSIS: Multiple sclerosis is a degenerative disease of the central nervous system. Sufferers often comment on the strange feelings associated with their condition. The waxing and waning of bodily strength and the mixture of sensations associated with it can result in feelings of euphoria one day and utter despair the next. Feelings of well-being can alternate with severe visual disturbances, numbness in fingers and toes, weakness in limbs and unpredictable dizzy spells.

Handwriting indicators- Fatigue, variable pressure, tremors, difficulty controlling size and spacing form, spidery execution. Hesitation dots at bottom and top of loops, lack of energy, small lower zones. Pressure fades along base line, base line droops with tiredness. Energy problem seen in light pressure. Frequent hesitations, awkward forms, involuntary movements, change of word structure, fierce determination, fatigue caused drooping lines.

ISSN 2250 - 3978 LILAVATI (PRINT)



Multiple Sclerosis patient's writing sample before grapho- therapy



Multiple Sclerosis patient's writing sample after grapho- therapy

3. PSYCHOLOGICAL PROBLEMS: In practice, psychologists classify mental disorders in broad groups, ranging, for example, from mild anxiety to full-blown panic attacks, from a relatively short-term depression, arising perhaps from a personal tragedy, to long-term, even suicidal-depression that requires hospitalization and drug therapy or shock treatments. Regardless, abnormal psychological states arouse our fear and, inevitably, our fascination.

•Speedy, difficult-to-read script. Extremely progressive slant-the letters almost laying, threadlike, on the baseline. Unfinished or omitted letters and strokes.

• Altered strokes-the letters are retouched and improved needlessly.

•Count the signs which indicate lying: coils, hooks, tapering strokes, altered letters written in various shapes, sinistrogyric strokes, heavy I dots, various slants, flourished capital letters.

ALTERED MENTAL STATES / DEPRESSION: The symptoms of depression of any degree include insomnia, loss of energy and interest in anyone or anything, feelings of worthlessness, and loss of appetite. In the handwriting, the following signs will appear:- Similar signs as fatigue.

• Suddenly the baseline will plunge downward. Low t bars, signs of low self esteem. Droopy garlands and lead in strokes, disturbed rhythm

•Individual letters, garlands, and end zones tend to fall below their appropriate zone. Irregular spacing and pressure.

• Altered, unfinished letters which are difficult to read.

• Sinistrogyric, open lower loops. Ink-filled letters, especially vowels.

•Tapering & overlapping strokes. Narrow left margin / left narrowing margin.

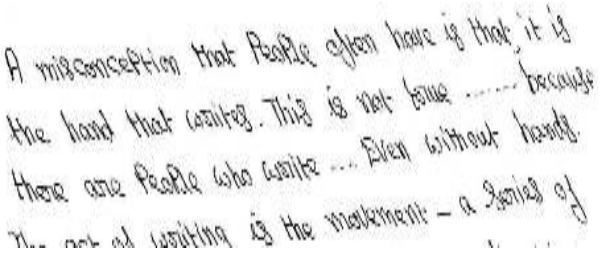
SUICIDE TENDENCY: Depression, self castigation, self hurting strokes, x marks in other letters/signature, varying space and size, falling letters, words, lines, more number of strokes ending in the left and left slant added with heavy pressure, highly sensitive to criticism, pride, self conscious, inferiority complex and above all – low self esteem leads to suicide.

FRUSTRATION = in general you will note a reduced middle zone with long upper or lower loops and stems. High upper stems show frustration in the achievement of higher goals. Very long lower loops show sexual and materialistic frustration. Prolonged or deep frustrations can produce emotional instability.

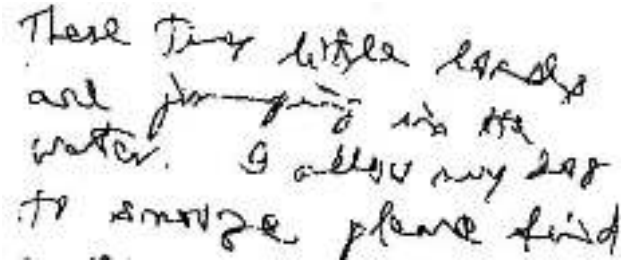
WEAKNESS= light irregular pressure, thin, broken strokes, the unfinished letters. The meandering baseline also descends. Certain letters in the beginning or in the middle of a word float below the normal baseline of the zone to which they belong. Superfluous dots and twisted strokes are common.

EMOTIONAL WITHDRAWAL: To protect themselves from intolerable circumstances-either real or imaginary-some people withdraw from reality. Among the graphic signals of emotional withdrawal are the following:

Backward slant, print writing, irregular and very wide spacing. Capital letters are disconnected from the script and may show a backward slant. Discordant and altered letters. On the same page, for example, the writer will use half a dozen different shapes to represent the letter a.



LACK OF MENTAL CULTIVATION



Lack of mental cultivation (an exaggerated lack of definiteness) is revealed when m's and n's are poorly formed. Lack the ability to build a mental picture and little ability to understand. Can be due to lack of formal education OR motor difficulty due to brain damage. Difficulty in learning and grasping new ideas. Sometimes age also adds to this disability.

PHOBIAS:

Handwriting indicators – no margins anywhere is fear of death or empty space. Extreme tight writing – fear of being alone.

Excessive spacing – fear of people. Wide margins all over – cluster phobia.

HEALTH ISSUE SIGNS IN HANDWRITING ARE GIVEN BELOW

1. Loop breaks, skips, jerks, dent, Pen trails, tremors, trembling effects of age.

2. Resting dots & pain dots, Weak, even limp, pressure points, Superfluous dots inside the strokes, letters, words, or lines. Pain can also show like dent, twisty word, thread, skip, cramped writing.

3. Distorted personal pronoun I (PPI). Distorted, twisted writing

4. Tumbling lines, words, letters. Stress/depression, Suicidal tendency, manic depression.

5. Blacked out lower case e, c. Vowels and loops filled with ink.

6. Buried emotions – left slant, tight spacing, small size, reticent, no margins

7. Agoraphobia (wide gap between words)

8. Immaturity, resentment, self pity, Guilt, trauma and remorse

9. Hatred and aggression, heavy I dots and punctuation marks.

10. Attention seeking/insecurity, flamboyance, Fading or fly away strokes

11. Blobs, smudges, sloppy, smeary, pasty writing

12. Nervous exhaustion, fatigue, variable / spasmodic pressure, difficulty controlling size and spacing form, spidery execution.

13. Extremely light, irregular pressure, trembling and shaking script.

14. Very meandering baseline combined with broken strokes.

15. Baseline plunging downward, letters plunging suddenly downward below baseline. Strokes become thicker toward the baseline

16. The letter o in a heart shape. Coils and hooks. Overlapping strokes, mainly in vowels. Altered shapes, letters and strokes-the letters are retouched and improved needlessly

17. Speedy, difficult-to-read script. Unfinished or omitted letters and strokes. Extremely progressive slant-the letters almost laying, threadlike, on the baseline.

18. Cysts and fibroids of ovaries and uterus may appear like pain dots in ovals or middle zone of g or d. Uterus removal surgery mark may appear in letter g. letter "g" represents reproductive system.

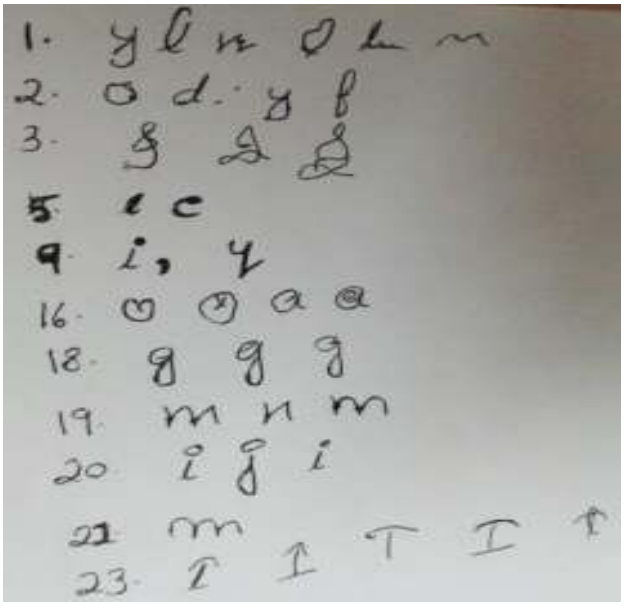
19. Pain dots in letter m and n represents kidney stones or toxins in the body.

20. Circle I dots cause many psychosomatic diseases.

21. Physical Pain = twisted letters. Irregular pressure.

22. Many round humps in "m" represents somnambulism (sleep talk/walk)

23. Control strokes or twigs in t bar, capital I and T says eye sight issue. Take samples with and without specs and see the difference. Pain dots all over the writing may indicate the person having squint eye.



ISSN 2250 - 3978 LILAVATI (PRINT)

"HEALING CURRENT"- HOLISTIC HEALTH THROUGH PSYCHONEUROBICS

Mrs. Madhuri Anand
BNMIT, Banashankari, Bangalore.

What is Health? According to the WHO, "Health is a state of complete physical, mental and social well being, and not merely the absence of disease or infirmity." To acquire good health a clean healthy mind, optimistic outlook, serene mentality, joyful spirit, laughter, clean thoughts are very important. Mind is very powerful, that it can dispel even the most incurable ailments of the body if it so desires.

"Healing Current", represents the Divine Spiritual Energy bestowed by God. When you imbibe this energy in your body with the help of Psychoneurobics, it will be beneficial in bringing the balance of the five elements of the body and also energizing and aligning of the seven chakras, the main energy centers' of our body.

SIGFA - is an acronym which stands for 'Spiritual Incorporeal God Father Almighty.' We derive this 'Healing Current', in the form of light rays from God Father himself to treat and heal our self in a natural way, a process which can be easily followed by one and all. This will also support us in discovering inherent virtues and bringing forth the powers that are hidden within, and by making their optimal use, it can strengthen even the weakest.

Psychoneurobics are Mind exercises. By changing the mind set we can change the body set. We train our mind to use the three elements of Raas, Raang and Naad to bring harmony and synchronization in our nervous system, so that each neuro cell of our body is able to receive the Divine energy and empower itself by mental exercises. Psychoneurobics enhances overall quality of life. It helps us in being confident, calm, relaxed, have better concentration and clarity. Psychoneurobics is a New Age Frontier, which involves Body, Mind and Spirit for healing and emotional well being. It is the Natural Art of Healing for everyone. It is an art of getting in touch with your own self, your soul within, and leading a healthy, empowered and a fulfilling life.

What is Health? According to the WHO, "Health is a state of complete physical, mental and social well being, and not merely the absence of disease or infirmity." To acquire good health, a clean healthy mind, optimistic outlook, serene mentality, joyful spirit, laughter, clean thoughts are very important. Mind is very powerful, that it can dispel even the most incurable ailments of the body, if it so desires.

Identify and learn the art of happy and healthy living, making your life energetic and fulfilling. Discover your destiny by discovering the most valuable treasure hidden within yourself. Understand that diseases in the body originate from the mind. This is where the **"Invisible Doctor"** resides. A higher set of resources is within us. It is the **conscience** of every human being. This conscience is the **"Invisible Doctor"** the doctor within, upon whom you can rely. If you believe you have limits, you stay limited. Limitations live only in our minds. But if we use our imagination, our possibilities become limitless. The key is to let go of those limitations and operate from a higher set of resources. Sound health and dynamic personality can be achieved, if one operates with positive values of the "Invisible Doctor".

"The miracle of Self-healing occurs, when the inner patient yields to the inner physician. – Vermon Howard.

A miracle is the operation of the Universal Law. A miracle happens when our Inner Invisible Doctor is awakened with full faith in healing with the Universal Law.

Universal Law of Healing comprises of Peace, Selflessness, Love, Joy and Happiness.

The concept of an **Invisible Doctor, the inner physician,** mind and soul is a complex phenomenon, beyond the scope of modern science. Modern science deals with physical universe and matter, and not with Spiritual aspects. These are certain truths of life which cannot be explained or understood through reasoning or logic, and hence attributed to God, the Supreme Power.

The Soul's real friend and guide to complete health, is the Invisible Doctor – When we are soul conscious, the primary quality of Truth, Peace, Love, Joy, Purity, Power, Bliss as well as the secondary qualities of the Divine Virtues naturally emerge on the screens of our mind as thoughts, desires, visions, feelings and so on. Owing to the interconnections of primary and secondary qualities, by focusing our attention or intellect on any of these qualities for a period of time, we are able to change the state of our consciousness, enabling us to enjoy holistic health and happiness.

Thoughts are powerful, they carry energy. That is why we say, **"Where the thought goes, Energy flows."** So cultivate the habit of thinking or creating positive and good thoughts. **When you think good,**

ISSN 2250 - 3978 LILAVATI (PRINT)

you do good, and when you do good, you feel good and when you feel good you generate a positive aura and develop a positive attitude, which leads to a healthy and happy life style.

"Healing Current," represents the Divine Spiritual Energy bestowed by God himself. "Healing Current," means "Spiritual Current," which is the energy, the "Spiritual Energy," which comes from the Power-house of God Himself. Just as the electrical current is called the electrical energy- the Spiritual Current is called the Spiritual Energy. When the Computer, grinder, water pump need electrical energy to function, they need to plug in to the electrical socket or electrical point to derive the electrical energy to function properly – likewise we human beings, need to connect our mind to the source of Spiritual Energy –God, the Almighty, to receive energy for our body, mind and spirit to function properly. All the organs of our body work like machines. The brain is like a computer, the heart is like a water pump, kidneys are like filtering unit and stomach like a mixer-grinder.

What is the difference between a living body and a dead body?

It is only the presence and absence of this Spiritual Energy. Only a living body or being is able to receive the Spiritual Energy, because of the **presence of the "SOUL"** in the body. When the Soul exits from the body, the body is dead. The Spiritual Energy is present in the Soul of our body, helps all the organs of our body to function properly and work likes a machine 24X7. The complete absence of this energy means death.

Difference between Spiritual Energy and Other Kind of Energy.

Machines in the human body like Heart, Kidney, Eyes fitted in the human body, work only by Spiritual Energy	Rest all machines in the world work by Physical Energy
Spiritual Energy is conscious and helps in thinking, comprehending and decision making.	Other human made machines are not conscious; they cannot do conscious and decision-making works.
Source of Spiritual Energy is Infinite – God, the Almighty.	Source of Physical Energy is Finite.
To tap Spiritual Energy, one needs to use Mind. No scientific tools can tap or store Spiritual Energy.	Physical Energy can be stored by scientific tools. Like solar battery, UPS etc. which stores the electrical energy in other forms.
Spiritual Energy is controlled by Intellect. Mind wastes spiritual energy in the absence of a powerful Intellect.	Physical Energy is controlled by machines. Manmade machines can be controlled by Spiritual Energy but Spiritual Energy cannot be controlled by machines.

There is a subtle difference between Physical energy and Spiritual energy. Mind is a part of Spiritual Energy, where as there is no mind in the physical energy. Computers and robots cannot think because they have no Spiritual Energy. Just as the gadgets like fridge, TV, AC do not function well when the electrical voltage is low, our body organs do not function at their best when we lack Spiritual energy or there is reduced flow of this energy in our body, and this leads to diseases.

Therefore it is important to understand what this Spiritual Energy is, and why it is mandatory to take this energy. It is also important for us to know the process of tapping this important Spiritual Current, the Healing Current that is bestowed by God himself for the Mind and Soul. In order to take it in abundance, we will have to connect our Mind with the Supreme. Here our Mind works like a regulator in the whole process. The Mind transfers this energy to our Brain, after taking it from God. This Spiritual Current is then transmitted to all the organs of our Body through the Spinal Cord.

SPIRITUAL ENERGY

SOUL

MIND

BRAIN

SPINAL CORD

BODY

The best part is that you can have this Spiritual Energy, The Healing Current free of cost, by a very sim-

ple way but, only through your own efforts. This requires a little shift or transformation in your way of living and developing a positive attitude. Turning to **MEDITATION,** instead of **MEDICATION** is the basic requirement. This Healing Current causes a deep sense of relaxation both physically and mentally and all types of pain vanish from the root.

"Healing Current," represents the Spiritual energy bestowed by God. When you imbibe this energy in your body, with the help of **PSYCHO-NEUROBICS,** it will be beneficial in bringing in the balance, of the 5 Elements of the body and also energizing and aligning the 7 Chakras, the main Energy Centers, of our body.

"SIGFA" is an acronym, which stands for, **"Spiritual Incorporeal God Father Almighty"**. It implies that the healing is done by the „Spiritual Incorporeal God Father 'himself' - who is our **Guide, Creator and Protector.**

SIGFA healing technique was developed by **DR.B.K.Chandrashekar,** after a **Divine Encounter with** God himself. Dr. Chandrasekhar, was previously an Indian Air Force Officer. 17 years ago he became a victim of three dreadful diseases like, Cancer, Hepatitis-C, and Fourth stage of Cirrhosis at the same time. After his interaction with God, through question and answers, he was guided to adapt and practice, the ancient Neurobic lifestyle, extracted from the pages of rich Indian culture and Vedic history. The **"Healing Current,"** bestowed by God provided a flow of spiritual energy which healed him and gave him a new life. Today he is living a happy and prosperous life. After recovering and leading a new phase of his life, Dr. B.K. Chandrasekhar took on the mission to spread this knowledge and help people to transform their life style for a happy and healthy living. He developed this amazing and simple technique called the **Psycho-Neurobics**, to keep our mind, body and soul happy and healthy forever. DR.B.K.Chandrashekar is now involved in spreading this precious knowledge both in India and abroad. It is his service to humanity by showing the practical method of restoring and retaining perfect physical, mental, spiritual, emotional and social health.

I am sure, that if you understand this concept and make it applicable in your life, you too can get a miraculous change in your life. Today, we too can lead a healthy life if our thinking is positive and we are able to control our mind, connect with our soul, and adapt and inculcate a healthy lifestyle by imbibing the flow of spiritual energy.

Even modern science has accepted that **mind, thoughts and emotions play a major role in all healthy and unhealthy activities of our body.** Whenever we hold something negative in our consciousness, it blocks the flow of life energy in neural-endocrinal axis, leading to diseases.

Sigfa healing is a process of re- engineering the balance between nature and self through the help of spiritual energy bestowed by God. In this **Unique Healing Technique,** you have to treat yourself by seeking healing power/current from the God Almighty, and discovering the Invisible Doctor within. Invisible Doctor heals the body and mind with will power and inner virtues, like Knowledge, Peace, Purity, Love, Joy & Happiness, and Bliss.

Believing in God, the Supreme Doctor is the root mantra. The Supreme Doctor cures the Body, Mind and Soul with his Spiritual Energy and Cosmic Power. We derive this **"Healing Current"**, in the form of Light rays from God Father himself, to treat and heal ourselves in a natural way, a process which can be easily followed by one and all. This will also support us in discovering our inherent virtues like Power, Purity, Joy & Happiness, Love, Peace, Knowledge, and Bliss and bringing forth the powers that are hidden within. Making their optimal use, it can strengthen even the weakest.

Psycho-Neurobics are mind exercises just as aerobics are body exercises. As aerobics are the exercises of pumping air into lungs, Neurobics are the exercises of creating bio – electrical impulses in neuro cells/ neuro transmitters by various motor or mental activities. Similarly **Psycho-Neurobics** are exercises of transferring spiritual energy into the neuro cell by connecting the psyche (mind) to the supreme source of spiritual energy that is God. Involving our psyche (mind) – a trident approach with muscular, respiratory actions, sound vibrations and visualization of different colors of light make Psycho-Neurobics highly effective to ensure a cure for various diseases. Here the **visualization of color shower** from **God Almighty** is most essential phenomenon.

Believing in God is the root mantra of Sigfa healing. Sigfa healing is an ancient system that prevents the diseases by going to its roots. Because the real cause of getting ill is the imbalance between bodies, mind, soul and nature. By changing the mindset we can change the body set. We train our mind to use the 3 elements of **Raas, Rang and Naad** to bring harmony and synchronization in our nervous system so that each neuro cell of our body is able to receive the Divine Energy and empower itself by mental exercises. **Psycho–Neurobics** enhances overall quality of life. It helps us to be calm, confident and relaxed and have better concentration and clarity.

Rang- different Colors,

Raas- different Mudras,

Naad- different Sounds, form the base of **Psycho-Neurobics.**

Raas is Mudras and Mudras themselves are science. From the ancient Vedic scriptures we have evidences to prove that Mudras have great healing properties and can be medicine themselves. Our body is composed of **5 elements- Fire, Air, Space, Earth and Water.** Hasta Mudras are important to balance the flow of energy of these elements. Each finger represents an element. Each element has been assigned a function in our body for its healthy functioning. Hence Hasta Mudras help in creating the required balance of the 5 elements.

SELF- Spiritual Energy in Light Form i.e. **Rang.** We receive light, the Spiritual Energy from God in the form of various colored rays that is Rang. Each color has a different healing property and works at a different frequency. These divine rays are able to heal us more than even Laser can.

Naad – Sounds produce different vibrations. It has great effect on calming and relaxing your mind and body as the respiration is controlled by **Brahmanaada – OM. Psycho–Neurobics** is completely a science of mind. It is an **ATM –Any Time Meditation exercise.** Diseases can be cured by doing this exercise regularly. Good results are obtained after doing exercises continuously for 21 days. Practicing regularly for 40 days you can achieve excellent results in all aspects of life. Your power to control mind is enhanced. If we are able to control our mind then we can change our life positively beyond imagination. When people utilize their inherent power in a true manner they achieve divinity in their life. To keep our body healthy is our duty. Without good health, we cannot empower ourselves. A healthy mind always lives in healthy body. Psycho–Neurobics establishes direct relation between the activity of mind and soul (mental and emotional activity) and physical wellness (healthy body).

The power of mind directed towards muscular and respirational activities is the base of Psycho-Neurobics. We are also familiar how thoughts and emotions are part of mental energy and how they are distributed in our brain by our mind. Thoughts and emotions work like a key to run our body. By giving the right direction to our thoughts and emotion, we can bring in a positive change in our life, and positivity is mandatory for a healthy and happy life. Hence it is important to train and develop our mind and body in a balanced way through Neuro-muscular integration and Neuro-respiration exercises along with the colored Light rays to heal ourselves and be fit, happy and healthy.

Our body has **7 main Chakras**, which are the **"Spiritual Energy Centers"**. They are subtle energy bodies which radiate and receive energy constantly. They push vital life energy through the body to ensure vitality. This life energy springs from the Divine and gives us access to all wisdom. If you hold negative thoughts, your Chakras become dirty with dark, dense energy and this blocks the flow of the Spiritual Energy, which leads to imbalance and dysfunction of Chakras and their related organs.

These **7 Chakras govern the major hormonal glands in the Endocrine System and influence physical and psychological health.** They are the energy centers' which are located along and around the spine. They act as energy transformers, simultaneously receiving, assimilating and transmitting various types of energy. Chakras can be imagined as vibrant colorful flower with many petals that are attached by invisible threads to the Spine. Each Chakra has its own pulse rate, color and musical sound. We associate each of the Chakras with single color of the visible light spectrum along with the function and organ of the body. When Chakras become imbalanced, they result in physical disease. Application of appropriate Color, Hasta Mudra, and Sound can correct such imbalances and heal

the ailments. Our chakras get disturbed due to stress and negative emotions creating diseases and disharmony which prevent us from functioning at our most vibrant and joyful level. The 7 chakras of our body play a vital role in our total well being. The inherent and basic human values with related positive emotions are connected with each chakra in order to activate and energize them.

	Chakra	Color	Function	Divine virtue
1	Base	Red	Energetic & dynamic	Will power & Positive energy.
2	Sacral	Orange	Emotions & sexuality	Purity
3	Solar Plexes	Yellow	Digestion & Contentment	Joy & Happiness
4	Heart	Green	Unconditional love & Inner harmony	Love
5	Throat	Blue	Effective Communication	Peace
6	Ajna	Indigo	Understanding & Intelligence	Truth and knowledge
7	Crown	Violet	Connection with the Universal Energies	Bliss

Combined effect of these 3 factors Raas (Mudras) **and Rang and Naad lead to reduced metabolic rate enhancing life span and quality of life.**

Hence we can say that **Psycho-Neurobics is a New Age** Frontier, which involves Body, Mind and Spirit for healing and emotional well being. It is an art of healing with **Meditation** and avoiding **Medication.** It is a natural art of healing for everyone. It is an art of getting in touch with your own self, your soul within and connecting with God Father Almighty- The source of your Spiritual Energy and leading a healthy, happy, empowered, enlightened, blissful and fulfilling life.

This is the **"Healing Current,"** which helps you lead a **Holistic Healthy and a happy life** through **Psycho-Neurobics.**

HEALING BODY WITH MUDRAS

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The physical body is made up of five elements namely - Air, Water, Fire, Earth and Aakash (ether - the tiny intercellular spaces in the human body).

Imbalance of these elements disrupts the immunity system and causes disease.

Deficiencies in any of these elements can be made up by connecting one part of the body with another in a particular manner through Mudras.

When a finger representing an element is brought into contact with the thumb, that element is brought into balance.

In general, mudras contribute to many things like emotional well-being, balances the flow of energy in our body, mental health, to establish coordination between the left and right brain hemisphere and thus, aiding to improve memory and concentration in children.

Thus, disease caused by the imbalance is cured.Mudras, start electromagnetic currents within the body which balance various constituting elements and restore health. The joining of fingers creates an effect on the human body.

It is also noted to improve blood circulation to all the parts of the body, curing vitamin deficiency, cure to running nose,eliminates itching by curing allergy, regulates proper digestion, cures bed-wetting in children and arthritis inaged people.It has also found to be greatly effective in easing the cramps that often occur during the menstrual cycle.

The mudras which concentrates to balance the seven sacral chakras aids in curing the disorders and diseases associated with those chakras. A healthy chakragenerates a healthy aura surrounding the body. The psychological, physical and socially health of people can be easily determined by their aura. An optimist has a perfectly radiant aura and people find welcoming to talk to such people.

TYPES OF HASTA MUDRAS

1. Mukula Mudra or Samana Mudra

Mukula Mudra or Samana Mudra is recommended for Digestive system, Gas, Acidity, Balancing of all five energies and can reduce waist line.

Finger Formation: Touch Tips of All five fingers of both the hands. Always to be done 5 minutes before Food, so your immune system becomes strong and food will digest easily.

Those who want to reduce waist line then try this, If you hold for 5 minutes then touch your navel with one hand and second hand which part you want to reduce then do this mudra two three times in morning and two to three times in night, you will see your waist line will be reduced. To be done 5 minutes 5 Times of the Day,

Benefits of Mukula Mudra or Samana Mudra:

- This balances all the five energies.
- It improves digestive system and food will digest easily.
- It is excellent for Gas and acidity problems.

ISSN 2250 - 3978 LILAVATI (PRINT)

• It produces electromagnetic energy. After holding for 5 minutes if you touch at the part hurts you or any problem will be resolved. It works like Injection.

2. Gyan Mudra or the Mudra of Knowledge

Gyan Mudra or the Mudra of Knowledge is effective in cases of mental ailment, imparts happiness, the intellect develops, memory is sharpened.

Finger Formation:

• Touch the tip of the thumb and the tip of the index or 1st finger together.

• The other 3 fingers have to be kept straight.

Benefitsof Gyan Mudra or the Mudra of Knowledge:

• It helps in meditation and concentration and reduces negativity of the mind

• It improves memory and with regular practice students can improve grades and intelligence

• It aids in alleviating headache, insomnia and hypertension and reduces anger

3. Vayu Mudra or Mudra of Air

Vayu Mudra or Mudra of Air helps in diseases like arthritis, trembling in Parkinson's disease. Better results obtained if practices after prana mudra. Vayu Mudra regulates vayu or air element in our body.

Finger Formation: The tip of the index or 1st finger is touched to the base of the thumb and the thumb comes over the finger with a slight pressure of the thumb being exerted. Rest of the fingers remain straight. This Mudra can be done 10 Minutes 5 Times a day or 45 Minutes or 3 times 15 minutes. It is to be done when problem is prevalent and has to be stopped as soon problems disappear.

Benefits of Vayu Mudra or Mudra of Air: Any kind of pain can be controlled by this mudra.By the practice of this mudra, all vayu,that is, air related affections, like Arthritis, Gout, Cervical Spondylosis, Sciatica, Knee pain, and Chronic Constipation, Gas formation are relieved. It is especially beneficial in reducing neck pain and spinal pain.

4. Shoonya Mudra or The Mudra of Emptiness

Shoonya Mudra or The Mudra of Emptinessprovides relief for ear related issues.

Finger Formation:

The tip of the middle finger is put at the base of the thumb and the thumb comes over the finger with slight pressure of the thumb being exerted on the finger. The other 3 fingers are kept straight.

Benefits of Shoonya Mudra or The Mudra of Emptiness:

• Regular practice of this mudra reduces ear pain and watering of the ears

• If this mudra is done for 1 hour daily it can benefit in hardness of hearing

• The bones become strong and is beneficial in heart disease

• It strengthens gums and is helpful in throat problems and thyroid disease

• Relieves travel sickness

5. Prithvi Mudra or the Mudra of Earth

Prithvi Mudra or the Mudra of Earth makes body sturdy. One experiences happiness.

Finger Formation:

In this mudra, the tips of the thumb and the ring finger are touched together. The other fingers are kept straight. Just touch, do not press. Prithvimudra is performed 15 minutes three times a day.

Benefits of Prithvi Mudra or the Mudra of Earth:

• Regular practice of this mudra is helpful in body weakness and thinness

• It improves the functioning of the digestive system and reduces the deficiency of vitamins

• It gives energy and lustre to the body

• It balances earth element in our body

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• Eliminate energy deficiency
• Makes us physical strong
• Increases stability
• Absorbs nutrients
• Stimulates the body temperature
• Good for liver, stomach, hair loss and for calcium deficiency

6. Prana Mudra or the Mudra of Life

Prana Mudra is one of the rarest mudra practically takes care of our most of the needs of balances. It activates rootchakra i.e., Mooladhar chakra. Pranamudra or the Mudra of Life helps in pumping the life force into your body. It imparts special power to the eyes.

Finger Formation: In this mudra the tips of the thumb, ring finger and the little finger are touched together while keeping the other 2 fingers straight.

Benefits of Prana Mudra or the Mudra of Life:

• It awakens the dormant power of prana, gives energy, health. It is beneficial in diseases of the eye and improves eyesight, raises body resistance to disease, removes tiredness
• During fasting it reduces hunger pangs and thirst
• In insomnia, doing this hand posture, along with Gyan Mudra, helps in bringing on sleep
• Increases vitality, power, mental and emotional level
• Reduces fatigue and nervousness, cramps and in muscles or veins and pain in legs
• Gives us courage, joy and energy
• Activates right and left brain
• Controls or overcome of mental tension, anger, irritability, jealousy
• Improves blood circulation removes blockages
• It is believed all Vitamins A, B,C, D, E, K are provided by doing this mudra

If pranamudra is done at the time of fasting then it takes care of all your physical needs. pranamudra is friendly mudra can be done at least 10 minutes after any other mudra. This is to be done 15 minutes three times a day or 45 minutes in one time or as and when you needed.

7. Apan Mudra (Amrit Mudra) or the Mudra of Digestion

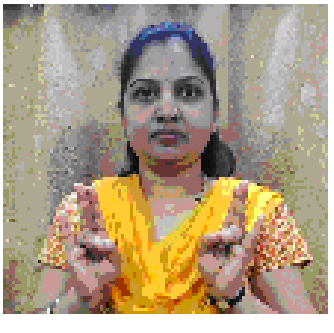
Apana Mudra or the Mudra of Digestion helps in clearing the body by elimination of waste matter from the mouth, eyes, ears, nose etc. Helps when urine is obstructed, reduces constipation.It is also called Diabetes Mudra it is boon for them.It is one of the best Mudra nature has provided to the mankind.

Finger Formation: This mudra is made by joining the tips of the thumb, the middle finger and the ring finger keeping the other fingers straight. Perform for 10-15 min daily before food. Any time, No time limit you can do it as much as you can in any position i.e. you need not sit or do it,however earth insulation is needed if you are sitting, you should not touching your foot with earth directly at that time, some insulation is require.

Benefits of Apan Mudra (Amrit Mudra) or the Mudra of Digestion:

• Its benefits are endless.Toxins are removed from the body and the body becomes pure. It also relieves constipation, piles, diseases caused by vayu or air, is helpful in diabetes, stoppage of urine, kidney defects and dental problems
• It is beneficial in stomach and heart diseases and brings out perspiration
• This mudra is a boon for womankind;It takes care of all the women issue from child hood to elderly women, one of the best at time of Menopause.
• It is also helps in reducing acidity level.
• Helps in purification of the body, urinary problems, easy secretion of excreta, regulating menstruation and painless discharge and easy child delivery

8. Surya Mudra or Mudra of the Sun



Surya Mudra or Mudra of the Sun reduces weight of your body, cholesterol and Diabetes. It improves digestive system.

Finger Formation: Surya Mudra is performed by touching the tip of the ring finger to

the base of the thumb and exerting pressure on the finger with the thumb.Surya Mudra is performed 15 minutes three times a day with both hands.

Benefitsof Surya Mudra or Mudra of the Sun:

• It balances the body, reduces body weight and obesity. It increases body heat and helps in digestion

• It reduces hypertension and cholesterol and builds strength

• It is beneficial in diabetes and liver defects

• It lessens your laziness.

Precautions: This mudra create heat in body and burn the fat.So if someone has more heat in body then he can do for lesser time what suits him or her. Weak persons should not perform this hand posture and DO NOT do this hand posture for a long time in hot weather.

9. Varun Mudra or Mudra of Water

Varun Mudra or Mudra of Water improves the deteriorated quality of blood due to shortage of water & gives freshness to the body. A miracle mudra for Skin problems, wrinkling, loss of glow, dehydration, excessive body heat, blood disorders.

Finger Formation: This Mudra is made by touching the tips of the thumb and the little finger.

Benefitsof Varun Mudra or Mudra of Water:

• It reduces dryness of the skin and improves skin lustre and softness

• It is useful in skin diseases, acne and blood defects. It improves facial beauty

Precautions: Persons suffering from Asthma and respiratory problems should do this Mudra for a short duration only.

WHEN TO PERFORM MUDRAS? Mudras are easy to perform anytime, although sitting in the lotus position and focusing on the healing can be an advantage. Mudras can also be practiced while sitting, lying, standing, walking or even talking. Mudras can be practiced for 4-5 minutes at one time. For good results mudras should be practiced for 24 minutes continuously. Some mudras are specified time or particular aliment. So be careful about it.

CONSLUSION : Hasta mudras can be used for healing certain ailments; regular practice of mudras will contribute to your overall good health and can be used as a preventive measure. Continuous practice of the mudras will create minute changes in your body using pulse centres on parts of your hands, which trigger certain healing processes within the corresponding body part.

AN INSIGHT TO BRAIN GYM EXERCISES AND ITSOUTCOME

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Have you ever thought why teachers in older days would give sit-ups as punishment?

Why do old people rub their stomach and say vatapi jeernobhava after a heavy meal?

Teachers would twist the children's ears when they were not able to recall.Why?

Teachers would cane the children on knuckles when found dozing away during the class. Why?

When we give it a thought, there are many such things we associate with or would have heard our parents or our elders of the family talking about them. These so called "strict punishments" greatly involved science in them.

Teachers and elders would give sit-ups as punishments when they found children to be hyper-active. This initiatedgrounding in the children and as a result, children would listen to teachers/ elders accordingly and obey them.

Rubbing the stomach after a heavy meal and saying vatapi jeernobhava links to the brain gym exercise PLAVINI. This exercise initiates proper digestion after the meal.

Twisting the ears of the students was another noted punishment. This enhanced the memory of the students by pressing the acupressure points on the ears that connects to the memory area and students would remember

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what was taught.

Most of us associate with getting caned on knuckles,we would become extremely alert after taking the beatings. The points on knuckles connect to bringing in alertness.

The brain gym exercises are not new to the Indians.It originated in India and through exchange of traditions, culture and activities, it traversed throughout the world. Weignorantly practiced these vividly in the name of punishments.

Brain gym exercises is a collection of many such exercises which aids inremoving toxins, realizing stress, enhancing - memory, concentration, attentiveness, retention and recalling ability. It enhances many more skills of a person and promotes health both physically and psychologically.

LIST OF BRAIN GYM EXERCISES: There exist many such brain gym exercises within our culture and the list below includes a few of them:

- Super brain yoga or sit-ups
- Caning on the knuckles
- Healthy mind in a healthy body
- Yawning and Relaxation
- Plaavini
- Twisting the ears
- Rudaali or All is Well! for healthy lymphatic system
- Ejection of toxins from the body

SUPER BRAIN YOGA OR SIT-UPS: The sit-ups also known as Ganapathi Namaskara or Baski in the local dialect, which is a super brain yoga. This brings in grounding i.e. calmness in children who are hyper-active. This is not to be done immediately after food intake as this exercise enhances the blood flow to all the parts of the body and thus, resulting in improper digestion.

This exercise can be done up to 108 times by boys and men and should not be exceeded by 21 times by girls and women. The right posture for the exercise is shown below:

CANING ON THE KNUCKLES: Time and again we hear from our elders that during their days of schooling they were subjected to punishments and caning on the knuckles happen to be one of those. The acupressure points on the knuckles bring in the much needed alertness needed in the students in the class.

Since this is nowhere in practice in today's schooling, it can be replaced with pressing and pulling all the fingers from the bottom to the top

HEALTHY MIND IN A HEALTHY BODY: Lack of physical exercises and technology making living easier, we are very much susceptible to different types of diseases. In the olden days, all the household chores were shared among the women in the home and thus, they would stay in pink of health!

A sound body directly casts its wonder on the brain. It increases the actions of positive traits in a person like enthusiasm, confidence, etc. and the happy hormones i.e. serotonin are released which brings in the feeling of well-being.

Since, in today's living, hand washing the clothes, utensils and drawing kolams are not extensively practiced, it can be substituted by pressing the palm from its base to the base of all the fingers. Almost all the major acupressure points of the body connecting to vital organs are present in the hands.

Thus a healthy body contributes to a healthy mind.

ISSN 2250 - 3978 LILAVATI (PRINT)

YAWNING AND RELAXATION: Yawning is

generally known as energetic yawn. It is called so because, after yawning it helps in bettering the concentration in the person. Yawning is generally followed by stretching of the legs and arms. This relaxation exercise relaxes and energizes the body to work effectively.

PLAAVINI: Plaavini or the Vaatapi Jeernobhava phrase used in the local dialect account to the digestion and assimilation. After a heavy meal, elders are generally seen rubbing their stomach and saying Vaatapi Jeernobhava, which means "Ohh! Vataapi or the fire in my stomach please help me in digesting the food that I've eaten in this meal-completely."This not only helps in digesting the food but also helps in digesting the thoughts which are mostly the opinions or the conclusions we draw on people, incidents, objects, etc. and helps us to accept it.

TWISTING THE EARS: Teachers in the bygone era would never think twice in punishing the students and twisting their ears as a punishment. Although not found in the present era, this punishment holds a lot of significance. The acupressure points on the pinna of the ear lobes trigger the memory region in the brain and thus, enhances the memory. Twisting the ears includes the pulling of the pinna along with pressing it firmly i.e. exerting pressure on the acupressure points.

RUDAALI OR ALL IS WELL EXERCISE FOR HEALTHY LYMPHATIC SYSTEM: Rudaalis

are women who are professional mourners. They hired upon the death in the upper-caste families in the Rajasthan region of the Indian Subcontinent. These women publicly express grief of family members who are not permitted to display emotion due to social status. A simpler version of this exercise is the ALL IS WELL shown in the movie 3 IDIOTS. Since, the lymphatic system in our body happens to be the drainage system, cloggingit withharsh memories or emotions or thoughts might lead to multiple myeloma or cancer. This exercise also relaxes the muscles in the shoulder region which intern cures the frozen shoulders condition.

EJECTION OF TOXINS FROM THE BODY: Toxins

not only refers to the ones in form of the food but it also indicates the unwanted thoughts, unpleasant memories and emotional surges attached with them. Toxins in any form is harmful to the body and thus, ejecting it out of the body is the best solution. Throwing the toxins away from the body relaxes both, the mind and the body and thus, keeps us healthy and lively.

DENOUEMENT OR CONCLUSION: A few exercises when done on a daily basis not only keeps our body healthy but also helps in striking the balance of the mental health. As the Latin Phrase "A Sound mind in a sound body" is concurred, when both our body and mind are free of the clogs, it helps us in making right decisions and the flow of life is eased and enjoyed.

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OPTIMAL HEALTH THROUGH AYURVEDA

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Ayurveda is natural health care system that originated in India more than 5000 years ago.its main objective is to achieve optimal health and well begin through a comperhensive approach mind,body,behaviour and enviroment .Ayurved emphasizes prevention and health promotion and provides treatment for disease. Treatment of disease is highly individualized and depends on the pyschophysiologic constitution of patient. Common spices are utilized in treatment,as well as herbs and herbals mixtures and special preparation know as Rasayans are used for rejuvenation, promotion of longveity and slowing of the aging process.Ayurveda's approach, emphasis on prevevtion and ability to manage chronic disorders that its widespread use would improve the health status of the world's population

KEY WORDS:- Ayurveda, optimal health, herbs and herbal mixtures,chronic disorders

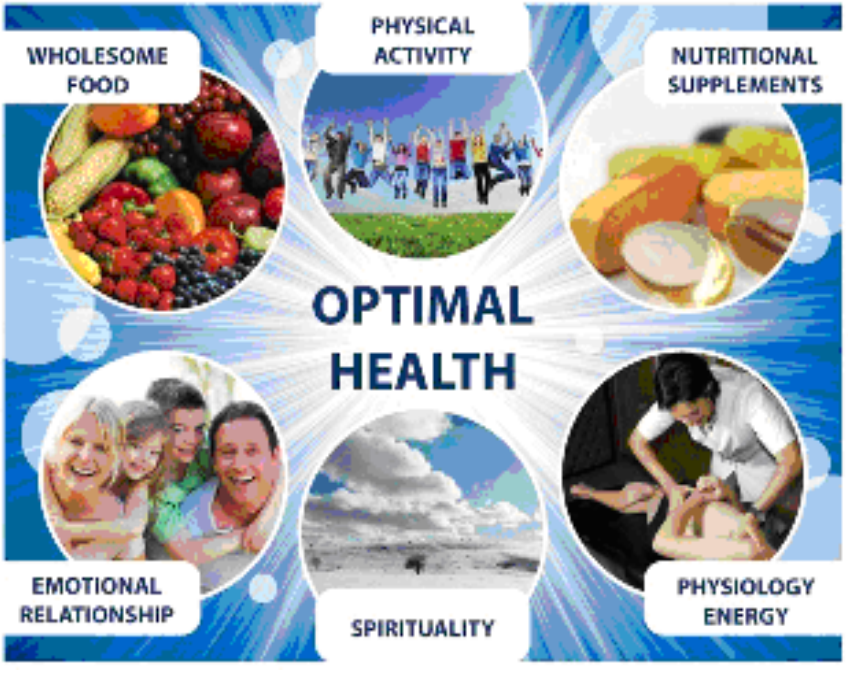
Ayurveda is a science of life (Ayur = life, Veda = science or knowledge). It offers a body of wisdom designed to help people stay vibrant and healthy while realizing their full human potential.

The two main guiding principles of Ayurveda are

1) The mind and the body are inextricably connected, and

2) Nothing has more power to heal and transform the body than the mind.

Freedom from illness depends upon expanding our own awareness, bringing it into balance, and then extending that balance to the body. This process isn't as complicated as it may sound. For example, when you meditate you effortlessly enter a state of expanded awareness and inner quiet that refreshes the mind and restores balance. Since the mind and body are inseparable, the body is naturally balanced through the practice of meditation. In the state of restful awareness created through meditation, your heart rate and breath slow, your body decreases the production of "stress" hormones such as cortisol and adrenaline, and you increase the production of neurotransmitters that enhance wellbeing, including serotonin, dopamine, oxytocin, and endorphins.



Optimal health is an individual person's physical, emotional and mental health abilities. That is, it is the health goals that a person can realistically achieve to feel their personal best. No two people's health goals are the same, that's why optimal health is such an individualized matter. One person might focus on physical health while to another healing emotional wounds is a more pressing matter. It really just depends on what is important to you. Likewise, one person's optimal health may be another's bare minimum. There is no right or wrong when it comes to optimal health--really, it's just a matter of finding what best suits you and your abilities.

Ayurveda Today: Despite Ayurveda being such an ancient concept, it's theory has stood the test of time and continues to be practiced to this day. Ayurveda remains the prevailing wisdom in much of the Indian subcontinent, with Ayurvedic hospitals and doctor's offices being the norm; whilst in the West, it has developed the way many leading nutritionists, naturopaths, herbalists and complementary healthcare practitioners treat their patients.

Whilst Western culture continues to focus on treating disease, Ayurveda focuses on prevention.

• Studies indicate that Ayurveda may be effective at reducing the risk of heart disease, with one particular study showing how it reduced atherosclerosis (the thickening and build-up of plaque on the artery walls) in both healthy adults and those with existing heart problems.

• The ayurvedic herb, guggul, has been shown to inhibit production of cholesterol in the liver, helping to reduce cholesterol levels.

• Fenugreek seeds can lower triglycerides and LDL ('bad') cholesterol whilst raising HDL ('good') cholesterol, and have also been shown to be an effective way of stabilising blood sugar in diabetic patients. These effects may be related to the high fibre content of the seed, as when fenugreek is consumed it lowers the absorption of cholesterol in the intestine.

• Turmeric, another widely used herb in Ayurveda, has been shown to be beneficial for certain inflammatory conditions and arthritis – especially when used in combination with other Ayurvedic lifestyle practices, such as Yoga.

• A preliminary clinical trial in 2011 that was partly funded by the US national centre for complementary medicine, found that Ayurvedic treatments for rheumatoid arthritis saw a similar success rate to conventional treatments. The study compared the effectiveness of the conventional drug methotrexate with an Ayurvedic treatment consisting of 40 herbal compounds.

• Another preliminary clinical trial in 2011 found that osteoarthritis[1] patients who took a compound derived from boswellia (also known as frankincense) had greater decreases in pain compared to pateints receiving a placebo. Boswellia produces a resin that is often used for it's anti-inflammatory and immune boosting properties.

Other Ayurvedicherbs[2] are being studied as treatments for cancer, dementia, Alzheirmer's disease, high blood pressure, thyroid problems, Parkinson's disease[3], irritable bowel syndrome and obesity, amongst many other problems. To this date, most clinical studies of Ayurvedic herbs have been small and therefore inconclusive; however, with larger studies on the horizon, the wider acceptance of Ayurveda looks set to grow even further.

Ayurveda is to be thankful for life and the wonder that it provides. It is to make wise choices for our health and for the health of others, to grow as spiritual beings and realise the potential within each of us. By following the teachings of Ayurveda, we grow continuously and evolve into the very best version of ourselves, becoming the master of our own destiny and the pioneer of our own health.

Ayurveda provides detailed instructions of daily regimen, seasonal regimen, food, sleep and sexual behavior so that health can be optimized and illness healed. Ayurveda is grounded in metaphysics of the five elements, earth (prithvi), water (jal), fire (agni), air (vayu) and ether or space (akash). Ayurveda stresses a balance of three elemental energies or humors: vata, pitta and kapha.

Ether and air combine to form Vatadosha, which governs the principle of movement and therefore can be seen as the force that directs nerve impulses, circulation, respiration, and elimination. Fire and water form Pitta dosha, process of transformation or metabolism. Water and earth elements combine to form the Kaphadosha, which is responsible for growth, adding structure unit by unit. Another function of the Kaphadosha[4] is to offer protection.

Ayurveda holds that each human possesses a unique combination of Doshas as the ratio varies from person to person.

Altogether, Ayurveda is not only treatment but a way of life. It uses herbs, herbal-mineral combination, massage, meditation and yoga for ones physical, mental and spiritual well being because of which the medicinal system has no side effects. Moreover, Ayurveda gives you an in-depth knowledge of life and helps achieve – dharma and moksha

Is there good scientific research around Ayurvedic medicine?

Many Ayurvedic adherents argue that the system's incredible longevity offers a powerful argument for its success and safety. However, most of the information regarding Ayurveda's efficacy has been passed from teacher to student. In addition to this "oral history,"[5] the ancient books CharakSamhita and SushrutaSamhita contain observational documentations about the system's effectiveness.

Although there is not a large body of clinical research on Ayurveda,many of the system's principles and practices are now recognized and used in conventional medical settings. For example, the Ayurvedic tenant of the psychological and physical impact humans experience during the changing of seasons is borne out in research on SAD (seasonal affective disorder).

There is also medical and layperson acknowledgement of the health benefits of Ayurvedic practices, such as yoga, massage, andmeditation. Herbs used in Ayurvedic medicine, such as tumeric, ginger, and neem, are now recognized as beneficial for heart health and as antioxidant-boosters. See the References and Further Reading section below for examples of research studies that are beginning to emerge on the use of specific Ayurvedic herbs.

Western knowledge of Ayurveda is still in its infancy, thus skepticism exists. As the use of Ayurvedic medicine grows, and as more practitioners share their knowledge with other healthcare providers, this wariness of Ayurveda may transform into appreciation and knowledge of the system.

How it works? : Ayurvedic practitioners believe that the body and the world around it are composed of and governed by three elements called doshasvatva, pitta, and kapha. These three are present in each person in varying levels, the functions and qualities of which define one's unique abilities and characteristics, as well as determine how one should eat and live in order to maintain a proper balance.

But like every coin has two faces, Ayurveda too does have pros & cons;

The pros: Safe and Chemical Free: Since the medicines are made of natural ingredients and chemicals are not used, the harsh effects of chemicals do not affect the consumer.

• Complete Cure: These medicines do not put a stop gap on the disease; they cure it in a way to prevent the reoccurrence of the disease. It aims at giving a long term cure for the disease.

• Improves Health: Consumption of these medicines not only cures the disease, but also improves overall health by improving metabolism, reducing stress and bringing tenacity.

• No Operation: Many people have the phobia of going under the knife. Ayurvedic medicines make sure that you do not have to get operated in situations like Haemorrhoids, bone inflammation, gall bladder stones and removal of non-terminal tumour.

• Effective Cure: There are several issues related to fields like gynaecology[6], psychiatry, toxicology, nutrition, detoxification & rejuvenation, and fertility that have effective cures in this form of treatment and do not have any side effects.

The cons: There are several instances in today's world where a person might be given life support to be kept alive. Ayurvedic medicines can hardly help in these situations and it has been seen that consumption of these medicines has worsened the condition of the patient.

• Ayurvedic medicines have a slow and gradual effect on the body generally.

• Since ayurveda is highly focused on prevention, it doesn't focus on treating diseases caused by bacteria and other organisms

Conclusion: "The great thing about Ayurveda is that its treatments always yield side benefits, not side effect [7]".

REFERENCES:

[1]www.arthritis.org

[2]Shekakai,Mehendhipowder,Thulsi.

[3] alpha-synuclein, PD01A (developed by Austrian company, Affiris),

[4]Triphala.

[5]A.FeundP.Thomson and few other members spoke about

[6]The Kahun Gynaecological Papyrus is the oldest known medical text of any kind. Dated to about 1800 BC

[7]ShubrhaKrishnan,essentialayurveda

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MANAGEMENT OF BIOMEDICAL WASTE

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In Connecticut, Biomedical waste (BMW) is regulated as a solid/ special waste. Biomedical waste is any infectious (including sharps), pathological and chemotherapy waste generated during the provision of human / animal health care, related medical research and teaching, the operation of laboratories, morgues and funeral establishments, the Biotechnology (such as the production and testing of vaccines), and from mobile health care facilities. The BMW, in addition to the risk for patients and personnel who handle these wastes poses a threat to public health and environment (Singh et al., 1996).Although these wastes represent less than ten percent of the wastes generated in health care, BMW presents a hazard to public health and safety and therefore, must be segregated and managed accordingly. This paper highlights the composition of biomedical waste, hazards of biomedical wastes, the need for its appropriate management and options that can be implemented.

Biomedical waste has become a serious health hazard in many countries, including India. Careless and Indiscriminate disposal of this waste by healthcare establishments and research institutions can contribute to the spread of serious diseases such as hepatitis and AIDS (HIV) among those handle it and also among the general public. Biomedical waste is generated during diagnosis, treatment and immunization processes in healthcare establishments. It includes waste such as sharps, human tissue or body parts and other infectious materials (Baverja et al., 2000). These wastes are potentially hazardous / infectious and their indiscriminate and unscientific management poses serious threats to human health.

Hospitals and other health care establishments in India produce a significant quantity of waste, posing serious problems for its disposal, an issue that has received scant attention (Lakshmi, 2003, Patil & Pokhrel, 2004). The major problem arises when the hospital refuse is dumped in open and is mingled with domestic waste leading to various types of hazards (Kelkar, 1998). The exposure to infectious and hazardous hospital waste can cause serious health problems to those who handle it, particularly to waste collectors or rag pickers and the environment (Silva et al., 2005). So, it needs proper management. Biomedical waste management has been brought into focus in India recently, particularly with the notification of the BMW (Management and handling) Rules, 1998. The rule makes it mandatory for the health care establishments to segregate, disinfect and dispose their waste in an eco-friendly manner (Sharma, 2002).

1.1 Classification of Biomedical waste:

Successive disposal includes proper classification of waste as per BMW (Management & Handling) Rules 1998 given below in the Table 1.

Category	Type of waste	Description and example
Potentially Toxic	Pharmaceutical	Includes unused, expired, broken, split and contaminated drugs, vaccines and sera and discarded items such as residues, gloves, masks, connecting tubing, and drug vials.
	Radioactive waste	Waste containing radioactive substances e.g. unused liquids from radiotherapy or laboratory research; contaminated glassware, packages, or absorbent paper; urine and excreta from patients treated or tested with unsealed radio nuclides; sealed sources.

Potentially Infectious	Infectious	Waste suspected to contain pathogens e.g. laboratory cultures; waste from isolation wards (AIDS); tissues (swabs), materials, or equipment that have been in contact with infected patients and excreta.
	Pathological	Human and animal tissues, organs, body parts, human fetuses and animal carcasses, blood, and body fluids.
	Sharps	Includes needles, hypodermic needles, scalpel and other blades, knives, infusion sets, saws, broken glass, and nails.
	Genotoxic	Highly hazardous waste with mutagenic, tetro-genic, or carcinogenic properties. It also includes vomit, urine, or feaces from patients treated with cytostatic drugs, chemicals, and radioactive material.
	Chemical	Waste containing chemical substances e.g. laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents.
	Wastes with high content of heavy metals	Batteries; broken thermometers; blood-pressure gauges; etc.
	Pressurized containers	Gas cylinders; gas catridges; aerosol cans

Non-hazardous waste constitutes about 85% of the waste generated in most healthcare set-ups. This includes waste comprising of food remnants, fruit peels, wash water, paper cartoons, packaging materials

2. Potential Implications of Biomedical Waste

2.1 Risk to healthcare workers and waste handlers : Improperly contained contaminated sharps pose greatest infectious risk associated with BMW. There is also theoretical health risk to BMW handlers from pathogens that may be aerosolized during the compacting, grinding or shredding process that is associated with certain BMW management or treatment practices. Physical (Injury) and health hazards are also associated with high operating temperatures of incinerators and steam sterilizers and with toxic gases vented into the atmosphere after waste treatment.

2.2 Risk to the public : Public impacts are confined to aesthetic degradation of the environment from careless disposal and the environmental impact of improperly operated incinerators or other medical waste treatment equipment.

There may be increased risk of nosocomial infections in patients due to poor waste management. Improper waste management can lead to change in microbial ecology and spread of antibiotic resistance.

It is important to note that not all hospital waste has the potential to transmit infection. It is estimated that 80-85% is non-infectious general waste, 10% is infectious and 5% is other hazardous waste (CPCB, 2000). However, if the infectious waste gets mixed with the general non-infectious waste, the entire bulk of BMW potentially becomes infectious (Info Nugget, 2003). Waste piles also attract a variety of disease vectors, including mosquitoes and flies. Thus, improper waste management practices are a serious problem that involve not only to the hospital administration but society at large.

3. Biomedical waste management : BMW should be managed according to its type and characteristics. For waste management to be effective, the waste should be managed at every step, from acquisition to disposal. The following are the elements of a comprehensive waste management system: waste survey, segregation, accumulation and storage, transportation, treatment, and disposal.

3.1 Waste survey : The survey should differentiate and quantify the waste generated. It should determine the points of generation, the type of waste at each point and the level of generation and disinfection within the hospital. This helps to determine the method of disposal.

3.2 Waste segregation : This consists of placing different kinds of wastes in different containers or coded bags at the point of generation [Table2]. It helps

to reduce the bulk of infectious waste as well as treatment costs. Segregation also helps to contain the spread of infection and reduces the chances of infecting other health care workers.

3.3 Waste accumulation and storage : Waste accumulation and storage occurs between the point of waste generation and site of waste treatment and disposal. While accumulation refers to the temporary holding of small quantities of waste near the point of generation, storage of waste is characterized by longer holding periods and large waste quantity. Storage areas are usually located near where the waste is treated. Any offsite holding of waste is also considered storage.

To contain spills, storage areas should not have floor drains and should be recessed to hold liquids. Floor and walls should be impervious to liquid and easy to clean. They should be disinfected regularly. Refrigeration may be required for prolonged storage of putrifiable and other wastes. Storage area should be posted with 'EXPLICIT' signs.

3.4 Waste transportation : When BMW is not treated on site, untreated waste must be transported from the generation facility to another site for treatment and disposal.

Table 2: categorization and color coding of the container

Substance/ Waste material	Category	Color Coded bags
Human tissues organs, animal waste, blood and body fluids	1	Red
Animal and slaughter House waste	2	orange
Microbiological and Biotechnological waste	3	yellow
Waste sharps	4	blue
Discarded medicines	5	blue
Solid waste	6	Yellow/black
Disposable	7	Yellow/black
Chemical	9	Yellow/black

3.5 Waste treatment : Treatment is mainly required to disinfect or decontaminate the waste, right at source so that it is no longer the source of pathogenic organisms. After such treatment, the residue can be handled safely, transported and stored.

• Needles and syringe nozzle –shredded in needle destroyer and syringe cutters.

• Scalpel blades /Lancet/Broken glass should be put in separate containers with bleach, transferred to plastic/cardboard boxes; sealed to prevent spillage and transported to incubators

• Glassware should be disinfected, cleaned and sterilized.

• Culture plates with viable culture should be autoclaved; media are placed in appropriate bags and disposed off. The plates can be reused after sterilization.

• Gloves should be shredded/ cut/ mutilated before disposal.

• Swabs should be chemically disinfected followed by incineration. If they contain only a small amount o blood that does not drip, they can be placed in the garbage.

• Disposable items are often recycled and have the risk of being used illegally. Dipping in freshly prepared 1% sodium hypochlorite for 30 min.-one hour, followed by mutilation before disposal should be policy adopted for such items.

• Liquid waste generated by the laboratory is either pathological or chemical in nature. Non-infectious waste should be neutralized with reagents.

• Liquid infectious waste should be treated with a chemical disinfectant for contamination and then neutralized.

3.6 Waste Disposal : The waste disposal methods vary their capabilities, cost, availability to generation and impacts on the environment. The various disposal methods includes incineration, autoclaving, chemical methods, thermal methods, ionizing radiation process, deep burial and micro waving

Incineration and autoclaving are considered traditional methods. Chitins et al (2003) have devised a solar heating system for disinfecting infectious waste in economically less developed countries. They obtained a BMW free of pathogenic bacteria before disposal by this method. This would ensure maximum public hygiene quality. Untreated BMW can be disposed off in sanitary landfills. Disposal without treatment is not recommended for human tissues, sharps, and culture from clinical laboratories.

4. Conclusion : Effective management of waste is possible only if the disposers follow the proper regulations enacted by the pollution control committee. Safe and effective management of waste is not only a

legal necessity but also a social responsibility. There would be positive result in BMW management practices, with enactment of few more legislations and regulation specific to the handling of BMW. New approaches in BMW are implemented in many parts of the world and show positive results and are sustained in many parts of the world, because of increase in awareness about the harmful effects of the BMWs. Hospitals having defunctional/defective incinerators should be made to utilize central incineration facility as efforts of government is to reduce the number of incinerators in cities to prevent rise in air pollution. Small health care establishments in city, which have still not registered with central facility, should be encouraged to register thereby bringing down the operating cost of contractor and decrease the cost of incineration per kg.

Proper collection and segregation of BMW are important. At the same time, the quantity of waste generated is equally important. a lesser amount of BMW means a lesser burden on waste disposal work, cost-saving and a more efficient waste disposal system. Hence, health care providers should always try to reduce the waste generation in day-to-day work in the research centre or at the hospital.

References:

• Saurav Guptha and ram Boojh, "Report: Biomedical waste management practices at Balrampur Hospital, Lucknow, India", Waste Management & Research,2006: Vol 24: 584-591

• CPCB 2000 Manual on Hospital waste Management, Central Pollution Control Board, New Delhi.

• Lt Col SKM Rao, Wg Cdr RK Ranyal, " Biomedical waste Management: An Infrastructural Survey of Hospitals", MJAFI, 2004; Vol 60:379-382

• Mukesh Yadav, " Hospital Waste- A major Problem", Hospitals Today, Vol 8, No4, Oct-Dec2001:276-282

• Biomedical Waste management News Letter from "ENVIS" Pondicherry Pollution Control Committee, Vol.2, No.3 Sept, 2006

USES OF TULASI IN AYURVEDA

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Now a days people are following scientific methods for their health treatment.It causes many side effects. This paper consists of how tulasi usefull in Ayurveda.

It acts as a detoxifying, cleaning and purifying agent both from with in and without. It is also effective in treating skin diseases, itching and issues like ring worms.it can be made in to teas or can be had raw, powdered, paste or in the form of herbal supplements. It helps in reliving stress, strengthen, immunity and facilitate proper digestion.it also beneficial in treating conditions like hepatitis,malaria, tuberculosis, dengue and swine flue

Tulsi, otherwise known as Holy basil, is known for its heating power, and it has a rich history dating back to ancient eastern uses 300 years ago. Historically used as medicine due to its widespread healing power, tulsi leaves are now regarded by most countries as adapt genes (anti stress agent) and have been used widely to promote health throughout the entire body. It's suspected that is native to tropical Asia, although it now grows in many tropical climates across the globe. Today, tulsi is commonly consumed in supplement from or as a natural remedy for anxiety, adrenal fatigue, hypothyroidism, unbalance blood sugar and as a home remedy for acne. In modern medicine, in last few decades, several Indian scientists and researchers have studied the pharmacological effects of various parts of the tulsi plant on the immune system, reproductive system, center nervous system, cardiovascular system, urinary system and blood biochemistry. Researchers described the therapeutic significance of tulsi in the management and relief of various ailments, and they established a scientific basis for the therapeutic uses of tulsi. It protects organs and tissues against chemical stress from industrial pollution and heavy metals, and physical and heavy metals, and physical stress from prolonged physical exertion, ischemia, physical restraint, and exposure to cold and excessive noise [1].

Tulsi nutrition facts: Tulsi is an aromatic shrub in

the basil family lamiaceae that's through to have originated in north central India and now grows native throughout the eastern world tropics. Tulsi is a perennial that has a light lemon scented purple-pink flowers. Tulsi leaves are oval shaped with a slightly sharp tip, and the edges are slightly toothed. There are two types of tulsi: Rama tulsi with white stem and green leaves, and Sham tulsi has a dark pinkish-purple stem and leaves. Both types are similar in smell and benefits. ¼ cup of fresh tulsi leaves (six grams) include the following (listed in recommended daily values):

1calorie

no cholesterol

0.2grams of sodium

0.2 grams of carbohydrates

31 percent vitamin K

6 percent vitamin A

2 percent vitamin C

FIGHTS ACNE: Tulsi kills bacteria and infections. Therefore it's a great natural home remedy for acne and other skin irritations.

Holly basil benefits the skin and heals skin infections both internally and externally-and it's completely safe! The primary compound of holy basil oil is eugenol, the active ingredient in the powerful antimicrobial clove oil, which is widely believed to treat many skin disorders[2]. Research shows that tulsi is a natural acne treatment, and when used with coconut oil as a carrier, its more viscous and absorbs into the skin even better.

PROTECTS AGAINST DIABETES: Tulsi has the ability to control blood glucose levels; several tests tube and animal experiments, as well as human clinical trials, shows that tulsi has anti-diabetic activity. Studies using diabetic laboratory animals show that tulsi can reduce blood glucose, correct abnormal lipid profiles, and protect the liver and kidneys from the metabolic damage caused by high glucose levels

FIGHTS CANCER: Tulsi not only workers as a natural cancer treatment, but it prevents it. Research shows that people who regularly consume tulsi are less likely to be immune-compromised and less susceptible to developing cancer cells. The photochemical in tulsi prevent chemistry-include lung, liver, oars and skin cancers because they increase antioxidant activity, alter healthy gene expressions, induce cancer cell death, prevent blood vessel growth and stop metastasis, which is the spread of cancer from one organ to another.

Tulsi also protect your body from radiation poisoning and heals damage from radiation treatment. It selectively protects the normal tissues against the destructive effects of radiation. Laboratory studies published in Alternative Medicine Review shows that tulsi protect against toxic chemical-included injury by increasing the body's levels of antioxidant molecules, such as glutathione, and enhancing the activity of antioxidants enzymes. These enzymes protect cellular organelles and membranes by fighting free radical damage caused by a lack of oxygen and other toxic agents. In fact, the journal Nutrition and cancer published an interesting review outlining the important research involving tulsi's cancer-killing prowess we've seen the past several years. The doctors involved in this research agree that conventional chemotherapy and radiotherapy treatment during the past three decades haven't been able to contain the disease, and they have serious side effects. Many natural agents, especially tulsi leaves and extracts from other plants, prove to be nontoxic, easily available and have proven anticancer properties[3].

BALANCES HARMONES: Elevated cortisol level can be dangerous; it's commonly known as the stress hormone, and it can have a major impact on our learning, memory, immune function, bone density, weight gain and heart disease. Luckily, tulsi has the amazing ability to regulate cortisol level and keep hormone levels balanced naturally. Tulsi has a physical effect on the body and metal benefits as well. By drinking tulsi tea or adding tulsi to your meals, you calm your system and keep your body running smoothly.

CURES RESPIRATORY DISORDERS: Tulsi is effective in curing almost all varieties of respiratory disorder, including working as a bronchitis natural remedy, a deep cough that usually comes on with another type of upper respiratory infection, such as the cold or flu. The component of tulsi leaves like camphene, eugenol and cineole provide relief from congestion and other symptoms of respiratory disorder. This means tulsi is an asthma natural remedy, as it relieves congestion and allows for easier breathing.

GOOD SOURCE OF VITAMIN K: Vitamin K is an essential fat-soluble vitamin that plays an important role in bone health and heart health. It's one of the main vitamins involved in bone mineralization and

blood clotting, but also helps maintain brain function, a healthy metabolism and protects against cancer. One cup of tulsi leaves has more than your daily recommended value of vitamin K, making it a perfect source to prevent vitamin K deficiency, and can be beneficial to your bone density, digestive health and brain function.

DENTAL CARE: Tulsi has the power to fight bacteria in your mouth that lead to dental issue, such as cavities, plaque, tartar, and bad breath. Tulsi leaves serve as a mouth freshener because they kill the bacteria and germs hiding in your mouth. Tulsi can cure ulcers in the mouth, and it's known to stop the growth of oral cancer cells caused by chewing tobacco. For this natural dental care, try adding a drop of tulsi essential oil to your toothpaste or drinking one cup of tulsi tea every day.

RELIEVES HEADACHES: Because tulsi has sedative and disinfectant properties, it's a natural headache remedy that can relieve migraine pain. This is especially true with headache due to sinus pressure. Tulsi is anti-congestive and helps reduce the buildup and tension due to sinus issues. An easy way to take advantage of this tulsi benefit is by drinking one cup of tulsi tea every day or by diffusing tulsi essential oil.

SUPPORT EYE HEALTH: Our eyes are susceptible to viral, bacterial and fungal infections that can be very dangerous. Thankfully, holy basil has the power to fight these detrimental infections. Tulsi fight against conjunctivitis (pink eye) and boils; it also has anti-inflammatory and soothing properties that protect your eyes from environmental damage and free radicals. Tulsi leaves prevent a range of eye issues, including cataracts, vision defects and ophthalmic. It's also a glaucoma natural treatment and natural treatment for macular degeneration. Glaucoma, for instance, is caused by a buildup of fluid in the eye that puts pressure on the optic nerve, retina and lens; the pressure can permanently damage the eye if not treated. Macular degeneration, another major vision inhibiter, is age associated vision loss and blurry vision related to damage to the macula, or center of the eye.

HISTORY & INTERESTING FACTS: Holy basil in English, or tulsi in the various Indian languages, is an important medicinal plant in the various traditional and folk systems of medicine in Southeast Asia. Tulsi is a medicinal herb that's considered a sacred plant by the Hindus in the Indian subcontinent. In traditional system of medicine, different parts of tulsi the leaves, stem, flower, roots, seeds and even whole plant have been recommended for the treatment of bronchitis, bronchial asthma, malaria and insect bites. In fact, of all the herbs used with in Ayurveda, tulsi is preeminent, and scientific research now confirms its beneficial effects. There is mounting evidence that tulsi can address physical, chemical, metabolic and psychological stress through a unique combination of pharmacological actions.

HOW TO USE &COOK TULSI: Tulsi plants are grown in almost every Hindu house hold. The leaves have a sweet, aromatic smell and a minty

taste; they're used in garnishing food, sauces and soaps. They're also commonly used to make juices, flavored water and tulsi tea. In India, people eat tulsi leaves raw in order to cure a cough or cold. You can buy a care for a tulsi plant or you can purchase tulsi leaves and powder from health food store. If you buy fresh tulsi, look for leaves that are vibrant and green, without any holes and dark sports. To prepare tulsi leaves clean them thoroughly, and then chop them coarsely with a kitchen knife. It's best to use fresh tulsi leaves with in a day or two, but they can be stored in a sealed bag in the refrigerator for five days or so. Tulsi tea is popular beverage in India that's consumed in place of coffee. Tulsi tea boosts metabolism and helps with weight loose; it's rich in antioxidants and prevent aging effect as well as cancer. Tulsitea is almost soothing, and it balances our system and improves immunity; it increases your resistance to stress and chronic fatigue syndrome; plus works as a natural remedy for anxiety. You can find tulsi tea at many health food stores; it comes in boxes of tea bags. You can also dried tulsi leaves in bulk and buy use your tea steeper to make this beneficial and tasty tea. If you'd rather have an iced tea it's simple to let the tea cool, add ice, and even some stevia or lemon for flavor. You can also prepare tulsi juice, which includes five tulsi leaves that have been infused in water. The juice is known to enhance kidney function and relieve diarrhea, vomiting and fever. Tulsi essential oil can be found in many health food

stores or online. The essential oil is extracted from tulsi and is used in lotions, soap, perfume, shampoo and conditioner. You can also diffuse the oil in your home; the calming and immune-boosting properties can be inhaled as well.

RECIPES USING TULSI: One tablespoon of fresh and chopped tulsi leaves would be a great addition to my green tea chicken soup recipe. It's so good for you because it heals your gut and boosts your immune system. The tulsi addition brings the health benefits of this soup up a notch by adding infection-fighting and stress-relieving properties. Fresh tulsi leaves or tulsi powder can add an interesting and unexpected flavor to your everyday salad recipe. Try adding tulsi to my Egg Salad Recipe or this great quinoa tabular salad recipe that already has a mint flavor-by adding tulsi you can really step it up a notch! Quinoa is a grain that's higher in protein, fiber, magnesium and float, so you get a ton health benefits. Adding tulsi tea to your bath is an awesome way to enhance organ function and kill bacteria or fungal infections. Check out my 10 Detox Bath Recipes; try adding tulsi tea to the green tea detox bath or my home made lemon rosemary bath salt.

POSSIBLE SIDE EFFECTS: Researchers have found that tulsi is safe for consumption and topical use. One note to keep in mind is that tulsi may slow blood clouting, so taking tulsi along with medications that also slow clotting might increase the chances of brushing and bleeding. Some medications that slow blood clotting include aspirin, clopidogrel, dalteparin, enoxaparin, heparin, ticlopidine and warfain.n

REFERENCE:

1. Shimizu T, Torres MP, et.al; Holy Basil leaf extract decreases tumorigenicity and metastasis of aggressive human pancreatic cancer cells in vitro and in vivo: potential role in therapy. Cancer Lett. 2013 Aug 19;336(2):270-80. doi: 10.1016/j.canlet.2013.03.017. Epub 2013 Mar 21.

2. Baliga MS, et.al; Ocimum sanctum L (Holy Basil or Tulsi) and its phytochemicals in the prevention and treatment of cancer. Nutr Cancer. 2013;65Suppl 1:26-35.

3. Shimizu T, et.al Holy Basil leaf extract decreases tumorigenicity and metastasis of aggressive human pancreatic cancer cells in vitro and in vivo: potential role in therapy.CancerLett. 2013 Aug 19;336(2):270-80.

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THEME :-06

PARASHAREEYAM

Agricultural, Horticultural & Animal Sciences, Fisheries, Forestry

Sl No	Title of the Paper	Authors	Page No
1.	CLEAN GENE TECHNOLOGY	Savita Kanthi Shruti Koraddi Prateekha Khadi	119 - 123
2.	SNAKES, SNAKE POISON & ANTIDOTES AS DESCRIBED IN SCRIPTURAL TEXTS	Ms. S. Goda Devi	123 - 128
3.	LEGAL REGIME OF INTELLECTUAL PROPERTY RIGHTS FOR BETTERMENT OF AGRICULTURAL SCIENCE WITH SPECIAL REFERENCE TO PLANT VARIETIES AND FARMER'S RIGHTS ACT	Dr. Jyothi Vishwanath Thripura V	128 - 131
4.	EDIBLE VACCINES PRODUCTION BY PLANTS	Savita Kanthi Shruti Koraddi Prateekha Khadi	131 - 135
5.	ROLE OF DRIP IRRIGATION FOR WATER CONSERVATION	Ruksar Sultana Puneeth kumar M.C	135 - 139
6.	ORGANIC FARMING IN INDIA –A REVIEW	Divyashree. D. M K. Siva Saketh Reddy	139- 141
7.	AGRO WASTE MANAGEMENT: WASTE TO WEALTH	Vinutha C.V Pamulasaikiran	142 - 144

CLEAN GENE TECHNOLOGY

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The World's population is increasing daily and this situation has created two major problems. First, there are many more mouths to feed and secondly, there is less arable land to farm to produce more food needed by the rapidly swelling population. While conventional breeding has performed wonderfully well in meeting this challenge, a lot more is still necessary to meet the hunger threat. In this respect, transformation biotechnology can help especially where conventional breeding lacks solution. Plant transformation technologies require selectable marker genes to produce transgenic plants. However, after selection events, selection marker genes are of no value thereafter except when used as gene of interest (e.g. selectable markers that provide herbicide tolerance). In fact, selection marker genes in transgenic plants are perceived to pose potential biosafety problems. In all genetic transformation technologies based on direct gene transfer (electroporation of protoplasts, particle bombardment, etc) the selectable marker genes generally co-integrate with the gene of interest(s) in one Mendelian locus in the plant genome; hence, their removal is highly desirable. This may also help in the acceptability of transgenic plants by society. Transgenic plants that contain the desired gene of interest but lack the selection marker gene used in its production are termed "clean" and the methods utilized in their production are referred to as Clean Gene Technology. There are several proved methods of eliminating selectable marker genes. Various techniques have been developed in recent years to generate marker free transgenic plants and to eliminate marker genes from transgenics. These include site-specific recombination, homologous recombination, transposition, transient co-integration of the marker gene, and a co-transformation-segregation approach, but success has been limited to only a few plant species. Transgenic technology could become more reliable with the improvement of existing marker gene removal strategies and the development of novel approaches for plant genome manipulation.

Keywords: Bio-safety, selectable marker, transgenics, clean gene technology, marker-free, selection marker, site-specific recombination, homologous recombination, transposition, transient co-integration of the marker gene, and a co-transformation-segregation.

Selectable marker genes are vital to the research and development of genetically modified (GM) crops. The methods used to introduce foreign DNA in a plant cell, either by microinjection, particle gun, electroporation or Agrobacterium, are relatively inefficient. Pinpointing cells that successfully incorporated foreign DNA in an ocean of non-transformed cells is akin to finding a needle in a haystack. To find transgenic cells, a marker gene is co-introduced with the gene of interest. These dominant genes confer resistance to antibiotics, such as hygromycin (hpt) and kanamycin (nptII), and herbicides, such as phosphinothricin (bar) and chlorosulfuron (als), that kill non-transformed cells.

However, antibiotic and herbicide resistance marker genes may not be required in mature plants, especially when they are cultivated in fields.The presence of these marker genes in commercialized transgenic crops has caused considerable public concern about the medical implications of GM food consumption and GM crop cultivation. Herbicide resistance genes might be transferred by out crossing to weeds and wild crop relatives. There also exists the possibility, albeit extremely rare, of horizontal gene transfer from transgenic plants to soil and intestinal microorganisms, resulting in pathogens against which antibiotics currently being used are rendered ineffective. Selectable marker genes (SMGs), such as antibiotic or herbicide resistance genes, are used in nearly every plant transformation protocol to efficiently distinguish transformed from non-transformed cells. However, once a transgenic event has been selected, marker genes are generally of no use. On the contrary, the continued presence of marker genes in transgenic plants may raise public and regulatory concerns and may have technological disadvantages.

The main perceived risk is horizontal gene transfer of antibiotic resistance genes to pathogenic organisms or the transfer of herbicide resistance genes to weeds. Regulatory agencies may thus advice or require the absence of certain marker genes in commercialized transgenic plants.

Fears concerning SMGs center around the presence of antibiotic resistance genes in transgenic crops or its products that might reduce the efficacy of a clinically important antibiotic. A lot of attention has been spent on risk assessment concerning the transfer of antibiotic resistance genes from genetically modified (GM) plants to soil- and plant-related micro-organisms by horizontal gene transfer. For example, the transformation of bacteria in the food chain where

free DNA persists in some materials for weeks, and moreover, some bacteria develop natural/chemical competence to take up DNA from the environment. In addition, in the gastrointestinal tract of humans and farm animals, DNA may remain stable for some time, particularly in the colon. However, degradation already begins before the DNA or the material containing the DNA arrives at the critical sites for horizontal gene transfers, which are generally believed to be the lower part of the small intestine, caecum, and the colon. In the case that DNA can arrive to this part, it will be mostly fractionated in pieces smaller than a gene sequence. Thus, breakdown of DNA in the gut, combined with the breakdown of the DNA due to food processing, strongly reduces the risk of dissemination. Moreover, the antibiotic resistance genes that are commonly used as selectable marker genes in transgenic plants actually have a bacterial origin . Indeed bacteria have developed very sophisticated mechanisms to eliminate competitors and guarantee their own survival producing antibiotics and genes to confer resistance to these antibiotics. Thus, the contribution of horizontal transfer of antibiotic resistance genes between transgenic plants and microorganism is most likely insignificant compared to the existing exchange of such genes between bacteria.

On the other hand the escape of herbicide resistance genes to wild relatives is also a concern. Many crops are sexually compatible with wild and/or weedy relatives, then if the plants grow close one to another, crop-to-weed or crop-to-wild relative gene flow could result (reviewed by [6, 7]. The success of the introgression of a transgene in a wild relative has many barriers. Firstly, both have to grow in close proximity; secondly, both have to be flowering in overlapping time frames; thirdly, the progeny must be sufficiently fertile to propagate; and fourthly, a selective pressure should be applied (herbicide). There will only be a selective advantage for the wild relative if the herbicide is used in the habitat where the relative grows. For example, it is well known that cultivated rice is sexually compatible with perennial wild red rice (Oryza rufipogon Griff.), considered a harmful weed. It grows in many of the same regions, often has overlapping flowering times, and thus is a prime candidate for gene flow with cultivated rice. Indeed, Chen et al. showed that the gene flow rate was 0.01% under natural conditions. This and other studies showed the risk of the transfer of transgene(s) to the wild relative or weeds. Thus precautions should be taken into account to prevent gene flow and introgression. A possible way consists in containing transgenic pollen by growing barrier crops in adjacent areas or by alternating transgenic cultivars carrying different herbicide resistance genes. Other strategies consists in the creation of biological containment, to limit the transfer of pollen to plants in the surrounding area, e.g. by engineering male sterility or by delaying and/or decreasing flowering. Alternatively, complete removal of the marker gene should alleviate concerns regarding effects on human health and the environment.

In some specific cases, selectable marker genes are needed after selection, for example in propagation of lines with nuclear male sterility. However, generally SMGs are not needed after the selection of the transgene event. On the contrary, their presence may have some technological drawbacks. It has been reported that some genes (selectable markers included) may induce pleiotropic effects under certain conditions. In fact, a transcriptome analysis of three Arabidopsis transgenic lines containing pCAMBIA3300 vector (35S-bar-35S) showed that they differ from their WT counterparts by expression of 7, 18 and 32 genes respectively. However, only four genes were found to be significantly different in all three lines compared with the wild type plant in glufosinate untreated plants [14]. Thereafter, 81 genes were found to be differentially expressed in the presence of glufosinate in transgenic plants, in contrast to the 3762 differentially expressed genes in WT plants. From these 81 genes 29 were specific to transgenic plants [14]. These results suggested to the authors that glufosinate or a metabolic derivative of glufosinate activates unique detoxification pathways to offset any effects on plant growth and development. Nevertheless, in the above mentioned work, no indication or study of the position effect and/or effect of transgene regulatory sequences was reported. Indeed the regulatory sequences (promoters and terminators) can influence the activity of some genes in the same T-DNA or even endogenous genes that are close to the insertion site [16-18]. Furthermore, in systems where the number of efficient SMGs is limited, the re-transformation with the same SMG is precluded by its presence. This is problematic as most transformation protocols are indeed based on one or a few selectable marker genes only. Miki and McHugh [3] reported that more than 90 % of the scientific publications that use transgenic plants were based on three selection systems: the antibiotics kanamycin or hygromycin and the herbicide phosphinothricin. These outcomes provide an extra motivation to remove SMGs and other unnecessary sequences as soon as possible after selection of transgenic plants.

Methods to Produce Marker Free Transgenic Plants

1. Co-transformation : Co-transformation is a meth-

od for production of marker free transformants based on Agrobacterium- or biolistics mediated transformation in which a selectable marker gene and gene of interest are on separate constructs. Selectable marker genes can subsequently be removed from the plant genome during segregation and recombination that occurs during sexual reproduction by selecting on the transgene of interest and not the selectable marker gene in progeny.

Three approaches are used for co-transformation : Introduction of two TDNAs, in separate Agrobacterium strains or Biolistics introduction of two plasmids in the same tissue; (ii) Introduction of two T-DNAs carried by different repliconswithin the same Agrobacterium strain; an (iii) Introduction of two T-DNAs located on the same replicon within an Agrobacterium

Disadvantages : It cant be used for vegetatively propagated plants.

These procedures not only require fertile plants, but are also very time consuming.

Integration of an selectable marker gene and the transgene of interest on separate loci are required.

a) Using Plant DNA : Recent studies have shown that plants have T-DNA border like sequences in rice and Arabidopsis and these might be used in transformation. Because this so called Plant DNA (P-DNA)

It lacks any Open Reading Frames(ORF) and contains a high A/T content, it is likely the footprint of ancient Agrobacterium-mediated natural transformation events via horizontal gene transfer.

It has been demonstrated that plant-derived P-DNA fragments can be used to replace the universally employed Agrobacterium T-DNA for transformation.

Co-transformation of the desired transgene into P-DNA is capable of producing marker-free transgenic plants.

Inserting the bacterial ipt cytokinin expression cassette into the backbone of P-DNA vector enabled an increase in the frequency of backbone-free transgenic plant in the recoveredpopulation.

2. Site-Specific Recombination-Mediated Marker Deletion : In temperate bacteriophages, there is a second type of recombination called Site-specific recombination, which takes place only between defined excision sites in the phage and in the bacterial chromosome.

Positions of the site-specific recombination in the bacterial and phage DNA are called the bacterial and phage attachment sites, respectively. Each attachment site consists of three segments.

The central segment has the conserved nucleotide sequence that sites the recombination event. A phage protein, an integrase, catalyzes the site-specific recombination events, which lead to physical exchange of DNA.

Excision requires the phage enzyme integrase plus an additionalphage protein called excisionase.

There are three well-described site-specific recombination systems that might be useful for the production of marker-free transgenic plants: Cre/loxP system from bacteriophage P1, where the Cre enzyme recognizes its specific target sites.

a) Cre/loxP recombination system : In these systems, elimination of selectable marker gene would require recombinase expression in transgenic plants.

The recombinase gene cassette can be introduced into transformed plants that contain the selectable marker gene between two recognition sites.

Alternatively, a transgenic plant of interest can be crossed with a plant that expresses a recombinase gene.

After segregation, marker-free transgenic progeny plants can be identified.

A tightly controlled site-specific recombination system was recently employed in an efficient marker gene removal in tobacco pollen.

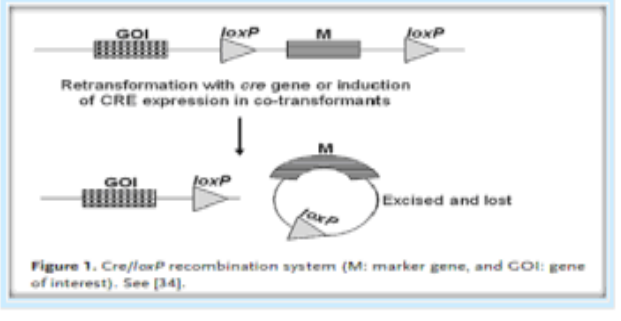

Figure 1. Cre/*loxP* recombination system (M: marker gene, and GOI: gene of interest). See [34].

3. Transposon based marker methods : In the 1940s, Barbara McClintock made an astonishing discovery. She detected two factors of DNA transposition in maize:

a) Ds (disassociation) element that was located at a chromosome break site

b) Unlinked genetic factor(ac) that was required to activate the breakage of chromosome

Transposons are DNA sequences between hundreds to thousands of bases long. They code at least one protein,which enables them to replicate.

The most widely studied transposon is the P element from the fruitfly (Drosophila melanogaster).

Steps

(i) Insertion of the marker gene onto a transposon, a segment of DNA that "hops" around in the plant's genome;

(ii) Co-transformation with gene of interest

(iii) Segregation of the marker gene.

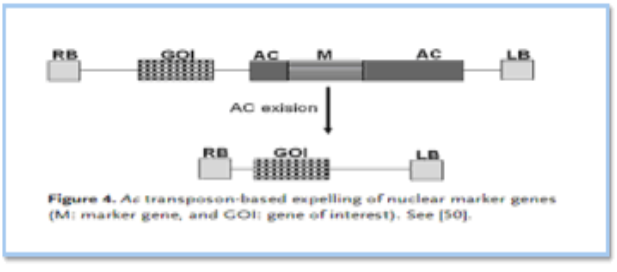

Figure 4. *Ac* transposon-based expelling of nuclear marker genes (M: marker gene, and GOI: gene of interest). See [50].

Disadvantages

(i) Different species have variable rates of transposition efficiency.

(ii) This method requires labor and time costs for crossing transgenic plants and the selection of the progeny.

(iii) There is low efficiency of marker-free transgenic plant generation, because of the tendency of transposable elements to reinsert elsewhere in the genome.

(iv) Imprecise excision.

(v) Generation of mutations because of insertion and excision cycles

(vi) Genomic instability of transgenic plants because the continuous presence of heterologous transposons decreases efficiency

4. Intrachromosomal recombination system: Recombination sites are engineered into the plant, but no recombinase is expressed. The attachment site from Phage origin is denoted POP' or attP, & the attachment site from Bacterial origin is denoted BOB' or attB. Intrachromosomal recombination in plants is obtained by insertion of selectable marker gene between two direct repeats of attP that facilitates spontaneous excision. Base composition of the attP site sequence is A + T rich, which is conjectured to play a recombination-stimulating role.

Possibly, the formation of a recombination hot spot is caused via the induction of double-strand breaks (DSBs) , but may also reduce of the stability of transgene sequences later on.

The potential advantages

(i) Expression of a heterologous recombinase and sexual reproduction are not necessary;

(ii) There is a one step selection procedure for transgenic calli (lengthy propagation two-step time as above might increase the risk of somaclonal variation);

(iii) It utilizes a natural nuclear recombination systems present in plants; (iv) the frequency of intrachromosomal recombination between two homologous sequences in plants might be increased by stimulation of repair systems; and

(v) The efficiency of homologous recombination is directly correlated with the size of the homologous regions

5. Removal of chloroplast marker genes/ transient co-integration of the marker gene : Mitochondria and chloroplasts have independent genomes in plants that have been the target (especially chloroplasts) of genetic transformation. Biosafety might be facilitated by maternal inheritance, which is the case in most plant species, in which transgenes in plastids would not be disseminated via pollen.

Chloroplast transformation vectors are designed with homologous flanking sequences on either side of the transgene. After recombination, co-integrates are inherently unstable because of direct repeats. Therefore, subsequent loop out recombination events create either the stable integration of a transgene of interest or loss of the integrated vector, which then yields a wild-type plastome.

References

Molecular Cut and Paste: Site Specific Recombination : Microbial site specific recombinases have also been used to eliminate unwanted markers from GM plants. These enzymes act as molecular scissors capable of cleaving DNA at specific sites. They can also act as molecular glue, ligating the cleaved DNA fragments at a second target sequence. The gene encoding these enzymes is introduced along with the marker gene, which is flanked by palindromic sequences recognizable by the enzyme, and the gene of interest. Once transformed cells have been selected, the recombinase gene can be activated by an external stimulus. The recombinases then cut out the marker genes and the genes for the enzymes themselves, making the resulting plants devoid of any selectable markers.

There are three well described site-specific recombination systems that have been used successfully for the removal of marker genes, the most widely used of which is the Cre/loxP system from the bacteriophage P1 (see Figure). The Cre recombinase catalyzes a reaction between two loxP sequences and results

in excision of the DNA fragment between them. The Cre recombinase gene can be introduced into transgenic plants either by re-transformation, breeding or inducible autoexcision. The autoexcision strategy is a one-step process that relies on chemically-inducible promoters for gene activation. Several experiments have demonstrated the advantages of this method in comparison to re-transformation and crossing.

The lysine-fortified transgenic maize LY038, in which the marker gene has been removed with the help of the Cre-lox system, has been approved for cultivation in Canada, Japan and the U.S. and for food and feed use in Australia, Mexico and the Philippines.

Jumping Along Chromosomes: Marker Deletion via Transposons : The process that enables certain genes to 'jump' at a certain position on the plant genome can also be used to generate marker-free plants. The approach is analogous to site-specific recombination, only that instead of a recombinase and recognition sites, transposons or jumping genes are used. Transposons contain a gene for a special enzyme, which recognizes certain signals in the DNA. The enzyme cuts the DNA fragment flanked by these signals and integrates them randomly in the genome. The most characterized transposons are those of the Ac/Ds family, which was first discovered in maize, the special enzyme being the Ac (activator) transposase and the Ds (dissociator) sequences the tag signals.

The gene of interest or the marker gene can be placed within the 'jumping' sequence, in such a way that the two genes can be separated from each other upon the activation of transposase. Although the system has been shown to be effective, marker removal efficiency via this strategy is poor, due to the low incidence of occurrence. This approach can also be time-consuming since breeding or segregation is required to separate the gene of interest and the marker gene.

Future Prospects : Numerous approaches to eliminate antibiotic and herbicide markers have been developed over the last several years and further improvements are now underway. Recently, researchers have described procedures to eliminate residual recognition sequences at recombination sites. This may increase the appeal of site specific recombination as the tool of choice to remove unwanted DNA sequences. Scientists are also searching for ways to hasten the selection of marker-less progenies after co-transformation or transposition. Novel marker elimination strategies based on gene targeting and homologous recombination have been reported. With these developments, the concern about an uncontrolled spread of antibiotic and herbicide resistance genes in the environment might become irrelevant in the future.

Advances on the use of zinc-finger nucleases have also been reported and their potential in removing transgenes and utility in targeted gene replacement offer much promise.

References and further reading

1. de Vetten N et al. (2003) A transformation method for obtaining marker-free plants of a cross-pollinating and vegetatively propagated crop. Nat. Biotechnol. 21, 439-442

2. Miki B & McHugh S (2004) Selectable marker genes in transgenic plants: applications, alternatives and biosafety. J. Biotechnol. 107, 193-232

3. Rommens CM et al. (2004) Crop improvement through modification of the plant's own genome. Plant Physiol. 135, 421-431

4. Bukovinszki A et al. (2006) Engineering resistance to PVY in different potato cultivars in a marker-free transformation system using a 'shooter mutant' A. tumefaciens. Plant Cell Rep. DOI 10.1007/s00299-006-0257-8

5. Hare PD & Chua N-H (2002) Excision of selectable marker genes from transgenic plants. Nat. Biotechnol. 20, 113-122

6. Kondrák et al. (2006) Generation of marker- and backbone-free transgenic potatoes by site-specific recombination and a bi-functional marker gene in a non-regular one-borderAgrobacterium transformation vector. Transgenic Res. 15, 729-737

SNAKES, SNAKE POISON & ANTIDOTES AS DESCRIBED IN SCRIPTURAL TEXTS

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The very first thought that flits across one's mind on hearing the word "Snake/Sarpa" is its terrible bite and the inexorable and unbearable pain that ensues. In as much as snakes are glorified in Indian mythology and literature, the name never fails to strike terror in a person's mind.

Snakes are reptiles which have inhabited the warm tropical regions of the earth and date back to about 200-240 millions of years. About 200 to 220 varieties are found in India of which merely a quarter are deemed venomous.

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Snake endowed with its piercing eyes and fangs and its typical gliding gait is fiery and frightening at one and the same time. The knowledge about sarpas, their poison, antidote and all related matter are recorded in Vedic literature. The Çatapatha Brähmaëa (XVIII. 39) Tattiréya Brähmaëa (III. 12. 8) Chändogya Upaniñad (VII. 1. 2) and the Atharva Veda in particular speak of Sarpavidya.

There are thousands of deaths reported due to snake bites through the length and breadth of our country (World), especially in the villages with vast agricultural lands which are in fact, the haven for this variety of reptiles. Many precious lives could have been saved but for the lack of the accurate knowledge of the first aid to be administered in the event of a snakebite.

Also texts like the Kaçyapa Samhitä, Suçruta Samhitä, Caraka Samhitä and a good number of other äyurvedic and general treatises step in and offer the much needed guidance in respect of techniques to be adopted in combating this seemingly insurmountable catastrophe. The present paper proposes to analyse the same.

The first thought that flits across one's mind on hearing the word Snake/Sarpa is its terrible bite and the inexorable and unbearable pain that ensues. In as much as snakes are glorified in indian mythology and literature, the name never fails to strike terror in a person's mind.we often glean from media that when a person suffers snake bite, the immediate solution is that another person tries to directly suck out the poison from the victim's place of bite, thereby injuring the victim twice over and endangering his/her life as well

Thousands of deaths are reported due to snake bites across the world. Closer home, such incidents are common, especially in villages which are havens for snakes. Many precious lives could have been saved but for the lack of accurate knowledge of the first aid to be administered in the event of a snakebite. It is in this context that ancient texts like Kashyapa Samhita, Susrutha Samhita, Caraka samhita and a good number of other Ayurvedic and general treatises step in and offer the much needed guidance in respect of techniques to be adopted in combating this seemingly insurmountable catastrophe.

These texts furnish us with minute details of the numerous variety of snakes, their generic and specific characteristics, their habitat, symptoms that follow a snake bite, the immediate first aid to be administered to the victim as also a time-bound medication regimen for complete healing , depending upon the variety of snake and the severity of its venom. The Susruta Samhita, in fact, refers to the now much touted "Golden hour concept" when it says that not even a muhurta must be wasted while treating a snake bite.(Muhurta comprises 48 minutes.) Poison acts with lightening speed like a sharp sword ,thunderbolt and fire and so any delay or negligence for even a moment might prove fatal.

Snakes which belong to the category of Reptiles have inhabited the earth for nearly 200-240 million years. They thrive in hot tropical regions. There are about 200-220 species of snakes in India, out of which a quarter are deemed poisonous. The fatal poison of some of the snakes has led to a general misconception that all are venomous and hence , in the days of yore, they were worshipped and propitiated .Even in this day and age, there are numerous temples dedicated to serpents in our country.

The knowledge of - snakes can be traced to the Satapatha Brahmana-(XIII.4.39) in the Pa¬riplava narration.The Mat.Samhita(II.7.15), the Vaj.Sam ,the Taittiriya Brahmana(III.12.8.3) etc speak of Sarpavidya, the nature and types of snakes along with their venom and antidotes and methods by which they can be charmed and controlled. This is referred to as agada tantra or Toxicology.The Sarpasastra figures prominently in the sarpayaga in the Mahabharatha as well. The very foundation of Ayurveda is formulated on the eight branches-Ashtanga Ayurveda" of which the"Agada Tantra –Toxicology happens to be one. Apart from the various antidotes, poisons are also treated by the recitation of the Garuda Mantras as substantiated by the Kashyapa Samhita and a number of other traditional Texts.

The Ayurveda states that the word Visha is derived from the root "vish by" having (ka) proportion which means to encompass or fully pervade the whole body)

देहं प्रविश्य यद्द्रव्यं दूषयित्वा रसाधिकात्।
आतुरमतिपातयति नचावकाशोऽस्ति ॥ ॥
स्वास्थ्यप्राण्हरं च स्यात् तद्द्रव्यं विषमुच्यते ॥
विषं हि निशितनिस्त्रिम्शाशानिहुतवहदेश्यमाशुकारि मुहूर्तमप्युपेक्षितुं

(The Sushruta Samhita states that-"As poison or visha is known to be very hot, drastic/quick in spreading, cold sprinkling is recommended.:s.s.kalpasthana ch iiisl.30

यस्मादत्यर्थमुष्णं च तीक्ष्णं च पठितं विषं।
अतः सर्वविषेषूक्तः परिषेकस्तु शीतलः।

As venoms comprise all properties in a drastic state, they aggravate or exacerbate all the dosas, which under the influence of visha,give up their normal func-

tions and as such impede pranas or vital functions. Respiration being thus blocked, the victim.though alive, stays unconscious. venom, while pervading the entire body, definitely stays at the site of injury and bite.

विषे यस्माद्गुणाः सर्वे तीक्ष्णाः प्रायेण सन्ति हि ॥
विषं सर्वमतो ज्ञेयं सर्वदोषप्रकोपणम् ॥
ते तु वृत्तिं प्रकुपिता जहति स्वां विषार्दिताः ॥
नोपयाति विषं पाकमतः प्राणान् रुणद्धि च ॥
श्लेष्मणाऽऽवृतमार्गत्वादुच्छ्वासोऽस्य निरुद्ध्यते ॥
विसंज्ञः सति तस्य रसं समनुवर्तते ॥
दर्वीकराणां विषमाशुट्टाति सर्वाणि चोष्णे द्विगुणीभवन्ति ॥
अजीर्णपित्तातपपीडितेषु बालप्रमेहिष्विथ गर्भिणीषु ।
वृद्धातुरक्षीणबुभुक्षितेसुरूक्षेशुभीरुश्वथ दुर्दिनेषु ॥

Sources of poison : Poison of the hooded snake is instantly fatal. Poisons acquire double potency in the hot season,in diabetics and the weaklings, pregnant women, children, the old who are sick and emaciated.-ssks ch iii sl 39

Poison is caused by mobile as well as immobile sources.The Sushruta Samhita mentions 16 sources of mobile poison such as sight, breath,fang,nails,urine,stools,saliva,menstrual discharge,mouth-bite and flatus. The work reveals that Victims with imminent signs of death such as falling of hair, lack of horripilation due to cold water, whose mouth emits thick wick of mucus, reddish black swelling at the site of bite and lock-jaw, bleeding upwards and downwards, are cases where no treatment helps.slokas 40-44 h.III ss.KS

जह्वगमस्य विषस्योक्तान्यधिष्ठानानि षोडष ।
समासेन मया यानि विस्तरस्तेषु वक्ष्यते ॥
जह्वगमस्य विषस्योक्तान्यधिष्ठानानि षोडष ।
समासेन मया यानि विस्तरस्तेषु वक्ष्यते ॥
तत्रदृष्टिनिःसंह्वासदंष्ट्रानखमूत्रपुरीषशुक्रलालार्तमुखसन्दंशविषार्धित-
तुन्दस्थिपित्तशोकशवार्ति ।

The work mentions that snakes are 80 in number and divided into 5 types: Darvikara-hooded, Mandalin-round-spotted, rajimat-striped, nirvisha-mildly venomous and Vaikaranjha. Which are again subdivided into three-darvikara, mandalin and Rajimat. Out of these, The first one is of twenty six types, the second-Mandalin of twenty two types, Rajimat-10,Nirvisha-twelve and Vaikaranjha-three. The offspring of the last variety are variegated-round spotted as well as striped-seven.Darvikara snakes are hooded and fast moving and bear marks of wheel, plough, umbrella, Swastika and goad on the body. Mandalin snakes are huge-bodied, variegated with a variety of circular marks are lustrous like the sun and move slowly.These snakes are again divided into the four Varnas depending on their features and colour etc. The three types of snakes aggravate the vata, pitta and kapha respectively.The striped snakes roam around in the last quarter of he night, while the mandalin roams in the other quarters. The Darvikara moves about in daytime. All the three are fatal in young, old and middle stages of life. Snakes overpowered by mongoose, which are young, emaciated, scared of water, and have cast off their slough are but mildly venomous. Those snakes with large eyes, tongue ,mouth and head are males. The female snakes have just the opposite characterstics, while the hermaphrodites-Napumsaka are those which display characterstic features of both.

Kinds of snake bites : Snakes which by nature are wrathful, if trampled under one's feet, inflict three types of bite :Sarpita, Radita and Nirvisha. Multiple bite marks inflicted due to twisting, covered with beak-like projections, causing an abnormally swollen and contracted look should be identified as Sarpita-deep type of bite. Reddish, blue and white yellow streaks must be identified as radita or superficial and this causes mild poisoning.If the marks/s of the bite are bereft of swelling, has little vitiated blood and the victim normal, it should be known as nirvisa. Victims bitten by vey old, young and diseased snakes are but mildly poisonous.

The Ayurveda states that word Visha is derived from the root "Vish"by having (ka) proportion which means to encompass or fully pervade the whole body) In snakes poison, like semen, pervades the entire body and in fury, moves out of the body, as semen by constant rubbing, and reaches the hook like fangs and gets collected and sticks there. That is why snakes do not release poison until provoked.

Specific symptoms of bites by the three kinds of snakes: The amount of toxicity of the venom injected and the size and species of snake plays a major role in identifying the bite symptoms. Some of the symptoms could be just triggered by sheer panic / terror experienced by the victim.

दर्वीकराणां विषमाशुट्टाति सर्वाणि चोष्णे द्विगुणीभवन्ति ॥
अजीर्णपित्तातपपीडितेषु बालप्रमेहिष्विथ गर्भिणीषु ।
वृद्धातुरक्षीणबुभुक्षितेसुरूक्षेशुभीरुश्वथ दुर्दिनेषु ॥

Poison of the hooded snake is instantly fatal. Poisons acquire double potency in the hot season,in diabetics sand weak people, pregnant women, children and old people who are sick and emaciated.-ssks ch iii sl 39 Darvikara variety: The skin, eyes, nails,tooth ,urine and stool and the seat of the bite will be black. Heaviness of the head, pain in the joints, weakness of the back ,neck and waist, yawning, shivering, hoarseness of the voice, rattling sound in the throat ,lassitude, cough and labored breathing, hiccough,

upward course of upward vayu, pain and ache in the limbs, thirst, excessive salivation, foaming in the mouth, choking of the external orifices of the body,piercing pain in the body,-all these are symptoms of a bite by a snake of the Darvikara species.

Snake bite symptoms: Yellowness of the skin, longing for coolness, extreme burning /piercing sensation In the body ,thirst, a feeling of intoxication, fever, hemorrhage through both the upper and lower channels, sloughing of the flesh, swelling in the bitten site, a jaundiced sight, various kinds of pain caused by the disturbed equipoise of the bodily pitta-these are the specific symptoms of a bite by a snake of the Mandali species.

Specific symptoms of a bite by a Rajima snake: Whiteness of the skin, "shita –jvara"/cattarhal fever, horripilation, numbness of limbs, foaming of the mouth, vomiting, constant itching of the eyes, swelling and rattling sound in the throat, laboured breathing, delirium- these are the typical symptoms of a bite by the snake of the Rajiman species. The Sushruta Samhita explains at length, the symptoms of the seven phases or impulses of poisoning by snakes in general:

The poison of the Darvikara vareity vitiates the blood/vascular system in the first stage of its course as a result of which the blood turns black,imparting its hue to the complexion and producing a creepy sensation of ants crawling on the body.In the second stage, it vitiates muscles which produce blackness,inflammation and cysts in the body.

In the third stage, it invades the principle of medas/ fat which results in the moistening of the site of bite and heaviness in the head, perspiration and numbness in the eyes.in the fourth stage, the venom enters the thoraco-abdominal cavity and aggravates the doshas especially kapha, producing somnolence,salivation looseness in joints.'in the fifth phase,it it penetrates into the bones and vitiates prana and agni resulting in pain in the joints, hiccough and burning sensation .In the sixth phase, it enters the principle of bone marrow/majjan and effectively deranges the large intestine/grahani which cause heaviness in the limbs,dysentery,cardiac pain and epileptic fits.

In the seventh stage, it enters the the semen and totally vitiates the vyana vayu and dislodges the kapha even in th minutest of capillaries, produces lump like phlegm from the mouth,and umbearable/searing pain in the waist and the back, impaired functions of the mind and body, excessive salivation,perspiration and suppression of breath.

The interval of time during which a deadly poison leaves a preceding kala and carried forward by the bodily vayu,attacks the succeeding one is called its Vegantara (The intervening stage)SL.41:"Yennantarena tu kallam kalkalpam bhinatti hi/sameeranenohyamanam tattu vegaantaram smrtam".

yenaNtre[tu kla< kalkLp< iÉniÄ ih.

smIr[enaeýman< tÄu vegaNt<,hœR Sm&tm!.

Treatment for snake bites.

In all cases of snake- bites,ligatures/tourniquets of some cloth ,fibre, skin or any soft material must be first bound four fingers above the site of the bite .This effectively arrests the spreading of the venom upwards. As an alternative ,the place of bite must be incisioned, bled and cauterized.(Where ligature is not possible).These three-Incision, cauterization and sucking of blood from the site of the bite are highly recommended in all cases of snake bites .However there is a word of caution here- the mouth of the person who sucks the poisonous blood must be stuffed with linen so that he is not endangered by by the poison..It would be immensely beneficial to the patient if he could,without any loss of time, bite the snake which bit him or if he could bite a clod of black earth or anthill-both of which are anti-venomous.

Ch.VI sl-3-6

The seat of bite of a Mandali snake bite must not ,however be cauterized because the poison being predominant in pitta, spreads speedily to the whole body. The Tourniquets must be bound with the corresponding Mantras. The Text uses the three-fold integrated treatment of medication, mantra and tantra to tackle snake eliminates the poison from the incisioned wound.Sl.14-15

Plasters of anti-venomous drugs(Agada) must be applied all round the seat of the bite,after scarifying it This should be sprinkled with water mixed with red sandal wood and Usira or with their decoction/ kashaya" The correct Agada compounds (according to the nature of the bite)must be administered through the medium of milk,honey and clarified butter. In the absence of this, the bite victim must be given a solution of black earth of an ant hill dissolved in water. As an alternative ,a paste of Kovidara" ",Shirisha," "arka" and" Katabhi must be prescribed. The patient must not be allowed to take oil ,horsegram soup, wine and "Sauviraka. He must be induced to vomit with the help of other suitable/ available liquids, as emesis or vomiting is a surefire way of venom elimination. In the case of bite by the Darvikara variety of snake, bleeding by opening the veins should be done in the first stage of poisoning followed by giving Agada compounds with honey

and ghee in the second stage. Anti-venom snuffs and collyrium must be applied in the third stage. Emesis and prescription of medicated gruel Yavagu are recommended in the fourth stage. In the fifth and sixth stages, cooling measures must be followed up with strong purgatives and emetics along with the gruel .In the seventh stage, strong medicated Avapida(pain-removing) snuffs and collyrium of anti-venomous potency must be employed for their purification/purging of the head. Superficial incisions like the marks of crow-feet must be made on the scalp and the poisoned blood must be removed. SL-17-24-ks ch V

The treatment is more or less same for the other snake bites with variations in the preparation of the medicines/kashayas. Mild vdoses are recommended for pregnant women and young children.The treatment must be begun after due consideration of desa (land as also the specfici seat of bite) ,the person's constitution,suitability, season, velocity of the venom and the patient's strengths and weakness.SL.34

प्रथमे विषवेगे तु वान्तं शीताम्बुसेचितुम्॥
अगदं मधुसर्पिभ् पययेत समायुतम्।
द्वितेये पोर्ववद्दान्तं पाययेत्तुत्विरेचनम्।
तृतेयेऽगदपानम् तुहितं नस्यं तथाऽजनम्॥
चतुर्थे स्नेहसम्मिश्रं पाययेतागदं भिषक्।
पञ्च्मे क्षौद्रमधुकक्वाथयुक्तं प्रदापयेत्।
चतुर्थे स्नेहसम्मिश्रं पाययेतागदं भिषक्।
पञ्च्मे क्षौद्रमधुकक्वाथयुक्तं प्रदापयेत्।
षष्ठेऽतीसारवत् सिद्धिरवपीड्श्च सप्तमे।
मूर्ध्नि काकपादं कृत्वा सासृग्वा पिशितं क्षिपेत्॥

The work prescribes nearly 80 varieties of different shrubs and herbs which could be used in different combinations and measures depending on the nature of the snake and its poison.decoctions,collyrium, nasal applications,gruels,powders,poultice made out of a combination of honey,ghee etc are widely recommended. A few examples can be given to substantiate this.

The powders of the five kinds of salts, and Tri-katu asted with honey is placed in a horn and used like snuff- ,collyrium and anointment which act as a very effective neutrilesor of venom. This is called Mahagada and is hailed for its unfailing efficacy.

त्रिवृद्विशल्ये मधुकं हरिद्रे रक्ता नरेन्द्रो लवण्श्च वर्ग।
कटुत्रिकं चवै सुचूर्णितानि श्रिञ्गे निदध्यान्मधुसंयुतानि॥
एषोऽगदो हन्ति विषं प्रयुक्तः पानाभ्यञ्जननस्ययोगैः।
अवार्यवीर्यो विषवेगहन्ता महागदो नाम महाप्रभावः॥
अजतिागादा स्लखकास ६३-६४ ङ्कवदिानगापातु॥
विडङ्गपाठात्रिफलाजमोदा हिङ्गनि वक्रं त्रिकुटीनिचैव।
सर्वश्च वर्गो लवणः सुसूक्ष्मः सचित्रकः क्षौद्रयुतो निधेयः॥
शृङ्गे गवां शृङ्गमयेन चैव प्रचछादितो पक्षमुपेक्षित्।
एषोऽगदः स्थावरजङ्गमानां जेता विषाणाम्जितो हि नाम्ना॥

A compound comprising powdered Vidanga, Patha, Triphala, Ajamoda, Hingu, Chakra, Tri-Katu, five kinds of salts and Chitraka must be stored in a cow's horn for a fortnight covered with a lid of the same material.This anti-venomous compound-Agada is known as Ajita and is effective for poisons from molile as well as immobile sources.

The Tarksyagada which is a compound made of fine powders of Prapaundrika,Deva-Daru,Kalanusaraya, Sthaunryaka,Dhyamaka, Padmaka,punnaga, Talisha, Suvarchika, Kutannata, ela, white Sindhu- vara, Shaleya, Kushtha, tagara, priyangu, lodhra, jala, svarna- gairika, Magadha, chandana and saindhava salt taken in equal parts and pasted with honey, must be kept inside a horn. This Tarkshyagada is said to neutralize the poison of even the deadly Takshaka..Slokas—Prapaundareekam..65-67

प्रपौण्डरीक सुरदारु मुस्ता कालानुसार्या कटुरोहिणी च।
स्थौणेयकध्यामकगुग्गुलूनि पुन्नगतालीशसुवर्चिकाश्च॥
कुटन्नटैलासितसिन्धुवाराः शैलेयकुष्ठे तगरं प्रियङ्गुः।
रोध्रं जलं काञ्चनगौरिकं च समागधं चन्दनसैन्धवं च॥
सूक्ष्माणि चूर्णानि समानि कृत्वा शृह्ङ निदध्यान्मधुसंयुतानि॥
एषोऽगदस्ताक्षर्य इति प्रदिष्टो विषं निहन्यादपि तक्षकस्य॥

Similarly it expounds in detail, the Rishabagada,Sanjivanagada,Darvikara-rajila gada,Mandali-visha-haragad, Vamsa tvagaadigada,pancha-Shirisha gada which is a decoction of the roots,flowers,bark, seeds and sprouts of a Shirish tree,taken with honey, etc,. slokas 68- 75

In current times, the snake- bite victim is moved beyond the snake's. biting distance, kept calm and still to the extent possible and taken to the nearest available hospital immediately. The bitten limb is loosely kept still and must be positioned below the heart level.Any ornaments,watch etc must be removed from the place of bite . Antivenom shots are injected after ascertaining the the species of the snake. The antidote is given intravenously in the quickest possible time. Intensive care treatment is administered in case of victims of severe envenomation as also those victims with a high bloodIpressure, with continuous administration of intravenous fluids. Blood clotting and similar symptoms are treated by giving additional antivenom, fresh frozen plasma, and platelet transfusions.

It is of great importance to identify the snake so that proper treatment can be given.

The sushruta Samhita has expounded exhaustively, the minutest details of the extensive use of the innumerable possibilities of treatment for snake bites. This paper has just about attempted to look into the

rudimentary treatment of the subject, which by itself is too lengthy and exhaustive. it would be of immense use to the public at large (who are plagued by snake bites) if this mine of information could be used in combination with contemporary/holistic lines of medication as an effective cure for snake poison.

Books referred:

Sushruta Samhita

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LEGAL REGIME OF INTELLECTUAL PROPERTY RIGHTS FOR BETTERMENT OF AGRICULTURAL SCIENCE WITH SPECIAL REFERENCE TO PLANT VARIETIES AND FARMER'S RIGHTS ACT

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Agriculture-Biotechnology or Plant-Biotechnology (herein after referred to as the Agri-biotech sector), is the application of the science of biotechnology in agriculture and its related processes and products. Agri-Biotech as a sub-sector is amongst the fastest growing in the biotech sector and has witnessed globally and in India.

As India being largely an agrarian economy, Agri-Biotech sector tends to encourage agricultural activities since this would ensure the disease-resistant, weather suited and higher yielding varieties of seeds which eventually produce crops, plants and foods benefitting farmers and breeders as well as contributing to the economies.

As mentioned above, bio-safety is one of the main concerns in this domain since farmers and breeders rights need to be protected. These concerns main range from the safeguarding of breeder's and farmer's rights by implementation of intellectual property rights on the newly developed plant varieties to the various other forms of competition issues that may arise in this sector.

There has been a sharp division of opinion and extensive debate regarding whether living material created through biotechnological efforts should be allowed to be patented and Indian patent law at present does not allow patenting of living material. Plant varieties are however, eligible for protection under the Protection of Plant Varieties and Farmers Rights Act.

India has adopted a sui-generis system for the protection of plant varieties which is non-patent based.

The PPVFR Act, 2001, flows directly from Article 27.3(b) of the TRIPS Agreement. It was also seen that biotechnology being a sunrise sector in India, the developmental costs involved in this area were higher as compared with and an effective and an influential policy for Plant Breeder's Rights, Farmer's Rights and the preservation of the biological diversity of the country was needed.

India's PPVFR Act not only upholds farmers' rights to save, use and exchange seeds and propagating material but also attempts to enable farmers to claim special forms of intellectual property rights over their varieties. The Act grants plant variety protection on new varieties (largely modeled on UPOV), extant varieties and essentially derived varieties. Extant varieties include farmers' varieties, varieties in the public domain and varieties about which there is common knowledge.

Nine rights can be said to have been given to farmers under the Act including: the rights to save, exchange and (to a limited extent) sell seeds and propagating material, to register varieties, to recognition and reward for conservation of varieties, to benefit sharing, to information about expected performance of a variety, compensation for failure of variety to perform, availability of seeds of registered variety, free services for registration, conducting tests on varieties, legal claims under the Act, and protection from infringement.

Grant of legal ownership for a limited period over the developed variety will encourage both public and private investment in plant variety research and widen the availability of superior variety in the market. This will facilitate rapid growth in agriculture and improve economic condition of our farming community.

In an era of globalization and intellectual property regime where the biotech industries will play a greater role in development of plant variety the gene trade across boundary is likely to go up in coming days. There is tremendous scope for gene rich countries to derive benefit out of gene trade.

The domestication of plants of value to human needs about 12,000 years ago marked the beginning of settled cultivation or agriculture. Since then, a wide range of plants have been collected from the wild and grown for varied purposes such as food, feed, fodder, fuel, fibre, fertilizer and medicine.

Early farming communities not only domesticated a wide range of species of plants, but also selected and cultivated numerous varieties within species. Thus, rural and tribal families have played a key role not only in the domestication of economically useful plants, but also in their improvement through selection and knowledge addition.

During the long process of selection, conservation and cultivation, farmers have gained extensive knowledge of each variety. This knowledge includes the suitability of the variety for specific growing seasons and conditions, its maturity duration during different seasons, its resistance to different diseases, pests and other natural vagaries, its suitability to different soils, quality of its produce, and its suitability for different uses and so on.

This knowledge base of each variety available with farmers is as highly valuable to modern scientific improvement. It makes the contribution of farmers to plant genetic diversity as important as the contribution scientists make by developing modern plant varieties.

Therefore, when scientists are given the right to own new varieties created by them, this right has to concurrently recognize the right farmers have on their varieties.

A new legislation called The Protection of Plant Varieties and Farmers' Rights Act, 2001 enacted by the Government of India, seeks to protect the rights of farmers and breeders on plant varieties. This Act recognizes the individual and community roles played by farmers in the improvement and conservation of varieties. As farming is a family activity, individual and community rights of farmers mean equitable rights for men and women engaged in farming.

Genesis of PPVFR Act 2001 : The Protection of Plant Varieties and Farmers' Rights (PPVFR) Act is an attempt by Indian legislation to fulfill its commitments under TRIPS Article 27.3(b) .

The Act, approved by the Indian Parliament in August 2001 and came in enforcement on 30th October, 2001 is arguably the only sui generis system for plant varieties protection other than the UPOV (International Union for the Protection of New Varieties of Plants) Convention. It is an "effective system for the protection of plant varieties, the rights of farmers and plant breeders, to encourage the development of new varieties of plants" and is the first amongst the various legislations that provide protection to farmers.

It is an undertaking by the Indian Government to recognize the contribution of both commercial plant breeders and farmers in plant breeding activity and for granting rights to both breeders and farmers and also gives rights to traditional communities on their genetic resources.

The act is based on the important principle of distributing ownership rights in a fair and equitable manner. It provides intellectual property protection of Farmers Variety as equivalent to plant breeders and can distribute benefits sharing proceeds from the sale of protected varieties.

IPR and Plant Varieties : Legally valid ownership rights assigned to the creator of intellectual works are called Intellectual Property Rights (IPR).

It is an exclusive right given to the owners to commercialize their creation for economic gains. This right is transferable by sale, licensing or succession. This ownership, however, is not permanent, like the ownership on real estate, but is assigned only for a prescribed period. On completion of this period, the IPR becomes a public property with exclusive right to none. Most of the IPRs are valid only in the country where they are established according to the IPR law of that country.

IPR on plant variety means that the person who establishes the ownership right on the plant variety alone has the legal right to produce, store, process and market the seed of that variety for as many years as the ownership is valid. Ownership right is established on the basis of evidence that the person has contributed to the development and conservation of a variety. This right is called the Plant Breeder's Right (PBR). The PBR can be licensed, sold or inherited. It is applicable only in the country where it is established as per the national law.

Plant Varieties and Farmers Rights : The PPVFR Act allows the registration of three types of plant varieties. These are farmers' varieties, extant varieties and new varieties. However, the Rules on this Act are not explicit in stating eligibility of farmers' varieties.

Farmers' varieties are those traditional varieties developed and conserved by farmers. This includes the landraces, folk varieties and wild species of crop plants, about which farmers possess useful knowledge. Most of these varieties are usually developed and conserved collectively by community of farmers

rather than by individual farmers.

Hence, the Act recognizes that varieties conserved by communities of farmers are also eligible for registration.

Farmer's rights are the traditional rights farmers have on the seeds or the propagating material of plant varieties.

This right arises from the important role farmers have been playing to conserve and enrich varieties and the knowledge they hold on the total genetic variability of the country. Hence, the farmers' rights on seed is concerned with both the traditional varieties conserved by them and modern varieties bred by using traditional varieties. The importance of these rights from the conservation point of view becomes more compelling with the grant of PBR to breeders. Therefore, the PPVFR Act safeguards farmers' rights on plant varieties.

Legal protection to this traditional right to save, resow, exchange, share or sell seeds is important to majority of Indian farmers and to Indian agriculture.

All plant varieties, except modern improved varieties, have been selected, improved and conserved by farmers. Depending on the level of improvement and use in cultivation, they are called traditional varieties, folk varieties and land races. All of them are essentially farmers' varieties. Apart from the biological entities constituting these varieties, the rich knowledge farmers have, on each of them is equally important.

This knowledge is the decisive factor for assessing the importance of these varieties to agriculture, in the present and in the future. This knowledge has been generated and conveyed over long years of intelligent observations and improvements effected on these varieties by farmers across different growing conditions.

During the process of selection, cultivation and conservation of these varieties across hundreds of years, farmers have acquired knowledge on the unique properties of each variety and how these properties could be used in agriculture. The uniqueness and usefulness of this knowledge is far more valuable than the innovation and utility assigned on a new variety for granting a patent or PBR.

Why should Farmers register their Varieties? : Farmers in India are not familiar with ownership on plant varieties. Although they have richly contributed to the development of hundreds of traditional varieties, they have not held these varieties as their property. What they own is the crop they raise within their farm and not the variety. These varieties were left in the public domain for free use by other farmers within and outside the country. With this freedom on varieties, farmers are more familiar with sharing seed on free or exchange basis or with occasional sale. Therefore, the paradigm of ownership on plant variety is totally new to them. As this ownership under PPVFR Act is established by registration of plant variety, it is natural that the farmers should know why they should register varieties.

With the implementation of PPVFR Act, the historic value system of plant variety as the common property will change.

Some of the important reasons for registration of farmers' varieties are:

(i) Registration of farmers' varieties is free

It costs nothing to register farmers' varieties. The process of registration is also simple, as farmers need to provide only the information they know about the variety. Moreover, renewal of registration of farmers' variety is also free.

(ii) For establishing intellectual property rights of farmers on their varieties

The primary purpose of registration of plant varieties is to establish the IPR of the breeder on the plant variety bred by him/her. This IPR is the basis of the PBR on the variety. The PPVFR Act recognizes farmers as breeders for their profound and extensive contribution in developing and conserving so many varieties. Thus farmers are eligible for the PBR on their varieties. If they fail to establish this right, they will be foregoing an entitlement allowed under the law.

(iii) For exploiting commercial potential of farmers' varieties

The PBR granted on farmers' varieties offers exclusive right to produce and market the seed of registered varieties. There are many farmers' varieties in several crops, which are popular and offer commercial opportunities for large-scale sale of seed and propagating material. Farmers themselves can exploit this market with the help of exclusive marketing right on the seed or license the PBR of the variety for a competitive licensing fee.

(iv) For establishing ownership on farmers' varieties

Many farmers' varieties are notable special traits, which may have greater value in contemporary and future crop improvement. The PPVFR Act provides for equitable share of benefit from new plant varieties, which were bred by using one or more farmers' varieties. Whenever a registered farmers' variety is used for such breeding, the determination of eligi-

bility for a share of the benefit to the legal owner of the variety becomes easier for the PPVFR Authority.

(v) For safeguarding farmers' varieties from piracy

There are instances where the traditional variety of one country was pirated to another country, and IPR on that variety was established by the pirate. Registration of farmers' variety establishes all information about a variety in the National Plant Variety Register. When such record is available on a variety, it is difficult for a plant pirate to establish elsewhere another IPR on that variety. Even when such IPR is established by deceit, it can be revoked with the help of the prior information on the variety available in the National Plant Variety Register. However, the revoking process may not be easy, if farmers' varieties are not registered.

Registration of crop varieties under PPVFR Act 2001 confers legal ownership on the breeder over his developed variety and grants him exclusive commercial right for a limited period of (15-18 years depending type of crop species) of time. Breeder can exploit his exclusive right (known as breeder right) to derive financial benefit from the commercialization of his protected variety. This provides scope of getting back his investment in plant breeding research and to generate some profit. Registration of a variety also helps in checking bio-piracy and mis-utilisation by unauthorized users.

Like institutional varieties, farmers' varieties can be registered in the name of farmer, a group of farmers or community and the farming community can be benefited from the commercialization of the protected varieties and benefit sharing provision in the Act.

Conclusion : Grant of legal ownership for a limited period over the developed variety will encourage both public and private investment in plant variety research and widen the availability of superior variety in the market. This will facilitate rapid growth in agriculture and improve economic condition of our farming community.

In an era of globalization and intellectual property regime where the biotech industries will play a greater role in development of plant variety the gene trade across boundary is likely to go up in coming days. There is tremendous scope for gene rich countries to derive benefit out of gene trade.

Our country has rich biodiversity and huge potential for plant variety research and development to take full advantage of various provisions of the PPVFR Act 2001. Let us join our hands to make this mission a successful one.

[1]http://www.plantauthority.in/ Last accessed on 1/11/2016

[2]Protection of Plant Varieties and Farmers' Rights Act, 2001

[3]Trade Related Aspects of Intellectual Property Rights

[4]"Members may also exclude from patentability: plants and animals other than microorganisms, and essentially biological processes for the production of plants and animals other than non-biological and micro-biological processes. However, members shall provide for the protection of plant varieties either by patents or by an effective sui generis system..."

[5]"Sui-generis": Of its own kind and class; unique or peculiar. The term is used for in IP Law to describe a regime designated to project the rights that fall outside the traditional patent, trademark, copy right, and trade secrets doctrines", Black's Law Dictionary, 8th edition, by Bryan A. Garner

EDIBLE VACCINES PRODUCTION BY PLANTS

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Edible vaccines hold great promise as a cost-effective, easy-to-administer, easy-to-store, fail-safe and socio culturally readily acceptable vaccine delivery system. Therefore; it play great role, especially in Third World countries where transportation costs, poor refrigeration and needle use complicate vaccine administration. Initially thought to be useful only for preventing infectious diseases. It has also found application in prevention of autoimmune diseases, cancer therapy, etc. It involves introduction of selected desired genes into plants and then inducing these altered plants to manufacture the encoded proteins. Introduced as a concept about a decade ago, it has become a reality today. Most of the vaccines production was carried out in tobacco plant that is not edible. These vaccines are now being produced in edible plants such as banana, tomato and potato. For use in animals the common fodder crops are used. Banana is an ideal system for the production of edible vaccine since it is grown in most part of the world and eaten raw. A variety of delivery systems have been developed. Edible vaccines are currently being developed for a number of human and animal diseases. There is growing acceptance of transgenic crops in both industrial and developing countries. Resistance to genetically modified

foods may affect the future of edible vaccines. They have passed the major hurdles in the path of an emerging vaccine technology. Various technical obstacles, regulatory and non-scientific challenges, though all seem surmountable, need to be overcome.

Key words: autoimmune diseases, edible vaccines, genetically modified foods

According to WHO, various diseases are responsible for 80% of illness worldwide and cause more than 20 million deaths annually. Vaccines represent an invaluable contribution in the field of biotechnology as they provide protection against various diseases. Conventional vaccines are made up of live/attenuated vaccine and killed vaccine. Newer approaches have also been made with regard to the use of purified antigen vaccines and recombinant vaccines. Despite the successful immunization program, the mortality rates are increasing every year. This may be constraints on vaccine production, distribution and delivery. Moreover, the administration of vaccine is cost effective method of combating spread of infections and epidemics. So it is necessary to produce new vaccine that have economic and other advantages over the existing vaccines. An alternative approach is the use of edible vaccines. It has given new and dramatic hope for improved life. Edible vaccines are emerging innovations in medical science and plant biology for the efficacious and affordable pharmaceuticals.

Edible vaccine is a vaccine that is based on the genetically engineered expression of an antigenic protein by an edible plant. Following consumption, the protein is recognized by the immune system. The process of producing transgenic plants is known as transformation. These vaccines are important for developing countries since they are inexpensive. Assist in diseases such as diabetes, diarrhea, multiple sclerosis, rheumatoid arthritis. Provide mucosal immunity responses in the body. The first journal publication describing Edible Vaccine was published in 1992. The study was conducted by Mason, Lam, and Arntzen at Texas A&M University. A tobacco plant was successfully transformed and hepatitis B antigen was expressed.

Choice of plants for edible vaccines : Most of the vaccines production was carried out in tobacco plant that is not edible. These vaccines are now being produced in edible plants such as banana, tomato and potato. For use in animals the common fodder crops are used. Banana is an ideal system for the production of edible vaccine since it is grown in most part of the world and eaten raw.

Edible vaccine production : The bacterium, Agrobacterium tumefaciens is commonly used to deliver the DNA for bacterial or viral antigens. A plasmid carrying the antigen gene and an antibiotic resistance gene are incorporated into the bacterial cells. The cut pieces of potato leaves are exposed to an antibiotic to kill the cells that lack the new genes. The surviving cells (gene altered ones) can multiply and form a callus. This callus will sprout and form shoots and roots, which are grown in soil to form plants. After 3 weeks the plant produces potatoes containing antigen vaccines (Figure 41.4). The first clinical trials in humans involved the ingestion of transgenic potatoes with a toxin of E.coli causing diarrhoea.

Delivery of vaccine to the gut : Vaccines, being protein are likely to be degraded in the stomach. But in the case of edible vaccine it has been found that orally administered plant material can induce immune

Table 41.2: Examples of plant edible subunit vaccines

Recombinant protein (vaccine)	Transgenic plant	Protection against
Rabies glycoprotein	Tomato	Rabies virus
Foot and mouth virus (VP1)	Arabidopsis	Foot and mouth virus
Herpes virus B surface antigen	Tobacco	Herpes simplex virus
Cholera toxin B subunit	Potato	*Vibrio cholerae*
Human cytomegalovirus glycoprotein B	Tobacco	Human cytomegalovirus

response. There is a difficulty of dose adjustment when edible vaccines are consumed as a part of food stuff. Instead of the direct use of plant material, a food based tablet containing a known dose of vaccine has been produced. This approach is being applied to vaccines produced in tomatoes.

Examples of edible vaccine in treatment of diseases

Edible vaccine and Hepatitis B : Vaccine in GM fruit could wipe out Hepatitis B the virus, which causes high fever and attacks the liver, is a precursor of liver cancer, the biggest single cause of cancer deaths. This new development will save hundreds of thousands of lives a year, said Charles Arntzen, the scientist who developed the technology in 2000. The virus, which causes high fever and attacks the liver, is a precursor of liver cancer, the biggest single cause of cancer deaths. This new development will save hundreds of thousands of lives a year, said Charles Arntzen, the scientist who developed the technology in 2000. Successful experiments show that the vaccine worked, he added, and will cost less than one penny a dose to make. A single gene transferred into a tomato or banana plant is reproduced as a protein thousands of times inside the fruit. When eaten it passes into the intestine and then into the blood stream producing antibodies against hepatitis B - working the same way as a traditionally injected but much more expensive vaccine. Successful experiments show that the vaccine worked, he added, and will cost less than one penny a dose to make. A single gene transferred into a tomato or banana plant is reproduced as a protein thousands of times inside the fruit. When eaten it passes into the intestine and then into the blood stream producing antibodies against hepatitis B - working the same way as a traditionally injected but much more expensive vaccine. A single dried banana chip or tomato paste sandwiched in a wafer contains enough protein to act as a vaccine dose. A single dried banana chip or tomato paste sandwiched in a wafer contains enough protein to act as a vaccine dose. The vaccine has been held back because the US department of agriculture and the food and drug administration had no licensing mechanism for plant vaccines. The vaccine has been held back because the US department of agriculture and the food and drug administration had no licensing mechanism for plant vaccines.

Edible vaccine production in tomato crop : Also tomato provides other health benefits like controlling cholesterol levels, vit. C, lycopene as an antioxidant, also guard against colon and rectal cancer. The researchers from the Korea Research Institute of Bioscience and Biotechnology in Seoul are now trying to increase the potency of the vaccine in order to ' supercharge' the immune response. They said the tomato was a good way of getting a vaccine into the body because it was enjoyable to eat and could be eaten raw. " To create the vaccine, the scientists combined the gene behind the betaamyloid protein with the tomato's genetic code. They then fed mice the designer tomatoes once a week for three weeks. Blood samples taken from the mice revealed the tomatoes triggered their immune systems to release disease- fighting antibodies, although the levels of plaques in the brain were not reduced" . It works by attacking the toxic beta-amyloid protein that destroys vital connections between brain cells, causing Alzheimer's. The Tomato 'vaccine' that could prevent Alzheimer's It works by attacking the toxic beta-amyloid protein that destroys vital connections between brain cells, causing Alzheimer's.

Insulin production in edible vaccines : Insulin in Plants to Combat Diabetes Researchers have developed technologies that permit the introduction of a hybrid gene that produces human insulin in tobacco and then lettuce. Researchers have developed technologies that permit the introduction of a hybrid gene that produces human insulin in tobacco and then lettuce. Currently, insulin is given to diabetic patients by means of shots that enable the hormone to go straight into the bloodstream. But there has recently been a study that aimed to produce insulin capsules in the future. This may be possible with the help of a little genetic engineering. Currently, insulin is given to diabetic patients by means of shots that enable the hormone to go straight into the bloodstream. But there has recently been a study that aimed to produce insulin capsules in the future. This may be possible with the help of a little genetic engineering. What makes the study have a greater significance in the advancement of diabetes treatment is an alternative means of introducing the insulin hormone in the body. By genetically engineering the hormone into the plant cells of a parent plant, the cell walls would be able to help prevent the insulin from degrading. What makes the study have a greater significance in the advancement of diabetes treatment is an alternative means of introducing the insulin hormone in the body. By genetically engineering the hormone into the plant cells of a parent plant, the cell walls would be able to help prevent the insulin from degrading.

Advantages Edible Vaccines : Advantages Edible plants are very effective as a delivery vehicle for inducing oral immunization Excellent, feasibility of oral administration compared to injection. Easy for separation and purification of vaccines from plant materials. Effective prevention of pathogenic contamination from animal cells. Convenience and

safety in storing and transporting vaccines. Effective maintenance of vaccine activity by controlling the temperature in plant cultivation. Possible production of vaccines with low costs. Reduced need for medical personnel and sterile injection conditions. Economical to mass produce and transport. Reduced dependence on foreign supply. Storage near the site of use. Heat stable, eliminating the need for refrigeration. Antigen protection through bioencapsulation.

Disadvantages Edible Vaccines : Optimization of dose of vaccine: A low dose may not be sufficiently immunogenic while high doses may cause tolerance. The dose of edible vaccine shall vary with the fruit, plant, size, ripeness and protein content of the edible part. Protein content of transgenic organisms: The immunogenic protein may not accumulate in high concentrations in the transgenic organisms Immunogenicity: Edible vaccines show low immunogenicity. To enhance immunogenicity, mucosal adjuvants, better targeted to the immune system, may be used. Cholera toxin is used as an engineered adjuvant. Antigenic variability: It would be difficult to develop edible vaccines against diseases caused by anti genetically variable groups of pathogens as well as those caused by multiple varieties of organisms (dengue) or by complex parts from different life cycles of parasites (malaria) or by rapidly mutating organisms like HIV. Thermal Stability: Proteins in food are heat labile. Cooking results in destruction of protein the material shall destroy the immunogenicity nature of the protein. Lack of Awareness and Funds: Small companies are undertaking most research as edible vaccines are targeted to markets of developing nations. Large companies are more interested in developing vaccines for farm animals as compared to human beings. Regulatory Issues: It has to be decided whether edible vaccines would be regulated under food, drugs or agricultural products. Ethical considerations usually restrict clinical trials from directly assessing protection in humans. Not convenient for infants.

Current Status of Edible Vaccines : Edible vaccines are currently being developed for a number of human and animal diseases, including measles, cholera, foot and mouth disease, and Hepatitis-B and C. Many of these diseases are likely to require booster vaccinations or multiple antigens to induce and maintain protective immunity. At least 350 genetically engineered pharmaceutical products are currently in clinical development in the United States and Canada. Scientists believe that potent drugs and vaccines will soon be harvested just like wheat and corn. In Canada, a genetically engineered tobacco plant made to produce Interleukin 10 will be tested to treat Crohn's disease, an intestinal disorder. Scientists have also discovered that fruits with high water content could result in proteolysis. Experimentation with freeze-dried food to create pellets or powder is now being investigated to help avoid proteolysis and overall efficacy. Arntzen and his colleagues plan to develop banana-based vaccines. They're also targeting papilloma virus, which can lead to cervical cancer, as well as Hepatitis-B virus. A reliable injectable vaccine already exists for Hepatitis- B, but a less expensive, edible vaccine would be better, particularly for use in the developing world. Current measles vaccines are made from the actual virus and work by priming the immune system to attack if it becomes exposed to a full assault of the measles virus. In contrast, plant-based vaccines rely on the measles virus gene for the H protein being genetically cloned into the plant.

Second Generation Edible Vaccines Multi-component vaccines can be obtained by crossing two plant or animal lines harboring different antigens. B subunit of Vibrio cholerae toxin (VC-B) tends to associate with its copies of itself, forming a doughnut-shaped five-member ring with a hole in the middle. cholera, enterotoxigenic E. coli and rotavirus. Using this strategy, several different antigens can be exposed to immune cells simultaneously, for example, a trivalent edible vaccine can be developed that shall be effective against cholera, enterotoxigenic E. coli and rotavirus. Global alliance for vaccines and immunization (GAVI) gives very high priority to such combination vaccines for developing countries.

Future of Edible Vaccines : Although still at an early stage of development, the experimental know- how and results strongly suggest that plant-derived edible vaccines are likely to become a reality, in the next few years. Future research will demonstrate if these vaccines meet the standards of quality (purity, potency, safety and efficacy) defined for vaccines by the World Health Organization. Its economic production will lower down the cost of immunization In most countries of the world, plants engineered to produce vaccines fall under the very restrictive rules set up to control GM-crop plants. The present concern, especially in Europe, over the use of biotechnology for the genetic improvement of crop plants also negatively affects the acceptance of GM-plants for medicinal use. It is hoped that simpler rules will be set up for GM-plants producing vaccines and that they are seen as clearly and legally distinct from GM-plants grown for nutrition purposes.

Conclusion : Edible plant vaccines offer significant new opportunities for making safe and effective oral vaccines would be more widely used especially in

developing countries. Due to some positive aspects like they are economical, safe, easy to administered and can be stored without refrigeration so that these vaccines are prominent over typical traditional vaccines. Plant-based vaccines are obtained from specific transition plants. This technique can be utilized for the treatment of Hepatitis-B, measles, cholera, foot and mouth disease but still diseases like cancer, malaria, HIV, asthma, etc. are major health problems in developing countries. By means of edible vaccines these problems can be solved.

References

1. Jogdand S N. Medical Biotechnology. Himalaya publishing house. Mumbai, 2000.

2. Landridge W. Edible vaccines. Scientific Am 2000; 283:66-71.

3. Lal P, Ramachandran V G, Goyal R. Sharma R. Edible vaccines: Current status and future.2007; 25:93-102.

4. Morr T S, Gomez Lim M A, Palmer K E. Edible vaccines: concept comes of age. Trends Microbiol 1998; 6:449-453.

5. Daniell H, Streatfield S J, Wyckoff K. Medical molecular farming: Production of antibiotics, biopharmaceutical and edible vaccine in plants. Trends Plant Sci 2001; 6:219-226.

6. Sibila J, Snjezana M, Natasa B. Production of biopharmaceuticals, antibodies and edible vaccines in transgenic plants. Current studies of biotechnology. 121-127

7. Mason H S, Arntzen C J. Transgenic plant as vaccine production system. Trends Biotechnol 1995; 13:388-92.

8. Mason H S, Lam D M K, Arntzen C J. Expression of hepatitis B surface antigen in transgenic plants. Proc Natl Acad Sci USA1992; 89:11745-49.

9. Hooper D C, Pierarrd L, Modelska A, Otvos L J, Fu Z F et al.Rabies ribonucleo capsid as an oral immunogen and immunological enhancer. Proc Natl Acad Sci USA 1994; 91:10908-912.

10. Mason H S, Ball J M, Shi J J. et al. Expression of Norwalk virus capsid protein in transgenic tobacco and potato and its oral immunogenicity in mice. Proc Natl Acad Sci USA 1996; 93:5335-40.

ROLE OF DRIP IRRIGATION FOR WATER CONSERVATION

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Due to rapid population growth and urban development, current water allocations coupled with expected future demands might soon exceed the supply required to satisfy present per capita, water-use rates. During water shortage, priority is given to water uses that are deemed more essential to human society. As climate change,water supply limits, and continued population growth have intensified the search for measures to conserve water in irrigated agriculture, the world's largest water user. Policy measures that encourage adoption of cities and the environment.

Water-conservation irrigation technology and water management practice are playing an increasingly important role in reducing both energy costs and water use.Not all of the water applied to the field is available for use by the plant, since some fraction is lost to evaporation, deep percolation, or runoff. Adopting more efficient techniques, such as using drip irrigation systems, can help ensure that farmers use water more efficiently.Drip irrigation systems normally place the water directly into the soil, or onto the soil surface,reducing the risk of runoff and thereby improving water application efficiency.This paper explains the present scenario of irrigation, operation and maintenance of drip irrigation.

Irrigation has had a substantial effect on agricultural history,from its use by Egyptian and Iranian farmers over 2500 years ago through modern agriculture.The most common irrigation techniques of today are furrow,flood,sprinkler and drip[1]. Furrow and flood the irrigated area, while sprinkler and drip are direct applicators. Drip irrigation is a technique in which water flows through a filter into special drip pipes, with emitters located at different spacing. Water is distributed through the emitters directly into the soil Drip irrigation is gaining popularity for its efficiency of irrigation. Drip irrigation is a process of selective water application[2] .

A number of emitters are placed either on or below ground level. Placement of emitters is numerous in order to directly apply water to the crop.Sprinkler irrigation technology can save up to 50% of the necessary irrigation water volume needed for local food crop production compared to traditional flood irrigation practice, and drip irrgation can save up to 80% . If applied in a sustainable context, water-efficient irrigation techniques can improve the resilience of the local food crop production as less water is needed for the same agriculture outcome. This can lessen

pressure on blue water sources and thus allow for the cultivation of more crops.

Furthermore, the drip irrigation method saves water and fertilizers by allowing water to drip slowly to roots of plants, either onto the soil surface or directly into the root zone through a network of valves, pipes, narrow tubing and emitters that deliver water directly to the base of the plant. In addition, we encourage the use of complementary technology to enhance the efficiency of the drip irrigation intervention, such as moisture sensors buried in the soil that help optimize the application of water to crops.

An example of adrip irrigation systems layout and its different components are sketched out below in Figure 1 and 2.

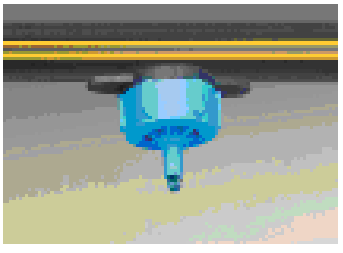

Figure 1: Adrip irrigation system

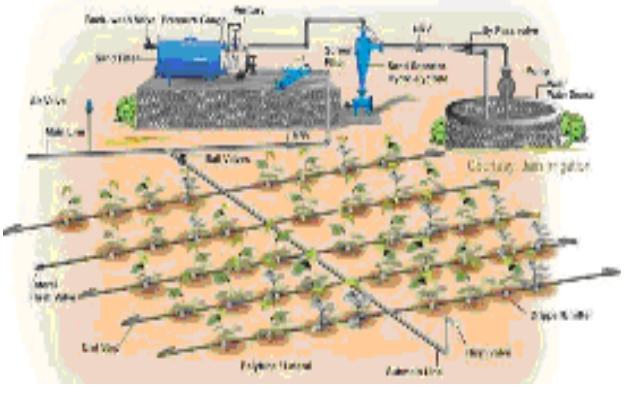

Figure 2: Different components of drip irrigation system

Technical Description :

Drip irrigation systems deliver water and agrochemicals (e.g.,fertilizers and pesticides) directly to the root zones of the irrigated plants at a rate best suited to meet the needs of the plants being irrigated. Thus,this systems makes efficient use of water, especially when compared to conventional methods of irrigation such as furrow, border, basin and sprinkler irrigation systems, which ,under arid and drought conditions, suffer from an high rate of water loss and have a low degree of water use efficiency[3].

The techniocal description of drip irrigation system is given in figure 3.

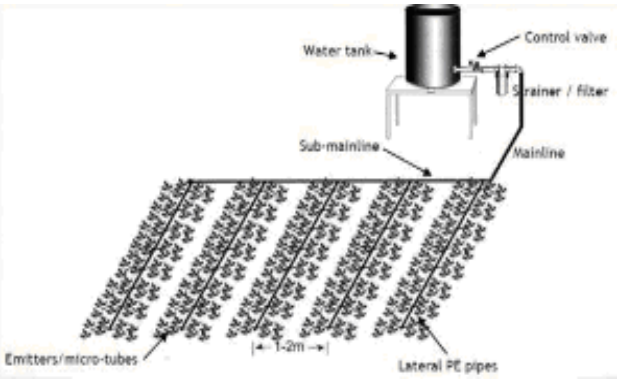

Figure 3: Technical description of drip irrigation system.

Operation and Maintainance: For perennial crops, the drip hose should be lifted periodically if a drip hose systems is used on the soil surface, so that leaves, soil amd debris do not cover the hose. If the drip hose is not lifted, roots can grow over the hose, anchor it to the ground, and eventually pinch off the flow of water. Leaks can occur unexpectedly as a result of damage by insects, animals, or farmimg tools. Systematically minitor the lines for physical damage.It is important to fix holes as soon as possible to prevent uneven irrigation. If the rate of water flow progressively declines during the season, the tubes or tape may be slowly plugging, resulting in severe damage to crop. Once a month,flush the drip lines by opening the far ends of a portion of the tubes at a time and allowing the higher velocity water to flush out the sediment (INFONET-BIOVISION 2010).If poorly treated waste water is used, soil quality can be degraded over time (e.g. accumulation of salts) (tilley at al.2008).

The History of drip irrigation: Drip irrigation has been used for thousands of years. Ancient people knew that they had to supply water to their crops, and they did so by any means possible. They eventually figured out how to bury pots near the plants.

After World War II, plastics was used all over the world. Because it became so popular, an Australian inventor got the idea to use plastics to hold and distribute the water to his crops. The inventor, Hannis Thill, created a way for the water to be released through long passageways in the tubing in order to make the distribution more even.The first company to deal entirely with drip irrigation was known as Netafim, and they took Thill's idea and developed an emitter that would allow the water to be distributed on the most efficient way possible.

Drip irrigation now: Now, drip irrigation can be a complicated, or simple, setup depending on what your needs are. Large farms use drip irrigated on

their crops, and you will find a similar, smaller systems in almost every greenhouse in the country. Irrigation systems have evolved, however.

There are a few disadvantages to using this type of a system. The first that it can get clogged if you don't clean or use a proper filter on it.I've been running my systems for two years now and so far no problems. It is a good idea when you first start your systems you check to make sure none of the drip emitters are plugged.

Karnatataka plans to bring sugarcane area under drip irrigation: In the effort to improve water use efficiency, the government of karnataka proposes to undertake massive drip irrigation project in the State.The government is working on an ambitious programme to bring sugarcane area of 434,000 hectares in the State under drip irrigation in the next three years.

"We are actively cosidering the proposal to make it mandatory for the sugarcane farmers to adopt drip irrigation system so that an enormous quantity of water could be saved across the state," M B Patil, minister of irrigation, said.

Depletion ofGroundwater and Surfacewater Resources: Globally irrigated agriculture is the largest abstractor and predominant consumer of ground water resources, with important groundwater–dependent agroeconomies having widely evolved. But in many arid and drought-prone areas,unconstrained use is causing serious aquifer depletion and environmental degradation, and cropping practices also exert a major influence on groundwater recharge and quality.By the deep of 700 feets we can see the groundwater.we know that in the 21st century we are not getting water to drink and also for agricultural field.

As usualy on the surface of Earth the surafce water resources are lakes,ponds,rivers,seas,canals..are get dried due to less rainfall. For this purposes the surfacewater gets dried in this situation we can't earn the water for agricultural field.So for this condition water cannot be save by common irrigation condition.So the technology is improved greater level by using drip irrigation method.In this method the water can be saved 90% .

As the below table indicates the water savings and increased yields Achieved using Drip irrigation in karnataka:

Crop	Water used by drip irrigation systems (mm/ha)	Water used by conventional irrigation systems (mm/ha)	% saving of water	Yield using drip irrigation systems(q/ha)	Yields using conventional irrigation systems (q/ha)	% increased in yield
Sugarcane	-	-	50	100 000 tonnes	-	35
Bananas	-	-	50	29 000 tonnes	-	50
Cotcrus-fruit	-	-	50	80% harvest	10% harvest	50
Grapes	278	532	65-70	325 tonnes	264 tonnes	30
Pomegranates (plants spaced at 12-foot intervals)	785	1440	50-55	109 000	75 000	30
Guavas	-	-	55-60	-	-	25
Caster apples	-	-	50-55	-	-	20
Mosambi	640	1660	60	150 000	100 000	50
Groundnuts(peanuts)	580	900	35	3 200	2 675	20
Tomatoes	222	324	30	48 000	32 000	50

Table: State-wise Area under Drip Method of irrigation:

State	Area('000 ha)		Percent to Total Area		ACGR (Area)
	1991-92	2000-01	1991-92	2000-01	
Maha.	32.92	160.28	44.64	53.16	19.23
Kar.	11.41	66.30	16.64	18.03	19.55
T.N	53.57	55.90	7.59	15.20	29.76
A.P	11.59	36.30	16.41	9.88	13.52
Guj.	35.60	7.60	5.05	2.07	8.79
Kerl.	30.35	5.50	4.30	1.50	6.81
Orissa.	0.04	1.90	0.06	0.52	53.56
Har.	0.12	2.02	0.17	0.55	76.74
Raj.	0.30	6.00	0.43	1.63	39.49
U.P	0.011	2.50	0.16	0.68	82.74
Punjab	0.02	1.80	0.03	0.49	64.87
Others	2.12	5.40	0.00	1.47	10.11
Total	70.59	367.70	100	100	20.13

Notes: a-includes state subsidy scheme area of 58498 ha;b-includes area under central and state scheme for development of oil palm and sugarcane;ACGR-Annual compound growth rate percent per annum between 1991-92 and 2000-01.

Source:AFC,1998;GOI (2004)

Subsidies for Drip irrigation technology: The subsidy for micro irrigation was introduced by the central and state governments between 1988-1991.A centrally sponsored scheme (css) on use of plastics in agriculture was launched during the Eighth Five year plan (1992-97) of government of India with an outlay of INR 2,500 million , of which an outlay of INR 2000 million was earmarked for promoting efficient methods of irrigation through drip and micro irrigation in the country[4]. During 1994-96 the government was giving a subsidy at the rate of 50% of cost of equipment to all categories of framers. From 1997 to 1999-2000, for facilitating installation of drip systems.

Advantages of Drip irrigation:

• Water application efficiency is high if managed correctly.

• Recycled non-potable water can be safely used.

• Moisture within the root zone can be maintained at field capacity.

• Soil type plays less important role in frequency of irrigation .

• Soil erosion is lessened. Maximum use of available water.

• No water being available to weeds.

• Maximum crop yield.

• High efficiency in the use of fertilizers.

• No runoff of fertilizers into ground water.

• Less evaporation losses of water as compared to surface irrigation.

• Improved seed germination.

• Water distribution is highly uniform, controlled by output of each nozzle.

• Labour cost is less than other irrigation methods.

• Ready adjustment to sophisticated automatic control.

• Decreased to tillage operations.

• Improved infiltration in soil of low intake.

Disadvantages of Drip irrigation:

In spite of the fact that drip irrigation has so many potential benefits , they're a certain limitation also , there are as fallows:

• Sensitivity to clogging

• Moisture distribution problem

• Salinity hazards

• High cost compared to furrow.

•High skill is required for design, installed and operation.

• Initial cost can be more than overhead systems.

• The sun can affect the tubes used for drip irrigation, shortening their usable life.

• If the water is not properly filtered and the equipment not properly maintained, it can result in clogging.

• For subsurface drip the irrigator cannot see the water that is applied.This may lead to the farmer either applying too much water (low efficiency) or an insufficient amount of water , this is particularly common for those with less experience with drip irrigation.

• Drip irrigation might be unsatisfactory if herbicides or top dressed fertilizers need sprinkler irrigation for activation.

• Drip tape causes extra cleanup costs after harvest. Users need to plan for drip tape winding , disposal , recycling or reuse.

• In lighter soils subsurfaces drip may be unable to wet the soil surface for germination. Requires careful cinsideration of the installation depth.

• The PVC pipes often suffer from rodent damage,requiring replacement of the entire tube and increasing expenses.

Conclusions: Finally we can conclude that Adoption of drip irrigation technology, much like any other new technology fallows different stages of introduction, acceptance and adoption. When micro irrigation is initially introduced among farmers, only a few early adopters take it. These early adopters are mostly those farmers who view these as coping mechanism for an immediate hardship such as limited water availability in their well, limited hours of farm power supply or reduced availability of labour. we can conclude that drip irrigation acts as very important role in the agricultural field and for water conservation.In this information we can see that drip irrigation method materials are cheap and best so we can be used easily for many crops.

By using the drip irrigation for agricultural field, not only a supply of water it can be used to tranfers fertilizers for the better consuption of yield.By this purpose of method the farmer can be easily get a crop yields.In this way we can be improve our country income and easy to develop a country.For this purpose we are concluded that Farmers are the Backbone of our country.

References:

[1] FAO(editor)(1998): Irrigation water management:Irrigation methods.(=Training manuals -5). Rome: Food and Agriculture Organization of the United Nations(FAO). [Accessed: 12.07.2010).

[2] INFONET-BIOVISION (Editor) (2010):Water for Irrigation . Zurich:Biovision .[Accessed:02.08.2010].

[3] Chandrakanth,M.G., Bisrat Alemu and Mahadev g.Bhat (2004), combating Negative Externalities of Drought: Astudy of Ground water Recharge Through Watershed, Economics and Politics weekly ,39 (11): 1164-1170,(March 13,2004), (special article).

[4] Agwater solutions project case study book written by M.S.Rathore

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ORGANIC FARMING IN INDIA –A REVIEW

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The inability of Indian agriculture to meet the demand for food in the country during the two and half decades immediately after independence had been a matter of concern at those times. The system of our agriculture based on the traditional knowledge and practices handed down from generation could not produce enough to feed the increasing population. The ignominy of our dependence for food on the western developed nations and the politics of food production by modernizing agriculture. The revolution fulfilled our aspirations by changing India from a food importing to a food exporting nation. However, the practice of organic farming, said to the best known alternative to the conventional method, also originated in the west, which suffered from the ill effects of chemical agriculture.

Organic farming is one of the several approaches found to meet the objectives of sustainable agriculture. Many techniques used in organic farming like inter- cropping, mulching and integration of crops and livestock are not alien to various agriculture systems including the traditional agriculture practiced in old countries like India. The paper discusses and the present status of organic agriculture in our country.

Organic farming is a method of crop and livestock production that involves much more than choosing not to use pesticides, fertilizers, genetically modified organisms, antibiotics and growth hormones.

Organic production is a holistic system designed to optimize the productivity and fitness of diverse communities within the agro-ecosystem, including soil organisms, plants, livestock and people. The principal goal of organic production is to develop enterprises that are sustainable and harmonious with the environment.

If organic farming is better for the environment, people's health, and animal welfare, how come all farming isn't organic? As we've already seen, evidence for the benefits of organic farming in all these areas is encouraging, but still disputed. Organic standards are rigorous and it takes several years for a farm to convert completely, during which time it cannot sell its produce as "organic"; that alone is a major barrier to conversion. Although you might expect food produced without chemicals to be cheaper, organic food is often more expensive than conventionally farmed food for a variety of reasons, including the smaller quantities and much more labor-intensive way in which it's produced. That means organic is more expensive for grocery stores to buy wholesale (as well as for consumers to buy retail), which makes it somewhat less attractive to cost-cutting chains competing fiercely on price. Inevitably, expensively produced organic food is sold as an upmarket option to people happy to pay a premium, which reinforces the unfortunate idea that it's a middle-class preserve. This clearly offends organic growers such as Guy Watson, who comments (refreshingly) that: "... the organic I aspire to is also affordable, enjoyable and accessible... To use exclusivity as a marketing tool is a betrayal of the essential inclusiveness at the heart of true organic farming Nevertheless, much organic food is—and will continue to be—sold in just that way, so organic will remain a more expensive option.

2.Importance of Organic Farming:

2.1. No Poison Is Always Great : Organic farming does not use any type of harmful chemicals to keep pests away, unlike the majority of industrial farming. They use all natural methods that do not harm the consumer or the environment that they are grown in. Herbicides, pesticides, and artificial growth hormones are all forbidden on an organic farm.

2.2. Closely Regulated : In order for a food to be labeled as organic, the entire process of which is was created is thoroughly investigated. The organic food industry is internationally regulated, which means that organic means the same standards where followed, no matter where in the world it was made. This helps the consumers to know that they are truly getting what they think that they are.

2.3. Better Taste and More Nutrition : Fruits and vegetables that are organically raised have a much better taste than other mechanically farmed ones. This is due to the fact that they are given a much longer time to develop and are not pumped with artificial things.

2.4. Costs Are Lowered : There is a deep stigma around anything organic that it had to have cost an arm and a leg to cultivate. This is actually the opposite of the truth. When you cut out the time that is spent to farm organic crops, the actual costs are minimal. These farmers do not have to shell out large amounts of money for expensive chemicals and massive amounts of water, unlike industrial farmers.

2.5. The Environment Doesn't Suffer : Another thing that benefits from the use of organic farming is the environment! In industrial farms, the chemicals that are used are seep into the ground and contaminate the soil and local water sources. Humans, animals, and plant life are all affected negatively by this. With Indian Agriculture and Allied activities. Technical and Institutional changes in Indianorganic farming, there are no chemicals used, so no pollution occurs either.

3.Present Scenario Of Agricultural Practice In India: This Section includes Characteristics / Status of Indian Agriculture and Present Scenario of Agriculture. Agricultural performance, Issues in Food Security in India and Non Institutional and Institutional Agencies in rural credit system.Recent trends, major challenges inagriculture measures to enhance viability of agriculture, Factors of Production in agriculture.Agricultural Finance and Marketing and Impact of Globalization on Indian Agriculture and issues of Food Security.You should have basic knowledge on Concept and Types of Farm Management with definition, meaning and its branches.Classification of field crops and the Factors affecting on crop production and Agro Climatic Zones.Various Cropping Systems: Definition and types of cropping systems and Problems of dry landagriculture.Basics of Seed production, seed processing and seed village

Meteorology : Agricultural extensions: Its importance and role, methods of evaluation of extension programmes.Role of KrishiVigyan Kendra's (KVK) in dissemination of Agricultural technologies.You can study these selected books for Present Scenario of Indian Agriculture and Allied activities for NABARD Exam 2016

4. Methods Of Organic Farming

4.1. Crop diversity : Organic farming encourages Crop diversity. The science of agroecology has revealed the benefits of polyculture (multiple crops in the same space), which is often employed in organic farming.[37] Planting a variety of vegetable crops supports a wider range of beneficial insects, soil microorganisms, and other factors that add up to overall farm health. Crop diversity helps environments thrive and protects species from going extinct.

4.2. Soil development : Plants need nitrogen, phosphorus, and potassium, as well as micronutrients and symbiotic relationships with fungi and other organisms to flourish, but getting enough nitrogen, and particularly synchronization so that plants get enough nitrogen at the right time (when plants need it most), is a challenge for organic farmers.[39]Crop rotation and green manure ("cover crops") help to provide nitrogen through legumes (more precisely, the Fabaceae family), which fix nitrogen from the atmosphere through symbiosis with rhizobial-bacteria. Intercropping, which is sometimes used for insect and disease control, can also increase soil nutrients, but the competition between the legume and the crop can be problematic and wider spacing between crop rows is required. Crop residues can be ploughed back into the soil, and different plants leave different amounts of nitrogen, potentially aiding synchronization.[39] Organic farmers also use animal manure, certain processed fertilizers such as seed meal and various mineral powders such as rock phosphate and green sand, a naturally occurring form of potash that provides potassium. Together these methods help to control erosion. In some cases pH may need to be amended. Natural pH amendments include lime and sulfur, but in the U.S. some compounds such as iron sulfate, aluminum sulfate, magnesium sulfate, and soluble boron products are allowed in organic farming.

4.3. Livestock : For livestock like these healthy cows vaccines play an important part in animal health since antibiotic therapy is prohibited in organic farming

Raising livestock and poultry, for meat, dairy and eggs, is another traditional farming activity that complements growing. Organic farms attempt to provide animals with natural living conditions and feed. Organic certification verifies that livestock are raised according to the USDA organic regulations throughout their lives.These regulations include the requirement that all animal feed must be certified organic.Organic livestock may be, and must be, treated with medicine when they are sick, but drugs cannot be used to promote growth, their feed must be organic, and they must be pastured.Also, horses and cattle were once a basic farm feature that provided labor, for hauling and plowing, fertility, through recycling of manure, and fuel, in the form of food for farmers and other animals. While today, small growing operations often do not include livestock, domesticated animals are a desirable part of the organic farming equation, especially for true sustainability, the ability of a farm to function as a self-renewing unit.

4.4. Composting : Using manure as a fertiliser risks contaminating food with animal gut bacteria, including pathogenic strains of E. coli that have caused fatal poisoning from eating organic food.[85] To combat this risk, USDA organic standards require that manure must be sterilized through high temperature thermophilic composting. If raw animal manure is used, 120 days must pass before the crop is harvested if the final product comes into direct contact with the soil. For products that don't directly contact soil, 90 days must pass prior to harvest.

4.5. Intercropping : Multiple cropping systems, such as intercropping or companion planting, offer more diversity and complexity within the same season or rotation, for example the three sisters. An example of companion planting is the inter-planting of corn with pole beans and vining squash or pumpkins. In this system, the beans provide nitrogen; the corn provides support for the beans and a "screen" against squash vine borer; the vining squash provides a weed suppressive canopy and discourages corn-hungry raccoons.[4]

Double-cropping is common where two crops, typically of different species, are grown sequentially in the same growing season, or where one crop (e.g. vegetable) is grown continuously with a cover crop (e.g. wheat).[3] This is advantageous for small farms, who often cannot afford to leave cover crops to replenish the soil for extended periods of time, as larger farms can.[6] When multiple cropping is implemented on small farms, these systems can maximize benefits of crop rotation on available land resources. [6]

CONCLUSION: As we know about the organic farming,we went through the advantages of organic farming so that it helps in prevention of pollution. We can use the method of organic farming without the usage of artificial fertilizers, pesticides and insecticides.

AGRO WASTE MANAGEMENT: WASTE TO WEALTH

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Agricultural waste may produce several harmful effects, including health risks and contamination of surrounding water bodies and the atmosphere,

Agricultural waste, if not properly disposed off, can cause short-term and long-term effects on environment by introducing foreign toxins into the soil and water.

Agricultural pollution comes from several sources. pesticides and fertilizers comes the bulk of agricultural waste and include man-made synthetic chemicals and materials. synthetic compounds often do not biodegrade upon exposure to the air or water and may linger for decades or even a century. these chemicals are sprayed on crop fields to keep insects away and streams and waterways as runoff. Contaminated water is another primary effect of agricultural waste, waterbecomes contaminated through fertilizer and pesticide residue,along with pathogens such as viruses and bacteria, which many enter drinking water systems.the accumulation of these substances ultimately leads health issues such as blue baby syndrome and neurological.Agricultural waste can alsonegatively affect aquatic animals and plants because fertilizers,ammonia, manure and the waste their way into local environments and disrupt ecosystem processes. so, there is a need to convert the agricultural waste to useful products which is not harmful to environment. This paper highlights the effective management of the agro waste including the organic waste and non biodegradable waste.

Introduction:Agro waste management : waste to wealth : Agro waste is the waste produced as a result of various agricultural operations. It includes manaure and other waste from farms ,poultry houses and slaughter houses harvest waste,fertilizers run-of from fields, farm plastics and other wastes

The main types of agricultural wasteare

1)biological

2)solid

3)hazardousand

4)used oil

Agricultural waste may produce and the atmosphere.agricultural waste , if not properly disposed off, can cause short-term And long-term effects on environment by introducing from into the soil and water .

The accumulation of these substances ultimately leads to health issues such as blue baby syndrome and neurological aliments. Contaminated wateris another primary effect of agricultural waste; water becomes contaminated through fertilizer and pesticide .

In India" Agriculturalis called as back bone of mycountry(India).so 80%of peopledo agricultural in India we Can get so many agro wastes . The waste can be converted to wealth "waste to health ". Agricultural is the largest contributor of any resource sector to the economy it is also large generator of waste material

This is practical guide to be more environmentally responsible and gain maximum return from their waste resources

This includes

1)provide practical information to maximize the benefits and minimize negative impactsofhandling waste

2)look at the environmental risks associated with some waste management practices

3)describes management and facility options for dealing with waste

"Best management practice agro waste management is first manure ".manure is a dynamic organic material continually undergoing biological and chemical changes each phase of management may results in looses or changes to the beneficial nutrient in the manure includes the facial and urinarywastes of live stock and poultry, plus materials such as bedding and added to water .The combined moisture level of faces and swine manure canbe solid ,semi solid as liquid manure contains abut 75% of the nutrients fed to livestock including nitrogen, phosphorous and potassium in manure is found in the liquid position, therefore,it is important to contain the liquids for land application. Almost all the phosphorous is in the solids ,when manure is diluted by water ,nutrients concentrations are reduced.

Advantage ofmanuremanagement

1)Harmful effects on fish from oxygen depletion in streams ends and exterioris

2) Nuisance to neighbor due to odours from manure

3) Bacterial and nitrogen contamination of water supply

4) Manure causes pollution to the groundwater .

5) Potential disease in humans and livestuck due to

pathogen.

6) Nutrient enrichment of h2o systems due to increased levels nitrates and phosphates .which can cause eutrophication of surface water.

Manurestorageincludes following differenttypes

1) Liquid manurestorage-circular concrete tank

2) Solid manure storage-curbed storage slab with ramp

3)In barn storage-manure pack

4) Solid or semi solid manure storage-concrete slabwith side walls and drive in ramp.

5) Liquid manure storage –unborn concrete storage with slatted floor(underconsrtuction)

6) Concrete liquid manure storage ,with cover for adour control'

7)Combination indooroutdoor feed lot'

8)Roof exhaust to maximize air dilution.

"Best management practice of agro waste management second one is "see page from farm silos"

The first good of any waste management system is to maximize the economic benefit from the waste resource and maintain acceptable environmental standards . if wastes arenot properly handed they can pollute surface and ground water and contribute to air pollution .wecan think manure is main and also important but other one called seepage from farm silos is also important one. The problem from seepage from farm silos are;

Silage seepage presents several concerns for the agricultural industry

1) Contamination of surface and groundwater

2) Determination of the soilstructure

3)Odurs

Silage effluent has extremelyhigh BODvalues , which are approximately 200 times as strong as raw domestic sewage. A significant discharge of efficient into a water course can remove so much oxygen and other aquatic creature die immediately

With respect to ground water quality ,silagelechate contains nutrients ,acids ,minerals and bacteria nitrate-nitrogen is the most significant groundwater from thisgroup. The greatest %of silage seepage is produced within 5 to10 daysafter filling the silo

Bestmanagementpractices

1) Harvest silage/haylage at low moisture that is below 60% moisture content forto were silos and below 65% for horizontal silos

2) Silos should be leaching through the silage/haylage

3) Divert all surface water away from the silo site

4) For new silos ,installseepage collection and storage systems

"Best management practice of agro waste management third one is "sead stocksispusal"'.

The disposal of dead animals must be in accordance with the PEL guidelines are designed to protect the public and animal health to reduce the risk of contamination of drinking water supplies and surface waterresources . alllive stock and poultry operations need a management plan for dead animals .after birth in livestock operations an egg in poultry operations are additional wastes which should be handled in a similar manner .

Environmental concerns : Dead animals are a health risk humans and farm animals they may be carries of disease .if not promptly removed or disposed of carcass will as producing offensive adours.

one option for disposal: Dead animals should be removed from the buildings as soon as possible and disposed of an approved manner with in one day

2) Livestock and poultry can nit be disposed if in manure storage or be sperad on to the land with manure.

3) Under any circumstances should dead animals are not leftlying around the farm buildings an extended period of time.

4) We have many dead animal removal service.

A dead animal and poultry removed service removes carcass to be rendered .poultry and other small

Of death, for a current list of live stock removal companies all thePEL, department of agriculture and forestry

"Best management practice of agro waste management fourth one is " farm plastics , chemicals , empty containers ,buildings materials, old machineryanimal health reproducts and petroleum wastes.

Plastics are used on the farm in a variety of manures .these Include silage wrap and twine. Plastic film placed onthe surface of the soil to exchange heat reaction is a new technology used in agricultural it is also used for aver and storage of forages..

Steps in off-farm recycling of plastic wrap is removed , shake it to remove contaminated(dirt ,water,ice etc0. Separatestrings from the plastic.

1) Keep plastic clean and dry

2) Bale or compact into small square for easier handling,

Storing and transporting. Bale onlywith plastic string.

Proper disposal of farm plastics.

1)The most ideal method of disposalof farm plastics is to concrete the waste into a used by product such as building materials ,peace posts, recreation furniture orrecycled silage wrap.

2) Land filling or burning of farm plastics is not recommended.

Conclusion: Lastly I conclude that agriculture as many wastes that waste canbe converted to wealth but India didn't accepted such measure to concrete waste to wealth . if India takes the measure to make use of agriculture waste. Means it would be very helpful to the country and also for the better environment

References:

1) Use of manure from J.L.Hatfield ,Babby, A.stewart

2) Agricultural waste management in province prince Edward Island

3) P.Jacobs and associates and R.B.Thomas

4) Ministers release booklet on agricultural waste management

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THEME :-07

VASUNDAREEYAM

Cosmology, Ecology, Environmental & Earth Sciences

Sl No	Title of the Paper	Authors	Page No
1.	DESIGN, DEVELOPMENT AND EFFICIENCY IMPROVEMENT OF A BIODIGESTER AND ITS UTILITY AS A SOLUTION FOR SOLID WASTE MANAGEMENT IN URBAN INDIA	Jyothilakshmi. R	147 - 148
2.	SLAUGHTER HOUSE WASTE MANAGEMENT	Hemalatha B.R	149 - 151
3.	STUDIES ON THE STATUS OF LAKES	Megha M.A & Priyanka.S	151 - 154
4.	WASTE SEGREGATION USING SMART DUSTBIN	Y.Prananvi & S.Archana	154 - 158

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DESIGN, DEVELOPMENT AND EFFICIENCY IMPROVEMENT OF A BIODIGESTER AND ITS UTILITY AS A SOLUTION FOR SOLID WASTE MANAGEMENT IN URBAN INDIA

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Solid waste is heterogeneous mixture of solid materials which does not have any further use to the society. Municipal solid waste refers to wastes generated from commercial and residential places situated in a municipal or notified area (MSW rule, 2000) in an urban locality. Rapid urbanization coupled with the burgeoning population has enhanced the quantity of waste, resulting in serious environmental problems due to lack of appropriate planning and management This necessitates suitable management strategies in an environmentally compatible manner while adopting principles of economy, aesthetics, energy and conservation (Tchobanoglous et al., 1997). This will reduce the risk to the environment and human health at all levels starting from generation to disposal of waste.(Kassim and Ali, 2006). Nevertheless successful implementation of the environmentally sound management of solid waste requires active participation of all stakeholders and sectors like administrative, financial, legal, planning and engineering (Joseph, 2002; Ramachandra and Varghese, 2003; Ramachandra, 2009).

Background of the study: As India is moving towards sustainable development as for as energy needs are concerned, biogas as biofuel may provide a sustainable solution to energy crisis by displacing oil use in agriculture and transport sector. Biogas is an obvious choice and has a promising future in india due to tropical location, very high population of livestock and wide variety of substrates available inabundance for biogas generation. An estimate indicates that India has potential of generating 6.38*1010m3 of biogas from 980 million tons of cattle dung produced annually. The heat value of this amounts to 1.3*1012 .In addition to gas around 350 million tons of organic manure would also be produced(T.N.Tulasidas et al).If organic wastes such as sewage,municipal solid waste,waste from industrial effluents can also be taken as feedstock to increase biogas potential further. Current study deals with these aspects and also effective utilization of slurry which is the byproduct of biogasification.

Steps in the research:Current research involves design of a biodigester which takes all sort of biodegradable waste and converts it to biogas through anaerobic digestion. The biogas thus produces will have Hydrogen sulphide which should be removed by scrubbing. The byproducts are NPK rich which can be used as manure.

Steps in the research:

1. Size reduction: The segregated waste is fed into the shredder to reduce the size of the waste to a uniform size of around 15-20mm.Shredders with the handling capacity of 4tons/he are available.

2. Anaerobic digestion: digeste rhas an unique system of mixing which does not require mechanical moving parts and also has an ability to control scum and sedimentation while hadling high solid concentration. Plug Flow reactor type of Biodigester is shown in Fig 1. loaded PFR digester with dung and biodegradable waste is shown in fig.2.

3.Biogas collection: The biogas generated as result of stabilization of the waste,leaves the BIMA digester to a dry type gas holder made of a synthetic membrane (polyester).The biogas would have a composition of 60% methane and 40%carbon dioxide.

4. Power generation: The biogas after removal of hydrogen sulphide is used as fuel in the engine to produce electricity.The gas is drawn from the gas holder by gas blowers and fed into the gas engine. An alternator is connected to the engine to produce electricity.

5. Dewatering of digested substrate: The residue from the digester is collected in an effluent buffer tank for dewatering. Dewatering is carried out in a screw press of capacity upto 6m3/hr. As the screw is rotated, the material is moved forward and consequently the pressure is increased. The centrate is discharged through the openings in the curb and the dewatered cake is discharged at the other end of the press. The cake from screw press would be converted into manure by composting.

6. Odour control system: Receiving area, conveyer,s hredder, feed preparation tank and screw press are connected through PVC pipelines to the biofilter to reduce the odour inside the plant. The foul air from each location are sucked and passed through the media impregnated with microorganisms to remove odour.

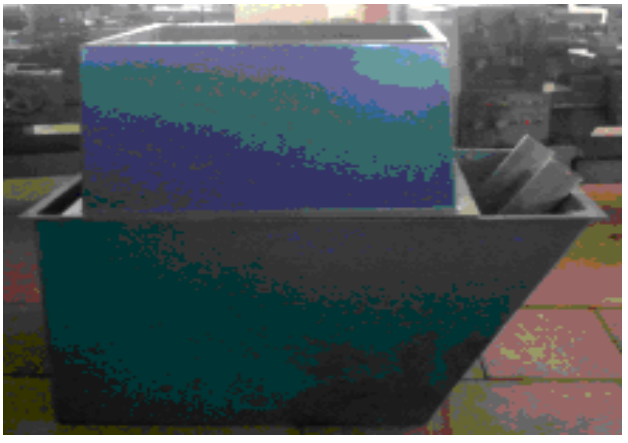

Fig 1: Plug Flow reactor type of Biodigester

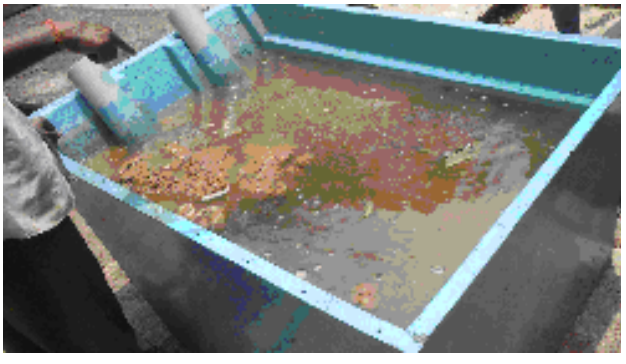

Fig 2: loaded PFR digester with dung and biodegradable waste

Usage of biodigested slurry:Biodigested slurry is the by-product obtained from the biogas plant after the digestion of the dung and generation of the gas. It is a very good manure. The nutrients contents NPK get enriched in the biodigested slurry. The elemental analysis of biodigested slurry using X-ray reveals that the Silicon, Phosphorous, Sulphur, Potassium, Calcium and iron are present with 65.595,8.275,3.117'7.623,11.693 and 3.698 percent respectively.

The biodigested slurry has a great potential as organic manure and it can be applied to all crops. Biodigested slurry is as valuable as main product of the biogas plant. In addition it reduces pollution, save energy required to produce chemical fertilizer.

The study also involves carrying out biogas production using different types of feedstock and calculating biogas production in each cycle and methods to increase the production rate. It also deals with methods to enrich the biogas by removing unnecessary chemicals. It also involves in the methods of developing systems to make use of biogas to generate electricity.

References

1.CIRE 1995,Planning and management of non-conventional energy development, Hyderabad

2. Kishore VVN and Srinivas s. N Biofuels of India. Journal of Scientific and industrial research, Vol.62 106-123,Jan Feb 2003

3. Biogas Technology, Dr. Veeresh kumargoud, Dr.T.N.Tulasidas,Er,H. Eshwarappa, GKVK, Bangalore

4.MNES Report "Renewable Energy in India and business opportunities".MNES(Ministry of non-conventional energy sources),Govt. of Undia,New Delhi,2001.

5. Ravindranath, N.H. Renewable Energy and Environment: A Policy Analysis for India; Tata

McGraw-Hill Pub. Co.: Uttar Pradesh, India, 2000.

6. Zhang, J.; Mauzerall, D.L.; Zhu, T.; Liang, S.; Ezzati, M.; Remais, J.V. Environmental health in China: Progress towards clean air and safe water.

7. NAS. Methane Generation from Human, Animal and Agricultural Waste; National Academy of Sciences: Washington, DC, USA, 1977.

8. Bioenergylists. Available online: http://www.stoves.bioenergylists.org

9. Luijten, C.C.M.; Kerkhof, E. Jatropha oil and biogas in a dual fuel ci engine for rural

electrification.

10. Bhattacharya, S.C.; Abdul Salam, P.; Sharma, M. Emissions from biomass energy use in some selected asian countries.

11. Xiaohua, W.; Jingfei, L. Influence of using household biogas digesters on household energy

consumption in rural areas—A case study in Lianshui County in China.

12. Martins das Neves, L.C.; Converti, A.; Vessoni Penna, T.C. Biogas production: New trends for alternative energy sources in rural and urban zones.

13. VITA. Testing the Efficiency of Wood Burning Stoves: International Standards; Volunteers in Technical Assitance, Inc.: Arlington, TX, USA, 1985.

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SLAUGHTER HOUSE WASTE MANAGEMENT

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Slaughterhouses are the primary establishments that prepare animals for food consumption. Its facilities should enable the slaughtering, dressing, cutting and inspecting meals and refrigeration. While doing so, it produces enormous quantity of wastes that need to be treated properly before actual disposal. The wastes produced in slaughter houses are mainly solid and liquid wastes.

In developing countries, some or all of these products are dumped as solid waste without any further processing / composting or they are washed away. This causes a serious threat to the environment leading to health hazards. Thus this paper deals with how efficiently the slaughter house wastes can be managed using biological treatment process and used as by-products apart from not polluting the environment to a large extent.

Key words: Slaughtering, composting, biological treatment

Slaughterhouses produce enormous quantity of wastes that need to be treated properly before the actual disposal of these wastes. The wastes produced in slaughter houses are mainly solid and liquid. In most developed countries, everything produced by or from the animal except dressed meat, is considered as by-product. These by-products are either edible or inedible.

In many countries, all the waste that is unsuitable for human consumption is processed by rendering companies as animal feed, glue etc. In large slaughter houses, screening devices through which waste water has to flow prior t being treated, remove large solids such as hair, paunch manure, pieces of viscera and meat, dirt and other materials. Some of these solids have an economic value and are rendered so as to produce salable product. Materials of little economic value may be dumped at a landfill, spread out on the land or treated together with the solids from biological treatment processes.

1.1 Classification of Slaughter Houses

Based on scale of operation, slaughter houses have been classified into three categories namely; large, medium and small (Table 1).

Table 1: Classification of slaughter houses

Category	Number of Animals Slaughtered
Large	More than 200 bovines and more than 1000 sheep / goat
Medium	50-200 bovines and 300-1000 sheep / goat
Small	50 bovines and 300 sheep / goat

1.2 General Slaughtering process and procedure : The slaughtering process differs by species and region. The elements of hygiene will differ depending on the type of processing. There will be significant differences between the hygiene standard required in a plant manufacturing meat products, which are sold as sliced, prepackaged meat products, and the hygienic standard required in a place where the animals are slaughtered. The main hygiene principle in processing is that clean and unclean operations are efficiently separated. This requires a well planned plant layout, where the purpose of any structure should be to protect the products against unintended contamination.Processing principles are shown in the following flow-diagram (Fig.1).

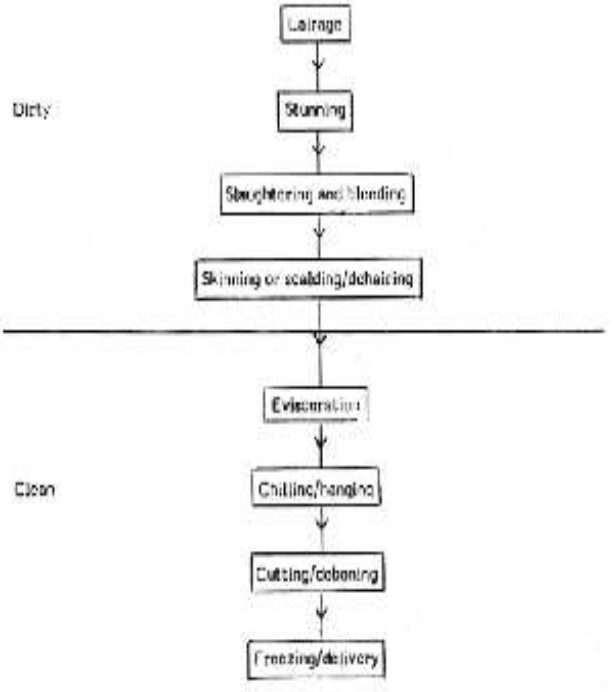

Fig.1: Flow chart showing the process of dirty and clean slaughtering

1.3 Solid wastes in slaughter houses : The solid waste from slaughter houses is varied depending on the kind and scale of operations. Usually the quantity of waste per animal is large in small scale operations

where the recovery of offal is ineffective. In modern slaughter houses, extensive processing of by-products is under taken and results in less production of waste.The data collected on the solid waste quantity generated in the slaughter houses by CPCB through survey is shown in table 2.

Table-2: Quantity of Solid Waste generated in slaughter houses (CPCB)

Animal	Kg/head	Kg/tone of live weight killed (TLWK)	% of Animal weight
Bovine	83	275	27.5
Goat/ Sheep	2.5	175	17
Pig	2.3	40	4

2. Present Scenario in India : Almost one sixth of world's cattle and one half of buffalo are found in India. India ranks second in world in goat and sixth in sheep population. As per FAO(2004), India possess 226 million cattle, 96.9 million buffaloes, 18.5 million pigs, 59 million sheep, 125 million goats, 842 million poultry. It may be noted that cattle and buffaloes have been the largest meat contributors of the total meat production in India [2].As per reported by ministry of food processing, in 2003, our country has a total of 3600 recognized slaughter houses, 9 modern abattoirs and 171 meat processing units is slaughtering over 121 million cattle's(sheep, goat, pigs and poultry) and 36.9 million buffaloes, annually, fordomestic consumption as well as for export purpose [1]. Currently there is no organized system for disposal of both solidand liquid waste generated in slaughter houses in our country. Largelythe solid waste in general is collected and dumped or disposed of inopen which is unhygienic.

3. Management of Solid Waste : A. Large slaughter house: They are located mostly in cities and in congested areas. They generate substantial quantity of solid waste, which have to be processed in environmentally acceptable manner. For large slaughter houses, Bio-methanation& rendering for waste are suggested.

B. Small slaughter house: In this case, sophisticated and capital intensive technologies are not viable options due to low volume of waste and non-availability of other infrastructure facilities. For small slaughter houses, a more pragmatic approach would be to make use of natural process such as composting. This would be financially & technically viable for small slaughter houses.

4. Processing of Solid Waste from Slaughter Houses

4.1 Composting : Composting involves the aerobic biological decomposition of organic materials to produce a stable humus like product. This is a common practice of wastes stabilization but requires proper understanding of the following steps:

Parameters	Requirements
Carbon-Nitrogen Ratio	30:1
Particle Size	15cm
Temperature	55o -65o
Moisture content	40-45%
pH	6 - 8

The compost stack is prepared by making heaps of waste and for preparation of compost stack, the alternate layers of waste should be built up to a height of 4 to 5 feet. The compost can be removed after 4 to 5 weeks which is considered reasonably enough time for composting, although it depends upon many factors such as type of material, size of heap, ambient temperature etc. the quality of compost can be improved gradually with experience by proper combination of different wastes providing appropriate time intervals for mixing and moisture content.

4.2 Biomethanation : It is the type of anaerobic stabilization of waste practiced in many places. The success of the process, especially the effective removal of BOD has led biogas plant to be acceptable for slaughter house waste.

Conventional floating drum type Biomethanation plant having a drum with a diameter slightly less than that of cylindrical digester serves as gas holder. The plant delivers gas at uniform pressure and provides good seal against gas leakage. It is reliable & has proven performance for bovine dung processing when loading rate is maintained about 0.5 -0.6 kg volatile solids /m3 /day. The waste should be suitably diluted before feed. The plant can handle feed with solid content upto 8 percent.The anaerobically digested sludge has higher nitrogen content& is dewatered by filter press and can be used as manure. In high rate Biomethanation system, there is proper arrangement for operation control and safety measures. The benefits of high rate Biomethanation are reduced digester volume requirement & increased process stability. In plant, bio gas generation will be 2600 m3 / day for 60 tonnes of waste / day.

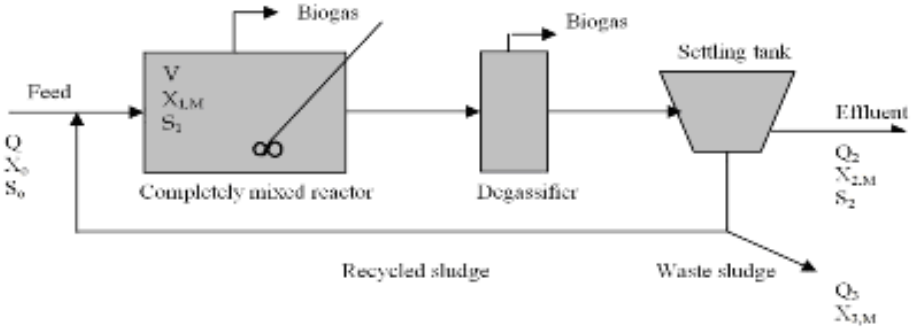

Fig-2: Bio Gas unit

4.3 Rendering : It is carried out in dry rendering or wet rendering plants. In both the processes, large pieces such as heads, bones etc are reduced in size by shredders or other machinery. Large soft offals are also cut to size before processing.

5.Conclusion : Slaughter house waste has high potential to be treated anaerobically for bio gas production. However, various circumstances do not always permit forby-product recovery. The reasons may be inadequate quantity of materials, lack of markets, cost of processing etc. Incineration is also an option for treatment f slaughter house waste.

References

1] Javed Ahmad et al (2012) "Biogas from slaughter house waste- Towards an energy self sufficient Industry", Journal f Microbial Biotechnology, S12.

2] A Manual on Pollution Control in Slaughter Houses, Government of Karnataka.

STUDIES ON THE STATUS OF LAKES

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Lakes are vital parts of fresh water ecosystems of any country. A fresh water lake when maintained free from pollution can offer many beneficial uses in an urban area. Urban lakes more commonly act as thermal cooling, reaction centers and de- stressing points in the highly-stressed urban life. Now a day, due to the pressure from activities like urbanization, industrialization, as well as aesthetical beauty of the water body, the commercial value of the surroundings is improved. Lakes provide life to various forms of aqua flora and fauna, livelihood for fishermen community, food for the local populace, pollution sink, and ground water recharge leading to rise in the water table and also as flood mitigators. The urban population can free themselves from the polluted urban air and find solace in the cool air by the lake side and relax in recreational activities such as swimming, boating, fishing and strolling along the lake shores. The present paper attempts to review the tropic status of lakes of India and also restoration of lakes.

Lakes are an important feature of the Earth's landscape. They are extremely valuable ecosystems and provide a range of goods and services to humankind. They are not only a significant source of precious water, but extend valuable habitats to plants and animals, moderate the hydrological extreme events (drought and floods), influence microclimate, enhance the aesthetic beauty of the landscape and offer many recreational opportunities [1].

However, anthropogenic pressures on lakes have increased rapidly in recent decades. Major changes have occurred in the land use in their catchments where natural vegetation is cleared, and agricultural, urban and industrial activities are intensified. These anthropogenic activities (deforestation, agriculture, urban settlements and industries) have accelerated the aging process as increased amounts of sediments, nutrients and toxic substances enter lakes with the runoff [2]. Most lakes are in different stages of degradation in various ways - through eutrophication, toxic pollution or habitat loss. In addition the catchment based activities have been accompanied by encroachment on lake-shores by reclaiming shallow lake margins, sewage disposal, water abstraction, and diversification of in-lake recreational activities. All these activities directly cause rapid degradation of lakes.

Most important and common form of lake degradation is that of deterioration of water quality due to organic pollution from disposal of domestic wastewater and other solid wastes. Eutrophication, (i.e) enrichment with nutrients, is another major and most wide spread problem in almost all lakes. Enrichment occurs due to nutrients entering with the runoff from the catchments. Strom water runoff from

urbanized catchments brings a variety of toxic substances besides nutrients and particulate matter. Siltation due to high sediment load in the runoff caused by erosion is also a serious problem in all reservoirs and lakes.

Large reservoirs are affected by silt carried by the rivers from their large catchments whereas in rurallakes much of siltation occurs due to human activities such as agriculture and over grazing in theirclose vicinity. Invasive aquatic weeds, particularly exotic species such as water hyacinth, are among other factors responsible for rapid degradation of lakes. Finally, equally important contribution to the degradation of lakes are human alteration in hydrology (excessive water abstraction), shoreline modification through landfill or beautification measure that remove natural vegetation and in-lake activities (bathing, washing, idol immersion and disposal of religious offerings).[1]

2.Trophic Classification of Lakes

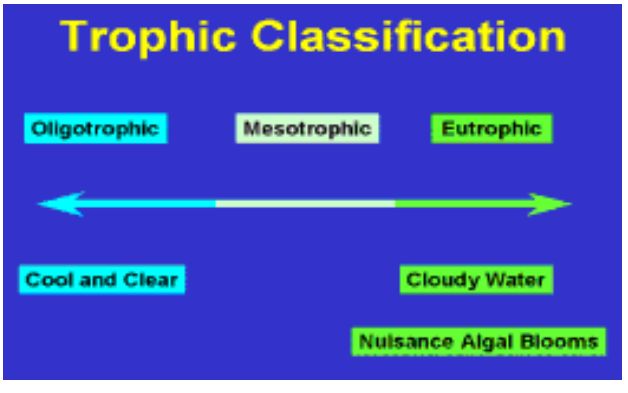

Fig 1: Classification of lakes

Each trophic state can represent a wide range of biological, physical, and chemical characteristics and anylake may be categorized within any of these trophic states. In general, the increase in productivity anddecrease in clarity corresponds to an enrichment of nutrients, plant and animal life. Lakes with low biological productivity and clear water are considered oligotrophic. Highly productive lakes with lowclarity are considered eutrophic .Lakes that are mesotrophichave intermediate or moderate productivityand clarity. It is important to remember that eutrophication is a natural process and is not necessarilyindicative of man-made pollution. Over a period of hundreds of yearslake will eventually fill withsediment due to natural erosion processes. Streams carry sediments to lakes; trees and other vegetationalong the water's edge drop their leaves and add nutrients to the lake. Over time this[provides habitat forother vegetation until the lake changes from an open water system to a wetland.

3.Types of lakes

3.1 Oligotrophic Lakes

Fig2 :Oligotropic lake

An oligotrophic lake is a lake with low primary productivity, as a result of low nutrient content. These lakes have low algal production, and consequently, often have very clear waters, with high drinking-water quality. The bottom waters of such lakes typically have ample oxygen; thus, such lakes often support many fish species, like lake trout, which require cold, well-oxygenated waters. The oxygen content is likely to be higher in deep lakes, owing to their larger hypolimneticvolume.Ecologists use the term oligotrophic to distinguish unproductive lakes, characterised by nutrient deficiency, from productive, eutrophic lakes, with an ample or excessive nutrient supply. Oligotrophic lakes are most common in cold regions underlain by resistant igneous rocks (especially granitic bedrock).

Ex:Kurtkowtieclake an oligotropic lake in the tara mountain of southern poland

3.2 Mesotropic Lakes

Fig3 :Mesotropic Lake

Mesotrophic lakes are lakes with an intermediate level of productivity. These lakes are commonly clear water lakes and ponds with beds of submerged aquatic plants and medium levels of nutrients.The

term mesotrophic is also applied to terrestrial habitats. Mesotrophic soils have moderate nutrient level. There has been little monitoring of the trophic status of water bodies within the Region, so the full status of mesotrophic lakes in the North East is unknown.

The best examples of mesotrophic lakes are found within the Northumberland National Park and have collectively been notified as the Roman Wall Loughs SSSI and SAC, although these also show some signs of nutrient enrichment.

3.3 Eutrophic Lakes

Fig 4: Eutrophic Lake

A eutrophic body of water, commonly a lake or pond, has high biological productivity. Due to excessive nutrients, especially nitrogen and phosphorus, these water bodies are able to support an abundance of aquatic plants. Usually, the water body will be dominated either by aquatic plants or algae. When aquatic plants dominate, the water tends to be clear. When algae dominate, the water tends to be darker. The algae engage in photosynthesis which supplies oxygen to the fish and biota which inhabit these waters. Occasionally, an excessive algal bloom will occur and can ultimately result in fish death, due to respiration by algae and bottom-living bacteria.

The process of eutrophication can occur naturally and by human impact on the environment.Eutrophic comes from the Greek eutrophos meaning "well-nourished", from eu meaning good and trephein meaning "to nourish".

3.4 Hypereutropic

Fig 5: Hypereutropiclake

Hypereutrophic lakes are very nutrient-rich lakes characterized by frequent and severe nuisance algal blooms and low transparency. Hypereutrophic lakes have a visibility depth of less than 3 feet, they have greater than 40 micrograms/litre total chlorophyll and greater than 100 micrograms/liter phosphorus. The excessive algal blooms can also significantly reduce oxygen levels and prevent life from functioning at lower depths creating dead zones beneath the surface.Likewise, large algal blooms can cause biodilution to occur, which is a decrease in the concentration of a pollutant with an increase in trophic level. This is opposed to biomagnification and is due to a decreased concentration from increased algal uptake. [3]

4.WATER POLLUTION OF LAKES

Fig 6: Polluted water body

Litter pollution in the form of plastic and styrofoam pollution is prevalent as beach pollution on most stormwater retention lakes. Containing and retrieving trash and floatable debris is easy with a floating boom. Simply direct the litter to the shoreline where it can be economically collected in a net system or removed with a skimmer.

If there is a concern with invasive plants the use of Aquatic Plant Control Boom to control lake pollution will help contain these (some examples are water hyacinth islands, water lettuce, duck weed, etc). These types of invasive plants can be mechanically harvested easily once directed to a shoreline or economically treated with herbicides where appropriate.There are several ways to control pollution entering the lakes and the use of oil spill cleanup boom and equipment will control oil sheen and spills on the surface of a lake and allow for easy oil cleanup. See our seven simple water pollution solutions.During marine construction activities marine pollution can be avoid by using turbidity curtain to control in-water plumes of silt of suspended sediments.Using these simple water pollution solutions are an economical way for pollution prevention.[3]

5. Conclusion : Nowadays, water pollution is becoming more water pollution has been affected on animals,people and lakes. Therefore,we have to reduce the water pollution by industrial and domestic uses. Because of this many people are suffering from several diseases. We can minimize the water pollution by converting eutropic lakes to mesotropic lakes.

6.References

[1]http;//www.arcjournals.org/pdfs/ijres/v2-i2/3dotpdf

[2]http;//www.hws.edu/fli/pdf/lessons_stu_tropic.pdf

[3]http;//cfb.unh.edu/filed_limn_2005/student_lect…

WASTE SEGREGATION USING SMART DUSTBIN

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Rapid increase in volume and types of solid and hazardous waste as a result of continuous economic growth, urbanization and industrialization, is becoming a burgeoning problem for national and local governments to ensure effective and sustainable management of waste. It is estimated that in 2006 the total amount of municipal solid waste generated globally reached 2.02 billions tones, representing a 7% annual increase since 2003 (Global Waste Management Market Report 2007). The segregation, handling transport and disposal of waste are to be properly managed as to minimize the risks to the health and safety of patients, the public, and the environment.

The economic value of the waste is best realized when it is segregated. Currently there is no such system of segregation of dry, wet and metallic wastes at a household level. This project proposes an Automated Waste segregator which is a cheap, easy to use solution for a segregation system at households so that it can be sent directly for processing. The AWS employs parallel resonant impedance sensing mechanism to identify metallic items and capacitive sensors to distinguish between wet and dry waste.

In recent times, garbage disposal has become a huge cause for concern in the world. A voluminous amount of waste that is generated is disposed by means which have an adverse effect on the environment. The common method of disposal of the waste is by unplanned and uncontrolled open dumping at the landfill sites. This method is injurious to human health, plant and animal life. This harmful method of waste disposal can generate liquid leachate which contaminate surface and ground waters can harbour disease vectors which spread harmful diseases and can degrade aesthetic value of the natural environment and it is an unavailing use of land resources[1-2].

In India, rag pickers play an important role in the recycling of urban solid waste. Rag pickers and conservancy staff have morbidity due to infections of skin, respiratory, gastrointestinal tract and multisystem allergic disorders, in addition to a high prevalence of bites of rodents, dogs and other vermin. Dependency on the rag-pickers can be diminished if segregation takes place at the source of municipal waste generation.

The economic value of the waste generated is not realised unless it is recycled completely. Several advancements in technology has also allowed the refuse to be processed into useful entities such as Waste to Energy, where the waste can be used to generate synthetic gas (syngas) made up of carbon monoxide and hydrogen. The gas is then burnt to produce electricity and steam, Waste to Fuel, where the waste can be utilized to generate bio fuels[3-4].

When the waste is generated into basic streams such as wet, dry and metallic, the waste has a higher potential of recovery, and consequently, recycled and reused. The wet waste fraction is often converted either into compost or methane-gas or both. Compost can replace demand for fertilizers, and biogas can be used as a source present, it is always much better to segregate the waste at the source itself.

The benefits of doing so are that a higher quality of the material is retained for recycling which means that more value could be recovered from the waste. The occupational hazard for waste workers is reduced. Also, the segregated waste could be directly sent to the recycling and processing plant instead of sending it to the segregation plant then to the recycling plant. Currently there is no system of segregation of dry, wet and metallic wastes at a household level. J.S.Bajaj has recommended that a least cost, most appropriate technological option for safe management should be developed. The purpose of this project is the realization of a compact, low cost and user friendly segregation system for urban households to streamline the waste management process.

We are implementing a smart dustbin which is a cheap, easy to use solution for a segregation system at households, so that it can be sent directly for processing. It is designed to sort the refuse into metallic

waste, wet waste and dry waste. The mixed waste is sorted based on the following methods at the industrial level. Larger items are removed by manual sorting. Then the refuse is sorted based on its size by using large rotating drums which is perforated with holes of a certain size. Materials smaller than the diameter of the will be able to drop through, but larger particles will remain in the drum. For metallic objects electromagnets or eddy current based separators can be used. Near infrared scanners are used to differentiate between various types of plastics based on the ability of the material to reflect light. X-rays can also be used to segregate materials based on their density.

Problem Statement : The main sources of waste are industrial and domestic waste. This project mainly concentrates on domestic whose value is unrecognized since people don't spend time on segregating waste into their basic streams. The wet waste generated can be used to generate biogas, metallic and dry waste can be send for recycling, if metallic waste is left untreated then it becomes a threat to animal and plant lives. If waste is separated at household level then they can be directly sent for recycling instead of sending them to industries first for segregation which becomes a huge task and the waste does not get segregated accurately. The methods adopted for waste segregation in industries is hazardous to human health since it makes use of x-rays and infrared rays.

The environmental risks associated with poor waste management are well known and understood. Fly tipped wastes can poison and injure children and animals as well as create an eyesore. Careless disposal of liquid wastes such as solvents can leach into the ground water and contaminate drinking water supplies. Poorly planned and managed landfills will create a significant neighborhood nuisance, and where landfill gas and leachate are not properly treated there will be a serious threat to the safety of local residents. Incinerators operated without adequate pollution abatement equipment will releases highly toxic dioxins. Even recycling and composting facilities can be a source of litter and pleasant odor if not properly regulated. The main aim of the project is to segregate waste at source level to wet, dry and metallic such that waste is not wasted but there value is understood and can be converted to a source of energy, in a cost effective way.

Design Methodology : The salient features of the design implementation are as follows:

1.Microcontroller AT89S52 is used, which controls the entire operation. When waste is introduced into the system, IR proximity sensor detects the waste activating the controller, which in turn starts the entire process.

2.IR proximity sensor is used which detects the entry of waste into the system and sends a signal to the controller.

3.Proximity sensor is used for the detection of metallic waste, when any metallic particle is introduced into the system proximity sensor gets activated.

4.Moisture sensor is used for the detection of wet waste, this sensor measures the moist content to differentiate between wet and dry waste.

5.DC motor along with a driver is used for the rotation of a conveyer belt, the speed of rotation of the motor is controlled by using PWM.

6.Stepper motor is used for the rotation of bins which collect wet, dry and metallic waste.

7.A 16*2 liquid crystal display is used to display the kind of waste whether it is wet, dry or metallic.

8.Buzzer is used which produces beep sound when any one sensor gets activated detecting waste.

9.Kevil u Vision3 software is used to develop applications for microcontrollers. It is popularly known as IDE i.e. Integrated Development Environment, because it provides a single integrated environment to develop code for embedded microcontrollers.

10.A software known as TopWin6 2005 Programmer is used to burn the code into the microcontroller.

Claudine Capel, WASTE SORTING-ALOOK AT THE SEPERATION AND SORTING TECHNIQUES IN TODAYS EUROPEAN MARKET

Separating the different elements found in waste streams is essential for enabling the recovery of useful materials, minimizing the amount of material sent to landfill and allowing recyclable materials to find a new incarnation. Companies sort and recycle materials in order to extract value.

Separation technologies: Waste disposal companies dealing with the sorting of materials will commonly use one or more of these five methods:

Drum screens: These separate materials according to their particle size. Waste is fed into a large rotating drum which is perforated with holes of a certain size. Materials smaller than the diameter of the holes will be able to drop through, but larger particles will remain in the drum.

Eddy current separator: This method is specially for the separation of metals. An 'eddy current' occurs when a conductor is exposed to a changing magnetic

field. Put simply, it is an electromagnetic way of dividing ferrous and non-ferrous metals.

Induction sorting: Material is sent along a conveyor belt with a series of underneath. These sensors locate he

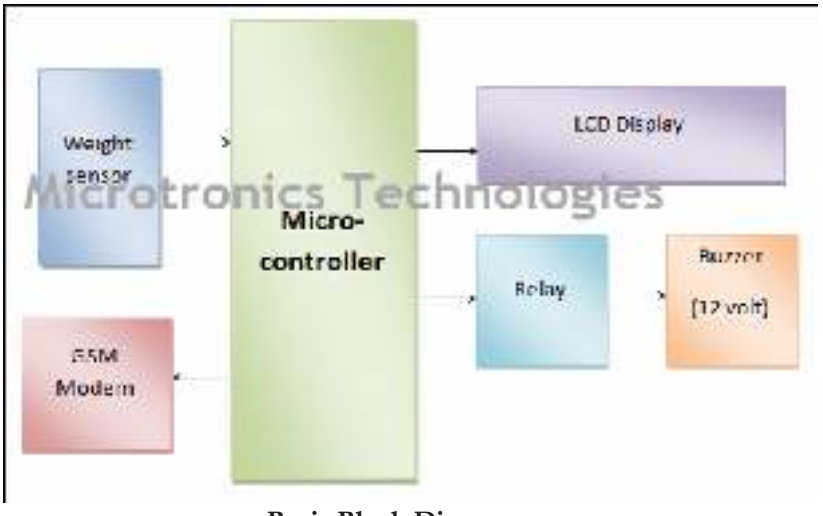
Near infrared sensors (NIR): When materials are illuminated they mostly reflect light in the infrared wavelength spectrum. The NIR sensor can distinguish between different materials based on the way they reflect light.

X-ray technology: X-rays can be used to distinguish between different types of waste based on their density.

Difference between our system and existing systems: Our system mainly concentrates on separating waste at a less cost. In our system we have made use of AT89s52 compared to MSP430 which is costlier. In order to differentiate between wet and dry waste a moisture sensor is used instead of a capacitive sensor which increases the complexity by making it difficult to differentiate between dry and wet waste by making use of dielectric values of waste substances. In the former system to separate metallic waste inductive sensors were used which again requires the controller to be preprogrammed with the threshold values, the necessity is removed in our system by making use of a proximity sensor which directly detects metals.

At industrial level methods used for segregation of waste are hazardous to human health and also the process involves manual effort and also complete segregation is not obtained. By segregating waste at root source, not only can waste be recycled but beauty of the surroundings can be maintained.

DESIGN PRINCIPLE



Basic Block Diagram

The main object of this project is to separate the waste properly. When the waste is dumped into the smart dustbin, the IR sensor detects the waste and activates microcontroller. Generally IR sensor is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiations.

Then the microcontroller activates DC motor which is used for the rotation of conveyor belt. We have used AT89S52 microcontroller which is low power, high performance, 8-bitmicroC and it is compatible with all micro C of 8051 family.

DC motor contains current carrying armature which is connected to the supply end through commutator segments and brushes and placed within the north south poles of a permanent or an electromagnet.

When waste is dumped into smart dustbin, it falls onto the conveyor belt where different sensors are connected to identify the type of waste. The first sensor is the metal sensor which transmits electromagnetic field. Any metal object within the electromagnetic field will become energized and retransmits an electromagnetic radiation of their own. The sensor's coil receives retransmitted field and alerts the user by producing a target response.

Next sensor connected is the moisture sensor which uses capacitance to measure dielectric permittivity of the surrounding medium. Wet waste has higher relative dielectric constant than that of dry waste because of the presence of moisture, oil and fat. By this we come to know whether the waste is wet or dry.

According to the waste being sensed the bin is selected using a stepper motor. Stepper motor has a rotor with permanent magnets mounted on it, while the stator winding the second winding is energized. The two windings are turned on and off alternatively. This causes the motor to lock on to the desired position.

A 2*16 LCD is used to display the type of waste being sensed by one of the sensors. Also it displays different messages. Buzzer is used to indicate when any of the waste is detected by any one of the sensor. Separate drivers are used for both DC motor and Stepper motor to enhance the voltage level since output from microcontroller is 5v and motors require voltage of 12v. The initialization of all modules ensures that any dynamic changes in the environment do not affect the sensing.

Hardware Requirements:

*Microcontroller (AT89S52)

*IR sensors
*Moisture sensor
*Metal(Proximity) sensor
*DC motor
*Stepper motor
*DC Motor driver
*Stepper motor driver
*Conveyor belt
*LCD
*Buzzer
Software Requirements
*Keil-micro Vision3
*TopWin6

APPLICATIONS, ADVANTAGES AND DISADVANTAGES

Applications :

The following are the applications of smart dustbin at various places:
*Shopping malls
*Public places
*In and around schools
*Offices
*Household purpose

Advantages:

Agriculture : The wet waste is used for agriculture purpose as fertilizers. Most people are familiar with making compost from food wastes that can be done at the backyard. Rotten vegetables, fruits, grass and leaves are common ingredients of compost which is then used for home-gardening purpose. They are mixed together with certain moisture level and turned regularly for air flow to the heap.

It can take several weeks or even months before they are considered suitable to used as fertilizer or soil amendments. This is the kind of method we know that has long been practiced since centuries ago.

Biomax Technology from Singapore uses a similar concept but its patented technology converts organic wastes into organic fertilizer in just one day.

Power generation using plastics : The waste containing plastic are further used in generation of power. The plastic recycling is limited by the fact that different types of plastic cannot be mixed. The quality of the resulting recycled plastic may be also poor. "That's why recycling is not very successful".

Though recycling of plastic is not completely successful, we can use plastic for generating power. In a process that is as simple as throwing bits of a plastic in chamber and heating it up, Pol can turn the plastic into tiny spheres of pure carbon just a few microns across.

Bio gas generation : Biogas typically refers to a mixture of different gases produced by the breakdown of organic matter in the absence of oxygen. Biogas can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. It is a renewable energy source and in many cases exerts a very small carbon foot print.

Wet waste from dustbin can be directly use for this purpose.

Disadvantages

Mixed waste cannot be separated

Using smart dustbin mixed waste cannot be separated.

Cannot be used for large waste

Our smart dustbin cannot be used for large size waste. It is basically for separating waste at root source so, it is not designed for huge size waste.

CONCLUSION AND FUTRURE SCOPE : Waste Segregation using smart dustbin has been successfully implemented for the segregation of waste into metallic, wet and dry waste at root source. One of several environmental problem is bad waste management practices which can result land and air pollution and can cause respiratory problems and other adverse health affects as contaminants are absorbed from the lungs into other parts of the body. The method presented provides a fruitful way to come out of this problem by making entire system automated. The components used in smart dustbin are economic, environmental friendly and gives accurate results for separating three different types of wastes which are generally produced at places like shopping malls, offices, houses, schools/colleges etc.

Presently there is no device available for segregation of waste at root source other than manual separation probably the biggest advantage of smart dustbin is the safety it provides. This device carefully separates all three types of wastes and not only increase the economic value of waste but also gives a healthy and beautiful environment at lesser cost.

Segregating waste normally is not accurate and many of us don't like to do that. Due to open dumping of solid waste, it emits bad smell due to the presence of dead animal waste and biodegradable components. Rodents and dogs are feeding on such dumping place and they may bite people present in those areas. Such dumping sites are spoiling environment of

nearby villages surrounding the dumping site.

Smart dustbin can segregate only three types of wastes. In future improvements can be done to segregate more number of wastes like plastic, glass, toxic waste, separation of different metals. This can be improved to segregate mix waste dumped at a time using different high accurate sensors and other technologies and segregation of mix waste can also be achieved by using a servo motor to give jerks to conveyor belt so that mix waste gets separated. Size of smart dustbin can be made compact using different technologies and different methodologies. Some additional feature can be added like generating power or biogas generation at root source itself.

REFERENCE

1. Claudine Capel, "Waste sorting – a look at the separation and sorting techniques in today's European market", Waste management-world.

2.CludineCapel, Innovations in waste", Waste-management-world.

3.Shuchi Gupta, Krishna Mohan, Raj Kumar Prasad, Sujata Gupta, ArunKansal, "Solid Waste Management In India: Options and Opportunities in Resource, Conversation and Opputunities".

4. Sakai, S.E.Sawell, A.J.Chandler, "World Trends in Municipal Solid Waste Management", Environmental Preservation Center.

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THEME :-08

NAGARJUNEEYAM

Chemical, Biological & Materials Sciences

Sl No	Title of the Paper	Authors	Page No
1.	CORROSION STUDIES OF ELECTROLESS CHOMIUM BASED COATINGS	A.R. Shashikala Kusuma H.T & Meghana P B. S.Sridhar	161 - 164
2.	CHEMICAL CONVERSION COATINGS ON MAGNESIUM ALLOY	Mallika B.A, SriPriya Shashikala A.R	164 - 168
3.	FERRIC CHLORIDE CATALYZED ONE-POT SYNTHESIS OF NITRILES FROM ARALDEHYDES UNDER SOLVENT FREE CONDITION	Aisha Siddekha M. A. Pasha	168 - 171

ISSN 2250 - 3978 LILAVATI (PRINT)

CORROSION STUDIES OF ELECTROLESS CHOMIUM BASED COATINGS

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Chromium –Phosphorous and Nickel- Chromium –Phosphorous coatings were developed by electroless process, using different complexing agents. The action of these complexing agents was synergistic in nature, giving good quality coating. The corrosion resistance of the coatings was evaluated by galvanostatic polarization and salt spray tests. The coatings offered good corrosion resistance in acidic medium. Microhardness of the Chromium –Phosphorous and Nickel- Chromium –Phosphorous coatings was measured and it is found that,incorporation of nickel improved hardness as well as corrosion resistance.

Key Words: Electroless, corrosion, complexing agents, polarization, Impedance

Chromium finds extensive applications in automobile industries due to its excellent tarnish, corrosion, wear and scratch resistance [1,2]. In recent years chromium coatings is being used on light weight components for better fuel efficiency. Electroplating of chromium has many disadvantages– use of toxic hexavalent chromium,low cathodic current efficiency and porous nature of the coating due to simultaneous liberation of H_2 gas [3].

Despite of extensive literature on the topic, still there is no comprehensive approach to the problem. In this direction electroless plating is an appropriate method over electroplating in producing chromium coating. Complexing agent in the plating bath solution plays significant role in producing good quality coating [4]. Phosphorous being a metalloid, addition of which to chromium may impart better corrosion resistance [5].KSCN acts as complexing agent for Cr^{3+} ions in electroless plating bath solution [6]. It is known that more than one complexing agent in the bath solution enhances the deposition rate [7]. In the present study we have made an attempt to use KSCN and glycine individually and in combination as complexing agents in the plating bath solution during electrolessplating of Cr-P alloy.In recent years the development of electroless Ni–P, Fe–P, Fe–P–Mo, Fe–P–W coatings has gained importance [8–10]. Electroless Ni–P coatings possess superior uniformity, hardness and corrosion resistance than those obtained by electroplating [11]. Ni–P and Ni–P–Cr alloy coatings have been deposited on to silicon substrates by a sputtering technique.The addition of Cr atoms into Ni–P based coating not onlysuppresses the formation of Ni3P but also reduces the grain size of the coating. It is also reported that addition of the third component enhances the mechanical strength at elevated temperatures [12]. Ternary Ni-Cr-P coatings were found to provide improved corrosion resistance, thermal stability and hardness compared to Ni-P coatings [12]. However, the use of high current densities makeselectrodeposition of chromium economically non-viable.

In the present study, electroless Cr-P and Ni-Cr-P coatings were developed by using different complexing agents and corrosion resistance of the coatings was compared.

Experimental procedure: Plating solutions were prepared by using analytical reagent grade chemicals and double distilled water. Cr-P and Ni-Cr-P alloy coating was deposited on 99.9% purity copper foils (100x100x0.25mm), using the following sequence of operations. Steps 1-3 were followed as per publication [13].

1. De-greasing: The substrate surface was degreased with acetone.

2. Mechanical polishing: Degreased coupons were mechanically polished with emery paper (6/0) using ethanol and distilled water. Water rinse.

3. Chemical polishing in two steps (i) Immersion in a solution containing by volume 16% HNO_3 (69 v %), 59% H_3PO_4 (85 wt %), 25% CH_3COOH (98 wt %) for 15-20 seconds, water rinse. (ii) Dipped in a solution containing 80 mL H_2SO_4 (98 wt %), 20mL HNO_3 (69 v%), 1mL HCl (38 v%), and 60g CrO_3. Water rinse

4. Surface activation was carried out by dipping the substrates in $SnCl_2$ solution (2g $SnCl_2$ in 10ml HCl diluted to 1000 ml in water) for 10-15 seconds. This is followed by immersion in $PdCl_2$ solution [14](1g $PdCl_2$ in 10ml HCl diluted to 1000 ml in water).

5. Electroless Cr-P alloy plating was carried out in a bath solution containing $Cr_2(SO_4)_3.6H_2O$ (0.1M), NaH_2PO_2 H_2O (0.1M), KSCN /glycine (0.1M), NaCl (10 g/L), H_3BO_3 (10g/L), $NaNO_2$ (0.005M), at pH 3.0, temperature 323K, substrate Cu foil, time 60 min., unstirred condition. The deposition was carried out from 30 minutes to 4 hours.

Electroless Ni-Cr-P alloy plating was carried out in an electrolyte system containing 0.2M $NiCl_2.6H_2O$, 0.4M

$CrCl_3$, 0.3M $Na_3C6H_5O_7.2H_2O$, 0.2M CH_3COONH_2, 0.3M $NaH_2PO_2.H_2O$, 30g/L NH_4Cl, 25g/L H_3BO_3, and 0.05g/L $NaNO_2$ at pH 3.0, temperature 60-70°C for 60 minutes. The deposition was carried out from 30 minutes to 4 hours.

Measurement and evaluation techniques:

a. Corrosion resistance of all the coatings was evaluated by galvanostatic polarization experiments using potentiostat/ galvanostat (362 A, PG and PAR, USA) in a three compartment cell containing corrosive medium with platinum foil and a saturated calomel electrode as counter and reference electrode, respectively. The potential of working electrode is measured against the saturated calomel electrode, at different current densities. Logarithm of current density was plotted against electrode potentials, from which Tafel slopes for cathodic and anodic processes were calculated.

The corrosion current (i_{corr}, $\mu A/cm^2$) for the coating was calculated using the following equation, $i_{corr} = b_a b_c / 2.303\, R_p\, (b_a + b_c)$

where, b_a and b_c are anodic and cathodicTafel slopes, $R_p$is polarization resistance

b. Salt Spray test was conducted for conversion coatings in a salt spray chamber, CMI equipments Private Limited, Bangalore as per ASTM B117 standard using 5% NaCl solution as corrosive medium for 96 hours.

c. Visual inspection of all the coatings was carried out under 4X magnification. The coating should be continuous, adherent and uniform in appearance. It should be free from powder, pits, discontinuities such as breakups, voids, pin holes and scratches.

d. Adhesion of Cr-P coating was evaluated by Scotch tape peel-off test. Pressure sensitive tape of 1 inch width, type 3M-500 (pressure 500 g/in. width) was applied over the coating using a 2 kg rubber covered roller. The tape was then removed quickly at a right angle to the surface and the test specimens were examined visually for any coating removal.

e. Microhardness of the deposited Cr-P alloy before and after heat treatment was measured using a conventional microhardness tester with 5 g load.

Results and discussion:

a. Polarisation studies: The structural variation in the coating is usually related to its chemical resistivity, which can be studied by the corrosion characteristics. In order to understand the corrosion behaviour of these coatings, galvanostaticpolarisation studies were made in 1N H_2SO_4, 1N HCl and slightly acidic (pH 5.0) 5% NaCl at 303K. Linear polarisation experiments were conducted by varying the potential ± 20 mV about an open circuit potential. The polarisation diagrams obtained are presented in Fig.1and 2.

The values of anodic (b_a) and cathodic (b_c) Tafel slopes were evaluated. The polarisation values, R_p (E/I) were obtained from the plots. The corrosion current density ($i_{corr}\mu A/cm^2$) was calculated for each coating.

The corrosion data of Cr-P and Ni-Cr-P coatings in different corrosive media are given in Table 1. It is observed from the table that the corrosion resistance of the Ni-Cr-P coatings is slightly more than of Cr-P coatings. The corrosion resistance of the coatings obtained with different complexing agents in the present studies are much better than the values obtained for Ni-P alloys15.

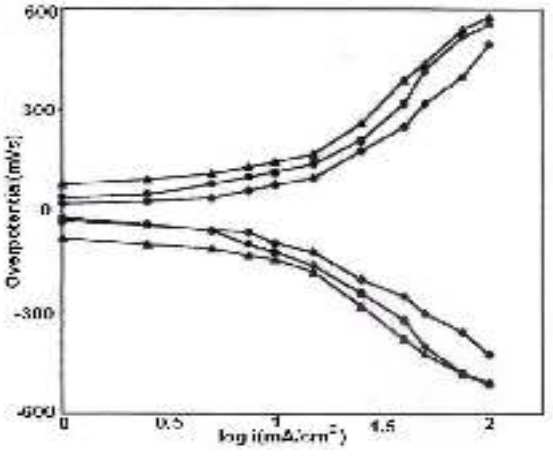

Fig.1: Polarization diagrams of the

Cr-P alloys in◆5% NaCl●HCl ▲ H_2SO_4

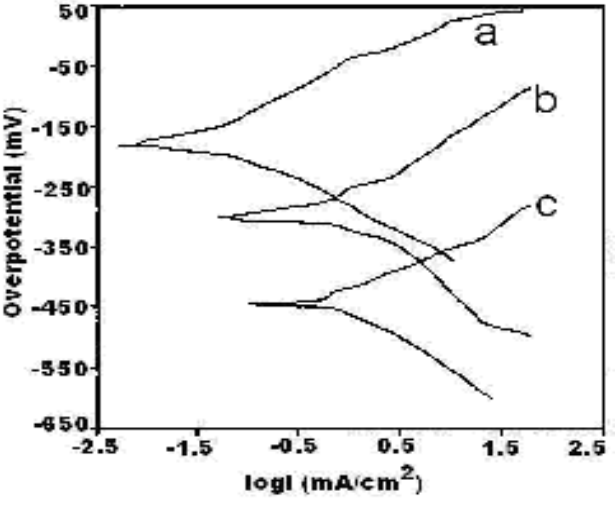

Fig. 2: Polarization diagram of Ni-Cr alloy a) 5% NaCl b) 1M HCl c) 0.5M H_2SO_4

Table 1. Corrosion data of the Cr-P and Ni-Cr-P alloy coatings in different media at 303K

Corrosion Medium	Cr-P coatings			Ni-Cr-P coatings		
	b_a (mV/dec)	b_c (mV/dec)	i_{corr} µA/cm^2)	b_a (mV/dec)	b_c (mV/dec)	i_{corr} µA/cm$_2$
5% NaCl	175	196	6.8	82.4	88.8	5.6
1N HCl	215	298	8.5	89.9	102.0	6.5
1N H_2SO_4	194	216	11.9	65.0	120.9	9.1

b. Salt spray test: Neutral salt spray test was conducted to study the stability of samples in 5% NaCl solution as per ASTM B117 standard using salt spray chamber. The test was conducted for 96 hours by spraying 5% NaCl solution at pH 6.5. After 96 hours, all the samples were removed from the chamber and washed thoroughly to remove the adherent salt and are air-dried. The coating was carefully examined for any discoloration and formation of corrosion spots on the surface by 4X magnification lens.

Cr-P coating was stable up to 70 hours. Slow degradation with darkening of the coating observed after 70 hours and the corrosion rate was increased. However, Ni-Cr-P coating was found to be stable up to 92 hours. Some white patches were found after the salt spray test.

Testing and evaluation : To evaluate the performance of the coating in service conditions for functional applications the test coupons obtained at optimum conditions were subjected to the following tests.

a. Visual inspection : All the Cr-P plated specimens were examined visually with 4X magnification for any defect. Uniform plating without patches and discoloration obtained.

b. Adhesion test : Adhesion of Cr-P coating was evaluated by Scotch tape peel-off test. Pressure sensitive tape of 1 inch width, type 3M-500 (pressure 500 g/in. width) was applied over the coating using a 2 kg rubber covered roller. The tape was then removed quickly at a right angle to the surface and the test specimens were examined visually for any coating removal. No detachment of the coating from substrate was observed indicating the excellent adhesion of the coating.

c. Microhardness test : Microhardness of the deposited Cr-P and Ni-Cr-P coatings before and after heat treatment was measured using a conventional microhardness tester with 5 g load. The microhardness of the as deposited Cr-P alloy was found to be 707 VHN and after heat treatment it was improved to 745 VHN. The microhardness of the as deposited Ni-Cr-P alloy was found to be 757 VHN and after heat treatment it was improved to 850 VHN.

Conclusions:

- Suitable electrolytic solutions and working conditions were optimized to obtain electroless Cr-P and Ni-Cr-P coatings.
- The coatings are partially crystalline in nature.
- The coatings offered good corrosion resistance towards corrosive media.
- Addition of third element Nickel in Cr-P coatings has improved corrosion resistance and hardness.
- The developed procedure is simple and ecofriendly.

References:

1. D. L. Synder; "Metal Finishing 72th Guide Book and Directory Issue", Elsevier Science Inc., New York, (2004) p 179

2. J. K. Dennis and T. E. Such, "Nickel and Chromium plating", 3rdedn, Woodhead, London, (1993) p 207,

3. D. Smart, T.E. Such and S.J. Wake,Trans Inst. Metal Finishing, 1983, 61, 105

4. D. J. Levy: AES Tech. Proceedings, 1963, 29

5. T. Watanabe, Y. Sakurai, Y. Hamakaw, T. Masumoto, K. Shirae and K. Suzuki (ed.); "Current topics in amorphous materials-physics and Technology", Elsevier. New York, (1993) p 137

6. C. N. Taramani, N. S. Begum and S. M. Mayanna: Mater. Chem. Phys., 2004, 83, 278

7. T. Mimani and S.M. Mayanna: Journal of Applied Electrochemistry, 1984, 23, (4), 339

8. F. ShafiaHoor, C. L. Aravind, M. F. Ahmed and S. M. Mayanna: Journal of material Sci., 2000, 19, 1067.

9. T. Mimani and S.M. Mayanna, Surface coatings Technology, 1996,79,246.

10. L. Ramesh, B. S. Sheshadri and S. M. Mayanna: Proc. European Workshop on 'Chemistry, energy and environment', (eds. C. A. C. Sequearia and J. B. Moffat), 505; 1997, Lisbon, Royal Society Special

Publication.

11. J. Gruberger, K.-M. Yen and R. E. White,Surf. Coat. Technol., 1992, 53, 203

12. W.-Y. Chen, S.-K. Tien and J.-G. Duh,Surf. Coat. Technol., 2004, 188–189, 489.

13. S. K. Sharma and N. C. Mehra, J. Mater. Sci. Lett., 8 (1989) 352

14. T. Mimani and S. M. Mayanna, Plating and Surface Finish, 80 (2) (1993) 66.

15. J. Bassett, R.C. Denney, G.H. Jeffery, J. Medham (eds.), Vogel's 'Text book of Quantitative Inorganic Analysis', 4thedn., London, ELBS & Longman group Ltd, (1978) p 738.

CHEMICAL CONVERSION COATINGS ON MAGNESIUM ALLOY

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Comparative studies on some of the important chemical conversion coatings viz,stannate, cerium oxide, chromate and galvanic black anodizing on magnesium alloy AZ31B have been conducted. The surface morphology and composition of the coatings were examined by SEM and EDX techniques. Corrosion resistance of these coatings was compared by polarization studies and salt spray tests. The space worthiness of the coatings was evaluated by environmental tests viz., humidity and thermal cycling tests. The optical properties (solar absorptance and infrared emittance) of the coatings were measured before and after environmental tests. The corrosion resistance investigated was found in the following order,

Galvanic black anodizing > Chromate conversion coating > Cerium Oxide coating >Stannate coating.

Among the four conversion coatings galvanic black anodized coating showed better corrosion resistance.

Keywords: Magnesium Alloys; Polarization;Thermal Cycling; Humidity Test; Optical properties

Magnesium and its alloys are increasingly used in aerospace and automotive applicationsbecause of their ultra lightness and high strength to weight ratio with a density that is two thirds of aluminum and one fourth of iron [1]. Unfortunately, magnesium has high chemical affinity and reacts with atmospheric oxygen and water resulting in the formation of porous oxide carbonate film on the surface [2, 3] which does not offer protection. The metal corrodes even in moist air and in distilled water. The situation is even more complex for magnesium alloys.

In earlier days, hexavalent chromium compounds were widely used for producing conversion coatings [3, 4] to protect magnesium alloy. However, the use of Cr6+ is reduced in recent years as it is found to be carcinogenic [5]. Other alternative such as stannating [6] and salts of lanthanide elements have been used in producing eco friendly corrosion protection coatings on aluminum and magnesium alloys [7-12]. Cerium oxide conversion coatings were developed by various authors [13, 14]. Photo electrochemical investigation for nucleation and growth process [15] of stannate conversion coatings has been studied. Galvanic black anodizing on magnesium lithium alloys for thermal control applications has been studied [16-18]. These chemical conversion coatings provide better corrosion resistance and acts as an excellent base for paints and adhesives.

In the present work comparative studies have been carried out on stannate, cerium oxide,chromate and galvanic black anodizing coatings on magnesium alloy AZ31B. The corrosion resistance of the coatings was compared using polarization and neutral salt spray tests. The environmental stability of the coatings was compared using humidity, thermal cycling and thermo vacuum performance tests.

2. EXPERIMENTAL PART : Chemical conversion coatings were obtained on magnesium alloy AZ31B (with chemical composition 3% Al, 1% Zn and balance Mg) test samples of dimension 5 x 5 x 0.2 cm as per the following sequence of operations.

1. Solvent degreasing in isopropyl alcohol using an ultrasonic bath for 10 min. at roomtemperature.

2. Alkaline cleaning in a solution containing 50 g/L Sodium hydroxide and 10 g/l Tri sodium orthophosphate for 10 min. at 55 ± 5 ^{o}C followed by water rinsing.

3. Acid cleaning in a solution containing Chromic acid 180 g/L, Ferric nitrate 40 g/L , Potassium fluoride 4.5 g/L for 2-3 min. at room temperature followed by water rinsing.

In addition to above, acid pickling was carried out only for stannate coating. Acid pickling was performed in a solution containing 280 ml/L 40% Hydrofluoric acid (%V/V) for 10 min. at room temperature followed by water rinsing.

4. Different chemical conversion coatings were then obtained by using the following bath formulations and operating conditions.

a) Stannate conversion coatings were produced by immersing the substrate in a solution containing 10-12 g/L Sodium hydroxide, 40-50 g/L Potassium stannate, 10–25 g/L Sodium acetate and 40–50 g/L Tetra sodium pyrophosphate at 82 ^{o}C, pH 11.6, for 20 min with continuous agitation [19]

b) Cerium oxide coatings were obtained by dipping the pretreated samples in a solution containing 5 g/L Cerium sulphate and 40 ml/L Hydrogen peroxide at room temperature, pH 2.0 for 3-4 min.

c) Chromate conversion coating process was performed by dipping the samples in a solution containing 10 g/L Chromic acid and 7.5 g/L Calcium sulphate at room temperature, pH 1.2 for 30-60 sec. [3].

d) Galvanic black anodizing was carried out in a solution composed and operated as follows: 25 g/L Potassium dichromate; 25 g/L Ammonium sulphate; pH 5.8; temperature 28 ±1°C; anode to cathode ratio 1:10; for 15 minutes, galvanic current 0.8-2.4 mA/cm2 with agitation in an anodizing (stainless steel) tank [17].

6. Water rinse and air drying at room temperature for 5-6 hours.

All the chemicals used were of LR grade and the solutions were prepared by using de-ionizedwater. The pH of the solution was adjusted upwards with dilute ammonium hydroxide and downwardwith dilute sulphuric acid solutions.

3. MEASUREMENT TECHNIQUES : The coatings were examined visually under 4X magnification for any degradation in physical appearance before and after corrosion and environmental stability tests.

Surface morphological studies were carried out with scanning electron microscope JEOL, JSM , 840 which is equipped with an energy dispersive X- Ray spectroscopic micro analyzer, Oxford Instruments Analytical, UK, for elemental analysis of the coatings.

Corrosion resistance of the coatings was evaluated by

a) Galvanostatic polarization experiments using potentiostat/ galvanostat (362 A, PG and PAR, USA) in a three compartment cell containing corrosive medium (5% NaCl) at pH 5.0 with platinum foil and a saturated calomel electrode as counter and reference electrode, respectively.

b) Salt Spray test was conducted in a salt spray chamber, CMI equipments Private Limited, Bangalore as per ASTM B117 standard using 5% NaCl solution as corrosive medium for 96 hours. Salt solution was prepared by dissolving 5% Sodium Chloride in distilled water and filtered before use. The test specimens were cleaned by dipping in isopropyl alcohol and dried.

The test specimens were placed in salt spray chamber so that all the specimens are exposed to free setting of fog. The test chamber was closed, chamber temperature was set to 38°C and fog was turned on. The test samples were visually examined after every two hours for any degradation of the coating.

Humidity tests were carried out in a thermostatically controlled humidity chamber (HeraeusVotsch type 08, 500, Germany). The relative humidity in the chamber was maintained at 95±0.5% at50°C.

Thermal cycling test was carried out in a thermostatically controlled hot and cold chamber Brabender Real Test Umweltsimulatoren, (Germany).

Optical properties of the coatings viz, solar absorptance and infrared emitance were measured by using a solar reflectometer version 50, Model SSR – ER and emissometer model RD1, respectively,from Devices and Services Co (USA). Both these instruments provide an average value of solarabsorptance and infrared emittance digitally over the entire solar (200-2500nm) or infrared (2.5µm-25µm) region.

4. RESULTS AND DISCUSSION

4.1. Surface morphology and EDX studies

The scanning electron micrograph of stannate, cerium oxide, chromate and galvanic black anodizing coatings on magnesium alloy AZ31B are shown in Figure 1. Stannate coating consists ofuniform spherical and cubic grains. Cerium conversion coating consists of a thin fine cracked surfacewith 'dry mud' morphology. Chromate coatings and galvanic black anodizing was having a gel likestructure which after drying, harden to give a microcracked pattern.

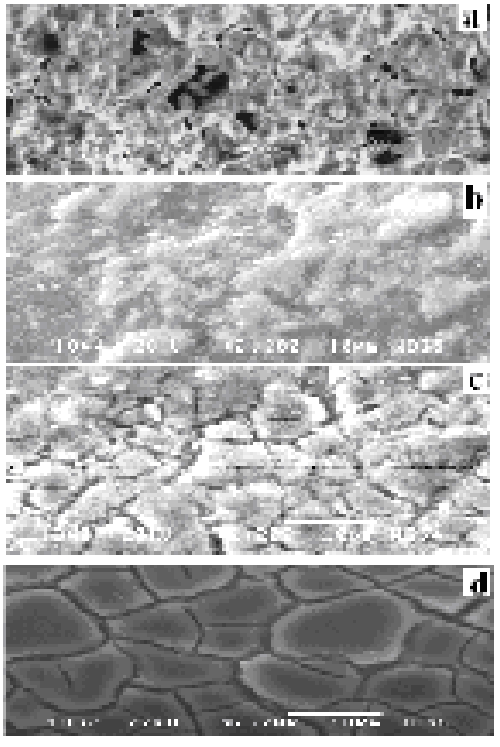

Figure1.Scanning electron micrograph of (a) Stannate (b) Cerium (c) Chromate and (d) Galvanic-black anodizing on magnesium alloy AZ31B

Elemental composition of the conversion coatings were obtained from EDX. The composition (weight %) of different metals in the various conversion coatings is tabulated in Table1.

Table 1.Elemental composition (weight %) of various chemical conversion coatings

Type of conversion coating	Mg	Cr	Ce	Sn	O	Al	Zn
Stannate	56.82			8.31	32.70	1.17	1.00
Cerium oxide	56.42		4.52		33.06	4.51	1.49
Chromate	57.07	9.46			30.36	2.49	0.62
Galvanic black anodizing	48.66	12.16			34.54	3.52	1.12

4.2. Testing and evaluation

4.2.1. Polarization Studies : Galvanostatic polarization experiments were carried out in a three compartment cell containing 5% NaCl solution at pH 5.0 using potentiostat / galvanostat to study the corrosion resistance of thecoatings. Platinum foil and saturated calomel electrodes were used as counter and reference electrodes,respectively. The polarization diagrams for different conversion coatings are given in Figure 2. Thecorrosion resistance of the different coatings was calculated using the following equation

$I_{corr} = b_a b_c / (b_a + b_c) 2.303 R_p$

I_{corr} corrosion current in $\mu A / cm^2$

b_a, b_c are anodic and cathodicTafel slopes

R_p polarization resistance

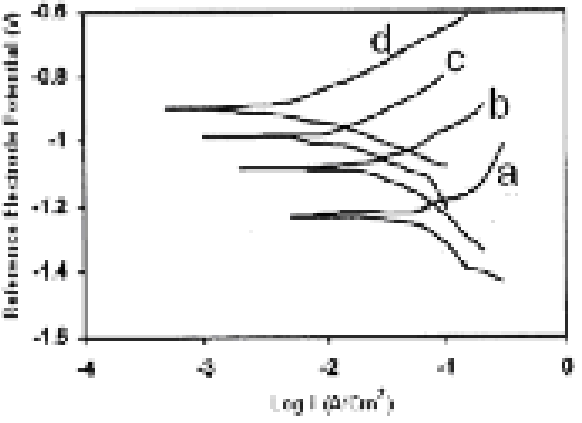

Figure 2.Polarization diagram of conversion coatings on Mg-AZ31B in 5% NaCl solution, a) Stannate b) Cerium c) Chromate d) Galvanic black anodizing

The polarization data of the conversion coatings is tabulated in Table 2. From the Figure and Table it is clear that the corrosion current for different conversion coatings are in the following sequence (I_{corr}) Black anodizing < (I_{corr}) chromate< (I_{corr}) ceriumoxide< (I_{corr}) stannate

Table 2.Polarization data of different conversion coatings on Mg-AZ31B in 5% NaCl solution.

Type of conversion coating	b_a (mV/dec)	b_c (mV/dec)	Rp (Ohm)	I_{corr} $\mu A/cm^2$
Stannate	201.6	271.09	4.4	11.4
Cerium oxide	87.05	228.7	3.4	8.05
Chromate	103.3	106.67	4.5	5.06
Galvanic black anodizing	172.9	86.12	5.2	4.8

4.2.2. Salt spray test : After neutral salt spray test the coating was carefully examined for any discoloration andformation of corrosion spots on the surface by 4X magnification lens. Stannate coating was stable upto 18 hours and slow degradation started from 18-20 hours. After 20 hours the corrosion rate wasincreased, a significant increase in the values of as and eIR was observed after salt spray test. Ceriumoxide coating was found to be stable up to 28 hours. After 28 hours, degradation and darkening of thecoating is observed. An increase in as and eIR value by 0.075 and 0.10 respectively was observed. Onthe other hand chromate is found to be stable up to 68 hours. After 70 hours degradation in terms ofwhite patch-

es were observed. The measured as and eIR values increased by 0.008 and 0.01,respectively. However, the galvanic black anodizing was found to be stable up to 90 hours. Anegligible change (decrease) in solar absorptance and infrared emittance was noticed. This decrease inthe optical properties may be due to the white patches found after the salt spray test.Stannate coating is found to be corroded extensively, followed by cerium oxide conversioncoating. However, the extent of corrosion in case of chromate and galvanic black anodizing coatingwere found to be less. And only a negligible degradation was observed in galvanic black anodizing.The solar absorptance (as) and emittance (eIR) of the samples before and after the test wasrecorded and is tabulated in Table 3.

Table 3.Variation in optical properties of different conversion coatings before and after salt spray test

Type of conversion coating	α_s		ε_{IR}	
	Before Test	After Test	Before Test	After Test
Stannate	0.391	0.486	0.31	0.52
Cerium oxide	0.457	0.559	0.26	0.36
Chromate	0.796	0.804	0.27	0.28
Galvanic black anodizing	0.942	0.938	0.92	0.85

4.2.3. Humidity test : The humidity test was carried out to examine the resistance of the coating to the corrosive pre launch atmosphere. The test was conducted in a thermostatically controlled humidity chamber for 48hrs. A relative humidity of 95 ± 0.5% was maintained in the chamber at 50 ± 1°C. The test specimenswere then examined visually, and their optical properties were measured. The as and eIR for differentsamples before and after humidity test is tabulated in Table 4. No change in color and degradation ofthe coating was observed in case of chromate and galvanic black anodizing. However, in case ofstannate darkening of the coating and also some black degradation spots were observed. The increasein the as and eIR is ~ 0.092 and 0.10, respectively. In case of cerium oxide darkening of the coating is observed without any degradation or black dots. However, the increase in the as and eIR is as high as0.125 and 0.10, respectively.

Table 4.Variation in optical properties of different conversion coatings before and after humidity test

Type of conversion coating	α_s		ε_{IR}	
	Before test	After test	Before test	After test
Stannate	0.391	0.483	0.30	0.40
Cerium oxide	0.457	0.582	0.25	0.35
Chromate	0.796	0.796	0.29	0.31
Galvanic black anodizing	0.942	0.943	0.94	0.94

4.2.4. Thermal Cycling test : A satellite in orbit becomes too hot when exposed to direct sun light and experiences lowtemperature when it dives in to earth shadow. The thermal cycling test is designed to evaluate the effect of cycling temperature on the deposit that is likely to be encountered throughout the life span ofa spacecraft. The test was conducted in thermo statistically controlled hot and cold chambers. A totalof 100 cycles were applied. A cycle consists of placing the samples in to a chamber operating at -45° Cfor 5 minutes, bringing them to an ambient temperature with a dwell of 15 minutes then shifting themto a hot chamber at 85° C for another 5 minutes. After thermal cycling test, specimens were inspectedvisually and their optical properties were measured. The as and eIR for different samples before andafter thermal cycling test is tabulated in Table 5. No change in color and degradation of the coatingwas observed in case of chromate and galvanic black anodizing. Further no change in opticalproperties was observed. In case of cerium conversion coating visually no degradation was noticed but a slight increase in as and eIR value ~0.003 and 0.02 was observed. However, in case of stannate coating darkening and black spots were observed with increase in as and eIR value by ~ 0.042 and 0.11,respectively.

Table 5.Variation in optical properties of different conversion coatings before and after thermal cycling test

Type of conversion coating	α_s		ε_{IR}	
	Before test	After test	Before test	After test
Stannate	0.391	0.433	0.30	0.41
Cerium oxide	0.457	0.460	0.25	0.27
Chromate	0.796	0.796	0.29	0.29
Galvanic black anodizing	0.942	0.942	0.94	0.94

5. CONCLUSIONS : 1. Different chemical conversion coatings such as cerium oxide, stannate, chromate and galvanic black anodizing coating were carried out on precleaned Magnesium alloy AZ31B. The corrosion resistance and thermal stability of the different coating was compared.

2. Scanning electron micrographs showed that the stannate coating has uniform spherical andcubic grains. Cerium coating consists of a thin and cracked coating with 'dry mud' morphology. A gel like structure with 'mud crack' pattern was observed in case ofchromate and black galvanic coating.

3. The corrosion resistance of the coatings was investigated by the polarizationand salt spray techniques. From polarization studies the corrosion resistance of the coatings was found in the following order: galvanic black anodizing >chromating> cerium oxide

>stannate coating. It is in good agreementwith salt spray studies.

4. The space worthiness of the coatings was examined by the humidity and thermal cycling tests and evaluation of their optical properties. No degradation was noticed in case of galvanic black anodizing and chromate conversion coatings. A small change in optical properties was observed in case of cerium oxide coating while large scale degradation was observed with stannate coatings.

References

1. J. K. Gray, B. Luan, J. Alloys Compounds, 336 (2002) 88.

2. G. T. Parthiban, S. Muralidharan, N. Palaniswamy, K. Chittukala, D. Chanthraleka and A. Shamitha Begum, J. Electrochem. Soc. India, 54 (4) (2005) 129.

3. A. K. Sharma, Metal Finishing, 87 (2) (1989) 73.

4. A. K. Sharma, R. Umarani, S.M. Mayanna, ThermochimicaActa, 376 (2001) 67.

5. J. K. Dennis and T. E. Such, 'Nickel and Chromium plating', 3rd Edition, Woodhead PublishingLtd, Cambridge, England, (2003) p240.

6. HongweiHuo, Ying Li, Fuhui Wang, Corr. Sci., 46 (2004) 1967.

7. Amy L. Rudd, Carmel B. Breslin, Florian Mansfeld, Corr. Sci., 42 (2000) 275.

8. Luis Enrique M. Palomino, Joao Fabio W. de Castro, Idalina V. Aoki and Hercilio G. de Melo, J.Braz. Chem.Soc., 14 (4) (2003) 651.

9. Yu Xingwen, Cao Chunan, Yao Zhiming, Zhou Dermi, Yin Zhongda, Corr. Sci., 43 (2001) 1283.

10. William G. Fahrenholtz, Mathew J. O'Keefe, Haifeng Zhou, J. T. Grant, Surf. Coat. Technol., 155(2002) 208.

11. M. Bethen Court, F. J. Botana, M. J. Cano M. Marcos, Appl. Surf.Sci., 189 (2002) 162.

12. T. Schram, G. Goeminne, H. Terryn, W.Vanhoolst, Trans. IMF, 73 (3) (1995) 91.

13. ManueleDabala, Katya brunelli, EnricaNapolitani, MaurigioMagrine, Surf.Coat.Technol., 172(2003) 227.

14. LiqunBai, Di Li, Min Guo, Jing Xin, Material Sci. Forum, 546-549 (2007) 555.

15. L. Anicai, R. Masi, M. Santamaria, F. D. Quarto, Corr. Sci., 47 (2005) 2883.

16. A. K. Sharma, R. Umarani, H. Bhojaraj, H. Narayanamurthy, J. Appl. Electrochem., 23 (1993) 500.

17. A. K. Sharma, R. Umarani, AfzarMalek, K. S. N. Acharya, M. Muddu and Sumeet Kumar, MetalFinishing, 94 (4) (1996) 16.

18. A. K. Sharma, J. Spacecraft Technol., 7 (1) (1997) 49.

19. L. J. Durney (Editor), Electroplating Engineering Hand book', Van Nostrand Reinhold Co., (1984)p 419.

FERRIC CHLORIDE CATALYZED ONE-POT SYNTHESIS OF NITRILES FROM ARALDEHYDES UNDER SOLVENT FREE CONDITION

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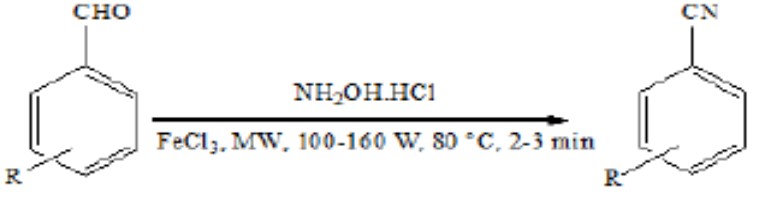
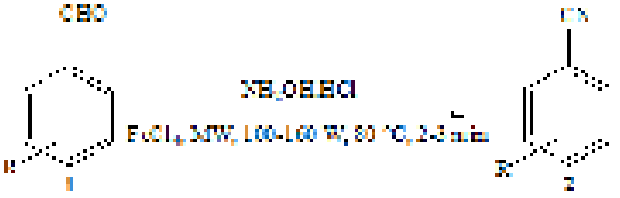
Nitriles have remarkable synthetic properties in organic synthesis. They are useful starting materials for the synthesis of various biologically active molecules such as 2-oxazolines, tetrazoles, imidazoles, triazoles, benzamidines. The conversion of aldehydes to corresponding nitriles is an important functional group transformation and it has received attention from the chemists for newer methods. We wish to report, a one-pot conversion of aldehydes to nitriles under solvent-free condition using ferric chloride as a catalyst under microwave irradiation. This method has many advantages such as using mild reaction conditions, use of readily available, inexpensive catalyst, and gives products in good yields within 2-3 mins.



Key words: Aldehydes, hydroxyl ammonium hydrochloride, ferric chloride, microwave irradiation

Nitriles are useful starting materials for the synthesis of various bioactive molecules,[1] and are used in the preparation of thiazoles, [2]-oxazolines, tetrazoles, imidazoles, triazoles, benzamidines possessing a broad spectrum of biological activities,[2] and in the manufacture of perfumery chemicals.[3] Nitriles are also of interest due to their synthetic value as precursors to other functionalities such as carboxylic acids, esters, amides, ketones, and amines.[4]

A detailed literature survey reveals that, the most common methods for the conversion of aldehydes into nitriles being the dehydration of the aldoximes, formed in situ by condensation of aldehydes and hydroxylamine hydrochloride with catalysts like HY-Zeolite,[5] silica gel supported $NaHSO_4$,[6] $HCONH_2$,[7] Burgass reagent.[8] Some other reported methods for this conversion use reagents such as sodium azide, aluminium chloride,[9] triazidochlorosilane,[10] trimethylsilyl azide.[11] The same reaction can also be achieved using a combination of ammonia with other compounds, such as $NH_3/Pb(OAc)_4$ in dry benzene,[12] NH_3/I_2 in tetrahydrofuran (THF)–water,[13] NH_3/N-bromosuccinimide(NBS) in water,[14] NH_3/o-iodoxy benzoic acid (IBX) in acetonitrile,[15] [bis(trifluoroacetoxy)iodo]benzene,[16] $CuCl_2/Me_2CHOH/H_2O_2$,[17] $PhI(OAc)_2$ /THF/water,[18] KI/I_2–TBHP,[19] DMSO,[20] ICl_2,[21] and ceric ammonium nitrate.[22] Although most of these methods are satisfactory, there are disadvantages such as use of more complex,[16] hazardous reagents like $Pb(OAc)_4$,[12] azides,[9] use of explosive reagents like IBX, and solvent such as acetonitrile,[15] Low yields,[17] use of expensive reagents,[19] long reaction time,[20-21] and low temperature,[22] are some of the other limitations observed in these reported methods. Microwave-assisted organic reactions on the other hand, have emerged as an important tool in organic synthesis owing to their uniform heating effect.[23a] This technique has been utilized in various organic transformations.[23b] The main benefits of performing reactions under microwave irradiation are the reduced reaction time, good yields and solvent-free reactions can be effectively carried out under microwave condition. In continuation of our on-going research program on the exploration of new environment friendly approaches in microwave-assisted synthesis of nitriles, [24-26] we describe a simple, efficient and rapid method for the synthesis of nitriles from aldehydes and hydroxyl ammonium hydrochloride using ferric chloride as a catalyst. The methodology presented herein avoids the use of strong bases, hazardous solvents and requires only catalytic amount of Ferric chloride to promote the reaction (Scheme 1).



Scheme 1

2. Results and Discussion : To explore the possibility of the reaction, p-anisaldehyde (1 mmol) was treated with hydroxyl ammonium hydrochloride (1mmol) with 1mmol of reagents like KMnO4, Chloramine-T, Triplex, Titriplex, and ferric chloride under conditions such as solvent-free heating, ultrasonication, and microwave irradiation. The results of these reactions are summarized in Table 1. The screening of the catalysts showed that, ferric chloride gave the best yield under microwave irradiation. To establish the standard reaction conditions, the reaction was carried out in varying amounts of ferric chloride (1 mmol, 0.5 mmol, 0.2 mmol) at 160 W. The reaction was found to be slow in the presence 0.2 mmol of the catalyst. On increasing the amount of catalyst to 0.5 mmol, the reaction proceeds faster. Further increase in the amount of catalyst does not seem to alter the yield. The best results were obtained by treating the reaction mixture with 0.5 mmol of the catalyst at 160 W for 2 mins affording the corresponding product 2b in 82% yield. To explore the scope and generality of this procedure, a variety of other aromatic aldehydes containing electron withdrawing or donating group on the ring or heterocyclic aldehydes, were irradiated with hydroxyl ammonium hydrochloride for 2–3 mins to get moderate to good yields of the corresponding nitriles as summarized in Table 2. All the products were characterized by the comparison of their physical data with those of known samples and by IR spectral analysis.

Table 1. Screening of the catalyst at different reaction conditions

Entry	Catalyst (1 mmol)	Condition	Time (min)	Yield (%)
1	KMnO4	reflux	60	50
2	KMnO4	))))	30	25
3	KMnO4	microwave	10	45
4	Chloramine-T	))))	30	-
5	Chloramine-T	microwave	10	25
6	Triplex	))))	60	-

7	Triplex	micro-wave	10	-
8	Titriplex	))))	60	-
9	Titriplex	micro-wave	10	-
10	FeCl3	))))	60	-
11	FeCl3	micro-wave	2-3	93

Reaction conditions: p-anisaldehyde (1 m mol) and hydroxyl ammonium hydrochloride (1m mol) ,)))) ultrasound condition.

a Shimadzu FT-IR-8400s spectrophotometer.

4. General method for the preparation of nitriles : Aromatic aldehyde (1 m mol), hydroxyl ammonium chloride (1 mmol) and FeCl3 (0.5 mmol) were taken in a Pyrex tube mixed well and irradiated in a domestic microwave oven at 160 W for an appropriate time (Table 2). After completion of the reaction, the contents were cooled, extracted with ethyl acetate (2 × 10 mL); the extract was then washed with water (2 × 10 mL) to remove the catalyst, dried over anhydrous Na2SO4 and the solvent was removed under vacuum. The product was purified by column chromatography (silica gel; 2.5% EtOAc in light petroleum as eluent) to get the pure nitrile.

Table 2. Conversion of aromatic aldehydes to nitriles in the presence of catalytic ferric chloride

Entry	Aldehyde (1)	Product[a]	Time (sec)	Yield[b] (%)	MP/BP (°C)		IR cm^{-1}
					Exptl.	Reported	
1	C_6H_5CHO	2a	90	80	186	187	2197
2	4-$MeOC_6H_4CHO$	2b	120	82	58	57-59	2220
3	3-$MeOC_6H_4CHO$	2c	120	80	112	111-112	2231
4	4-HOC_6H_4CHO	2d	80	80	109	111-113	2230
5	2-HOC_6H_4CHO	2e	80	85	146	149	2225
6	4-$N(CH_3)_2C_6H_4CHO$	2f	90	85	75	75-77	2220
7	2-$NO_2C_6H_4CHO$	2g	120	75	105	107-110	2232
8	3-$NO_2C_6H_4CHO$	2h	120	75	144	145-147	2237
9	3-ClC_6H_4CHO	2i	90	80	95	95-96	2250
10	4-ClC_6H_4CHO	2j	90	80	91	91-93	2225
11	2-ClC_6H_4CHO	2k	90	82	42	43-46	2226
12	3, 4-$(CH_3O)_2C_6H_3CHO$	2l	180	80	61	63	2234
13	2, 4, 5-$(CH_3O)_3C_6H_2CHO$	2m	180	85	92	92-94	2223
14	3-CH_3O,4-HOC_6H_3CHO	2n	90	85	-	-	2225
15	3-Cl,4-$NO_2C_6H_3CHO$	2o	120	82	-	-	2233
16	Thiophene-2-aldehyde	2p	180	78	-	-	2223
17	Furfuraldehyde	2q	180	78	-	-	2221

aAll the products are known and were characterized by IR spectral analysis and comparison of their Melting points/Boiling points. b Isolated yield.

3. Experimental : All chemicals were commercial and used without further purification. Reactions were monitored on TLC by comparison with the authentic samples. Melting points were measured on a Raaga, Chennai, Indian make, melting point apparatus. The IR spectra of the products were recorded on

5. Conclusion : In conclusion, we have developed a new and effective method for the synthesis of nitriles under solvent-free microwave irradiation. The notable merits of the present method are the catalyst ferric chloride is readily available, inexpensive and safe reagent, short reaction times (2-3 mins), good yield

of products and simple work-up procedure. The present work is simple, economical, and efficient.

6. References

1. Medwid, J. B., Paul, R., Baker, J. S., Brockman, J. A., Du, M. T., Hallett, W. A., Hanifin, J. W., Hardy, R. A., Tarrant, M. E., Torley, I. W. and Wrenn, S. J. Med. Chem. 1990, 33, 1230; (b) Judkins, B. D., Allen, D. G., Cook, T. A., Evans, B. and Sardharwala, T. E. Syn. Commun. 1996, 26, 4351.

2. (a) Diana, G. D., Cutcliffe, D., Volkots, D. L., Mallamo, J. P., Bailey, T. R., Vescio, N., Oglesby, R. C., Nitz, T. J., Wetzel, J., Girandu, V., Pevear, D. C. And Dutko, F. J., J. Med. Chem. 1993, 36, 3240; (b) Fabiani, M. E. Drug. News. Perspect. 1999, 12, 207; (c) Chihiro, M., Nagamoto, H., Takemura, I., Kitano, K., Komatsu, H., Sekiguchi,K., Tabusa, F., Mori, T., Tominnaga, M. and Yabuuchi, Y. J. Med. Chem. 1995, 38, 353.

3. Kanetkar, V. R., Zope, D. D., and Subrahmanyam, Y. V. V. Ind. J. Chem. 2005, 44B, 1317.

4. (a) Mowry, D. T. Chem. Rev. 1948, 42, 189; (b) Friedrich, K. and Wallensfels, K. In the Chemistry of Cyano Group. Rappoport, Z., Ed.; Wiley-Interscience: New York, 1970; (c) North, M. Comprehensive Organic Functional Group Transformations. Katritzky, A. R. Meth-Conn, O. and Rees, C. W. Eds.; Pergamon: Oxford 1995, 617.

5. Srinivas, N.S., Reddy, E.B. and Das, B. Synlett 2002, 625.

6. Das, B., Madhusudhan, P. and Venkataiah, B. Synlett 1999, 1569.

7. Paraskar, A.S., Jagtap, H.S. and Sudalai, A. J. J. Chem. Res. 2000, 30.

8. Kaufman, D.H. and Miller, C.P. Synlett, 2000, 8, 1169.

9. Suzuki, H. and Nakaya, C. A. Synthesis, 1992, 641.

10. Elmorsy, S. S., El-Ahl, A. A. S., Soliman, H. and Amer, F. A. Tetrahedron Lett. 1995, 36, 2639.

11. Nishiyama, K., Oba, M. and Watanabe, A. Tetrahedron, 1987, 43, 693.

12. Parameswaram, K. N. and Friedman, O. M. Chem. Ind. 1965, 23, 988.

13. Talukdar, S., Hsu, J. L., Chou, T. C. and Fang, J. M. Tetrahedron Lett. 2001, 42, 1103.

14. Bandgar, B. P. and Makone, S. S. Synth. Commun. 2006, 36, 1347.

15. Arote, N. D., Bhalerao, D. S. and Akamanchi, K. G. Tetrahedron Lett. 2007, 48, 3651.

16. Telvekar, V N., Rane, R. A. and Namjoshi, T. V. Synth. Commun. 2010, 40, 494.

17. Erman, M. B., Snow, J. W. and Williams M. J. Tetrahedron Lett. 2000, 41, 6749.

18. Bag, S., Tawari, N. R. and Degani, M. S. ARKIVOC , 2009, 14, 118.

19. Reddy, K. R., Maheswaria, C.U., Venkateshwara, M., Prashanthia, S. and Kantama, M. L. Tetrahedron Lett. 2009, 50, 2050.

20. Chill, S. T. and Mebane, R. C. Synth. Commun. 2009, 39, 3601.

21. Kundaikar, H. S. and Chaudhari, H. K. Tetrahedron Lett. 2008, 49, 2213.

22. Bandgar, B.P. and Makone, S.S. Synlett, 2003, 2, 262.

23. (a) Caddick, S. and Fitzmaurice, R. Tetrahedron, 2009, 65, 3325. (b) Loupy, A., Microwaves in Organic Synthesis. Ed.; Wiley-VCH:Weinheim, 2002.

24. Reddy, M. B. M. and Pasha, M. A. Synth. Commun. 2010, 40, 3384.

25. Pasha, M. A. and Nizam, A. Ind. J. Chem., 2010, 49B, 1127.

26. Reddy, M. B. M. and Pasha, M. A. Chin. Chem. Lett., 2010, 21, 1025.

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THEME :-09

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Sl No	Title of the Paper	Authors	Page No
1.	APPLICATION OF GRAY CODES IN DIFFERENT FIELDS	Aruna.R Shashidhar Shekhar Neelannavar	174 - 178
2.	ANT COLONY OPTIMIZATION AND APPLICATIONS	Meenakshi H & Madhu N.R	178 - 181

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APPLICATION OF GRAY CODES IN DIFFERENT FIELDS

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The reflected binary code also known as Gray code, is a binary numerical system where two successive values differ in only one bit (binary digit).The reflected binary code was originally designed to prevent spurious output from electromechanical switches. Gray codes have found many applications in engineering and mathematics. They have found applications in such diverse areas as circuit testing, signal encoding, ordering of documents on shelves, data compression, statistics, graphics and image processing, processor allocation in the hypercube, hashing, computing the permanent information storage and retrieval and puzzles. This paper highlights the introduction and application of Gray codes in different fields.

Gray codes actually have a longer history, and the inquisitive reader may want to look up the August, 1972, issue of Scientific American, which contains two articles of interest: one on the origin of binary codes and another by Martin Gardner on some entertaining aspects of Gray codes . Other references containing descriptions of Gray codes and more modern, non-GA, applications include the second edition of Numerical Recipes.

Gray codes which was named by Frank Gray who patented the use of them in shaft encoders (Gray, 1953) due to its attribute of single distance only, which avoids ambiguous switching situations, is particularly used to handle safely and conveniently the control problems.

The Reflected Binary Code (RBC) which was an original name of Gray Code (GC) is derived from the stem of the fact that the second half of the values are equivalent to the first half in reverse order, except for the most significant bit, which is inverted i.e. 0 changes to 1. The gray code is a code with the property that there is only one bit- change between any 2 consecutive numbers.

This unique property allows gray codes to be used for linear and rotary shaft position encoding, labeling the axes of Karnaugh maps, solving puzzle problems such as Tower of Hanoi, processing of mutations of genetic algorithms efficiently, detecting and correcting errors in digital data transmission. Generating gray codes is a well-studied task and various solution approaches such as, recursive, straightforward, dynamic programming approaches are brought. In some works, a generalization of the gray code is also studied. The generalized gray code is known as n-gray code, in which numbers are represented in any base n.

2. Importance of Gray Code : The term Gray code is sometimes used to refer to any single-distance code, that is, one in which adjacent code words differ by 1 in one digit position only, This property can be seen in Table 1 which shows the Gray codes for size n = 1 to 4 bits.

Table1. Gray code patterns of size n = 1 to 4 bits

Base 10	Binary code	Gray code 4-bit	Gray code 3-bit	Gray code 2-bit	Gray code 1-bit
0	0000	0000	000	00	0
1	0001	0001	001	01	1
2	0010	0011	011	11	
3	0011	0010	010		
4	0100	0110	110		
5	0101	0111	111		
6	0110	0101	101		
7	0111	0100	100		
8	1000	1100			
9	1001	1101			
10	1010	1111			
11	1011	1110			
12	1100	1010			
13	1101	1011			
14	1110	1001			
15	1111	1000			

Gray codes were applied to mathematical puzzles before they became known to engineers. The Gray code arises naturally in many situations. Gray's interest in the code was related to what we would now call analog to digital conversion. Mechanical position sensors use Gray code to convert the angular position (angle-measuring devices) of a shaft to digital form. Gray codes were used in telegraphy.The Gray code also forms a Hamiltonian cycle on a hypercube, where each bit is seen as one dimension. In data transmission, Gray codes play an important role in error detection and correction. Solving puzzles such as the Tower of Hanoi and the Brain, the study of bell-ringing, analog-digital signal conversion, classifying of Venn diagrams, continuous space-filling curves, enhancing the resolution of spectrometer for a satellite application, labeling the axes of Karnaugh maps are the processes where Gray codes are

used due to its uniqueness. Gray codes are also beneficial in Genetic Algorithms due to its incremental change property. Using Gray codes for addressing the memory results in saving of the power. Also, Gray codes are extensively used by digital system designers for passing multi-bit count information between synchronous logic that operates at different clock frequencies. Furthermore, due to its attribute Gray code could be a good choice for the search of the optimal test-sequences in digital system testing. Hence it can be said that the Gray codes which were originally designed to prevent spurious output from electromechanical switches. Today they are widely used to facilitate error correction in digital communications such as digital terrestrial television and some cable TV systems (Afaq Ahmad and Mohammed M. Bait, 2009). Here we are discussing about some of the applications of gray codes.

3. Applications of Gray Codes

3.1 Tower of Hanoi : The Tower of Hanoi (also called the Tower of Brahma or Lucas' Tower, and sometimes pluralized) is a mathematical game or puzzle. It consists of three rods, and a number of disks of different sizes which can slide onto any rod. The puzzle starts with the disks in a neat stack in ascending order of size on one rod, the smallest at the top, thus making a conical shape.

The Tower of Hanoi is frequently used in psychological research on problem solving. There also exists a variant of this task called Tower of London for neuropsychological diagnosis and treatment of executive functions. The Tower of Hanoi is also used as a Backup rotation scheme when performing computer data Backups where multiple tapes/media are involved.

The Tower of Hanoi is also used as a test by neuropsychologists trying to evaluate frontal lobe deficits.

Gray code solution to Tower of Hanoi

The objective of the puzzle is to move the entire stack to another rod, obeying the following simple rules:

1. Only one disk can be moved at a time.

2. Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack i.e. a disk can only be moved if it is the uppermost disk on a stack.

3. No disk may be placed on top of a smaller disk.

With three disks, the puzzle can be solved in seven moves. The minimum number of moves required to solve a Tower of Hanoi puzzle is 2n - 1, where n is the number of disks.If one counts in Gray code of a bit size equal to the number of disks in a particular Tower of Hanoi, begins at zero, and counts up, then the bit changed each move corresponds to the disk to move, where the least-significant-bit is the smallest disk and the most-significant-bit is the largest. This technique identifies which disk to move, but not where to move it to. For the smallest disk there are always two possibilities. For the other disks there is always one possibility, except when all disks are on the same peg, but in that case either it is the smallest disk that must be moved or the objective has already been achieved. Luckily, there is a rule which does say where to move the smallest disk to. Let f be the starting peg, t the destination peg and r the remaining third peg. If the number of disks is odd, the smallest disk cycles along the pegs in the order f→t→r→f→t→r, etc. If the number of disks is even, this must be reversed: f→r→t→f→r→t etc. The position of the bit change in the Gray code solution gives the size of the disk moved at each step: 1, 2, 1, 3, 1, 2, 1, 4, 1, 2, 1, 3, 1, 2, 1, (sequence A001511 in theOEIS), a sequence also known as the ruler function, or one more than the power of 2 within the move number. In the Wolfram Language, Integer Exponent [Range [2^8-1],2]+1 gives moves for the 8 disk puzzle.

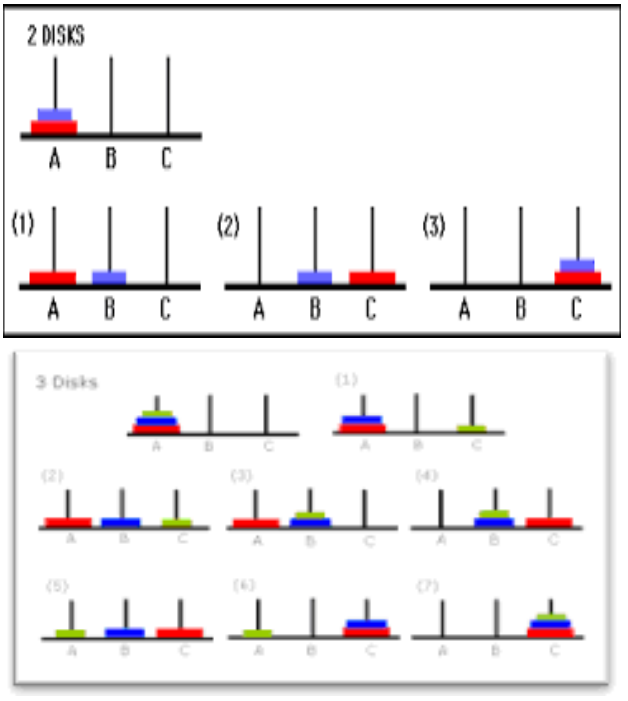

Fig.1 Tower of Hanoi

3.2 Baguenaudier: Baguenaudier (also known as the Chinese Rings, Cardan's Suspension, Cardano's Rings, Devil's needle or five pillars puzzle) is a disentanglement puzzle featuring a loop which must be disentangled from a sequence of rings on interlinked pillars. The loop can be either string or a rigid structure.("Bague" also means "ring," but this appears

to be an etymological coincidence. Interestingly, the bladder-senna tree is also known as "Baguenaudier" in French.)

It is thought to have been invented originally in China. The origins are obscure. The ethnographer Stewart Culin related a tradition attributing the puzzle's invention to the 2nd/3rd century Chinese general Zhuge Liang. The name "Baguenaudier" is French for "time-waster". It was used by French peasants as a locking mechanism.

Variations of this include The Devil's Staircase, Devil's Halo and the Impossible Staircase. Another similar puzzle is theGiant's Causeway which uses a separate pillar with an embedded ring.

The nine linked rings puzzle also called the Chinese rings puzzle is perhaps China's greatest mechanical puzzle. The puzzle consists of a long loop with a handle on one end that is nterlocked with nine rings. The objective is to disentangle the long loop from all nine rings, and the solution takes 341 moves, so lots of patience is required. But there's a method to the solution—and once one learns to solve the puzzle, it's hard to forget!

The Relationship of Chinese Rings to Gray Code

A puzzle involving disentangling a set of rings from a looped double rod and the solution of the Baguenaudier is intimately related to the theory of Gray codes.

The minimum number of moves a(n)needed for ^{n} rings is

$$a(n) = \left\lceil \tfrac{2}{3}\left(2^{n} - 1\right) \right\rceil \quad (1)$$

$$= \begin{cases} \frac{1}{3}\left(2^{n+1} - 2\right) & n \text{ even} \\ \frac{1}{3}\left(2^{n+1} - 1\right) & n \text{ odd,} \end{cases} \quad (2)$$

where [x] is the ceiling function, giving 1, 2, 5, 10, 21, 42, 85, 170, 341, 682, ... (OEIS A000975). The generating function for these numbers is

$$\frac{1}{(1-2x)\left(1-x^{2}\right)} = 1 + 2x + 5x^{2} + 10x^{3} + 21x^{4} + \ldots. \quad (3)$$

They are also given by the recurrence relation

$$a(n) = a(n-1) + 2a(n-2) + 1 \quad (4)$$

with a (1) = 1 and a(2)= 2

By simultaneously moving the two end rings, the number of moves for rings can be reduced to

$$b(n) = \begin{cases} 2^{n-1} - 1 & n \text{ even} \\ 2^{n-1} & n \text{ odd,} \end{cases} \quad (5)$$

giving 1, 1, 4, 7, 16, 31, 64, 127, 256, 511, ... (OEIS A051049).

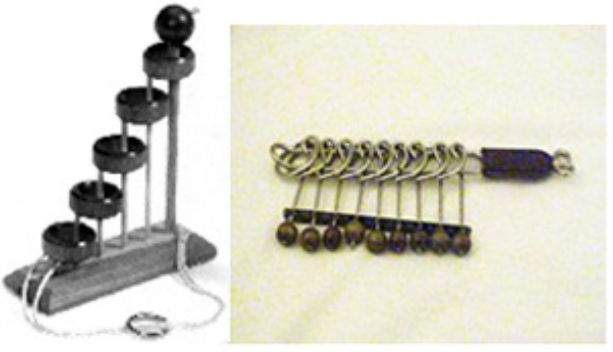

Fig 2: Baguenaudier (Chinese Rings)

3.3 Karnaugh Maps : The Karnaugh map, also known as the K-map, is a method to simplify boolean algebra expressions. Maurice Karnaugh introduced it in 1953 as a refinement of Edward Veitch's 1952 Veitch diagram. The Karnaugh map reduces the need for extensive calculations by taking advantage of humans' pattern-recognition capability. It also permits the rapid identification and elimination of potential race conditions.

The required boolean results are transferred from a truth table onto a two-dimensional grid where the cells are ordered in Gray code, and each cell position represents one combination of input conditions, while each cell value represents the corresponding output value. Optimal groups of 1s or 0s are identified, which represent the terms of a canonical form of the logic in the original truth table.These terms can be used to write a minimal boolean expression representing the required logic.

Karnaugh maps are used to simplify real-world logic requirements so that they can be implemented using a minimum number of physical logic gates. can be implemented directly using AND and OR logic operators. A sum-of-products expression can always be implemented using AND gates feeding into an OR gate, and a product-of-sums expression leads to OR gates feeding an AND gate. Karnaugh maps can also be used to simplify logic expressions in software design. Boolean conditions, as used for example in conditional statements, can get very complicated, which makes the code difficult to read and to maintain. Once minimised, canonical sum-of-products and product-of-sums expressions

Gray Code Solution : In the example (fig 2), the four input variables can be combined in 16 different ways, so the truth table has 16 rows, and the Karnaugh map has 16 positions. The Karnaugh map is therefore arranged in a 4 × 4 grid.

The row and column indices (shown across the top, and down the left side of the Karnaugh map) are ordered in Gray coderather than binary numerical order. Gray code ensures that only one variable changes between each pair of adjacent cells. Each cell of the completed Karnaugh map contains a binary digit representing the function's output for that combination of inputs.

After the Karnaugh map has been constructed, it is used to find one of the simplest possible forms — a canonical form — for the information in the truth table. Adjacent 1s in the Karnaugh map represent opportunities to simplify the expression. The minterms ('minimal terms') for the final expression are found by encircling groups of 1s in the map. Minterm groups must be rectangular and must have an area that is a power of two (i.e., 1, 2, 4, 8…). Minterm rectangles should be as large as possible without containing any 0s. Groups may overlap in order to make each one larger. The optimal groupings in the example below are marked by the green, red and blue lines, and the red and green groups overlap. The red group is a 2 × 2 square, the green group is a 4 × 1 rectangle, and the overlap area is indicated in brown.The cells are often denoted by a shorthand which describes the logical value of the inputs that the cell covers.

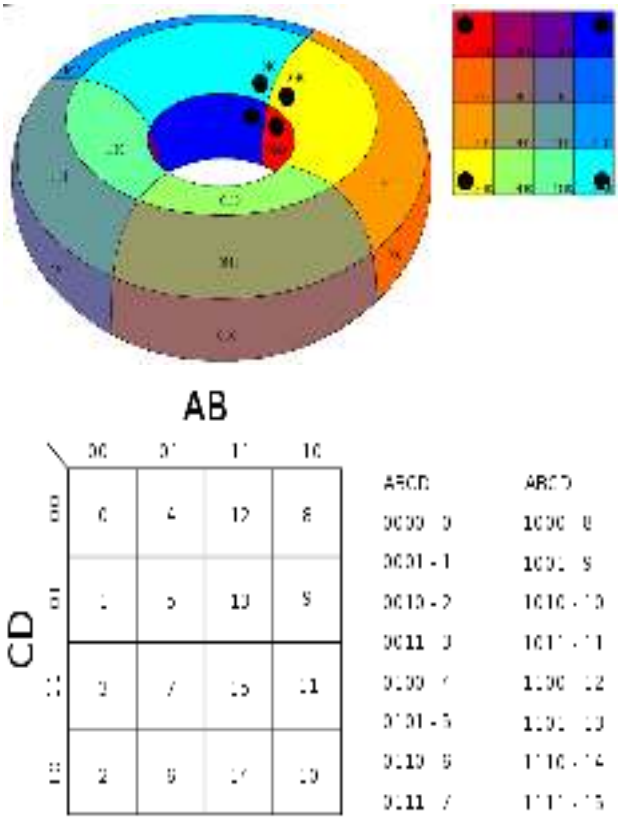

Fig.3: Karnaugh map

3.4Position encoders

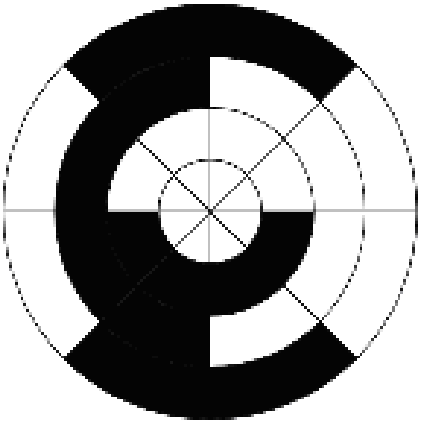

Fig 4: Rotary encoder for angle-measuring devices marked in 3-bit binary-reflected Gray code (BRGC)

Gray codes are used in position encoders (linear encoders and rotary encoders), in preference to straightforward binary encoding. This avoids the possibility that, when several bits change in the binary representation of an angle, a misread will result from some of the bits changing before others. Originally, the code pattern was electrically conductive, supported (in a rotary encoder) by an insulating disk. Each track had its own stationary metal spring contact; one more contact made the connection to the pattern. That common contact was connected by the pattern to whichever of the track contacts were resting on the conductive pattern. However, sliding contacts wear out and need maintenance, so non-contact detectors, such as optical or magnetic sensors, are often used instead.

Regardless of the care in aligning the contacts, and accuracy of the pattern, a natural-binary code would have errors at specific disk positions, because it is impossible to make all bits change at exactly the same time as the disk rotates. The same is true of an optical encoder; transitions between opaque and transparent cannot be made to happen simultaneously for certain exact positions. Rotary encoders benefit from the cyclic nature of Gray codes, because consecutive positions of the sequence differ by only one bit. This means that, for a transition from state A to state B, timing mismatches can only affect when the A → B transition occurs, rather than inserting one or more (up to N − 1 for an N-bit codeword) false intermediate states, as would occur if a standard binary code were used.

4.Conclusion : The reflected binary code is a binary numerical system where two successive values differ in only one digit. We discussed the applications of Gray code to solve a tower of Hanoi, Chinese rings and labelling of Karnaugh Maps generally. There are many applications of gray codes in engineering fields also.

References:

1]Afaq Ahmed &Mohamd.M.BasitSuwailam (2009), "A Less Complex algorithmic Procedure for computing Gray Codes", The Journal of Engineering Research, Vol-6, No-2, pp:12-19

2] DAH- JYH GUAN (1998), " Generalized Gray Codes with Applications", Procedure of National Science Council: ROC(A), Volume-22, No-6, pp:841-848

ANT COLONY OPTIMIZATION AND APPLICATIONS

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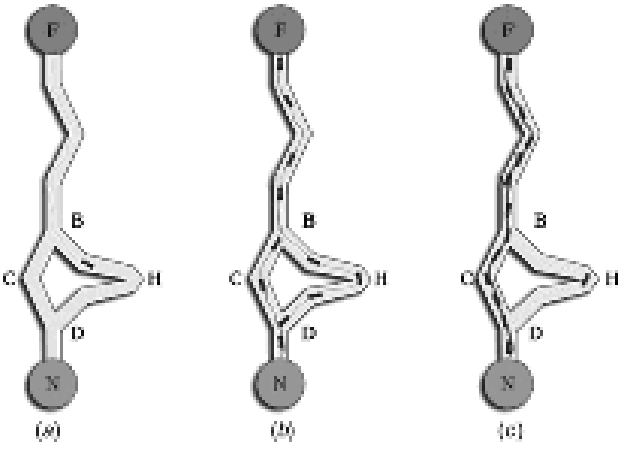
Ant Colony Optimization studies artificial system that takes inspiration from the behavior of real ant colonies and which are used to solve Optimization problems. At first, the ants wander randomly. When an ant finds a source of food, it walks back to the colony leaving "markers" (pheromones) that show the path has food. When other ants come across the markers, they are likely to follow the path with a certain probability. If they do, they then populate the path with their own markers as they bring the food back. As more ants find the path, it gets stronger until there are a couple streams of ants traveling to various food sources near the colony.

The inspiring source of ant colony optimization is the foraging behavior of real ant colonies. This paper explains the artificial ant colonies for the search of approximate solutions to discrete optimization problems.

Optimization problems are of high importance both for the industrial world as well as for the scientific world. Examples of practical optimization problems include train scheduling, time tabling, shape optimization, telecommunication network design, or problems from computational biology. The research community has simplified many of these problems in order to obtain scientific test cases.

Marco Dorigo and colleagues introduced the first ACO algorithms in the early 1990's . The development of these algorithms was inspired by the observation of ant colonies. Ants are social insects. They live in colonies and their behavior is governed by the goal of colony survival rather than being focused on the survival of individuals. The behavior that provided the inspiration for ACO is the ants' foraging behavior, and in particular, how ants can find shortest paths between food sources and their nest. When searching for food, ants initially explore the area surrounding their nest in a random manner. While moving, ants leave a chemical pheromone trail on the ground. Ants can smell pheromone. When choosing their way, they tend to choose, in probability, paths marked by strong pheromone concentrations. As soon as an ant finds a food source, it evaluates the quantity and the quality of the food and carries some of it back to the nest. During the return trip, the quantity of pheromone that an ant leaves on the ground may depend on the quantity and quality of the food. The pheromone trails will guide other ants to the food source.

Behaviour of ants

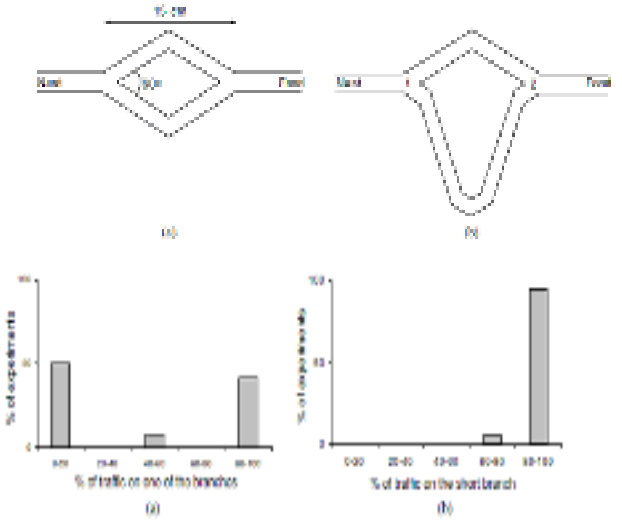


An experimental setting that demonstrates the shortest path finding capability of ant colonies. Between the ants' nest and the only food source exist two paths of different lengths. The ants begin by walking randomly. They cannot see the ground and have a very limited viewof what is around them. Therefore, if the ground has not been explored yet, they will just wanderand take random decision at each crossroads.

After a while, the places around the nest will be all explored. The ants will get to know that bythe marking done by the previous ants. Indeed, they will leave behind them the famouspheromones and inform the other ants that the way is already explored. The concentration of pheromones depends on the number of ants who took the way, the moreants taking the way, the more pheromones.The experimentation, gives also two paths to the food source, but one of them istwice longer than the other one. Here again the ants will start to move randomly and explore theground.

Probabilistically, 50% of the ants will take the short way while the 50% others will takethe long way, as they have no clue about the ground configuration. The ants taking the shorter path will reach the food source before the others, and leave behindthem the trail of pheromones. After reaching the food, they will turn back and try to find thenest. At the cross, one of the paths will contain pheromones although the other one will be notexplored. Hence the ant which carries the food will take the path already explored, as it means itis the way to the nest.As the ant is choosing the shortest way and will continue to deposit pheromones, the path willtherefore become more attractive for others. The ants who took the long way will have moreprobability to come back using the shortest way, and after some time, they will all convergetoward using it.Consequently, the ants will find the shortest path by themselves, without having a global view ofthe ground. By taking decision at each cross according to the pheromones amount, they willmanage to explore, find the food, and bring it back to the nest, in an optimizedway.

Stochastic Model for double bridge experiment



Deneuberg and Collegues proposed a simple stochastic model that describes the dynamics of ant colony in double bridge experiment. If per second cross the bridge in each direction at a constant speed vcm/s depositing one unit of pheromone on the branch. The probability $P_{is(t)}$ of choosing the shortest branch is given by

$$P_{is(t)} = \frac{(t_s + \varphi_{is}(t))^{\alpha}}{(t_s + \varphi_{is}(t))^{\alpha} + (t_s + \varphi_{il}(t))^{\alpha}}$$

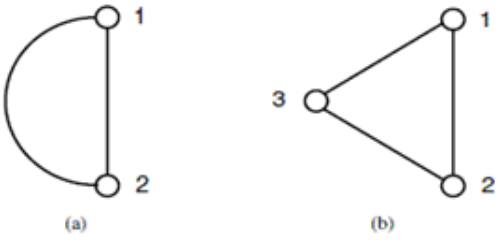
where s and t denote the short and long branch respectively and t is a function of total amount of pheromone $\varphi_a(t)$.The differential equation that describes the evolution of stochastic system are

$$d\varphi_{ij}/dt = \psi\, p_{ij}(t - t_{ij}) - \psi\, p_{ij}(t), \qquad (i = 1, j = 2, i = 2, j = 1),$$

$$d\varphi_{ij}/dt = \psi\, p_{ij}(t - \tau_{ij}) - \psi\, p_{ij}(t), \qquad (i = 1, j = 2; i = 2, j = 1),$$

Artificial ants and minimal cost path

Artificial ants : The double bridge experiments show clearly that ant colonies have a built-in optimization-capability: by the use of probabilistic rules based on local information theycan find the shortest path between two points in their environment. Interestingly, bytaking inspiration from the double bridge experiments, it is possible to design artificialants that, by moving on a graph modeling the double bridge, find the shortestpath between the two nodes corresponding to the nest and to the food source.As a first step toward the definition of artificial ants, consider the graph.



The graphconsists of two nodes (1 and 2, representing the nest and the food respectively) thatare connected by a short and a long arc (in the example the long arc is r times longerthan the short arc, where r is an integer number). Additionally, we assume the timeto be discrete (t=1,2,3…..) and that at each time step each ant moves toward aneighbor node at constant speed of one unit of length per time unit. By doing so, antsadd one unit of pheromone to the arcs they use. Ants move on the graph by choosingthe path probabilistically. $P_{is(t)}$ is the probability for an ant located in node i at timet to choose the short path, and $P_{il(t)}$ the probability to choose the long path. Theseprobabilities are a function of the pheromone trails $\varphi_a(t)$ that ants in node i (iE{1,2})encounter on branch a, (a E{ s,l}):

$$p_{is(t)} = \frac{[\varphi_{is}(t)]^{\alpha}}{[\varphi_{is}(t)]^{\alpha} + [\varphi_{il}(t)]^{\alpha}}, \qquad p_{il(t)} = \frac{[\varphi_{il}(t)]^{\alpha}}{[\varphi_{is}(t)]^{\alpha} + [\varphi_{il}(t)]^{\alpha}}.$$

Trail update on the two branches is performed as follows:

$$\varphi_{is}(t) = \varphi_{is}(t-1) + \varphi_{is}(t-1)m_i(t-1) - p_{is}(t-1)m_i(t-1), \qquad (i = 1, j = 2; i = 2, j = 1),$$

$$\varphi_{il}(t) = \varphi_{il}(t-1) + p_{il}(t-1)m_i(t-1) + p_{il}(t-1)m_j(t-1), \qquad (i = 1, j = 2; i = 2, j = 1)$$

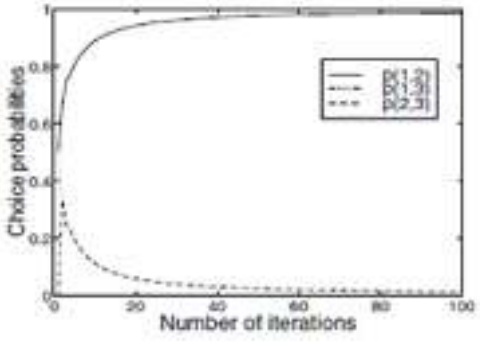
Where $m_i(t)$, is the number of ants on node I at time t , is given by

$$m_i(t) = p_{is}(t-1)m_j(t-1) + p_{is}(t-r)m_j(t-r), \qquad (i = 1, j = 2; i = 2, j = 1),$$

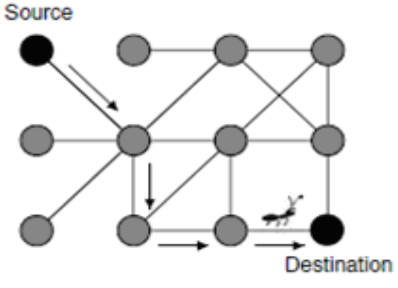
The Model differs from the previous in 2 aspects

* It considers the average behavior of the system, and not the stochastic behavior of the single ants.

* It is a discrete time model, whereas the previous one was a continuous time model; accordingly, it uses difference instead of differential equations.



Minimal cost path

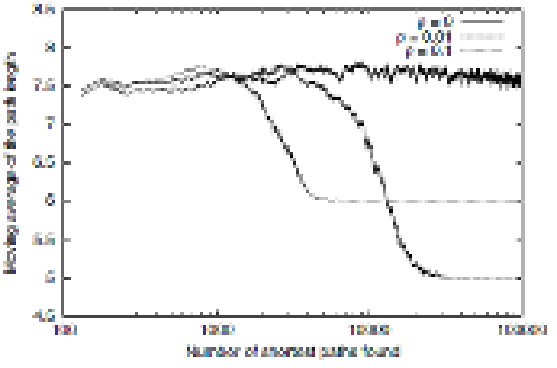


Each ant builds starting from the source node , a solution to the problem by applying a step by step decision policy. At each node, local information stored on the node itself or on its outgoing arcs is read by the ant and used in a stochastic way to decide which node to move next. At the beginning of the search process, a constant amount of pheromone

$\{\tau_{ij} = l, \forall (i,j) \in A\}$ is assigned to all the arcs.When located at a node i an ant k uses the pheromone trails τ_{ij} to compute theprobability of choosing j as next node:

$$P_{ij}^{k} = \begin{cases} \dfrac{\tau_{ij}^{\alpha}}{\sum l \in N_i^K \tau_{il}^{\alpha}} & if \quad j \in N_i^k \\ o & if \quad j \notin N_i^k \end{cases}$$

where N_i^k is the neighborhood of ant k when in node i. The neighborhoodof a node i contains all the nodes directly connected to node i in the graphG=(N,A) except for the predecessor of node i (i.e., the last node the ant visitedbefore moving to i). In this way the ants avoid returning to the same node theyvisited immediately before node i. Only in case N_i^k is empty, which corresponds toa dead end in the graph, node i's predecessor is included into N_i^k . Note that thisdecision policy can easily lead to loops in the generated paths.



Applications

Ant colony optimization algorithms have been applied to many combinatorial optimization

Problems . Some of the areas are:

- Traveling Salesman Problem
- Quadratic Assignment Problem
- Network Model Problem
- Vehicle routing problem
- Decision making problem
- Cutting stock problem
- Sensor layout problem
- GPS surveying problem
- Multidimensional surface global optimum
- Communication Network Problems
- Continuous Optimization Problems
- Dynamic Optimization Problems
- Multi objective Optimization

Conclusion : Ant Colony Optimization has been and continues to be a fruitful paradigm for designing effective combinatorial optimization solution algorithms. ACO is a well-established metaheuristic applied to a wide range of optimization problems and with hundreds of successful implementations. Several of these implementations have shown to be, at least at the time of their publication, the state-of the-art for the respective problems tackled, including problems such as vehicle routing, sequential ordering, quadratic assignment, assembly line balancing, open-shop scheduling, and various others. Applications of ACO to dynamic routing problems in telecommunication networks have been particularly successful, probably because several algorithm characteristics match well with the features of the applications.

References

1. Ant Colony Optimization by Marco Dorigo and Thomas Stutzle.

2. Dorigo M. and G. Di Caro (1999). The Ant Colony Optimization Meta-Heuristic. In D. Corne, M. Dorigo and F. Glover, editors, New Ideas in Optimization, McGraw-Hill, 11-32.

3. M. Dorigo and L. M. Gambardella. Ant colonies for the traveling salesman problem. BioSystems, 43:73–81, 1997.

4. M. Dorigo and L. M. Gambardella. Ant Colony System: A cooperative learning approach to the traveling salesman problem. IEEE Transactions on Evolutionary Computation, 1(1):53–66, 1997.

5. G. Di Caro and M. Dorigo. Mobile agents for adaptive routing. In H. El-Rewini, editor, Proceedings of the 31st International Conference on System Sciences (HICSS-31), pages 74–83. IEEE Computer Society Press, Los Alamitos, CA, 1998.

6. M. Dorigo, V. Maniezzo, and A. Colorni. The Ant System: An autocatalytic optimizing process. Technical Report 91-016 Revised, Dipartimento di Elettronica,Politecnico di Milano, Italy, 1991.

7. L. M. Gambardella, ` E. D. Taillard, and G. Agazzi. MACS-VRPTW: A multiple ant colony system for vehicle routing problems with time windows. In D. Corne, M. Dorigo, and F. Glover, editors, New Ideas in Optimization, pages 63–76. McGraw Hill, London, UK, 1999.

8. L. M. Gambardella, ` E. D. Taillard, and M. Dorigo. Ant colonies for the quadratic assignment problem. Journal of the Operational Research Society,50(2):167–176, 1999.

9. V. Maniezzo and A. Colorni. The Ant System applied to the quadratic assignment problem. IEEE Transactions on Data and Knowledge Engineering, 11(5):769–778, 1999.

10. Gambardella L. M., E. Taillard and M. Dorigo (1999). Ant Colonies for the Quadratic Assignment Problem.Journal of the Operational Research Society, 50:167-176.

11. A Concise overview of applications of ANT COLONY OPTIMIZATION THOMAS STUTZLE ¨ MANUEL LOPEZ-IB ´ A´ NEZ ˜ MARCO DORIGO IRIDIA, CoDE, UniversiteLibre de ´ Bruxelles (ULB), Brussels, Belgium.

12. Ant colony optimization: Introduction and recent trends Christian Blum 1 ALBCOM, LSI, Universitat-Politècnica de Catalunya, JordiGirona 1-3, Campus Nord, 08034 Barcelona, Spain Accepted 11 October 2005.

13. Ant Colony Optimization and its Application to Adaptive Routing in Telecommunication Networks Gianni Di Caro Dissertation present ´ee en vue de l'obtention du grade de ´ Docteur en Sciences Appliquees ´ Bruxelles, September 2004.

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THEME :-10

BHARADVAJEEYAM

Civil, Mechanical, Aerospace & Transportation Sciences

Sl No	Title of the Paper	Authors	Page No
1.	INTELLIGENCE ATM SECURITY SYSTEMS	Chaitra, Sushmitha SaiRohith & Bhagavath	184
2.	EARTHQUAKE RESISTANT CONSTRUCTION PRACTICES IN INDIA	Faria Begum, Kavya.M Harshitha T.N Hemalatha B.R	185 - 187
3.	HYPERLOOP TECHNOLOGY TRANSPORTATION	Rashmi K, Govardhan P Mohana K S Gnanendra Reddy R	187 - 190
4.	STRAIN AND TEMERATURE MEASUREMENT ON HOT END LOW PRESSURE TURBINE ROTOR BLADE OF AERO GAS TURBINE ENGINE	S. Gangabhavani T.N. Suresh, K. Banumathy Owais Majid Kamili K.Vishwanath	190 - 193

ISSN 2250 - 3978 LILAVATI (PRINT)

INTELLIGENCE ATM SECURITY SYSTEMS

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The main aim of the INTELLIGENCE ATM SECURITY SYSTEMS is to lock/unlock the system by using automatic locking system.It is highly safe control of the devices from other person due to the rapid development in the field of science and technology. In today's world automation plays a very important role. In this project an automated way of controlling system through Human interaction as well as through self-control of the system itself is provided. Other than this intelligent security system to be applied in home automation. The system contains some detective modules like temperature sensor, vibration sensors,automatic locking system,GSM, micro controller etc.

Automated teller machine were first introduced in 1939.Now a days, about 3 million units are installed world wide.

As the number of ATM units increase, the machine are prone to hacker attacks, fraud, robberies and security breaches. In the past, the ATM machines main purpose was to deliver cash and to debit corresponding bank account. However, ATM machines are becoming more complicated and thus becoming a high priority target robbers and hackers.

INTELLIGENCE ATM SECURITY SYSTEM are implemented with high security protection measures.ATM vandals can either physically tamper with ATM machine to obtain cash or employ credit card skimming methods to acquire control of users credit card account and unskilled robbers threaten bank patrons with a weapon to loot money, these all can be get rid by using Intelligence ATM Security Systems. This can be helpful for catching the thief easily in less time and also sends the information to nearest police station & concerned bank manager.

INTELLIGENCE ATM SECURITY SYSTEM are provided with highly advanced equipments like-

• AUTOMATIC LOCKING SYSTEM:

This automatic locking system helps to catch the robber or thief easily. It will shuts the door automatically, when the thief try to rob the money from the ATM machines and makes him not to escape from the ATM centre.

• VIBRATION SENSOR:

This VIBRATION SENSOR's are used for calibration purpose. When the thief hits the ATM machine with certain pressure, it will sends the message to the micro controller and make the doors to lock automatically.

• TEMPERATURE SENSORS:

It senses temperature, if any high temperature equipments are used to cut the machine ,it senses and makes the door to lock immediately.

• GSM SYSTEM:

Our ATM SYSTEM consists of GSM technology also, this GSM are connected to AUTOMATIC LOCKING SYSTEM. When the Automatic looking system shuts. The GSM system will activate and sends the information to nearby Police Station and to the particular Bank manager.

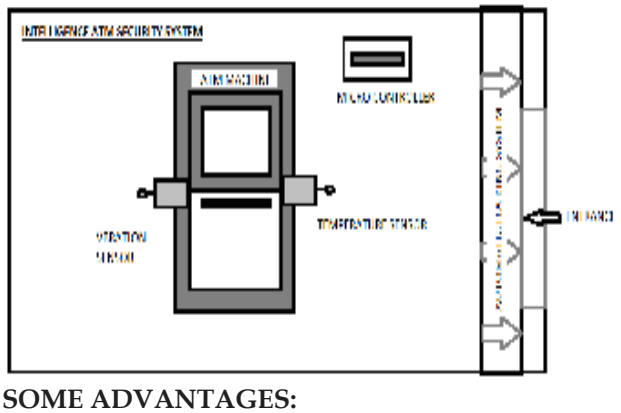
• MICRO CONTROLLER:

A Microcontroller is small integrated circuit containing a processor core, memory and programmable input / output peripherals. Microcontrollers used in automatic control products and devices.

• CLOSED CIRCUIT TELEVISION:

This device is used to record what is happening in the ATM unit.

BLOCK DIAGRAM OF INTELLIGENCE ATM SECURITY SYSEM:-



SOME ADVANTAGES:

• Can provide ATM centers in remote areas by implementing this system.

• Gives high security, reduces manual work.

• Helps to find the thieves easily.

• Low maintenance.

CONCLUSION: By implementing this type of systems, we can avoid the robberies and can give high security to the ATM system.

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EARTHQUAKE RESISTANT CONSTRUCTION PRACTICES IN INDIA

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Disasters are unexpected events which have adversely affected humans since the dawn of our existence. In response to such events, there have been attempts to mitigate devastating effects of these disasters. Results of such attempts are very encouraging in developed countries but unfortunately and miserably poor in developing countries including ours. Earthquakes are one of the nature's greatest hazards on our planet which have taken heavy toll on human life and property since ancient times. The sudden and unexpected nature of the earthquake event makes it even worse on psychological level and shakes the moral of the people. Man looks upon the mother earth for safety and stability under his feet and when it itself trembles, the shock he receives is indeed unnerving. Mitigation of the devastating damage caused by earthquakes is of prime requirements in many parts of the world. Since earthquakes are so far unpreventable and unpredictable, the only option with us is to design and build the structures which are earthquake resistant. This paper highlights the effect of earthquake on structures and guidelines of construction of earthquake resistant structures.

Keywords: Earthquake, Structures, disaster, hazards

Earthquake is a natural phenomenon occurring with all uncertainties. Earthquake and their disastrous consequences have been instrumental in shaping human history, and gaining knowledge to predict or prevent earthquakes disasters has been an integral part of human quest for knowledge since earliest times. Available information shows that several ancient civilizations developed legends to rationalize earthquake disasters and to link their occurrence with deviant or undesirable human behavior.

1.1 Earthquakes in India : TheIndian subcontinent has suffered some great earthquakes with magnitude exceeding 8.0. The earthquakes of the late nineteenth and early twentieth centuries triggered a number of developments in India towards science and engineering related to earthquakes, including the development of construction practices that are robust against earthquake shaking.

Despite these early developments towards seismic safety, moderate earthquakes in India continue to cause thousands of deaths, indicating poor seismic resilience of its built environment. The first seismic code was developed and implemented after the 1935 Quetta earthquake for reconstruction in Baluchistan (now in Pakistan)and the first national seismic code was developed in 1962 (IS 1893 1962). And yet, effective implementation of the building codes remains a major challenge.

The 2001 Bhuj earthquake was the first instance of an Indian earthquake causing collapses of modern multi-storey buildings, since the earlier earthquakes had occurred in rural or semi-urban settings. Approximately 14,000 deaths (Jain 2002) in this earthquake created unprecedented awareness amongst professionals, academics and the general public, and opened up a number of windows of opportunity for capacity-building for seismic safety.

2.Seismic hazards and Risk

2.1 The geotectonic setting of the Indian subcontinent : The geology and geography of the Indian subcontinent is rather complex and consists of three main sub-divisions: the Himalayas, the Indo-Gangetic Plains, and the Peninsula (Fig. 1). The Himalayas have been formed as a result of the collision of Asia with India and are rather young mountains. The front edge of the northward moving Indian plate consists of ocean sediments resting on hard basement rocks. As a result of intense compression at the boundary, there has been repeated folding and faulting, and melting in the deeper parts.

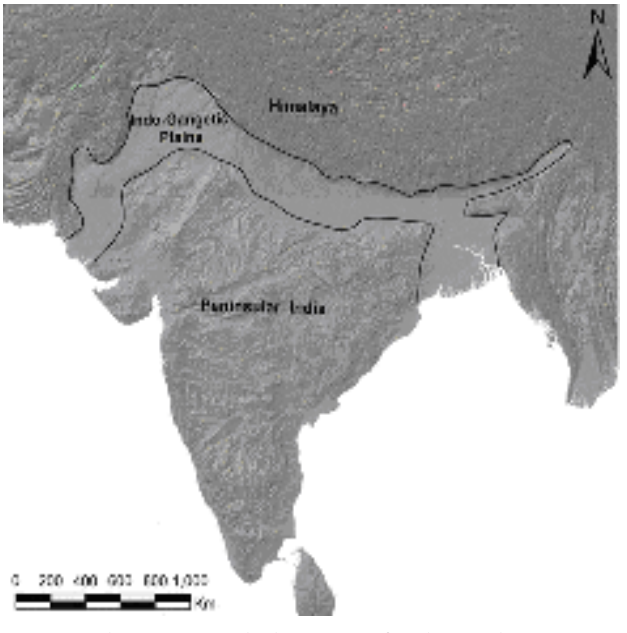

Fig. 1: Three main sub-divisions of Indian subcontinent namely Peninsular India, Indo-Gangetic Plains and the Himalaya (courtesy: Vikrant Jain)

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The Himalayan range covers Baluchistan on one side and Myanmar on the other, with significant bends and curvatures in the range. The mountain range rises steeply from the Indo-Gangetic Plains and only gently slopes towards Tibet. The Outer Himalayas (Siwalik Ranges) in the southern zone have elevations up to 900 m. The Middle or Lesser Himalayas have elevations up to about 3200 m, and the Great Himalayas (also termed Inner Himalayas) have elevations ranging from 3000 to 8000 m. The region north of the Great Himalaya is Tethys Himalaya with an elevation ranging from 3000 to 4200 m. The northern edge of the Tethys Himalaya is the collision zone of the Asian and the Indian Plates (Fig. 2). Tibet and Karakoram, to the north of the Tethys Himalaya, are part of the Asian Plate and have an elevation of about 5000 m.

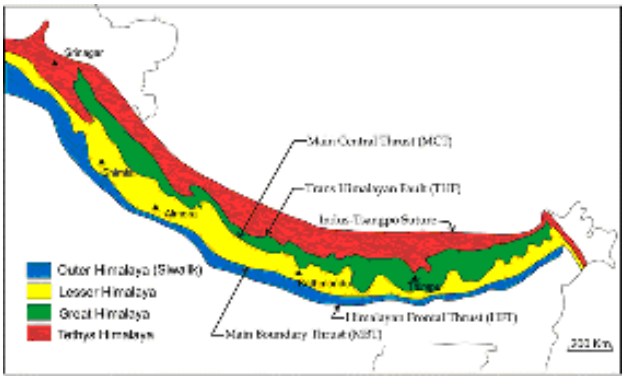

Fig. 2 :Major litho-tectonic units of the Himalaya (Modified after Valdiya 2010)

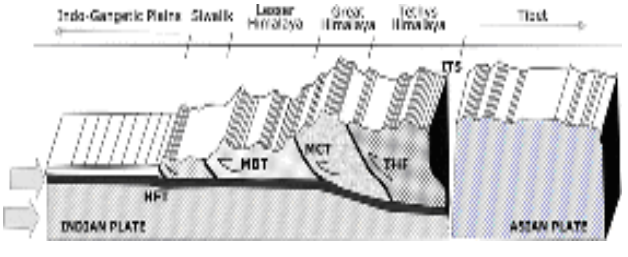

Fig. 3: Typical cross-section across the Himalaya showing major litho-tectonic units. (HFThimalayan frontal thrust, MBT main boundary thrust, MCT main central thrust, T-HFtranshimalayan fault, ITS indus-tsangpo suture zone) (Modified after Valdiya 1998)

There has been a regular occurrence of great earthquakes in the Himalayas and currently most of the seismic activity is located south of the Main Central Thrust (MCT). The Himalayan Frontal Thrust is believed to be the likely location of future great earthquakes. Because of its proximity to the densely populated Indo-Gangetic Plains, this poses a very serious seismic risk for the future and has been a major cause of concern in the scientific and emergency management communities. Peninsular India, even though far less active seismically, has also seen some very damaging earthquakes, for instance, the Koyna (1967), Latur (1993) and Bhuj (2001) earthquakes. It is clear that most parts of India are prone to earthquakes of varying magnitudes and with varying probabilities of occurrence.

In the aftermath of these events, the need for a comprehensive database compiling all available data on geological, geophysical and seismological aspects of the entire country was strongly felt, to facilitate seismic hazard assessment, and in 2000, the Seismotectonic Atlas of India and its Environs, was published by the Geological Survey of India (GSI 2000). The Atlas contains 42 maps that cover India and its neighbouring countries without delineating political national boundaries.

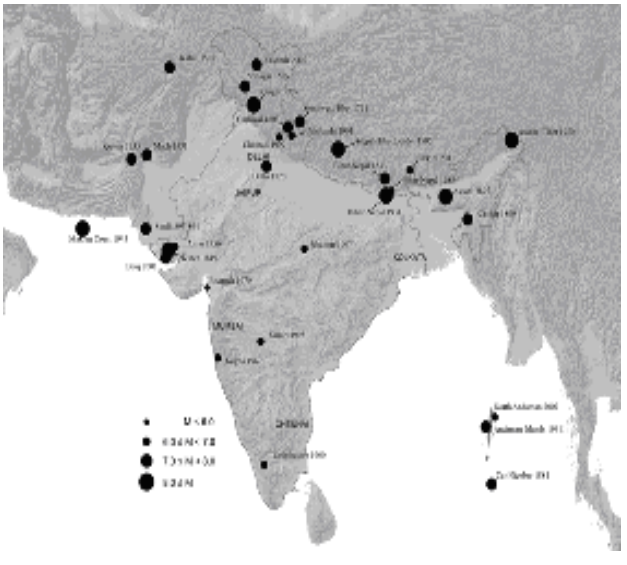

Fig. 4: Location of some significant earthquakes in the Indian subcontinent

3. Causes of Earthquake Damage

• Heavy dead weight and very stiff buildings, attracting large seismic inertia forces.

• Very low tensile and shear strength, particularly with poor mortars.

• Brittle behavior in tension as well as compression.

• Weak connection between wall and wall and roof and wall.

• Stress concentration at corners of doors and windows

• Overall un symmetry due to imbalance in the sizes and position of openings in the wall.

• Defects in construction, such as use of sub standard materials, unfilled joints between bricks.

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Ground vibrations during earthquakes causes inertia forces to travel through the roof and walls to the foundation causes major damage to the structure as shown.

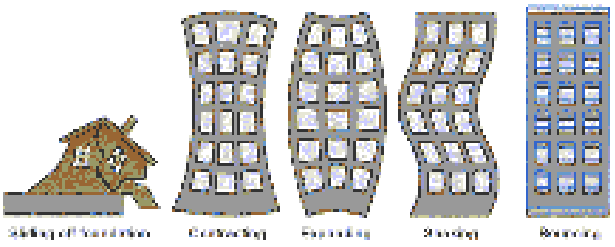

Fig 5: effect of earthquake on structures

4. Earthquake Resistant Design

• The building plan should be in a regular shape such as square or rectangular.

• No wall in a room should exceed 6m in length. Use cross walls for longer walls. In hilly areas, it should not exceed 3.5m in length.

• Don't use bricks of crushing strength less than 35kg /Sq.cm for single storeyed building and of 50kg /sq.cm for 2-3 storeyed building. Only solid and sound bricks / concrete blocks should be used.

• Provide a R.C.C band of 4 thickness throughout the run along wall at lintel level passing over doors and windows.

• The thickness of load bearing wall should be at least 200mm.

• The clear width between a door and nearest window should not be less than 600mm.

• Location of a door or window from edge of a wall shall be 600mm minimum.

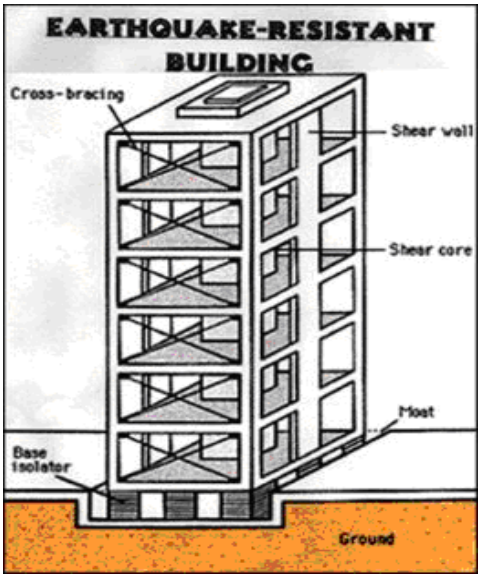

Fig 6: Earthquake resistant Structure

5. Conclusions

• Earthquake resistant construction is important in earthquake prone area.

• The building can resist earthquake forces with almost no damage.

• The building shall not collapse or harm human lives during severe earthquake motions

• However these structures will be uneconomical.

References

1] Sagar D.S, (2013), "Earthquake Resistance Construction", ICICE, Bangalore.

2] www.nicee.org

HYPERLOOP TECHNOLOGY TRANSPORTATION

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Hyper loop technology is also known as HTT, is an American research company formed idea in which the transport running through this technology can travel in high speeds up to 1200kmph. Approximately equal to the speed of a sound.

The technology used in hyper loop transportation is, this transport carries a number of passengers in a capsules associated with the pods that would be propelled by magnets at a speed of 760 miles per hour. This hyper loop's pods will be propelled by an electric motor and the magnetic field created by permanent magnets ,when the pods decelerate, the energy created will be used to recharge the batteries of the motor.

The advantages of hyperloop technology transportation is, it can travel beyond the speed of an aeroplane hence it can be used for long waytravels in a short interval of time and its design will be safe and smarter. Also the construction and operation costs for this transportation will be comparatively low and this technology can be installed underground, under water and above the ground level constructing capsule tunnels.The hyper loop technology results in less pollution due to the usage of renewable source of energy as a fuel for transportation. The extraordinary feature of hyper loop transportation is it can travel more than a speed of an aircraft in a cheaper cost.

Hyper loop is a trade name and a registered trademark of the Space Exploration Technologies Corporation for the high speed transportation of passengers and goods in tubes.[1][2]

The outline of the original Hyper loop concept was made public by the release of a preliminary design document in August 2013, which included a notional route running from the Los Angeles [LA] region to the San Francisco[SF] Bay Area, paralleling the Interstate 5 corridor for most of its length. Preliminary analysis indicated that such a route might obtain an expected journey time of 35 minutes, meaning that passengers would traverse the 350-mile (560 km) route at an average speed of around 600 mph (970 km/h), with a top speed of 760 mph (1,200 km/h). Preliminary cost estimates for the LA–SF notional route were included in the white paper—US$6 billion for a passenger-only version, and US$7.5 billion for a somewhat larger-diameter version transporting passengers and vehicles[3] —although transportation analysts doubted that the system could be constructed on that budget.

Hyper loop technology has been explicitly open-sourced by Elon Musk[4] and Space X, and others have been encouraged to take the ideas and further develop them. To that end, several companies have been formed, and dozens of interdisciplinary student-led teams are working to advance the technology[5]. However, some experts are doubtful, saying that the proposals ignore the expenses and risks of developing the technology and that the idea is "completely impractical"

Designs for test tracks and capsules are currently being developed, with construction of a full-scale prototype 5-mile (8 km) track scheduled to start in 2016.

HISTORY : The general idea of trains or other transportation traveling through evacuated tubes dates back more than a century although the atmospheric railway was never a commercial success.

Musk first mentioned that he was thinking about a concept for a "fifth mode of transport", calling it the Hyperloop, in July 2012 at a Pando Daily event in Santa Monica, California.

The Hyper loop high-speed mode of transportation would have the following characteristics:

- Immunity to weather.
- Collision free.
- Twice the speed of a plane.
- Low power consumption.
- Energy storage for 24-hour operations.

The name Hyperloop was chosen because it would go in a loop. Musk envisions the more advanced versions will be able to go at hypersonic speed. In May 2013, Musk likened the hyper loop to a "cross between a Concorde and a rail gun and an air hockey table".

From late 2012 until Aug 2013, a group of engineers from both Tesla and SpaceX worked on the conceptual modeling of hyper loop. An early system design was published in to the Tesla and Space X blogs. Musk has also invited feedback to "see if the people can find ways to improve it". The hyper loop will be an open source design. The following day he announced a plan to demonstrate the project.

In June 2015, Space X announced that it would build a 1-mile-long (1.6 km) test track to be located next to Space X's Hawthorne facility. The track would be used to test pod designs supplied by third parties in the competition. Construction on a 5-mile (8 km) hyper loop test track is to start on a Hyper loop Transportation Technologies-owned site in Quay Valley in 2016. By November 2015, with several commercial companies and dozens of student teams pursuing the development of hyper loop technologies, the Wall Street Journal asserted that "The Hyper Loop Movement, as some of its unaffiliated members refer to themselves, is officially bigger than the man who started it.

INITIAL DESIGN CONEPT : The Hyper loop concept operates by sending specially designed "capsules" or "pods" through a continuous steel tube maintained at a partial vacuum. Each capsule floats on a 0.5-to-1.3-millimetre (0.02 to 0.05 in) layer of air provided under pressure to air-caster "skis", similar to how pucks are suspended in an air hockey table, thus avoiding the use of maglev while still allowing for speeds that wheels cannot sustain. Linear induction motors located along the tube would accelerate and decelerate the capsule to the appropriate speed for each section of the tube route. With rolling resistance eliminated and air resistance greatly reduced, the capsules can glide for the bulk of the journey. In the Hyper loop concept, an electrically driven inlet fan and air compressor would be placed at the nose of the capsule to "actively transfer high pressure air from the front to the rear of the vessel," resolving the problem of air pressure building in front of the vehicle, slowing it down. A fraction of the air is shunted to the skis for additional pressure, augmenting that gain passively from lift due to their shape.

In the alpha-level concept, passenger-only pods are to be 2.23 meters (7 feet 4 in) in diameter and projected to reach a top speed of 760 mph (1,220 km/h) to

maintain aerodynamic efficiency; the design proposes passengers experience a maximum inertial acceleration of 0.5 g, about 2 or 3 times that of a commercial airliner on takeoff and landing. At those speeds there would not be a sonic boom [6].

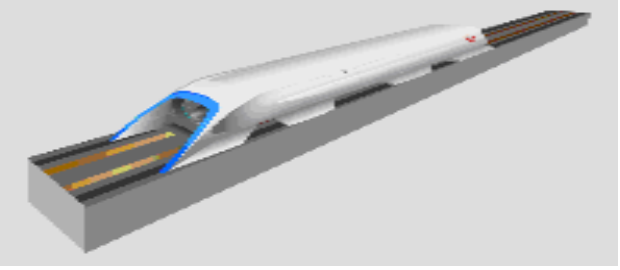

Fig a: Concept design of Hyper loop

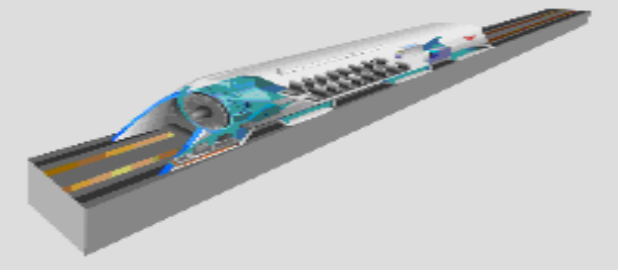

Fig b: Concept art of Hyper loop inner workings

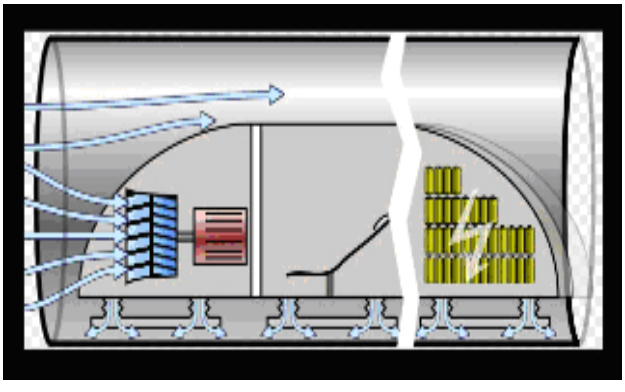

Fig c: Artist's impression of a Hyper loop capsule: Air compressor on the front, passenger compartment in the middle, battery compartment at the back, and air caster skis at the bottom.

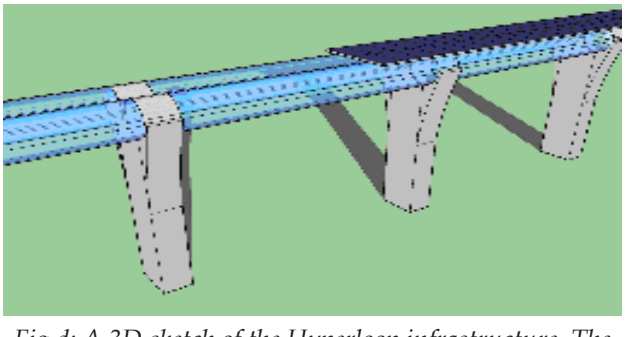

Fig d: A 3D sketch of the Hyperloop infrastructure. The steel tubes are rendered transparent in this image.

THEORY AND OPERATION: Developments in high-speed rail have historically been impeded by the difficulties in managing friction and air resistance, both of which become substantial when vehicles approach high speeds. The vacuum train concept theoretically eliminates these obstacles by employing magnetically levitating trains in evacuated (airless) or partly evacuated tubes, allowing for speeds of thousands of miles per hour. However, the high cost of maglev and the difficulty of maintaining a vacuum over large distances have prevented this type of system from ever being built. The Hyper loop resembles a vacuum train system but operates at approximately one millibar (100 Pa) of pressure.

Pros:

1. High speed of 760mph (1100kmph).
2. Runs from solar power.
3. No problem of traffic.
4. Can travel in any kind of weather.
5. Protect from earthquake by use of pylons.

Cons:

1. Even though the trains reach very high speeds, imagine the sensations a human being can feel at such high speeds as the track curves. The up-down and side-side movements can have nauseating effects as human body sensations are egregious.
2. These are very expensive to build, and they will build the tracks on water in a few cases. Even around other geographical features like mountains and hills.
3. How safe are they for kids, pregnant women and old people? Or do we have to be fit to ride on it?

CONCLUSION: All previously known modes have their advantages ... and disadvantages. The Hyperloop, which would be a fifth conveyance path which would cost 20 euros, so worth studying.The hyper loop is designed to be faster than any other commercial mode of transportation currently available the hyper loop might become the fastest mode of public transportation in the coming years Capsule Tube Propulsion.

REFERENCE:

1. "Hyperloop". US Patent and Trademark Office. May 1, 2015. Retrieved June 1, 2016.

2. Jump up^ "Hyperloop". US Patent and Trademark Office. December 31, 2013. Retrieved June 1, 2016.

3. 3 Musk, Elon (August 12, 2013). "Hyperloop Alpha" (PDF). SpaceX. Retrieved August 13, 2013.

4. 4 Garber, Megan (July 13, 2012). "The Real iPod: Elon Musk's Wild Idea for a 'Jetson Tunnel' from S.F. to L.A.".The Atlantic. Retrieved September 13, 2012.

5. 5 Hawkins, Andrew J. (2016-06-18). "Here are the Hyperloop pods competing in Elon Musk's big race later this year".The Verge. Retrieved 2016-10-19.

6. 6 Vance, Ashlee (August 13, 2013). "Revealed: Elon Musk Explains the Hyperloop, the Solar-Powered High-Speed Future of Inter-City Transportation". Bloomberg Businessweek. Retrieved August 13, 2013.

STRAIN AND TEMERATURE MEASUREMENT ON HOT END LOW PRESSURE TURBINE ROTOR BLADE OF AERO GAS TURBINE ENGINE

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This study is concerned with vibratory strain & temperature measurement on low pressure tip shrouded turbine rotor blades of an aero gas turbine engine. Strain gages were used to measure the blade vibratory strains during the engine ground tests while foil type thermocouple was mounted on turbine blade for measuring the temperature. Strain & temperature records were taken during the full scale engine tests conducted in a ground test facility. The paper highlights the challenges and difficulties encountered in blade strain measurement on rotating turbine blades. The results obtained from the experimental investigation were used for safety assessment and validation of analytical predictions.

Keywords: Strain, strain gage, slip ring, blade vibration, thermocouple, temperature, Oscillogram, Spectrum, Campbell diagram

Aero-engine testing is required for structural verification of components of a developmental engine. This measurement is required because of the aggressiveness used in designing new components and the complexity of blade vibration involved in developing an advanced gas turbine engine.

The successful operation of engine depends largely upon the structural integrity of its rotating parts. The structural integrity in turn depends upon the ability of the machine to withstand the vibratory stresses [1]. In case of jet engines, vibration induced fatigue failure of rotor blades is a problem of major concern to the designer. In fact the vibration of blades is an important event to understand, observe and predict [2]. Vibration leads to High Cycle Fatigue (HCF), which limits blade durability and life. HCF can result in blade failure, having expensive consequences for the engine involved.

In the design phase much effort is being undertaken to produce blades with a satisfactory mechanical integrity it is limited by the fact that the excitation forces are difficult to predict. Usually the design work concentrates on the calculation of frequencies and the stress distributions associated with particular mode shapes using FE tools. The standard procedure is to generate a Campbell-diagram, where the frequencies for different running conditions are plotted versus rotor speed. The intercepts of engine order spokes with the frequency lines give the information required to make a decision whether the particular design is acceptable or not. The final assessment of the complete dynamic picture, however, is taken from engine test runs.

Although researches have been done on response predictions and life evaluation of gas turbine blades, the severity of blade vibratory response is almost impossible to predict using theoretical tools as it depends on damping, strength of excitation/source, blade mistune effects etc. Hence in order to evaluate the HCF characteristics of rotating blades till date aero industry depends on measurements for actual vibratory amplitudes and assessment of criticality of resonance.

Use of high temperature strain gages is widely known practice which provides the direct measurement of actual vibratory strains experienced by the turbine blades during operation. Although strain gages are most reliable stress measurement technique but monitor a limited number of blades, are costly and time consuming to install, have a limited operating life and can interfere with the aerodynamic and mechanical properties of the assembly [3]

STRAIN GAGE AND TEMPERATURE INSTRU-

MENTATION : The prime objective of strain gage instrumentation is to define and perform systematic exploration that can evaluate vibratory stress responses and establish adequate margins with respect to such responses for long life in-service applications [4,5]. The strain measurement has to be conducted during the engine tests. It is a mandatory requirement from air worthiness point of view. The characteristic signature of a strain-gage vibrating aerofoil is its response to the instantaneous surrounding flow field in which it is immersed. It is, therefore, indicative of not only the severity of the mode(s) involved but also the mechanism of vibration causing it.

Selected turbine rotor blades were instrumented with high temperature strain gages at three specific locations (refer to fig 1) based on FEA results and dynamic spin rig tests. Location G gage was sensitive to bow mode of the shrouded blade while the location E gage was selected to capture the bow as well as cantilever mode. In addition location H was sensitive to the torsional mode of vibration. Hence the vibratory response of the turbine blades was captured and monitored at these critical locations during the engine tests.

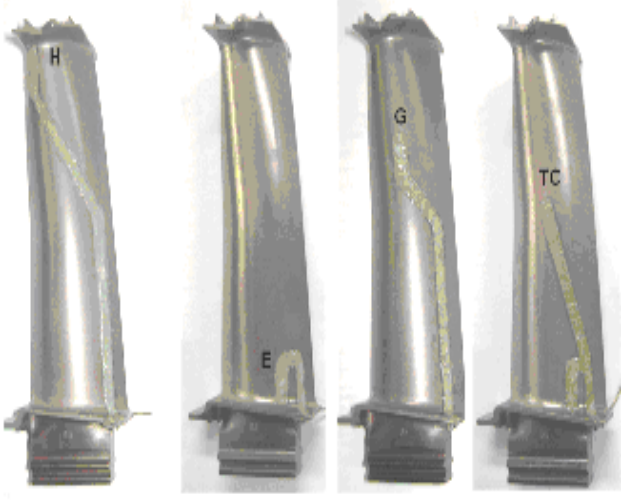

Fig 1 photograph of LPT blade showing strain gage & thermocouple (TC) locations

Foil type thermocouple was mounted on one of the low pressure turbine blades (as shown in fig 1) to measure the temperature experienced by the blade for different throttle conditions during the engine testing.

A glance at the Campbell diagram shows so many intersections between frequency-speed characteristics & the engine order lines that resonant conditions with some mode at some speed are essentially possible. The one way one could determine if a particular resonant condition is dangerous is through the measurement of stress levels during resonance. In this study the blade stresses were measured using high temperature strain gages. The main objective of the stain measurement was to provide real time monitoring of the blade vibratory strains during the engine tests for safety assessment and to give confidence for operating the engine up to its peak speeds. Additionally, the strain data was also used for validation of the analytical results.

EXPERIMENTAL EQUIPMENT & PROCEDURE : The jet engine under investigation is a developmental aero engine. It's a twin spool low bypass ratio turbofan engine of 50 KN class.

For the strain measurement, high temperature free filament resistance strain gages with Platinum-Tungsten grid were mounted on selected LPT rotor blades to measure the vibratory strain & frequency response of the blades. Ceramic cement with alumina silica mixed with water based slurry was used as an adhesive for bonding the strain gages on the blades. Before the strain gages were mounted on the blades degreasing & abrading was carried out [6]. After the strain gage was bonded, the blade was placed in a high temperature oven & heated sufficiently to ensure the proper bonding of the adhesive. The strain gages were mounted at three locations on the convex side (ref Fig 1). For the temperature measurement a foil type thermo couple was mounted on one of the LPT rotor blade (ref Fig 1).

Since the strain and temperature measurement was carried out on rotating turbine blades, a high speed slip ring was used for transferring the strain data from rotating blades to stationary data acquisition systems. Certain modifications were made to the engine components to provide a passage for the lead wires from the blade mounted strain gages to the slip ring unit mounted at the forward end of the engine. Holes were made on the turbine rotor blades & disc. A special instrumentation transfer tube of 1.5 m length was used to carry the sensor lead wires (strain & temperature) from rear end to front end of the engine (refer fig 2).

A hollow drive shaft provided the connection between the forward end of the fan shaft & the slip-ring unit mounted on the accessory bracket. The slip ring was housed inside the bullet nose & the output cables from the slip ring to the external data acquisition system were routed through the inlet casing struts. Air cooled high speed slip ring was used for low noise contamination of the strain signals.

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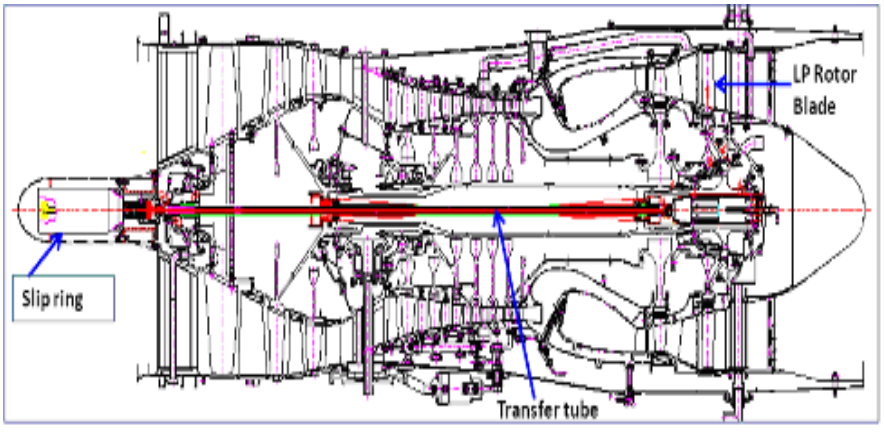

Fig 2 Slip-ring housed inside the bullet nose

Extreme care was taken to route the lead wires as they are in hostile environment and subjected to high rotational speeds and temperatures.

The experimental procedure consisted in operating the engine to its peak speeds. The engine speed varied from idling speed to the full engine speed. During the tests, the strain signals were continuously monitored online. At the appearance of signals indicative of blade vibration due to resonance the signals were recorded & monitored for the safe operation of engine. The strain and temperature responses were successfully captured thereby indigenously establishing the high temperature strain measurement technology for the first time. The acquired strain data was used in carrying out the detailed strain data analysis.

RESULTS & DISCUSSION : The developmental engine was tested up to its maximum spool speed and the detailed strain data analysis was carried out. Fig 3 shows the strain response of the LPTR blade for the three different strain gage locations with respect to the spool speeds. The temperature variation is also plotted in the same figure.

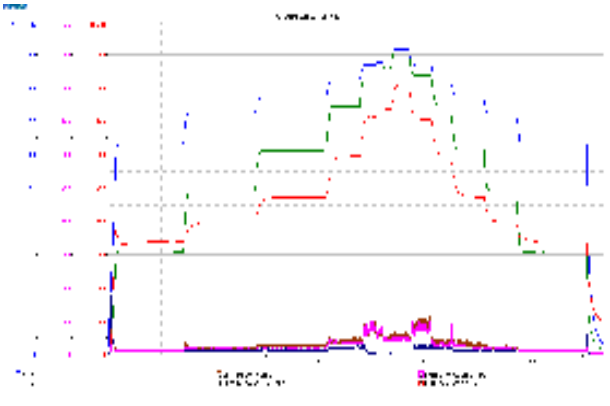

Fig 3 Strain and temperature response of LPTR blades

The test data revealed that there were three considerable cross-overs observed at three different speeds as shown in the Fig 4. The first resonance was the 42 EO cross over at speed of ~ 58% due to the vane pass excitation from the up-stream stage LPT NGV. The next resonance is due to the combined effect of both 9EO and 13 EO crossovers observed at NL ~79.5%. The third resonance is due to the 11EO cross over with one of the blade modes and it is observed at NL speed of 92.8%.

The oscillograph records representative of the strain data obtained from the LPTR blade at different resonance conditions are shown from figures 5 to 7. These records show that the blade response during the resonance in both time as well as frequency domain. Since the strain levels during all the three resonant conditions were within the allowable limits, the engine was successfully operated up to the peak speeds and thereby providing valuable input for online blade health monitoring and engine safety assessment.

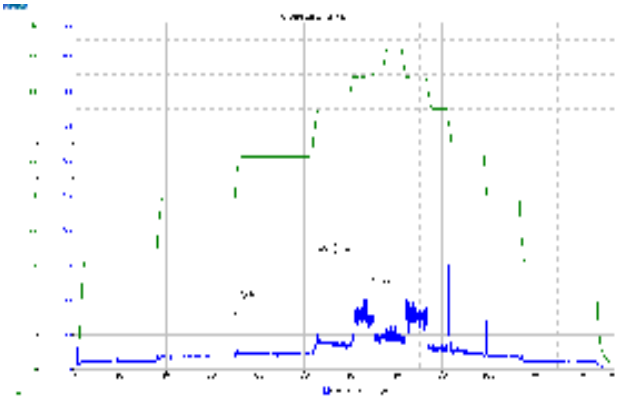

Fig 4 LPTR Blade resonance details W.R.T engine speed

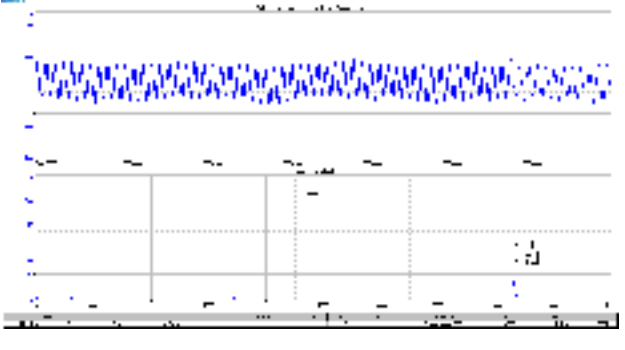

Fig 5 Oscillogram & spectrum of LPTR strain gage signal showing 42 EO Resonance

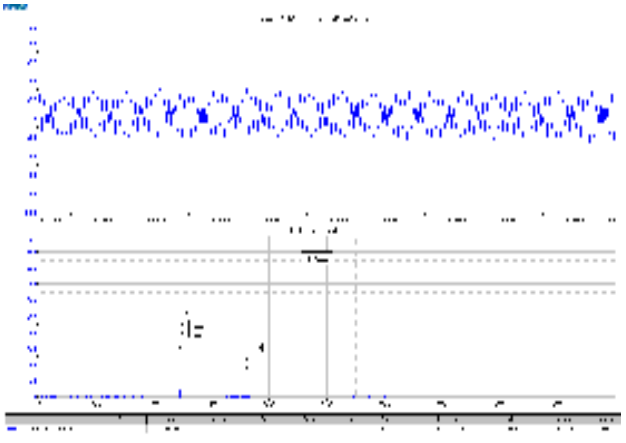

Fig 6 Oscillogram & spectrum of LPTR strain gage signal showing 9EO and 13 EO Resonance

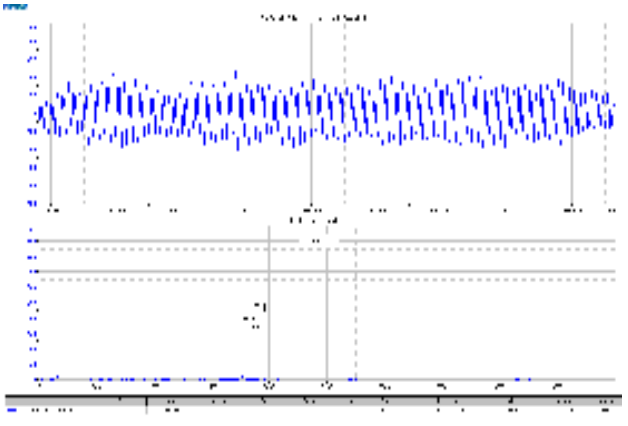

Fig 7 Oscillogram & spectrum of LPTR strain gage signal showing 11 EO Resonance.

The test Campbell diagram of the LPTR blade obtained from the strain data is shown in fig 8. This diagram shows the interference between the blade modes and the three critical crossovers as mentioned earlier. Hence the test Campbell diagram experimentally revealed the critical crossovers encountered during the engine test regime up to the max speeds. The test Campbell diagram was also used for validation of the analytical Campbell diagram.

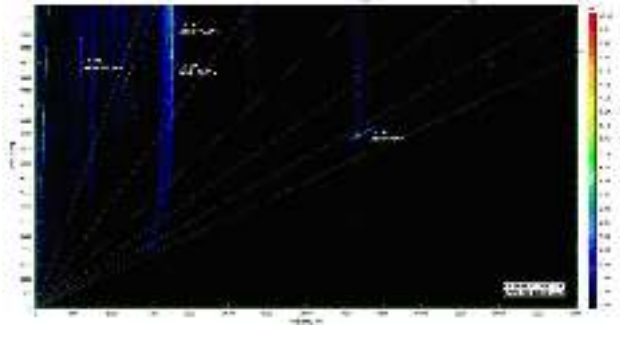

Fig 8 Test Campbell diagram of LPT rotor blade obtained from strain data.

CONCLUSION : The vibratory response of the LPT rotor blade during resonance was experimentally obtained using strain gages. Analysis of the strain data obtained during the engine testing in the test bed indicated that the strain levels experienced by the blade during the three resonant conditions were within the allowable limits. Additionally, the real time strain monitoring gave confidence to test the engine up to its maximum speed with safe margins available for the blade modes at the max operating conditions. The measured LPTR blade temperature was also obtained successfully and was used for correlation of the analytical results and it was as per the estimation. This study was useful in design validation at developmental stage, online engine health monitoring and also helpful in establishing the co relation between the experimental and analytical studies.

ACKNOWLEDGEMENT : The authors are grateful to Director, Gas Turbine Research Establishment, Bangalore, for granting permission to publish this paper. The authors are indebted to the entire GTRE strain gage team; all of whom have contributed to the material covered in this paper.

Fig 8 Test Campbell diagram of LPT rotor blade obtained from strain data.

REFERENCES

1. A.V. Srinivasan., Flutter & resonant vibration characteristics of Engine Blades, Worcester Polytechnic Institute, Worcester, pp 1-7

2. Craig P. Lawson1 and Paul C. Ivey., Turbo machinery Blade Vibration Amplitude Measurement through Tip Timing with Capacitance Tip Clearance Probes, Sensors & Actuators A: Physical, Volume 118, Issue 1, 31st Jan 05, pp 14 - 24.

3. Reshma Khan, Owais Majid Kamili, T.N. Suresh, S.Shylaja, Correlation between FEA and testing for HCF-safety assessment of an aero engine turbine rotor blade, Proceedings of the ASME 2013 Gas Turbine India Conference.

4. V.M.Cardinale, H.R.Bankhead and R.A.Mckay., Experimental Verification of Turbo lading, AGARD Turbine Engine Testing 38p, International Organization; 1981.

5. Dan forth, C.E., "Blade Vibration: Some Key Elements in Design Verification", Journal of Aircraft, Vol. 12, No. 4 , April 1975, pp 333-342.

6. Surface Preparation for Strain Gage Bonding, 1976, B-129, Measurements Group, North Carolina, USA

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THEME :-11

J. C. BOSEEYAM

Electronics, Electrical, Energy & Communication Sciences

Sl No	Title of the Paper	Authors	Page No
1.	COIN BASED MOBILE CHARGER	Ramyashree P Rashmi S & Aarthi V	196- 199
2.	LIFI (LIGHT FIDELITY)	Deeksha V Kademane Cynthia Merlin D.K Harisha.K & Anantha K.P	200 - 203
3.	BLUETOOTH BASED WIRELESS SMART TICKETING SYSTEM	ShaikDilshad & Jahnavi T	203 - 205
4.	ANALYSIS OF SECURITY ISSUES, CHALLENGES AND SOLUTIONS OF WIRELESS SENSOR NETWORKS	L Geetanjali & Nandini N	206 - 213
5.	IMPROVEMENT OF FREQUENCY STABILITY FOR A RING OSCILLATOR	A Manasa Mrs. Lavanya Vaishnavi D A	213 - 215
6.	STUDY ON MOBILE WIRELESS TECHNOLOGY	Seema Kousar Prasadkumar Hatti Balaji.N & Aarti.V	215 - 219
7.	BENEFITS OF WIRELESS ROUTERS	Ms. Sumaiya F Ms. Divya	219 - 223
8.	FARMER FRIENDLY FLYING ROBOT	Sindhu K P & Tejaswini	223 - 224
9.	WATER LEAKAGE AND EXCESS WATER FLOW MONITORING & ALERTING SYSTEM USING SMART IP	Varalakshmi.K.R Prateeksha Prakash Priya Shovna	225 - 230
10.	AMOLED FOR BACKPLANES AND COLOR PATTERNING TECHNOLOGIES – A REVIEW	Veena M & Praveen	230 - 234
11.	BASIC STUDY OF JUNCTION FIELD EFFECT TRANSISTOR (JFET)	Yashika B N & Swati V J	234 - 236

ISSN 2250 - 3978 LILAVATI (PRINT)

COIN BASED MOBILE CHARGER

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The coin based mobile charger provides a unique service to the public with the help of solar power / wind power / grid power .This can be easily installed at any place with ease and the principle can be applied to water dispenser, load weighing, etc

The user has to plug the mobile into one of the adapters and insert a predetermined coin,the charging capacity of the mobile is designed with predetermined values and charging may be continued by inserting more coins. It is compact and light, designed to cater for the growing number of mobile users.

In addition to the above the mobile charging unit can also be used for water dispenser where the quantity of water is controlled by a solenoid operated value which remains open for a predetermined duration to dispense the water and there after the value remains closed stopping the water.

Another application is to weigh a load using strain gauge in a bridge circuit where the values are displayed digitally in milligrams, grams, etc on ALCD screen.

Keywords: Mobile charger, Solar energy, Battery charger, Water dispenser.

The growth of mobile phone market is phenomenal in recent years and the need for charging the mobile battery is required anytime and anywhere. This can be achieved with the help of the grid power or solar power. Some people buy the pre-owned mobile phones that require charging frequently even two or three times a day. We have proposed two way mobile chargers so that we can utilize the sun light during day time grid power in the absence of solar light. In this way we can conserve hydroelectric power supply. Solar chargers convert light energy into DC current for a range of voltage that can be used for charging the battery. They are generally portable but can also be firmly mounted.

In additional to mobile charging two other application are available i.e., water dispenser and load weighing. When we insert a coin there will be 3 options. The first option is for mobile charging, second option is the water dispenser. As water is the basic essence for all living beings we added this facility. Here the water dispensing takes place with the control of the solenoid valve. This valve will remain open for a predefined time through which water is dispensed to the container. After a predefined time the valve remains off. The third option is for weighing the load. The load weighing depends on signal condition circuit. The weighed load is displayed on the ALCD provided. A suitable Arm7 controller is programmed for all the controlling application.

II - Block diagram : The block diagram of the system is shown in the below fig.1 and the three application modules namely (i) mobile charging, (ii) water dispenser and (iii) load weighing are depicted. The system consists of ARM7 LPC2148 Controller, solar Panel, Relay, IR Sensor, ALCD 16x2, battery, load Cell.

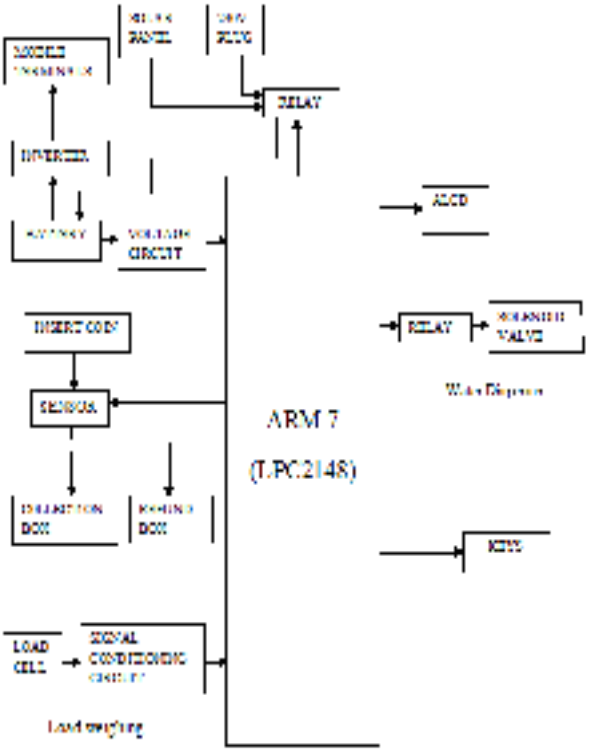

Fig. 1 Block diagram of proposed system

Working: The mobile battery charger starts charging a mobile connected to it when a coin is inserted at the coin insertion slot at the input stage. The command to insert coin will be displayed on the LCD display for the user so as to ensure correct coin insertion. Any other coin, if inserted in the slot will be returned to refund box. A sensor attached to the coin insertion slot accepts the coin into the battery charging unit and start charging the mobile battery for a specific period controlled by the software of the Arm7 Controller. The sensor is an IR sensor and the resistance

of the sensor decreases when IR light falls on it. A good sensor will have near zero resistance in presence of light and a very large resistance in absence of light. When the coin obstruct the IR light falling on a sensor, it sends a pulse to the control unit authorizing the start of charging the mobile battery connected to the device. Two IR sensors are used for positive authentication of the charging process.

For the water dispenser, it works when the relay inbuilt interfacing program counts to '1' the solenoid valve will be turned ON and water will be dispensed. When the counter reads '0' after a specific period of time the solenoid valve turns OFF.

For load weighing, we are using a strain gauge load cell which works on the principle of Wheatstone bridge where the resistance of the load is converted into a voltage and this voltage is expressed in terms of milligrams/grams and is displayed on the ALCD screen.

Salient features of major components:

1. ARM7:

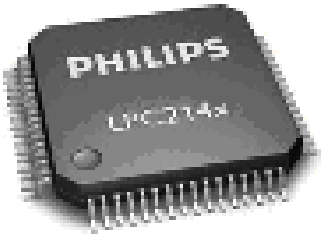

Fig. 1.1 ARM7 IC

ARM7 shown in the fig. 1.1 is a 16/32-bit ARM7TDMI-S microcontroller in a 64 pin package with16 KB on-chip Static RAM, 256 KB on-chip Flash Program Memory, In-System Programming (ISP), Four channel 10-bit A/D converter.

2. ALCD 16x2:

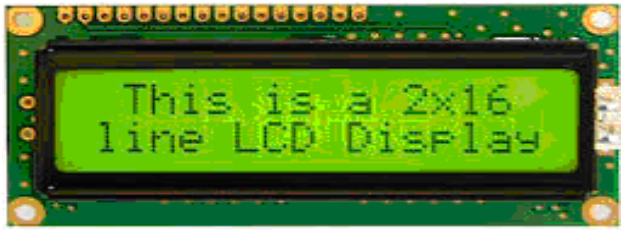

Fig. 1.2 ALCD 16x2

A liquid crystal display shown in fig. 1.2 is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals.

3. SOLAR PANEL:

Fig. 1.3 SOLAR PANEL

Solar panel shown in the fig. 1.3 refers either to a photovoltaic module or to a set of solar photovoltaic (PV) modules electrically connected and mounted on a supporting structure typically ranging from 100 to 320 watts.

4. RELAY:

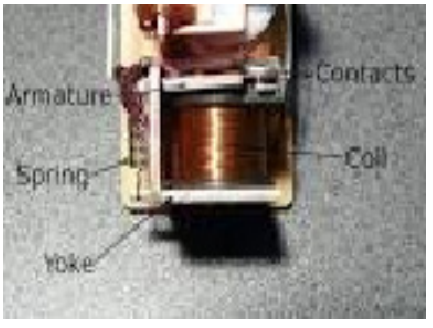

Fig. 1.4 RELAY

Relay shown in the fig. 1.4 is an electrically operated switch to control a circuit by a low-power signal

5. IR SENSOR:

Fig. 1.5 IR SENSOR

IR sensor shown in the fig. 1.5 transmits the signal from the IR transmitter to IR receiver, which in turn connected to a digital comparator.

6. STRAIN GAUGE LOAD CELLS:

It convert the load acting on them into electrical signals. The gauges themselves are bonded onto a beam or structural member that deforms when weight is applied.

7. SIGNAL CONDITIONING CIRCUIT:

It includes amplification, filtering, converting, range matching, isolation and any other processes required to make sensor output suitable for processing after conditioning.

III –FLOWCHART AND ALGORITHM

The flowchart and the algorithm are as shown in the below fig.2.

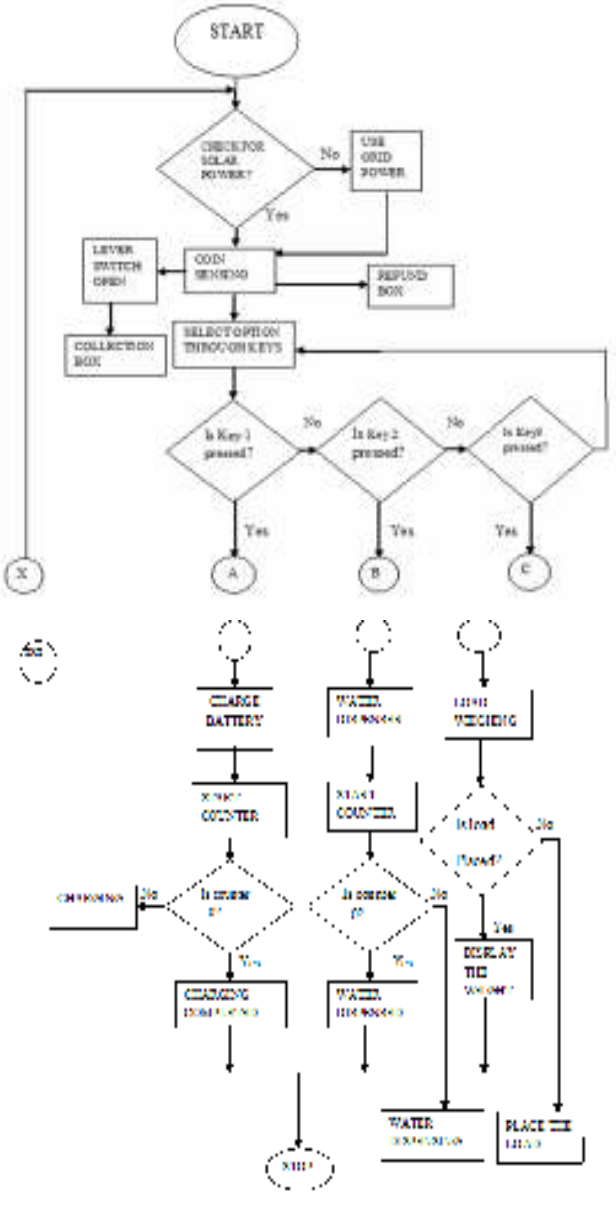

Fig.2 Flow chart of CBMC

ALGORITHM

Step 1: Start.

Step 2: Check for solar power or grid power.

Step 3: The text "PLEASE INSERT THE COIN" will be displayed initially.

Step 4: After inserting coin, the text "PRESS E FOR ENTER" will be displayed.

Step 5: After pressing enter key, the coin will move to the collection box then select different option through keypad.

Step 6: If key1 is pressed charge the mobile battery or if key2 is pressed water is dispensed to the container or if key3 is pressed weigh the load.

Step 7: If no key is pressed go to step-3.

Step 8: After a specified period it will halt the function.

Step 9: End.

IV – RESULTS AND DISCUSSIONS: The proposed prototype model of the system is shown in the below fig.3 and also the figures from 4a to 4h shows the different operations of the system for mobile charging, water dispenser and load weighing.

Fig.3 Proposed Prototype

The results of the prototype is can be performed in three desired functions as mentioned earlier i.e., Mobile charging, Water dispersion and Load weighing on suitable selection of the function.

Before the start of any function it is needed to input a coin. After the insertion of coin desired function is performed based on the key pressed. If no key is pressed after a predefined time the coin comes out.

Execution steps of the proposed prototype:

Step1:

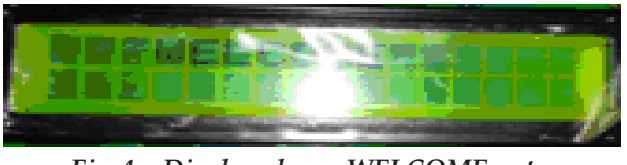

Fig. 4a. Display shows WELCOME note.

Step2:

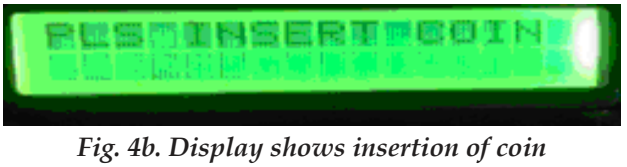

Fig. 4b. Display shows insertion of coin

Step3:

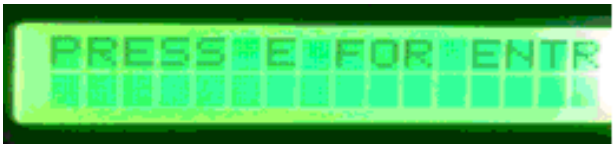

Fig. 4c. Display shows the pressing of ENTER key.

Step4:

Fig. 4d. Display shows the selection of different options.

Step5:

Fig. 4e. Display shows the charging of mobile battery.

Step6:

Fig. 4f. Display shows the water dispenser.

Step7:

Fig. 4g. Display shows the weight of the load.

Step8:

Fig. 4g. Display shows COLLECT THE COIN if no key is pressed.

CONCLUSION AND FUTURE SCOPE : The problem of switching off of phone due to empty battery is faced by everyone .This creates a problem to make important calls when we are away from home or for some business purposes. To overcome this problem and to make dead battery problem free we propose this coin based mobile charger where we can charge the phone by inserting a coin. By this method we can help people to charge their phone and at the same time two more facilities are provided water dispenser and load weighing.

FUTURE ENHANCEMENTS

1. After a mobile battery charging process is completed, a beep sound is given to the user to indicate that charging process is completed.

2. Instead of coin, a RFID punch card can be used.

3. In addition to the battery charging, currency charge for the phone can also be done.

Acknowledgment :

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REFERENCES

[1]. Bedford , B. D.; Hoft, R. G. et al. (1964). Principles of Inverter Circuits New York: John Wiley & Sons, 1964.

[2]. Pulvirenti, F. Milazzo, P. Ursino, R, Charger power switch for mobile phones, Analog and Mixed IC Design, 1997. Proceedings. 1997 2nd IEEE-CAS Region 8 Workshop,12-13 Sep 1997, Pg 97 - 100.

[3]. Weidong Xiao, William G. Dunford, Patrick r. Palmer and Antoine Capel, "Regulation of Photovoltaic voltage," IEEE Trans. Industrial Electronics, vol. 54 no.3, pp. 1365-1373, June 2007.

[4]. Barth, H. Schaefer, C. Schmidla, T. Norman, H. Kiel, M. van der Broeck, H. Yurdagel, Y. Wieczorek, C. Hecht, F. Sauer, D. U., Development of a universal adaptive battery charger as an educational project ,Power Electronics Specialists Conference, 2008. PESC 2008.IEEE , 15-19 June 2008, Pg 1839 – 1845.

[5]. Pastre, M. Krummenacher, F. Robortella, R. Simon-Vermot, R. Kayal, M. EcolePolytech. Fed.de Lausanne, Lausanne, A fully integrated solar battery charger Circuits and Systems and TAISA Conference, 2009. NEWCAS-TAISA '09. Joint IEEE North-East Workshop.

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LIFI (LIGHT FIDELITY)

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Light Fidelity or LiFi is a visible light communications (VLC) system running wireless communications, travelling at very high speeds and it is bidirectional.The term LiFi was coined by University of Edinburgh by the professor Harald Haas and the Technology used in the LiFi is LED(Light Emitting Diode), where light bulbs are used to enable data transfer, boosting speeds upto 224GB(gigabits) per second,Here the light bulbs that could act as a wireless routers .

If we consider the difference between the LiFi(Light fidelity) and Wifi(wireless Fidelity), LiFi transfers and connects much more faster than that of WiFi in which the LiFi uses visible light waves during data transfer whereas the WiFi uses shorter than that of radio waves and longer than that of micro waves for data transfer.

The extraordinary feature of LiFi is it can work 100 times faster than standard WiFi and LiFi is visible to eyes. Applications of LiFi are it can be used in electromagnetic sensitive areas such as Aircraft cabins, Hospitals, Nuclear power plants also it can be used in normal areas like educational organisations, banks, etc.,

Advantages of LiFi is due to its shorter range it is more secured then WiFi so that it can't be hacked by anyone and the Disadvantages of this LiFi is it cannot transfer or pass through the walls hence the continuous light source is required to transfer the data.In LiFi all audio, video and Internet streaming can be obtained successfully,easily and fastly in high quality.

"Light Fidelity or LiFi is a visible light communications (VLC) system running wireless communications travelling at very high speeds up to 224 Gigabits per second"

The term LiFi was coined by university of Edinburgh professor "Haraldhaas"

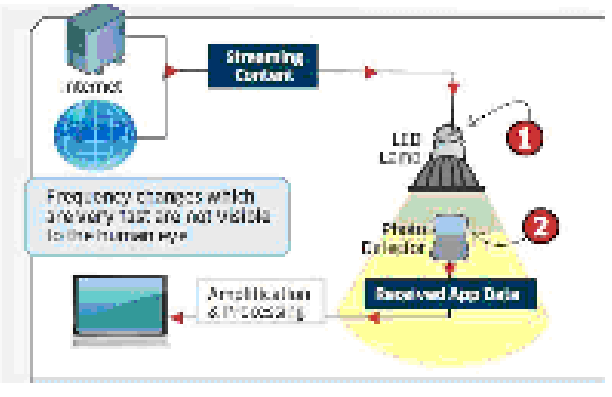
The Lifi uses common household LED (Light Emitting Diodes) Light bulbs to enable data transfer, boasting speeds of upto224 gigabits per second[1-6].

Technology used in LiFi:-

This LiFi uses common household LED (Light Emitting Diode) Light bulbs to enable data transfer, boasting speeds of up to 224 Gigabites per second.

The technology of LiFi uses a visible light communication (VLC), a medium that uses visible light between 400 and 800 terahertz (THZ). It works basically like an incredibly advanced form of morse code just like switching a torch on and off according to a certain pattern can relay a secret message, Flicking an LED on and off at extreme speeds can be used to write and transmit things in binary code[7-13].

How the Lifi works:



LiFi and WiFi are quite similar as both transmit data electromagnetically.

However, WiFi uses radio waves while LiFi runs on visible light.

LiFi is a visible light communications (VLC) system. This means that it accommodate a photo-detector o receive light signals and a signal processing element to convert the data into 'stream-able' content.

An LED light bulb is a semiconductor light source meaning that the constant current of electricity supplies to an LED light bulb can be dipped and dimmed up and down at extremely high speeds. Without being visible to the human eye.

For example, data is fed into an LED light bulb (with

signal processing technology), it then sends data (embedded in it beam) at rapid speeds to the photo detector (photodiode).

The tiny changes in the rapid dimming of LED bulbs is then converted by the 'receiver' into electrical signal.

The signal is then converted back into a binary data stream that we would recognise as web, video and audio applications that run on internet enables devices.

Differences between LiFi and WiFi

• LiFi signals cannot pass through walls, so in order to enjoy full connectivity, capable LED bulbs will need to be placed throughout the home

• Where WiFi can pass through the walls but the speed of WiFi is comparatively lesser then that of LiFi

• LiFi can transfer 100 times more faster data then that of the Wifi

• WiFi uses the radio waves of the electromagnetic spectrum, Where as the LiFi uses visible light of the electromagnetic spectrum

• Lifi can be used in electromagnetic sensitive areas, whereas WiFi cannot.

Advantages of LiFi:

• Due to its short range, the LiFi is fully secured and can't be hacked by anyone.

• Due to use of visible light the bandwidth of the visible light will be 10000 times more than that of the other waves hence it can't be mixed or collide the data with any other wavelengths.

• LiFi has low implementations and low costs.

• LiFi can be used in the electromagnetic sensitive areas.

• It is safe for humans.

• Lifi can be used to transfer the data very fastly and to transfer big files easily with other devices securely (upto 224 gigabites per second)

• LiFi can be used for the mass transfer of data at a single time without any delays or obstacles.

• Immediate data can be connected or transferred once the LED switched on.

• LiFi can be used for underwater data transfer.

Disadvantages of LiFi:

• The LiFi cannot be used without presence of light, it requires continuous light arrangement for the data transfer.

• LiFi is one of the short ranged technology, hence data cannot be transferred to the long ranges with a single LED.

• LiFi cannot be used in open wide areas.

• During day time also the LED must be kept on to transmit data through LiFi.

Applications of LiFi:

The main application of LiFi is it can be used in Electromagnetic sensitive areas like:-

1) Aircrafts cabins: - Inside an aircraft cabins or aeroplanes even nowadays its required to switch off a cell phones ,due to interruption of the other waves with the aircraft signals waves and may cause disturbance in interaction of pilots with their respective executives or guides. But using LiFi gives relief for the switch off problems of cell phone during journey of passengers in airlines and LiFi gives opportunity of using the cell phones inside an aircraft without any interruptions.

2) Military:-Military having many confidential data which must be maintained secretly and it should not reach or leak out with any other or foreign persons, hence by using LiFi, due to its short range there will be no problem of hacking and the secret of data will be maintained securely, successfully and safely

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3) Hospitals:- In hospitals some wards or areas will be having the electromagnetic condition, hence by using the LiFithere,the data will be transferred without any harm to the patients because LiFi is visible light wave and it is human friendly.

4) Educational Institutions:- In educational institutions we can observe many people access a network at a single time, to avoid the lagging and slow transfer of the data through networks, the lifican be used where it transfer the data in a large mass with high speeds.

Scope or Future of LiFi:

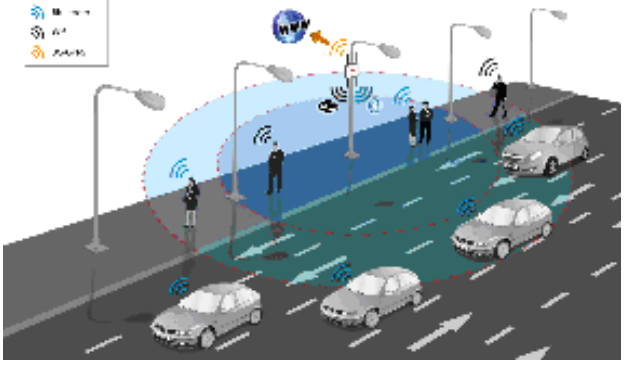
In November 2014, LiFi pioneers pure LiFi joined forces with French lighting company Lucibel aiming to bring out LiFi enabled products, by the end of 2015.

Pure LiFi already have two products on the market, Li-Flame ceiling unit to connect to an LED light fixture and Li-Flame desktop unit which connects to a device via USB, both aiming to provide light and connectivity in one device.

Plus, with faster connectivity and data transmission it is an interesting space for business. The integration of internet of things, devices and LiFi will provide a wealth of opportunities for retailers and other business alike.

For example, shop owners could transmit data to multiple customer's phones quickly, securely and remotely.

LiFi is reportedly being tested in Dubai, by UAE based telecommunications provider Du and Zero 1. DU claims to have successfully provided internet, Audio and Video streaming.



Conclusions: Over a LiFi connection.The possibilities are numerous and can be explored further, if this technology can be put into practical use, Every bulb can be used something like a WiFi hotspot to trans-

mit wireless data and we will proceed towards the cleaner, greener, safer and brighter future.

The concept of LiFi is currently attracting a great deal of interest, not least because it may offer a genuine and very efficient alternative to radio based wireless. As a growing number of people and their many devices access wireless internet, the air waves are being increasingly clogged, making it more and more difficult to get a reliable, high speed signal.

This may solve issues such as the shortage of radio frequency bandwidth and also allow internet where traditional radio based wireless isn't allowed such as aircraft or hospitals. One of the short comings however is that it only work in direct line of sight.

References:-

1. Harald Haas. "Harald Haas: Wireless data from every light bulb". ted.com.

2. Tsonev, Dobroslav; Videv, Stefan; Haas, Harald (December 18, 2013). "Light fidelity (Li-Fi): towards all-optical networking". Proc. SPIE. Broadband Access Communication Technologies VIII. 9007 (2). doi:10.1117/12.2044649.

3. Sherman, Joshua (30 October 2013). "How LED Light Bulbs could replace Wi-Fi".Digital Trends. Retrieved 29 November 2015.

4. "Global Visible Light Communication (VLC)/ Li-Fi Technology Market worth $6,138.02 Million by 2018". MarketsandMarkets. 10 January 2013. Retrieved 29 November 2015.

5. Coetzee, Jacques (13 January 2013). "LiFi beats Wi-Fi with 1Gb wireless speeds over pulsing LEDs". Gearburn. Retrieved 29 November 2015.

6. Condliffe, Jamie (28 July 2011). "Will Li-Fi be the new Wi-Fi?". New Scientist.

7. Li-Fi – Internet at the Speed of Light, by Ian Lim, the gadgeteer, dated 29 August 2011

8. "Visible-light communication: Tripping the light fantastic: A fast and cheap optical version of Wi-Fi is coming". The Economist. 28 January 2012. Retrieved 22 October2013.

9. "The internet on beams of LED light". The Science Show. 7 December 2013.

10. "PureLiFi aims at combating cyber crime". Ads Advance.

11. "Li-Fi: A green avatar of Wi-Fi". Livemint. 9 January 2016. Retrieved 24 February2016.

12. "The Future's Bright - The Future's Li-Fi". The Caledonian Mercury. 29 November 2013. Retrieved 29 November 2015.

13. Haas, Harald (19 April 2013). "High-speed wireless networking using visible light". SPIE Newsroom. doi:10.1117/2.1201304.004773.

14. Tech world by IDG (www.techworld.com)

15. LiFi research and and development centre(www.LiFi-centre.com)

16. Harald Haas TED talk about wireless data from every light bulb (TED.com)

17. Pdf by Study mafia.org (http://studymafia.org/li-fi-technology-seminar-ppt-with-pdf-report/)

BLUETOOTH BASED WIRELESS SMART TICKETING SYSTEM

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Millions of bus and rail passengers across India will in future be able to pay for their travel using their mobiles and get their tickets instantly with the introduction of Bluetooth enabled smart ticketing device kept at every bus stop to make journeys easier for passengers travelling across different types of transport or on different operators. Smart ticketing offers more convenience and flexibility for passengers allowing seamless connections different modes of transport and helping reduces ticket queues and crowding at transport. The smart ticketing revolution is helping tobuild a modern affordabletransport network that provides better journeys for everyone. By working together,industry,city regions and government have been able to ensure more and more people use smart ticketing to get around. We are determined to continue driving source so passengers get quickly and simple journeys that they want and deserve. The counter will be installed at each bus stop for the ease of the passengers, it helps to solve the problems like change issues and commentator queue for the ticket. The ticketing booking can be done by using our own mobile phones and passengers who do not have the android mobile phones can get tickets directly from the counter. We can also get daily pass.

Today's technology has changed the entire life of a human. Specifically since last decade, the communication technology has evolved exponentially. Mobile and handheld devices had targeted the business world for communication. Those devices are easy to use, cheaper and faster. Also don't need any high range of infrastructure. Hand held devices works on either radio, Bluetooth or Wi-Fi as transmission technology[1]. Bluetooth enabled devices are useful, since they don't need line

of sight to interact with other device. These devices used to send MMS or data instantly.

We can use mobile phones with advances in communication technologies like Bluetooth. A system will use such a wireless technology in order to buy a ticket on a station/platform via mobile phone. So, there is no need to go to booking center, stand in a queue and get the tickets. This will increase the business of railways.

So, we are proposing a mobile ticketing system, which will remove all hurdles to buy a ticket. The ticketing system will have three components. A mobile application, a server side application linked with the central database and an administrator interface which will reside on the server. The user can book tickets and execute transactions using the mobile application. The central distributed database which can be accessed at all the railway stations will keep a tab on the tickets issued and maintain a database of users and their purchase histories. The payments can be managed by integrating the mobile application with payment gateways to process credit card and direct bank account transactions. In the initial stages, we will use recharge coupons.

Presently the only system which has been fully implemented in India is the one in which railway tickets are bought by standing in queues near the ticket window. However they are very inefficient and can't be scaled without increasing the resources used to maintain them. Systems like smart cards have been implemented with kiosks to buy the tickets, but even they lead to overcrowding as the customer needs to be in close physical proximity to the vending kiosk. The next best possible solution is to give the traveller a facility to book a ticket from the mobile phone which is used, so commonly nowadays by all the consumers

Smart ticketing system means: To help make using public transport that bit easier for everyone,Smart Ticketing is being introduced to help give u a more convenient place where you can purchase and top-up travel cards.

SMS-based Ticketing : In this type of systems, the tickets are booked by sending a message to a special number by specifying the source and destination name, which in response sends you the ticket number and the time as an SMS .

The pitfalls in the systems are, first, it is possible to buy a ticket even when you are travelling in the train, and for example, if you are travelling from Borivalli to Church gate, it is possible to buy a ticket, say from Andheri to Church gate, thus saving money from Borivali to Andheri's fare. Thus such type of cheating is possible in this system. Second, moreover the tickets are not fully authenticated therefore forging of the tickets is possible in this method. It is difficult to differentiate a valid SMS ticket from a forged one.

Our proposed system is based around a simple concept - making railway tickets available to the end user using mobiles and technologies like Bluetooth or Wi-Fi[2]. Implementing a mobile railway ticket self-serving type of system should alleviate most of the current problems like huge lines and waiting times. The system will include all the stages including conception, implementation and deployment. As it is evident from the fact that the number of mobile users is increasing exponentially every single day, this aims to serve this growing market segment.

The main objective is to demonstrate the viability of a Bluetooth based mobile railway ticketing system and to develop and deploy a working prototype. The primary objective of this is to create an eco-friendly, financially profitable, easy to use, intuitive mobile ticketing system which can be used in various scenarios like buses, shopping malls, cinemas etc.

This is how the system is supposed to work: The railway ticketing area will be Bluetooth or Wi-Fi enabled. A Bluetooth or Wi-Fi server called as mobile grid server will be deployed there to connect to the customer's mobile phone and issue m-tickets.

Whenever the user wants a ticket issued, he goes near the ticketing area, fires up the mobile application and pairs or authenticates himself to the server using Bluetooth or Wi-Fi.

If the application is in use for the first time, he can enter his personal details which will be stored in the database. Also, an application ID will be generated based on the unique IMEIInternational Mobile Equipment Identity number or Bluetooth ID which will also be stored in the database.

Using the mobile interface, he can get an m-ticket issued by selecting the destination station and other details. The issued ticket details are stored in the server along with the unique application ID to identify the user. This simple step can help prevent fraud and makes the system foolproof [3].

Ticket examiners can be equipped with a GPRS enabled mobile phone which will connect directly to the central database. They can enter the ticket number into a WAP site or a mobile application and view

the application ID to which it has been issued, the customer details and the journey details.We are going to offer this facility for all mobile phone service providers so that their users benefit out of this[4].

The payments can be handled by integrating a micro-payment system within the application. The payment system can be integrated with recharge coupons, credit cards and bank accounts and the ticket charge will be automatically debited from the user balance.Each mobile client should support Bluetooth and J2ME environment.

It connects to the mobile grid on arriving at the station via Bluetooth.The client can download the application and register with the server for service. Make a request to mobile grid for ticket booking.It can issue and view a ticket from mobile grid after payments.Payments can be done using credit cards or recharge coupons.

The main objectives of this project are

1. Automatic ticketing.

2. Direct cash fare collection is avoided One of the first microprocessor-controlled cash registerfor Mcdonalds[5]

3. Usage of smart card technology[6].

Conclusion: With this proposed m-ticketing system, this aimed to prove that a mobile railway ticketing system using Bluetooth is a viable option. We have developed a working prototype which is scalable and can easily handle large amounts of traffic. During the testing phase, we have obtained favourable results. In the future, we can extend this ticketing system to include buses and trains. The mobile payments system can be used for bill payments and to pay for movie tickets as well. It can also be used for retail point-of-sales transactions and for simple mobile banking.

Moreover, we can reduce the waiting time of the passengers and can reduce long waiting queues.

References:

[1] In 1997 by Jim Kardach , Frans G. Bengtsson's historical novel The Long Ships

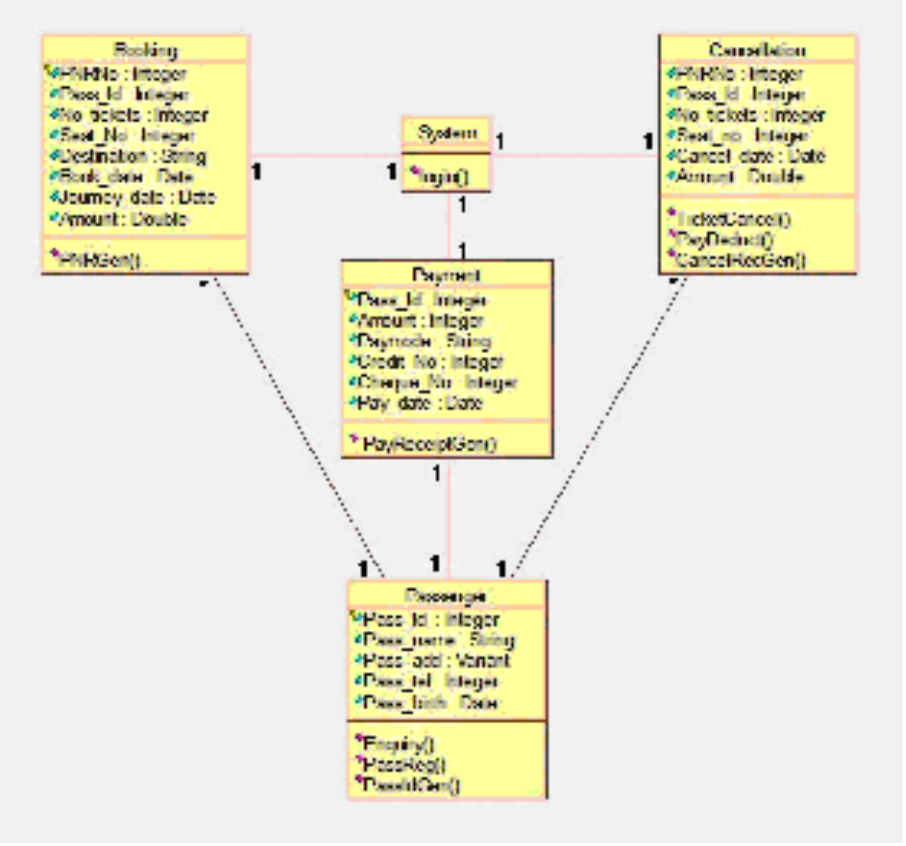
[2]International Journal of Scientific and Research Publications, Volume 5, Issue 7, July 2015

[3] The first edition of Fraud Risk Management, Mia Campbell, on behalf of the Fraud Advisory Panel.

[4]The Hindu business line newspape,new Delhi , Jan.30

[5]William Brobeck and Associates in 1974,Wikipedia.

[6] U.S. Department of Defense ,Common Access Card



Reference fig 1

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ANALYSIS OF SECURITY ISSUES, CHALLENGES AND SOLUTIONS OF WIRELESS SENSOR NETWORKS

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Wireless sensor networks are one of the mostexciting and challenging research domains of our time. They have a great potential to be deployed in wide mission-critical applications, such as military monitoring, health care as well as civilian applications. The highly sensitive nature of collected information makes security in these special networks a crucial concern. Owing to the hostile nature of their deployment environments, the wireless medium and the constrained nature of resources on the tiny sensor devices used in such networks, security poses more severe challenges compared to the traditional networks. As attacks to any part of the hardware or software may gives significant damages to these networks. Indeed, the development of effective and efficient defense mechanisms to those attacks must be addressed at every stage of the system design.

This paper tends to outline the major aspects of wireless sensor networks security. We discuss some security attacks and their classification mechanisms. Some related works and proposed schemes concerning security in these networks are also discussed. And finally we conclude the paper delineating the research challenges and future trends toward the research in wireless sensor network security.

Index Terms—wireless sensor networks, network attacks,security design challenges, symmetric and asymmetric cryptography.

Wireless sensors networks have emerged as modernday technology under the push of recent technological advances in Micro Electro-Mechanical Systems (MEMS) technology, wireless communications and digital electronics [1]. Sensor node is a smart, tiny, self-organizing low cost multi-functional device, equipped with battery, radio communication, microcontroller and sensors. It has very limited processing capability, battery power, and memory and also a restricted field of sensing [2] [3] [4]. A wireless sensor network (WSN) is application-specific, designed to monitor and control physical environments from remote locations with better accuracy. Therefore, multiple spatially distributed sensors nodes collaborate and in-network process collected information. They are connected to each other through short range wireless links, used as an infrastructure to forward the collected report to an authorized user-end over base station [1] [5] [6] [7].Indeed, WSNs gaining rapid worldwide attention becauseof their potentially low cost solutions to a variety of real-world challenges. Many other favoring factors of WSNs use are self-organizing, self-healing, having dynamic network topology to cope with node malfunctioning and failures, mobility of deployed nodes, unattended operation, ability to withstand bad environmental conditions, heterogeneity of nodes, scalability, at the time of deployment and after deployment, as well easy use [2] [6].

WSNs have the potential to be deployed in mission-critical applications such as military surveillance, or medical applications, e.g., Body Area Network (BAN) [8], where several low-cost nodes are attached to the human body to collect data and is periodically transferred to a sink node for further processing. Sink nodes are also often designed to work as gateways to transfer data to health systems residing in the cloud. These BANs could be deployed in hospitals or at homes for ambient and assisted living monitoring elderly. Patient data is often categorized as high sensitive information that must be transferred in an encrypted form and nobody can inject faked data as this can have serious impacts. Indeed, securing WSNs is of paramount importance in order to protect the sensitive data involved. This necessity of effective and efficient security techniques to secure sensor networks has attracted a great deal in the recent years.

The rest of the paper is organized as follows. In section II we summarize the major design obstacles for the sensor networks security. In section III the requirements of WSNs security are listed. The major threats and attacks against these networks are categorized in section IV, and we outline the corresponding defensive measures in section V. Finally, section VI points out our future observation and concludes the paper.

II. MAJOR DESIGN CHALLENGES : WSNs have many constraints from which new challenges stand out. The extreme resource limitations of sensor nodes and unreliable communication medium in unattended environments make it very difficult to

directly employ the existing security approaches on a sensor platform due to the complexity of the algorithms [2] [4] [6] [8]. Indeed, the understanding of these challenges within WSNs provides a basis for further works on sensor networks security.

A. Very Limited Resources : WSNs pose unique challenges because of the strict resource constraints on each individual sensor. Embedded devices with very limited resource must implement complex, distributed, ad-hoc networking protocols. Size reduction of sensor nodes is essential to cut costs and create moreapplications. As physical size decreases, so does energy capacity. The underlying energy constraints end up creating computational and storage limitations that lead to a new set of design issues. For example, Zigbex sensor type HBE has an 8-bit, 7.372 MHz ATmega128L RISC MCU with only 4 Kb SRAM, 128 Kb flash memories and 512 Kb flash storage [5]. With such limitations, the software built for the sensor must also be quite small.

B. Unreliable Communication : Due to the wireless medium that is inherently broadcast in nature, packets may get damaged due to channel errors and conflict will occur, or dropped at highly congested nodes in the network. As well, an attacker can launch Denial-of-Service (DoS) attacks without much effort, etc. Furthermore, the multi-hop routing, network congestion and node processing can lead to greater latency in the network, thus making it difficult to achieve synchronization among sensor nodes. The synchronization issues can be critical to sensor security where the security mechanism relies on critical event reports and cryptographic key distribution.

C. Unattended Operations : Sensors nodes interact closely with their physical environments, process and fuse data, and eventually create new knowledge that must be presented to an end-user. These tiny nodes are often deployed in open, large-scale and even hostile areas. Potential issues range from accidental node failure to physical capture. Getting secure data in harsh environment from physical wireless sensors to an end-user is not a simple task due to these severe constraints.

III. WSN SECURITY GOALS : In this section, the main security goals for WSNs are summarized [4] [6] [9] [10] [11].

A. Data Confidentiality : It is the ability to hide message from a passive attacker and is the most important issue in network security. Sensor nodes may communicate highly sensitive data, such as key distribution, so it is extremely important to build a secure channel in a WSN. Moreover, sensor identities and public keys should also be encrypted to some extent to protect against traffic analysis attack.

B. Data Integrity and Authentication : Integrity refers to the ability to confirm the message has not been tampered or altered while it was on the network. An adversary is not just limited to modifying the data packet. It can change the whole packet stream by injecting additional packets. So the receiver needs to ensure that the data used in any decision-making process originates from the correct source. Indeed, data authentication allows a receiver to verify that the data really is sent by the claimed sender.

C. Data Availability : Availability is of importance for maintaining an operational network. It is the ability of a node to utilize the resources and the network is available for the message to move on.

D. Data Freshness : It ensures that data contents are recent and there no replay of any old content. This requirement is especially important when there are shared-key strategies employed in the design and need to be changed over time.

E. Self-Organization : WSN is typically an ad-hoc network, which requires every sensor node be independent and flexible enough to be self-organizing and self-healing according to different situations. There is no fixed infrastructure available for the network management, so nodes must their selves adapt the topology and deployment strategy.

F. Time Synchronization : Many WSN applications demand some form of time synchronization for execution. A more collaborative sensor network may require group synchronization for tracking applications.

G. Secure Localization : Sensors may get displaced while deploying them or after a time interval or even after some critical displacement incident. The utility of a WSN will rely on its ability to accurately and automatically locate each sensor in the network.

IV. THREATS AND ATTACKS IN WSNS : An attacker in WSNs can be categorized as illustrate in Fig 1, based on the following characteristics: goals, performer, and layer wise.

A. Goal-Oriented Attacks: We distinguish passive and active attacks [10] [11] [12].

Passive Attacks : These attacks are mainly against data confidentiality. An attacker monitors unencrypted traffic and looks for sensitive information that can be used in other types of attacks. Passive attacks include traffic analysis, monitoring communications, decrypting weakly encrypted traffic, and

capturing authentication information. Passive interception of network operations enables adversaries to see upcoming actions. Such attacks result in the disclosure of information or data files to an attacker without the consent or knowledge of the user.

Active Attacks : In active attacks, the attacker is no longer passive but takes active measures to achieve control over the network. Some examples of active attacks are DoS, modification of data, black hole, replay, sinkhole, spoofing, flooding, jamming, overwhelm, wormhole, fabrication, Hello flood, node subversion, lack of cooperation, modification, node subversion, man-in-middle attack, selective forwarding and false node.

B. Performer-Oriented Attacks : Another category in attacks on WSNs can be either outside or inside attacks [13] [14] [15].

Outside Attacks : Outside attacks may cause passive eavesdropping on data transmissions, as well as can extend to injecting bogus data into the network to consume network resources and raise Denial of Service attacks.

Inside Attacks : Inside attackers can damage the network stealthily since they can avoid our authentication and authorization because they are legitimate nodes of the native network and have access to the network information, and it is not easy to expect their attack patterns. Inside attackers can launch various types of attacks, such as modification, misrouting, eavesdropping or packet drop. This last attack is tricky to counter, because for a particular packet drop, we cannot distinguish whether it is dropped by an attacker or a result from collision or noise. This attack suppresses the important information reaching the base station which significantly degrades network performance, such as packet delivery rate due to their repeated packet drops. There are several types of packet drop attacks such as blackhole, grayhole and on-off attacks. This is a serious threat for many applications, such as military surveillance system that monitors the battlefield and other critical infrastructures.

C. Layer-Oriented Attacks : WSNs are organized in layered form. This layered architecture makes these networks vulnerable to various kinds of attacks.

Physical Layer Attacks : Physical attacks on WSNs range from node capturing to the jamming of the radio channel [16] [17] [18]. Physical attacks on WSNs availability are even more difficult to prevent than software attacks, because of the lack of physical control over the individual nodes. Jamming is one of the most important attacks at physical layer, aiming at interfering with normal operations. An attacker may continuously transmit radio signals on a wireless channel. An attacker can send high-energy signals in order to effectively block wireless medium and to prevent sensor nodes from communicating. This can lead to Denial-of-Service attacks at this layer.

Data Link Layer Attacks : The functionality of link layer protocols is to coordinate neighboring nodes to access shared wireless channels and to provide link abstraction to upper layers. Attackers can deliberately violate predefined protocol behaviors at link layer. For example, attackers may induce collisions by disrupting a packet, cause drain of sensor node energy by repeated retransmissions, or intercepting and examining messages in order to deduce information from patterns in communication. This can be performed even when the messages are encrypted and cannot be decrypted, or even cause unfairness by abusing a cooperative MAC layer priority scheme [15] [18] [19].

Network Layer Attacks : The network layer of WSNs is vulnerable to the different types of attacks, such as DoS attacks that are aimed at complete disruption of routing information, and therefore the whole operation of ad-hoc network. A sinkhole attack tries to lure almost all the traffic toward the compromised node, creating a metaphorical sinkhole with the adversary at the centre.Also if an attacker captures a single node, it is sufficient for him to get hold of the entire network. Malicious or attacking nodes can however refuse to route certain messages and drop them [13] [17] [21].

Spoofed, Altered, or Replayed Routing Information are the most direct attacks against a routing protocol in any network, are to target the routing information itself while it is being exchanged between nodes. An attacker may spoof, alter, or replay routing information in order to disrupt traffic in the network.

Transport Layer Attacks : An attacker may repeatedly make new connection request until the resources required by each connection are exhausted, or reach a maximum limit. It produces severe resource constraints for legitimate nodes [14] [21].

Application Layer Attacks : Different type of attacks can be carried out in this layer, such as overwhelm, repudiation, data corruption and malicious code. In overwhelm attack, an attacker might overwhelm network nodes, causing network to forward large volumes of traffic to a base station. This attack consumes network bandwidth and drains nodes energy [19] [22].

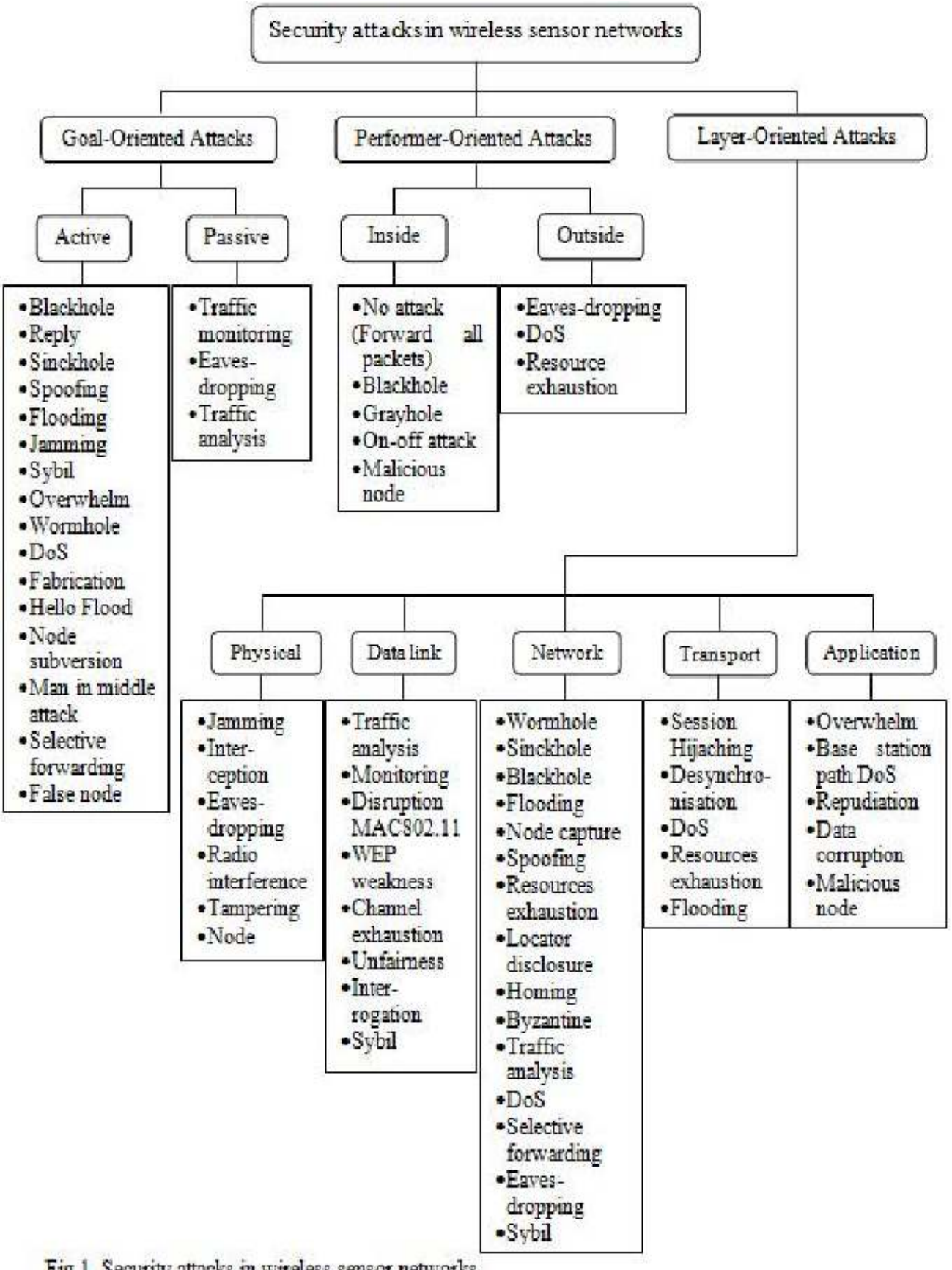

Fig.1. Security attacks in wireless sensor networks

V. BASIC SECURITY SCHEMES IN WSNS : To address the kernel security issues in WSNs, we talk about cryptography and its applicability. Basically, the major challenge for employing any efficient security scheme in WSNs is created by the size of sensors, consequently the processing power, memory and type of tasks expected from the sensor nodes, as well as the limited communication capacity [12] [23]. For secure transmission of various types of information over sensor networks, several cryptographic techniques are used: symmetric key ciphers and asymmetric key ciphers. The security of asymmetric cryptography depends on the difficulty of a mathematical problem and the resulting algorithm consumes considerably more energy than symmetric key ciphers, which are constructed by iteratively applying simple cryptographic operations.

There is currently enormous research in the field of WSNs security. Many researchers have provided security solutions by using symmetric key cryptography. We give some of the commonly used to achieve security goals.

A. Symmetric Cryptography in WSNs : The idea of the symmetric cryptography is to load secret information in the sensor nodes before their deployment in the network. This secret information may be the secret key itself or auxiliary information that helps the sensor nodes to derive the real secret key. With this secret key, nodes can securely communicate [23]. The main disadvantage of this solution is that compromising one node (access to the pre-loaded key) might lead to compromise the entire network. To overcome this limitation, several researchers propose schemes that establish pairwise keys rather than a unique global key.

Perrig et al. propose SPINS, a key management protocol that relies on a trusted base station to distribute keys. SPINS contains two parts: SNEP (Secure Network Encryption Protocol) and µTESLA (micro time efficient streaming loss tolerant authentication). This protocol offers many security properties like semantic security, data authentication, replay protection, data freshness, and low communication overhead, and it is optimized for resource constrained and wireless communication [24]. SPINS which is a three-part approach providing for an authentication routing protocol as well as a three-part approach providing authenticated streaming broadcasts as well as two-party data authentication, data confidentiality, and freshness [25].

In [24] TinySec (Link Layer Security Architecture), TinySec provides authentication service and it is lightweight security package. It is included into the official TinyOS release. TinySec supports two special security options: authenticated encryption (TinySecAE) and authentication only (TinySecAuth).

In [26], the authors propose LEAP (Localized Encryption and Authentication Protocol); a key management protocol intended to support a several communication patterns. In this protocol, each node stores four types of keys: individual, pairwise, cluster, and group. An individual key is a key shared between a node and the base station.

A pairwise key is shared between a node and each of its neighbors. A cluster key is a key shared between a node and all neighboring nodes. A group key is a key common to the entire network. The individual key is preloaded. After deployment, neighboring nodes establish pairwise keys. They authenticate themselves using a pre-deployed key which is erased as soon as pairwise keys are established. To establish cluster keys and the group key, nodes use broadcasts and message relaying. The protocol uses µTesla [24] to authenticate broadcasts.

In [27], the authors propose BROSK (BROadcast Session Key negotiation protocol). With BROSK every node broadcasts a message containing its nonce. So, every two neighbouring nodes that hear each other can compute a common key which is a function of their two nonces. Neighbouring nodes authenticate themselves with a pre-deployed key which is supposed to be unreachable in the case the node is captured.

In [28], Blon describes an optimal class of symmetric key generation systems solution. In this solution, some of the possible link keys in a network of size N are represented as a $(\lambda+1) \times N$ key matrix. The scheme stores small amount of information in each sensor node, so that some pair of nodes can calculate corresponding field of the matrix, and uses it as the link key. This solution is λ-secure, meaning that keys are secure if no more than λ nodes are compromised. Another λ-secure solution is presented in [29] and called Polynomial-based key pre distribution scheme. This scheme distributes a polynomial share to each sensor. So, each sensor node stores a polynomial with (λ+1) coefficients and every pair of sensor nodes can establish a key using the property of symmetry of polynomials. The solution is λ-secure, meaning that coalition of less than λ+1 sensor nodes, knows nothing about pairwise keys of others.

Liu et al. propose in [30] LBKs (location-based keys) that relies on location information to achieve key management. The keys are established according to the geographical location of sensor nodes. However, knowing the geographical location of nodes is not

guaranteed with random deployment.

Eschenauer and Gligor [31] propose a scheme based on a random key pre-distribution. In this scheme, each sensor randomly picks a set of keys and their identifiers from a key pool before deployment. Then, a shared-key discovery phase is launched where two neighbors exchange and compare list of identities of keys in their key chains. Basically, each sensor node broadcasts one message and receives one message from each node within its radio range where messages carry key ID lists. So, any pair of nodes has a certain probability to share at least one common key. The challenge of this scheme is to find a good trade-off between the size of the key pool and the number of keys stored by nodes to achieve the best probability. The main drawback of this approach is that if the number of compromised nodes increases, the fraction of affected links also increases.

In [32], the authors focus on developing cost-saving mechanisms while weakening the threat model. They propose Key Infection, a lightweight security protocol suitable for use in noncritical commodity sensor networks where an attacker can monitor only a fixed percentage of communication channels.

In general, existing symmetric cryptographic solutions for WSNs focus particularly on the efficiency of key establishment after the deployment of the network. However, they do not deal with key refresh which makes key management dynamic and adds a further difficulty to the task of attackers. Furthermore, symmetric solutions do not scale well when the number of sensor nodes increases, and neglect the effect of captured node attacks. Using symmetric cryptographies in software implementation are challenging. Because they are not providing a perfect trade-off between resilience and performance, and hostile nature environments where sensor nodes are deployed makes it vulnerable to various attacks.

In the context of public-key cryptography, with thousands and millions of multiplications involved, it has become a major research branch to adapt and optimize advanced cryptosystems to small systems, such as sensor devices. Many works focused on the lightweight adaption of asymmetric cryptographic algorithms.

B. Asymmetric Cryptography in WSNs : Public-key cryptosystems are considered to be too heavy to use in WSNs. However, recent works show successful implementation examples of public-key cryptography in constrained sensors devices.

The author Gura et al. report that both RSA and elliptic curve cryptography are possible for small devices without hardware acceleration. With 8-bit CPUs, ECC shows a performance advantage over RSA. Another advantage is that ECC's 160-bit keys result in shorter messages during transmission compared to the 1024-bit RSA keys. In particular, Gura et al. demonstrate that ECC point multiplication on small devices is comparable in performance to RSA public-key operations and an order of magnitude faster than RSA private-key operations.

The author Watro et al. show that part of the RSA cryptosystem can be successfully applied to actual wireless sensors. The TinyPK system described is designed to allow authentication and key agreement between resource-constrained sensors. The protocol is used together with the existing symmetric encryption service for node networks, such as, TinySec. In particular, they implemented the RSA public operations on the sensors and the RSA private operations to an external party, such as a laptop.

The author Malan et al. demonstrate a working implementation of Diffie-Hellman based on the Elliptic Curve Discrete Logarithm Problem. In addition, they show that public keys can be generated within 34 seconds, and that shared secrets can be distributed among nodes in a sensor network within the same, using just over 1 kilobyte of SRAM and 34 kilobytes of ROM. So, public-key infrastructure is viable on the MICA2 for infrequent distribution of shared secrets.

Wang et al., proposes a public-key scheme for WSNs. They built an ECC-based access, which consists of pairwise key establishment, local access control, and remote access control. They have performed a comparison test by implementing both symmetric-key and public-key primitives on MICAz nodes and HP iPAQ. Their case study shows that the public-key scheme is more advantageous than symmetric key in terms of the memory usage, message complexity, and security resilience.

A very efficient ECC implementation called WM ECC, which is based on prime field operations, is reported.

In [38], TinyPEDS is an approach for asynchronous WSNs, which allows confidential, memory-efficient, and distributed storage of sensed data on resource constrained devices. In [39] TinyPBC is presented. It is an efficient implementation of Pairing-based Cryptography (PBC) primitives for an 8-bit processor. TinyPBC takes less amount of time, only 5.45s to compute pairings on ATmega128L.

These solutions differ on the implementation algorithms, the optimizations performed, the functional completeness and platforms.

VI. CONCLUSION : The wireless sensor networks continue to grow and become widely used in many mission-critical applications. So, the need for security becomes vital. However, the wireless sensor network suffers from many constraints such as limited energy, processing capability, and storage capacity, as well as unreliable communication and unattended operation, etc. There are many ways to provide security, and the main one is cryptography. Selecting the appropriate cryptography method for sensor nodes is fundamental to provide appropriate security services in WSNs. Public-key cryptosystems are considered to be too heavy for resource-constrained sensor nodes. However, several studies have shown that it is feasible to apply public key cryptography to sensor networks by using the right selection of algorithms and associated parameters, optimization, and low power techniques. These cryptographic schemes were introduced to remove the drawbacks of symmetric based approaches, and lead to more performance.

Both RSA and Diffie-Hellman based on the elliptic curve cryptography are possible for tiny sensor nodes, and the results show that it is possible to achieve good results with smaller keys. It reduces computation time and also the amount of data transmitted and stored. Asymmetric approaches with public key cryptosystems, specifically elliptic curve cryptography are promising approach for meeting security requirements in WSNs.

In this article, we aimed to provide a general overview of the major aspects of wireless sensor networks security: challenges, goals, and attacks; as well as some of commonly used defenses approaches.

REFERENCES

[1] I.F.Akyildiz et al., "A Survey on Sensor Networks", IEEE Commun.Mag.,Vol. 40, No. 8, pp.102-114, Aug. 2002.

[2] E.Shi and A.Perrig, "Designing Secure Sensor Networks", Wireless Commun. Mag., Vol. 11, No. 6, pp.38-43, Dec 2004.

[3] Culler, D. E and Hong, W., "Wireless Sensor Networks", Communication of the ACM, Vol. 47, No. 6, pp. 30-33, Jun. 2004.

[4] Al-Sakib Khan Pathan, Hyung-Woo Lee, Choong Sean Hong, "Security in Wireless Sensor Networks: Issues and Challenges", Proc. ICACT 2006, Volume 1, 20-22, pp. 1043-1048, Feb. 2006.

[5] HBE-Zigbex. Ubiquitous sensor network. Zigbex Manual [Online]. Available: http://www.hanback.co.kr

[6] Dr. G. Padmavathi, Mrs. D. Shanmugapriya, "A Survey of Attacks, Security Mechanisms and Challenges in Wireless Sensor Networks", International Journal of Computer Science and Information Security, Vol. 4, No. 1 & 2, 2009.

[7] A. Perrig, J. Stankovic, and D. Wagner, "Security in Wireless Sensor Networks", Communications of the ACM, 47(6):53–57, Jun. 2004.

[8] R. Ramen, J. Lopez, S. Gritzalis, "Situation awareness mechanisms for wireless sensor networks ", IEEE Communication Magazine, vol. 46, no. 4, pp.

[9] David Martins, and Herve Guyennet, "Wireless Sensor Network Attacks and Security Mechanisms: A Short Survey", 2010 IEEE.

[10] Anitha S.Sastry, Shazia Sulthana and Dr.S Vagdevi, "Security Threats in Wireless Sensor Networks in Each Layer", International Journal of Advanced Networking and Applications, Vol. 04 Issue 04, pp. 1657-1661, 2013.

[11] Chris Karlof and David Wagner, "Secure routing in wireless sensor networks: attacks and countermeasures," Ad Hoc Networks Journal, Vol.1, Issue 2-3, pp. 293-315, 2003.

[12] Yan Sun, Zhu Han, and K. J. Ray Liu, "Defense of Trust Management Vulnerabilities in Distributed Networks," IEEE Communications Magazine, Vol 46, Issue 2, pp.112-119, 2008.

[13] Yanli Yu, Keqiu Li, Wanlei Zhou, and Ping Li, "Trust mechanisms in wireless sensor networks: attack analysis and countermeasures," Journal of Network and Computer Applications, Elsevier, 2011.

[14] W. Xu et al., "The Feasibility of Launching and Detecting Jamming Attacks in Wireless Networks," MobiHoc '05: Proc. 6th ACM Int. Symp. Mobile Ad Hoc Net. and Comp., pp. 46–57, 2005.

[15] W. Xu, W. Trappe, and Y. Zhang, "Channel Surfing: Defending Wireless Sensor Networks from Interference", in Proc. Of Information Processing in Sensor Networks, 2007.

[16] Shih, E., Cho, S., Ickes, N., Min, R., Sinha, A., Wang, A. & Chandrakasan, A., "Physical layer driven protocol and algorithm design for energy-efficient wireless sensor networks", Proceedings of the 7th Annual International Conference on Mobile Computing and Networking, Rome, Italy, pp. 272-287.

[17] Woo, A. and Culler, D., "A Transmission Control Scheme for Media Access in Sensor Networks", Proceedings of the Seventh Annual ACM/IEEE International Conference on Mobile Computing and Networking, MobiCom, Rome, Italy, 2001.

[18]Römer and Mattern, The Design Space of Wireless Sensor Networks. IEEE Wireless Communications, 2004.

[19]B. Krishnamashari, D. Estrin and S. Wicker, "Impact of Data

[20]S. Rajasegarar, C. Leckie, and M. Palansiwami, "Anomaly detection in wireless sensor networks", IEEE Wireless Communications, vol. 15, no. 4, Aug. 2008, pp. 34-40.

[21] Yun Zhou, Yuguang Fang, Yanchao Zhang, Securing Wireless Sensor Networks: A Survey, IEEE Communications Surveys & Tutorials, year 2008

[22] Y. Wang, G. Attebury, and B. Ramamurthy, "A Survey of Security Issues in Wireless Sensor Networks, " IEEE Commun. Surveys Tutorials, vol. 8, pp. 2– 23, year 2006.

[23] Yanli Yu, Keqiu Li, Wanlei Zhou, and Ping Li, "Trust mechanisms in wireless sensor networks: attack analysis and countermeasures," Journal of Network and Computer Applications, Elsevier, 2011.

[24] W. Xu et al., "The Feasibility of Launching and Detecting Jamming Attacks in Wireless Networks," MobiHoc '05: Proc. 6th ACM Int. Symp. Mobile Ad Hoc Net. and Comp., pp. 46–57, 2005.

[25] W. Xu, W. Trappe, and Y. Zhang, "Channel Surfing: Defending Wireless Sensor Networks from Interference", in Proc. Of Information Processing in Sensor Networks, 2007.

[26] Shih, E., Cho, S., Ickes, N., Min, R., Sinha, A., Wang, A. & Chandrakasan, A., "Physical layer driven protocol and algorithm design for energy-efficient wireless sensor networks", Proceedings of the 7th Annual International Conference on Mobile Computing and Networking, Rome, Italy, pp. 272-287.

[27] Woo, A. and Culler, D., "A Transmission Control Scheme for Media Access in Sensor Networks", Proceedings of the Seventh Annual ACM/IEEE International Conference on Mobile Computing and Networking, MobiCom, Rome, Italy, 2001.

[28] X. Du, and H-H. Chen, "Security in Wireless Sensor Networks", IEEE Wireless Communications, vol. 15, no. 4, Aug. 2008, pp.60-66.

IMPROVEMENT OF FREQUENCY STABILITY FOR A RING OSCILLATOR

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A CMOS voltage controlled ring oscillator based on N-stage single-ended chain of different inverter types is described in this paper. The proposal is characterized by increased frequency stability (Δ f=f< 2%) in term of power supply voltage variations in respect to stan-dard solutions (Δ f=f> 4%). The present results are using simulation and 1.2µm technology.

Keywords: Voltage controlled oscillator, ring oscillator, CMOS, frequency stability.

A voltage controlled oscillator (VCO) is one of the most important basic building blocks in analog and digital circuits. There are many different implementations of VCOs. One of them is a ring oscillator based VCO, which is commonly used in the clock generation subsystem. The main reason of ring oscillator popularity is a direct consequence of its easy integration. Due to their integrated nature, ring oscillators have become an essential building block in many digital and communication systems. They are used as voltage-controlled oscillators (VCO's)

2. Structure of CMOS ring VCO : A ring oscillator is comprised of a number of delay stages, with the output of the last stage fed back to the input of the first. To achieve oscillation, the ring must provide a phase shift of 2π and have unity voltage gain at the oscillation frequency. Each delay stage must provide a phase shift of π=N, where N is the number of delay stages. The remaining phase shift is provided by a dc inversion. That is an odd number of stages are necessary for the dc inversion.

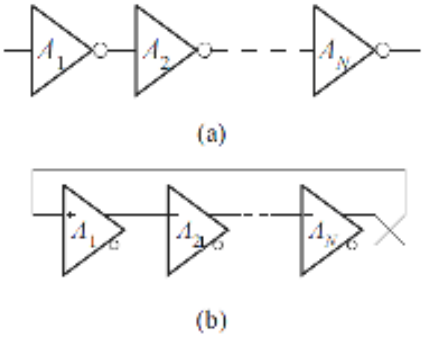

Fig. 1. Ring oscillator types: (a) single-ended and (b) differential

In order to determine a frequency of the ring oscillator we will use its linear model as is given in Fig. 2

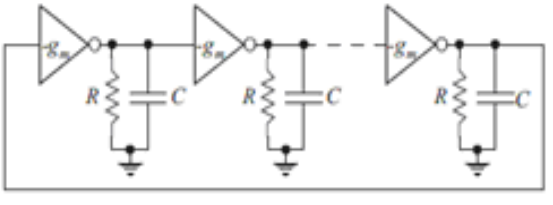

Fig. 2. . Linear model of ring oscillators

The oscillation frequency is given by

$$f_0 = \frac{I_{SS}}{2NV_{sw}C}$$

3 Ring oscillator inverting stage : As we have already mentioned, the ring oscillators is realized with N inverter stages. There are numerous types of inverter stages by which a ring oscillator can be realized.

Relative frequency deviations in term of temperature variations for 3-stages ring oscillators based on type of inverters stages presented in Fig. 3 are given in Fig. 4. In general all frequency deviations have similar behavior, but the basic type (Fig. 3 a)) and current starved with symmetrical load (Fig. 3 d)) inverters have the highest, while cur-rent starved with output-switching (Fig. 3 b)) inverter has the lowest sensitivity. The ratio of relative frequency deviations between basic type (Fig. 3 a)) and current starved with output-switching (Fig. 3 b)) inverters is 5:1

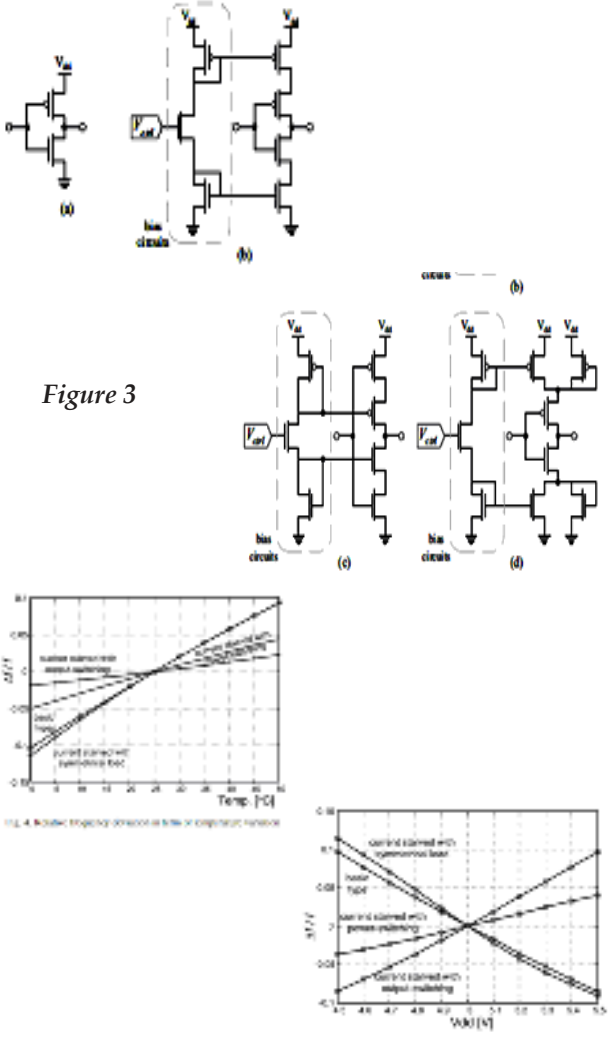

Figure 3

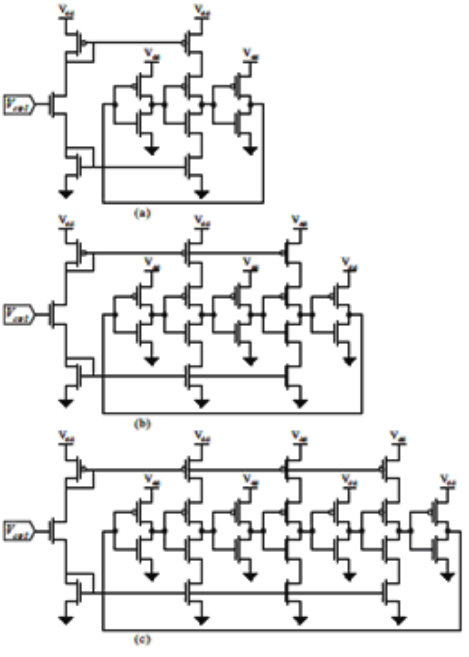

Fig. 6. Combined ring VCOs

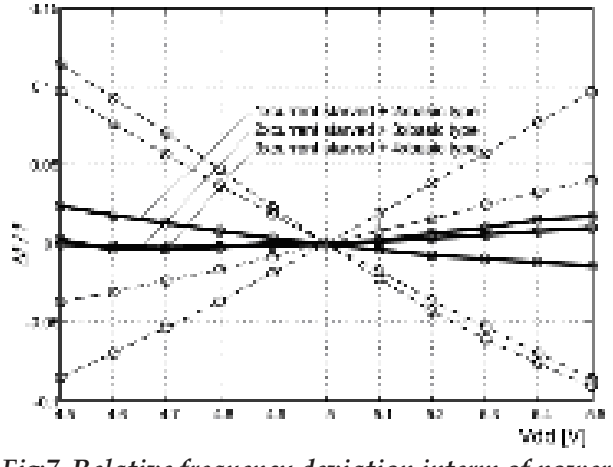

Fig:7. Relative frequency deviation interm of power supply voltage variation for proposed ring VCOs

Relative frequency deviations in term of power voltage supply variations for 3-stages ring oscillators based on type of inverters stages presented in Fig. 3 are given in Fig. 5. As can be seen from Fig 5, the basic type (Fig. 3(a)) and current starved with symmetrical load (Fig. 3(d)) inverters have characteristics with negative slope, while current starved with output-switching (Fig. 3 (b)) and current starved with power-switching (Fig. 3 (c)) inverters have characteristics with positive slope. Absolute value of inverters sensitivity in function to power supply voltage variation is within a range of 10% excluding current starved inverter with power-switching (Fig. 3 c)) inverters which has sensitivity of 5%. Taking into consideration the opposite slope characteristics of the relative frequency deviations in terms of power

voltage supply variations of the mentioned inverters (Fig. 5), we can conclude that is reasonable to design a ring oscillator composed of cascade chain of inverters. For example, odd numbered inverters can have positive, while even numbered negative slope. In this way, the relative frequency deviation in term of power voltage supply can be drastically reduced (more than 100%).

Several typical design solutions of 3-, 5- and 7- stages ring oscillators with reduced sensitivity are given in Fig. 6 a), b) and c), respectively. We call them as combined ring oscillators. Let note that in combined ring oscillators the odd numbered inverter stages are implemented with basic type, while even numbered as current starved with output-switching inverters.

The relative frequency deviations in term of power supply voltage for all three type of ring oscillators pictured in Fig. 6 are given in Fig. 7. By analyzing the results presented in Fig. 7 we can conclude the following: The relative sensitivity of the ring oscillator from Fig. 6 a) is less than 2%, while for those given in Fig. 6 b) and c) is less than 1%.

4 Conclusion : Ring oscillators are basic building blocks of complex integrated circuits. They are mainly used as clock generating circuits. Many different types of ring oscillators are available. They differ in respect to architectural, realization of inverters stages, number of inverter stages, etc. In this paper we have analyzed realization of ring oscillator based on four different types of single-ended inverters. According to the simulation results it is concluded as:

a) that for frequency stability in terms of temperature variations the best performance ($\Delta f=f< 2\%$) has current starved inverters with output-switching;

b) that for frequency stability in terms of power supply voltage variations the best per-formance ($\Delta f=f< 4\%$) has current starved inverters with power-switching;

c) by realizing combined types of ring oscillator the relative frequency deviation in terms of power supply voltage variations can be significantly decreased ($\Delta f=f< 2\%$) in respect to the best standard solutions ($\Delta f=f> 4\%$).

d) in respect to phase noise, ring oscillators based on current starved inverters with output-switching have the best performance (phase noise approx. 0.06 rad).

References

[1] C. H. PARK, O. KIM, B. KIM, A 1.8-GHz self-calibrated phase locked loop with preciseI/Q matching, IEEE J. Solid-State Circuits, vol. 36, (2001), 777-783.

[2] L. SUN AND T. A. KWASNIEWSKI, A 1.25-GHz 0.35- m monolithic CMOS PLL based on amultiphase ring oscillator, IEEE J. Solid-State Circuits, vol. 36, (2001), 910-916.

[3] J. SAVOJ AND B. RAZAVI, A 10-Gb/s CMOS clock and data recovery circuit with a half-ratelinear phase detector, IEEE J. Solid-State Circuits, vol. 36, (2001), 761-767.

[4] G. JOVANOVIC´, M. STOJCEV˘, A Method for Improvement Stability of a CMOS VoltageControlled Ring Oscillators, ICEST 2007, Proceedings of Papers, vol. 2, pp. 715-718,

STUDY ON MOBILE WIRELESS TECHNOLOGY

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Wireless communication is the transfer of information over a distance without the use of enhanced electrical conductors or "wires". The distances involved may be short (a few meters as in television remote control) or long (thousands or millions of kilometers for radio communications). When the context is clear, the term is often shortened to "wireless". It encompasses various types of fixed, mobile, and portable two-way radios, cellular telephones, Personal Digital Assistants (PDAs), and wireless networking. In this paper we will throw light on the evolution and development of various generations of mobile wireless technology along with their significance and advantages of one over the other. In the past few decades, mobile wireless technologies have experience 4 or 5 generations of technology revolution and evolution, namely from 0G to 4G. Current research in mobile wireless technology concentrates on advance implementation of 4G technology and 5G technology. Currently 5G term is not officially used. In 5G researches are being made on development of World Wide Wireless Web (WWWW), Dynamic Adhoc Wireless Networks (DAWN) and Real Wireless World.

Keywords— mobile technology, wireless communication, wireless networks.

Mobile wireless industry has started its technology creation, revolution and evolution since early 1970s. In the past few decades, mobile wireless technologies have experience 4 or 5 generations of

technology revolution and evolution, namely from 0G to 4G. The cellular concept was introduced in the 1G technology which made the large scale mobile wireless communication possible. Digital communication has replaced the analogy technology in the 2G which significantly improved the wireless communication quality. Data communication, in addition to the voice communication, has been the main focus in the 3G technologies and a converged network for both voice and data communication is emerging. With continued R&D, there are many killer application opportunities for the 4G as well as technological challenges.

MOBILE GENERATIONS:

ZERO GENERATION TECHNOLOGY (0G – 0.5G) 0G refers to pre-cell phone mobile telephony technology, such as radio telephones that some had in cars before the advent of cell phones. Mobile radio telephone systems preceded modern cellular mobile telephony technology. Since they were the predecessors of the first generation of cellular telephones, these systems are called 0G (zero generation) systems. Technologies used in 0G systems included PTT (Push to Talk), MTS (Mobile Telephone System), IMTS (Improved Mobile Telephone Service), AMTS (Advanced Mobile Telephone System), OLT (Norwegian for Offentlig Landmobil Telefoni, Public Land Mobile Telephony) and MTD (Swedish abbreviation for Mobilelefonisystem D, or Mobile telephony system D).

These early mobile telephone systems can be distinguished from earlier closed radiotelephone systems in that they were available as a commercial service that was part of the public switched telephone network, with their own telephone numbers, rather than part of a closed network such as a police radio or taxi dispatch system. These mobile telephones were usually mounted in cars or trucks, though briefcase models were also made. Typically, the transceiver (transmitter-receiver) was mounted in the vehicle trunk and attached to the "head" (dial, display, and handset) mounted near the driver seat.

FIRST GENERATION TECHNOLOGY (1G) : 1G stands for "first generation," refers to the first generation of wireless telecommunication technology, more popularly known as cellphones. A set of wireless standards developed in the 1980's, 1G technology replaced 0G technology, which featured mobile radio telephones and such technologies as Mobile Telephone System (MTS), Advanced Mobile Telephone System (AMTS), Improved Mobile Telephone Service (IMTS), and Push to Talk (PTT). 1G wireless networks used analog radio signals where the voice call gets modulated to a higher frequency of about 150MHz and up as it is transmitted between radio towers. This is done using a technique called Frequency-Division Multiple Access (FDMA).

It has low capacity, unreliable handoff, poor voice links, and no security at all since voice calls were played back in radio towers, making these calls susceptible to unwanted eavesdropping by third parties.

SECOND GENERATION TECHNOLOGY (2G - 2.75G) : 2G is short for second-generation wireless telephone technology. It cannot normally transfer data, such as email or software, other than the digital voice call itself, and other basic ancillary data such as time and date. Nevertheless, SMS messaging is also available as a form of data transmission for some standards.

2G technologies can be divided into Time Division Multiple Access (TDMA) based and Code Division Multiple Access (CDMA) based standards depending on the type of multiplexing used. 2G makes use of a CODEC (Compression Decompression Algorithm) to compress and multiplex digital voice data.

2G network can pack more calls per amount of bandwidth as a 1G network where they emitted less radio power and consumed less battery power, so it helps mobile batteries to last long. Digital coding improves the voice clarity and reduces noise in the line. Digital signals were environment friendly and the use of digital data service assists mobile network operators to introduce short message service over the cellular phones. Digital encryption has provided secrecy and safety to the data and voice calls.

2.5G – GPRS (General Packet Radio Service) 2.5G, which stands for "second and a half generation," is a cellular wireless technology developed in between its predecessor, 2G, and its successor, 3G. The term "second and a half generation" is used to describe 2G-systems that have implemented a packet switched domain in addition to the circuit switched domain. "2.5G" is an informal term, invented solely for marketing purposes, unlike "2G" or "3G" which are officially defined standards based on those defined by the International Telecommunication (ITU). GPRS could provide data rates from 56 kbit/s up to 115 kbit/s. It can be used for services such as Wireless Application Protocol (WAP) access, Multimedia Messaging Service (MMS), and for Internet communication services such as email and World Wide Web access. GPRS data transfer is typically charged per megabyte of traffic transferred, while data communication via traditional circuit switching is billed per minute of connection time, independent of whether the user actually is utilizing the capacity or is in an

idle state. 2.5G networks may support services such as WAP, MMS, SMS mobile games, and search and directory.

2.75 – EDGE (Enhanced Data rates for GSM Evolution) EDGE (EGPRS) is an abbreviation for Enhanced Data rates for GSM Evolution, is a digital mobile phone technology which acts as a bolt-on enhancement to 2G and 2.5G General Packet Radio Service (GPRS) networks. This technology works in GSM networks. EDGE is a superset to GPRS and can function on any network with GPRS deployed on it, provided the carrier implements the necessary upgrades. EDGE technology is an extended version of GSM. It allows the clear and fast transmission of data and information. It is also termed as IMT-SC or single carrier. EDGE technology was invented and introduced by Cingular, which is now known as AT& T. EDGE is radio technology and is a part of third generation technologies. EDGE technology is preferred over GSM due to its flexibility to carry packet switch data and circuit switch data. The use of EDGE technology has augmented the use of black berry, N97 and N95 mobile phones. EDGE transfers data in fewer seconds if we compare it with GPRS Technology.

THIRD GENERATION TECHNOLOGY (3G – 3.75G) : 3G is the third generation of mobile phone standards and technology based on the International Telecommunication Union (ITU) family of standards under the International Mobile Telecommunications programme, IMT-2000. 3G technologies enable network operators to offer users a wider range of more advanced services while achieving greater network capacity through improved spectral efficiency. Services include wide area wireless voice telephony, video calls, and broadband wireless data, all in a mobile environment. Additional features also include HSPA data transmission capabilities able to deliver speeds up to 14.4Mbit/s on the downlink and 5.8Mbit/s on the uplink. High-Speed Packet Access (HSPA) is a collection of mobile telephony protocols that extend and improve the performance of existing UMTS protocols.

3G networks are wide area cellular telephone networks which evolved to incorporate high-speed internet access and video telephony and it also makes use of value added services like mobile television, GPS (global positioning system) and video conferencing.

The basic feature of 3G Technology is fast data transfer rates and flexibility. It operates under CDMA, TDMA and FDMA.CDMA holds for IMT-DS (direct spread), IMT-MC (multi carrier). TDMA accounts for IMTTC (time code), IMT-SC (single carrier). FDMA has only one radio interface known as IMT-FC or frequency code.

There are many 3G technologies as W-CDMA, GSM EDGE, UMTS, DECT, WiMax and CDMA 2000. Enhanced data rates for GSM evolution or EDGE is termed to as a backward digital technology, because it can operate with older devices. 3G has the following enhancements over 2.5G and previous networks: Enhanced audio and video streaming, Several Times higher data speed, Video-conferencing support, Web and WAP browsing at higher speeds, IPTV (TV through the Internet).

3.5G – HSDPA (High-Speed Downlink Packet Access) is a mobile telephony protocol which provides a smooth evolutionary path for UMTS-based 3G networks allowing for higher data transfer speeds. HSDPA is a packet-based data service in W-CDMA downlink with data transmission up to 8-10 Mbit/s (and 20 Mbit/s for MIMO systems) over a 5MHz bandwidth in WCDMA downlink. HSDPA implementations includes Adaptive Modulation and Coding (AMC), Multiple-Input Multiple-Output (MIMO), Hybrid Automatic Request (HARQ), fast cell search, and advanced receiver design.

3.75G – HSUPA (High-Speed Uplink Packet Access) is a UMTS / WCDMA uplink evolution technology which will enhance advanced person-to-person data applications with higher and symmetric data rates, like mobile e-mail and real-time person-to-person gaming. HSUPA will initially boost the UMTS / WCDMA uplink up to 1.4Mbps and in later releases up to 5.8Mbps.

FOURTH GENERATION TECHNOLOGY(4G) : 4G refers to the fourth generation of cellular wireless standards which refers to all-IP packet-switched networks, mobile ultra-broadband (gigabit speed) access and multi-carrier transmission. 4G technology is basically the high quality audio/video streaming over end to end Internet Protocol.

WiMAX or mobile structural design will become progressively more translucent, and therefore the acceptance of several architectures by a particular network operator ever more common. Some of the companies trying 4G communication at 100 Mbps for mobile users and up to 1 Gbps over fixed stations.

Sprint Nextel was planned to launch WiMAX over 4 G broadband mobile networks in United States around 2010. The word "MAGIC" also refers to 4G wireless technology which stands for Mobile multimedia, Any-where, Global mobility solutions over, integrated wireless and Customized services.

FIFTH GENERATION TECHNOLOGY (5G) : 5G (5th generation mobile networks or 5th generation wireless systems) is a name of mobile telecommunications standards emerged between 2011 and 2013. It includes all type of advanced features such as camera, MP3 recording, video player, large phone memory, dialing speed, audio player and much more. 5G technology has extraordinary data capabilities and has ability to tie together unrestricted call volumes and infinite data broadcast within latest mobile operating system. 5G technology has a bright future because it can handle best technologies and offer priceless handset to their customers. The Router and switch technology used in 5G network providing high connectivity. The 5G technology distributes internet access to nodes within the building and can be deployed with union of wired or wireless network connections. The current trend of 5G technology has a glowing future. A new revolution of 5G technology is about to begin because 5G technology going to give tough completion to normal computer and laptops whose marketplace value will be effected. There are lots of improvements from 1G, 2G, 3G, and 4G to 5G in the world of telecommunications.

SIXTH GENERATION TECHNOLOGY (6G) : The mobile communication networks can integrate satellite communication networks and 5G to make global coverage. The networks consist of navigation satellite networks, telecommunication satellite networks and Earth imaging satellites networks. The navigation satellite networks are used for global position, the telecommunication satellite networks are used for global telephony, multimedia video and high-speed Internet connectivity and the Earth imaging satellite networks are used for resource monitoring and weather information. To integrate these three kinds of satellite networks to provide position identifier, multimedia and internet connectivity, and weather information services for mobile users are key objectives for 6G.

SEVENTH GENERATION (7G) : The 7G system can be supported by the global navigation satellite system, the telecommunication satellite system, the earth image satellite system and the 6G cellular system. The global navigation satellites systems are determine a use's position. The telecommunication satellite system can supply the voice and multimedia data for user's communication requirement. The earth image satellite system contains the weather information as extra service for mobile users. Comparing with the satellites, cellular base stations are much cheaper and stable. The satellites are so expensive and to do movement to cover larger area. In fact, these satellites are constantly moving at speeds of roughly 7,000 miles an hour, which are making two complete orbits in less than 24 hours. Thus, the handoff/roaming must happen between each satellite. Furthermore, any two different satellite systems are necessary for handoff/roaming when mobile users moving from one country to another. This kind of handoff/roaming is space handoff/roaming.

7.5G

7G Tranceiver Table Generation of Mobile Communication and its Year It provides the very high speed of peak download and peak upload of data rate. Here space time block codes are used to view the high definition of video broadcasting. Within a second we can download the five films that is 20 GB files and upload the 15 GB files or any datum. Therefore it also navigates the satellite networks techniques, hence using the OFDM methodology and FEC for the speed of communication process. It is possible technique only when achieve the higher bandwidth and improves the satellite cell sensitivity with its signal fidelity. The benefits of 7.5 G can easily communicate to the other even they are in the centre of the sea.

The Time of Year	Mobile Generation
1980	1G
1990	2G
2000	3G
2010	4G
2020	5G
2030	6G
2040	7G
2045	7.5G

CONCLUSION : Mobiles have become very essential part of our everyday life. Their current development is the outcome of various generations. In this paper we review the various generations of mobile wireless technology, their portals, performance, advantages and disadvantages of one generation over other. This field is still full of research opportunities. In conclusion, our survey reveals that there are following major area of research: 1.) Real wireless world with no more limitation with access and zone issues. 2.) Wearable devices with AI capabilities. 3.) Internet protocol version 6 (IPv6), where a visiting care-of mobile IP address is assigned according to location and connected network. 4.) Pervasive Networks providing ubiquitous computing: The user can simultaneously be connected to several wireless

access technologies and seamlessly move between them.

REFERENCES

[1] Amos Edward Joel (Bell Labs), "Cellular Mobile Communication System."

[2] Andrew McGirr, Barry Cassidy (Novatel), 1992, "Radio telephone using received signal strength in controlling transmission power".

[3] Douglas Fougnies et al. (Freedom Wireless) 1998, "Security cellular telecommunications system"

[4] Friedhelm Hillebrand, ed. (2002): "GSM and UMTS, the Creation of Global Mobile Communications", John Wiley & Sons.

[5] Goldsmith, Andrea (2005), "Wireless Communications. Cambridge University"

[6] Martin Cooper et al. (Motorola)(2002), "Radio Telephone System (Dyna-Tac)".

[7] Xichun Li, Abudulla Gani, RosliSalleh, Omar Zakaria The Future of Mobile Wireless Communication Networks, International Conference on Communication Software and Networks, 2009.

BENEFITS OF WIRELESS ROUTERS

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Internet is a must requirement of the world these days as everything today revolves around the internet world. For both recreation and work purposes, internet has been used and utilized. Every educated person uses this facility for different purposes. It can be for reading or sending emails, working, social networking, researching or gaming etc. There is a list of things only possible by using internet. A revolution in business industry demands all time usage of internet for every work they do is through internet. Internet has this biggest advantage of connecting people from different corners of the world which results in better communication and better chances for the business industry.

Not just it helps you with the internet access; it also helps you get rid of the mess of wires. People who use computers are already tired with the mess of wires. Using a wired internet connection only adds more to the mess. Lately many companies have assured better internet connection for internet users in the form of WiFi. And because every nearby gadget with an internet connection can have access to your internet, companies have protected your internet with a password. With this password protection, only you can use your internet which also protects the browsing speed. So everybody who is looking forward to wireless routers and their benefits, you must go ahead with it right away. It is a shame to not enjoy the best internet benefits from the best technology being offered to you.

A wireless router also has the ability to provide an internet connection known as WiFi. Your laptops, phones, and other gadgets with WiFi feature can have the access to the internet. Not just it helps you with the internet access; it also helps you get rid of the mess of wires.

There are two kinds of Internet routers available:

'Wired' and 'Wireless'.

When you sign up for a new broadband deal, you will receive a wireless model rather than a wired one from your Internet Service Provider (ISP).

That is because wired ones have become outdated and tend only to be used by those who want to get online via an Ethernet cable.

Wireless routers allow you to do that too and most come with at least four Ethernet ports for connecting PCs, TVs and other in-home gadgets to the Internet.

If you have wireless Internet access at home, you probably have a little box called a router that plugs into your telephone socket. This kind of router is a bit like a sophisticated modem: it's a standalone computer whose job is to relay connections to and

from the Internet. At home, you might use a router to connect several computers to the Internet at once (saving on the need for several separate modems). In other words, the router does two jobs:

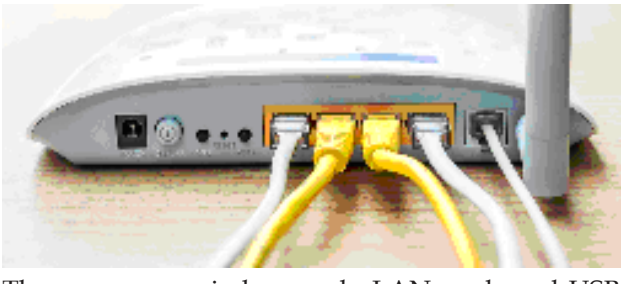
It creates a wireless computer network, linking all your computers together, and it also gives all your machines a shared gateway to the Internet.

You can connect a router to all your different computers using ordinary network-connecting cables (for the technically minded, these are called RJ-45, Cat 5, or Ethernet cables). This creates what's called a LAN (local area network).

Most of today's laptops, smartphones, and connected home devices use 802.11n, so an 802.11n router is a good fit for households that have a handful of these devices sharing Internet access. ... You'll see 802.11ac routers with labels like AC1200, AC1750, AC3200, and so on.

A typical wireless router looks like the following images below:

In 1991, NCR Corporation with AT&T Corporation invented the precursor to 802.11, intended for use in cashier systems. The first wireless products were under the name WaveLAN. They are the ones credited with inventing Wi-Fi.



There are now wireless ready LAN cards and USB devices that receive and transmit radio waves and perhaps the most commonly known wireless devices are wifimodems and wifi routers. A wireless modem is a device that is able to connect to awireless network as provided by an ISP

With wireless systems, you can connect on a Local Area Networks (LAN), Wide Area Networks (WAN), and the Internet without the physical connection of wires like UTP cables for instance.

Because of this new technology, new kinds of hardware emerged. It is very common nowadays to hear a "wifi" prefix in various hardware. "Wifi" meaning "wireless fidelity" basically means that the piece of equipment is compatible with the technology.

There are now wireless ready LAN cards and USB devices that receive and transmit radio waves and perhaps the most commonly known wireless devices are wifi modems and wifi routers.

A wireless modem is a device that is able to connect to a wireless network as provided by an ISP. When you connect your computer to a wireless modem, you can now have access to internet when a signal from your ISP is present. You can actually have internet connectivity anywhere a signal is present.

Since it is, in essence, a modem, it functions similar to its wired counterpart. It modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information. Modem stands for ìModulator/Demodulatorî and thatís the primary role of the device but only wireless.

Wifi routers are devices that perform the same functions of a normal router only wirelessly. They forward data packets along networks and they connect different networks and act as a gateway. Wifi routers can connect two LANS or WANs, LAN and WAN, or LAN and the internet.

Routers are smart devices that determine the best path for forwarding the data packets. When data is sent from one network to another, routers oversee this activity and direct the data packets to the correct location using the best path possible. With the wireless features, wifi routers can carry out it basic function through radio signals alone.

LINKSYS WRT1900ACS is one of the best wireless routers available on the market today.

A wireless router also has the ability to provide an internet connection known as WiFi. Your laptops, phones, and other gadgets with WiFi feature can have the access to the internet. ... Lately many companies have assured better internet connection for internet users in the form ofWiFi

If you have heard of a portable Wi-Fi router, you are probably wondering why you should use one with the convenient technologies that are being built into today's mobile devices. What is the point of using a portable Wi-Fi router when you can tether your smartphone and use it as a hotspot? Why spend the money on a portable Wi-Fi router?

These are some of the questions that probably come

to your mind when you see portable Wi-Fi routers being offered on the market. However, like the new technologies that are being included in mobile devices, portable Wi-Fi routers are being equipped with modern technologies and improvements as well. The most recent routers on the market are the very reason why there are benefits to using this type of device.

Differentiating the 5 GHz and 2.4 GHz frequency bands

Band	2.4 GHz	5 GHz
Channel	Three (3) non-overlapping channels	23 non-overlapping channels
Standard	Wireless-B, G, and N	Wireless-A, N, and AC
Network Range	Wider Range	Shorter Range
Interference	Higher	Lower

Portable Wi-Fi Router : With many mobile devices being equipped with hotspot capability, many wonder whether or not a portable Wi-Fi router is useful. Although you can use your phone as a Wi-Fi hotspot, there are still benefits to using a portable Wi-Fi router.

There are many advantages to using a portable Wi-Fi router, some of which include:

Increased Security over a Public Wi-Fi Access Point As a mobile device user, you know there are many public Wi-Fi access points that are available in public venues such as shopping centers, restaurants, coffee shops, parks, malls, and many other locations. Although public Wi-Fi access points are convenient, they also pose a risk to your privacy since this type of network is typically unsecured. This makes the connection more susceptible to hackers and other unscrupulous people that exploit the network for the purpose of eavesdropping and stealing personal information.

By using a portable Wi-Fi router, you can protect yourself from some of the risks that are possible when you enter passwords and banking information over a free public Wi-Fi network. The security is achieved by activating the firewall and using password protection to control who has access to the connection. Most portable Wi-Fi routers are also equipped with WPA (Wireless Protected Access) and WPA-2 encryption which enhances security when accessing the Internet.

Access Wireless Internet from Anywhere at Any Time : By using a portable wireless router, you can ensure that you will always have wireless access to the Internet while you are on the go or working from a remote location. Additionally, the wireless router can provide others with Internet connectivity but only with your permission. Other Wi-Fi devices such as a tablet, smartphone, or laptop PC can establish a connection to the Internet when you use a portable Wi-Fi router. This allows you to share content with others in the work setting or with your family.

Enjoy 3G and 4G Connectivity in Your Home Office: A portable wireless router allows you and your family to access 3G and 4G Internet from your home. You can use the portable Wi-Fi connection to replace a slower Internet connection that you are currently using in your home. Depending upon the area in which you live, a portable Wi-Fi router may offer you another option to access high speed Internet.

Portable Wi-Fi routers can also be used to extend an existing Internet connection and work similar to a wireless repeater. This helps you to provide more wireless coverage throughout your household, in addition to your home office.

Carry Your Wi-Fi Connection in Your Pocket : Most portable Wi-Fi routers are small enough to fit in your pocket which makes it a great device for use in hotels and conference areas. For mobile professionals, the best devices are those that are compact, easy to use, and multifunctional. Plus, you can establish a secure connection for conducting business on the road.

A portable Wi-Fi router also offers different modes which make it multifunctional. It can function as a router, access point, or wireless client. If the device is placed in router mode, this enables you to share Internet access with other mobile professionals. When the device is in access point mode, you can share Internet access whenever there is only one available Ethernet connection.

When used as a wireless client, a portable Wi-Fi router allows you to access an existing wireless connection without having to download any software or install hardware. Additionally, most models of

portable Wi-Fi routers also support a Virtual Private Network (VPN) with firewall features that include Network Address Translation (NAT) and MAC (Media Access Control) address filtering. Plus, they utilize a USB connection which allows you to connect whenever there is no wall outlet readily available.

One of the more recent routers that was just released on the market is a small travel device manufactured by Netgear. The Netgear Trek N300 is a travel router that includes a range extender and has an external antenna that folds out. The device is equipped with technologies that help to boost Wi-Fi signal strength and has an integrated power adapter that is built into the unit to make it easy to transport.

If you connect the Netgear Trek N300 to a public wireless network, it creates a secure connection to the Internet for all of your devices. The router can be plugged directly into a wall outlet or it can be connected to a USB port on your laptop PC using a USB cable. The side switch allows you to change back and forth from an Ethernet connection to a wireless network with two Ethernet ports for establishing an Internet connection or using a wired device to access the Internet.

In terms of other connectivity options, there is a mini USB port that allows you to power up the router and a full-sized USB 2.0 port for sharing files or connecting a shared printer. Like the portable Wi-Fi router we discussed earlier, the Trek N300 also allows you to use the device as a mobile hotspot, wireless access point, and range extender. It is also very easy to set-up and use, and only requires an app to be downloaded on your Android or iOS device. Here is more information on how the Trek N300 portable Wi-Fi router works to provide you with a visual representation of how a portable Wi-Fi router works.

If you think a wireless router's only job is to connect you to the world of the Internet, you're missing out on a lot of its awesome goodness. Sure, maybe all you need is Internet access. In that case, you don't really have to worry about all the tricks your router can do. But for those of you that want to maximize your experience, there are some advanced wireless router features that will make your life much easier.

Logging into your router's administration panel can be daunting. Some panels, like my own Linksys router, are relatively simple and clean. Others, like the open-source powerhouse known as DD-WRT, can be nothing short of overwhelming. There are just so many pages and options–and fiddling with the wrong one can leave you stranded without Internet.

Security Encryption

Password ?

Wireless security is the most important feature you could have. It almost seems like common sense–so much so that it probably doesn't require much attention given that. However, for the wireless neophytes reading this, you should know that not all encryption was made equal.

Digging through your router settings, you've probably encountered a wireless security setting that let you choose between WEP, WPA, and WPA-2. WEP is the weakest of them all while WPA-2 is the strongest, but WPA-2 is slower and more resource intensive than WPA. Play around with WPA or WPA-2 on your network to see which one works best. For most homes, WPA-2 is the way to go.

Always keep tabs on your wireless router's security. You wouldn't want someone to hijack it, nor would you want strangers leeching your bandwidth or performing illegal activities by means of your network.

Quality of Service & Wi-Fi Multimedia

Throughout your time on the Internet, your router will be bombarded with hundreds of different types of data, including: instant messages, video streams, websites, torrents, software updates, video games, and more. When your network activity is at a high point, you may want to prioritize certain data packets over others. That's what Quality of Service does.

With Quality of Service, you can grant greater bandwidth priority to, say, World of Warcraft packets over instant messenger packets. What does this mean? Well, if your router has a bunch of packets waiting to be sorted and sent out to the right devices, it will send out all World of Warcraft packets before sending out any instant messenger packets.

Wi-Fi Multimedia is actually a specialized form of Quality of Service that's much easier to use. The option is either enabled or disabled–and that's it.

Wi-Fi Multimedia works to improve reliability and performance for all data packets related to multimedia: audio, video, and voice. However, the technology is still pretty new, so there's no real guarantee that you'll see extreme improvements. But it's worth

testing if you use a lot of online multimedia and your network seems to be having performance problems.

Guest Access : When your friends come over and ask to use your Internet, do you just hand out your router password to them? If so, you better hope they're very trustworthy because you're letting them connect directly to the router and to all other devices connected to that router as well. There is a safer and easier alternative that doesn't require you to give away your main router password.

Guest Access is a feature that lets users connect to your router in a guest capacity. Guest users gain Internet access but not access to other devices on the network, thus improving your security just a bit.

FARMER FRIENDLY FLYING ROBOT

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This paper presents the approach of drones in Agriculture.The term drone covers a very broad category of unmanned aerial vehicle(uavs) that can be used for anything from military to personal entertainment,unlike regular helicopter, quadcopter have two sets of propellers making them easier to manevure both indoors and outdoors.

As we all know that Agriculture is a backbone of India.Today India ranks second in worldwide in farm output.Drones help farmers with 2 types of detailed views.First seeing a crop from the air can reveal pattern that expose everything from irrigation problems to soil variation and even pest and fungal infections that aren't apperent at eye level.Second, airborne cameras can talk multispectral images which can be combined to creat a view of crop.

Agriculture Drones are becoming a tool like any other consumer device, so we are presenting how Drone can be used for irrigation purpose and other agriculture issues such as spraying the pestisides in a controlled manner.

KEYWORDS: Drones, UAVS, Propeller, Airborne cameras, Quadcopters, Consumer device, Manevure.

DRONEthe flying robot covers a very broad category of unmanned aerial vehicles (UAVs) that can be used for anything from military to personal entertainment.Unlike regular helicopter, Drone (a quadcopter)have two sets of propellers making them easier to maneuverin both indoors and outdoors.

"I see drones becoming the cell phone of agriculture," says Dr. Ernest Earon, the President and Co-founder of Precision Hawk, a Canada-U.S. based company, whose Lancaster drone operates autonomously via artificial intelligence. For the past decade, he's been developing intelligent vehicles with remote sensing capabilities. His Lancaster Drone creates its own flight path based on surrounding conditions.

2.The launching of Drone:

The drone is launched by throwing it into the air. It lands after the requested data is collected. If conditions are bad, such as high winds or an overheating motor, it returns. A meter-long, 1.4-kilogram drone is shown in Fig.1 is used with various plug-and-play imaging sensors, including infrared and hyper-spectral, which depict more than 100 channels of light that can reveal problem areas that invisible to the human eye.

Fig1 : A Drone used for imaging

As we all know that agriculture is the backbone of our country.Today India ranks second rank in farm output.Agriculture Drones are becoming a tool like any other consumer devices. So, we are presenting how Drone can be used for irrigation purpose and other agriculture issues. Drones help farmersin many aspects. The important twoare:First seeing a crop from the air can reveal pattern that expose everything from irrigation problems to soil variation and even pest and fungal infections that aren't apparent at eye level.Second, airborne cameras can take multispectral images which can be combined to create a view of crop. Some of the technology advances being used in agricultureare:

- Precision farming, soil and cropsensors .

fig2 : Soil and crop sensors.

• High-flex tractor tires to ease weight across fields.

fig3 : High flex tractors.

• GPS navigation for farm machinery.

• Precision navigation for better water distribution.

• Robotic picking machines and tractors.

• Drones for crop mapping and monitoring.

• Research for soil nutrient replacement.

3.Advantages of Drones :

• It doesn't need a qualified pilot on board.

• It can enter environment that are dangerous to human life.

• It performs visual or thermal imaging of a region.

• It measures cell- phones, radio or TV coverage over any terrain.

4.Benefits of Agriculture Drone:

Increasedyields - identify issues with crops immediately and take action.

Timeandcostsavings - Drones can achieve the fast results and minimizes the personal requirement.

Easeofuse - we can easily provide training and support on all systems.

Returnoninvestment - identify issues,and resolve them quickly ,increasing yields.

Two questions are frequently asked about drone use in agriculture and provide some straight answers.

• How high can an agricultural drone fly?

Drones fly around 50m to 100m high. Above 50m high, a special authorisation is required.

• Is any special license required to fly agricultural drones?

No, license is not required to fly agricultural drones. License is required if you are operating a drone in Ireland for recreational use only. Recreational use is defined as not receiving any compensation for your operations. Drones should not be operated in Ireland higher than 120m vertical or farther than 500m horizontally from owner's location.

5.Conclusion : Information technologies provide new possibilities for a lot of problem .agricultural Drones are an incredible technology advanced in just a few years. Drones are crucial to farmers because they will no longer have to walk around their farms surveyingsoils ,crops and buildings.Its true to say that farming has become technically advanced for commercial farmers who have enormous chunks of land .

One day these Drones becomes fully automated and provide farmers with accurate data one the amount of pesticides , fungicides ,or fertilizers to apply on specific areas or crops after a surveillance.

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WATER LEAKAGE AND EXCESS WATER FLOW MONITORING & ALERTING SYSTEM USING SMART IP

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Water a natural and limited resource and hence is to be used carefully without much wastage. In rural areas water is used for irrigation and for household purpose where as in urban areas for drinking purpose as well as for industrial uses. It is the duty of every citizen to use this natural resource economically and wisely.

Especially in urban areas the incidence of leakage and excess water drawn illegally by certain customers is very common and needs the steps to plug these occurrences. A system based on Internet of Things (IOT) to prevent leakage, monitoring of excess flow of water and alerting by recording the flow rates at the consumer end is described. In this system, at each consumer end a water monitoring system is provided to record the flow rate using a flow sensor and to transmit the same to a nearby monitoring station using IoT. The leakage of water is controlled automatically by closing the water pump when the flow rate falls below a threshold value. The prevention of water leakage and illegal water consumption is done using computers (Desktop, Laptop), mobiles etc. This system can be used in industries, water supply departments, and agriculture to maintain the proper water quantity as well as to prevent waste. The system is efficient, automatic and may be used to maintain a data base of water consumption.

Keywords: Control, Leakage, IoT, Water, Database Management.

In recent years, water and energy conservation has become increasingly important for water utilities. Policy makers as well as utility managers realize that the reduction of water system leakage and unwanted demand is important from environmental view. Therefore leakage management is generally limited to passive leakage control such as responding to visible leaks or auditing for water loss. Recent droughts and increasing competition over limited water resources has created political pressure to reduce water leakage. Governing bodies have historically suggested conservation, but water rights issues could necessitate mandated leakage targets and proactive leakage management. Thus, there is increased demand for effective and appropriate leakage management technologies. The recovered losses can be viewed as an alternative major new source of water that will, in most cases, be more economic than developing expensive new water supplies. New proactive leakage management methods and technologies are being implemented internationally and are proving to be successful in creating a structured means to control annual system leakage by responding to each leakage situation in an optimal time.

2. ARCHITECTURE OF THE SYSTEM : Main components required for hardware implementation are netduino, water leakage monitoring sensors, water solenoid, power supply and replay circuit. List of hardware components required for the implementation is as follows:

- Netduino Plus 2
- Arduino
- Water Flow Sensor
- Electronic Water Pump
- Relay Circuit
- Power Supply

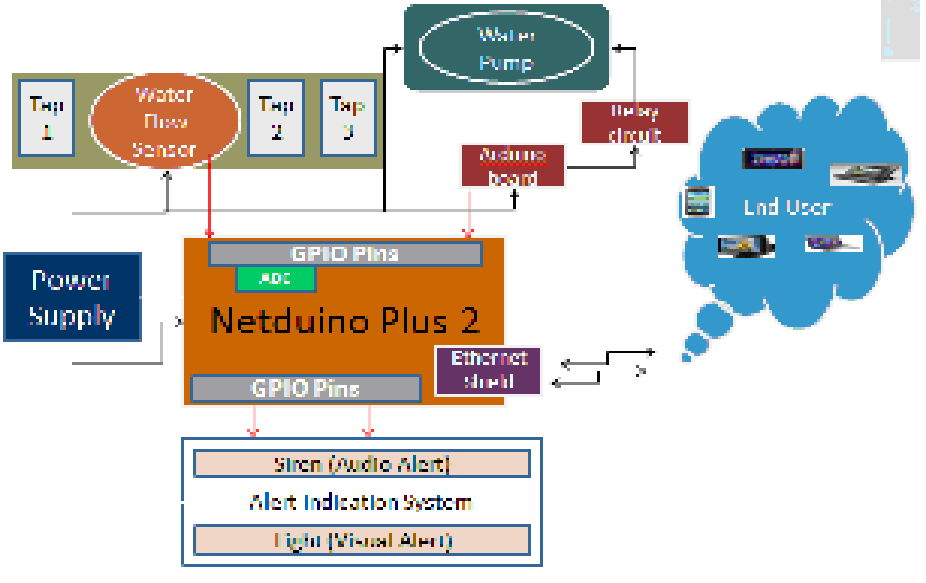

Figure 1. Block Diagram

2.1 Netduino Plus 2 Module : The Netduino Plus is an open source electronics platform using the .NET Micro Framework. The board features a 32-bit microcontroller and a rich development environment, making it a perfect solution for engineers and hobbyists alike.

The NetduinoPlus 2 has four times the speed (168MHz), six times the code space (384KB), and twice the available RAM (100KB+) of Netduino Plus. They've also given it a whole series of rich new features like four serial ports, six PWM channels and 12-bit ADC. The 6-pin ICSP header has been swapped out for a 10-pin Mini JTAG header. The goal is to enable developers to compile their own firmware using GCC and debug both native and managed code at the same time.

Features:

- STMicro 32-bit microcontroller
- Speed: 168MHz, Cortex-M4
- Code Storage: 384 KB
- RAM: 100+ KB
- 10 mbps Ethernet
- Micro SD card support up to 2 GB
- Input Voltage: 7.5 - 9.0
- 25 mA per Pin max Current
- Digital I/O are 3.3 V but 5 V tolerant

2.2 Processor/Microcontroller: The Atmel ARM processor is the main part and it contains the RAM and code space that is used by the app. The pins are wired into the blue pin headers along the side of the board. The pins are used to connect to other components that are external and also to the shields. Below is the picture of the processor.The processor picture is shown below in figure .2.

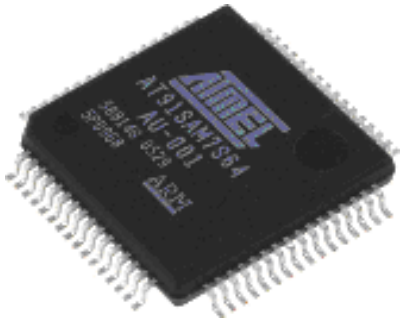

Figure 2. Atmel ARM processor

2.3 Analog Input: There are 6 analog input pin headers that could be used to read any analog sensors measuring any of the below things and more

- Humidity
- Temperature
- Light
- Pressure/force
- Motion

2.4 Ethernet: The Netduino Plus 2 has a Ethernet jacka enabling us to connect the unit to the network which could be a local network or The internet. Connecting to Internet opens up a whole new window of features like reading data from remote servers or posting data from the connected sensors and devices to the internet. This will enable us to build the internet of things using the Netduino.

2.5 MicroSD: This version of the adds MicroSD slot which can be used to insert a MicroSD card. The card can persit data that can be used by the Netduino or the Netduino can also write data to the card for local storage. We can even stored compiled programs on the card which can then be executed by the Netduino.

2.6 LED's: There are two type of LED's on the board . The White LED lights up when the board is powered up and acts as a power indicator. The other LED which is blue is user LED and can be controlled from the program running on the Netduino.

2.7 MicroUSB:

This port has several functions on the board.

The Micro USB port connects the Netduino board to a computer using the USB to MicroUSB cable.

This port can also supply power to the board.

Used to deploy apps on to the netduino board and also debug them interactively.

Many times this also can be used to connect input devices like keyboard and mouse.

2.8 Electric Water pump : A submersible pump (or sub pump, electric submersible pump (ESP)) is a device which has a hermetically sealed motor close-coupled to the pump body. The whole assembly is submerged in the fluid to be pumped. The main advantage of this type of pump is that it prevents pump cavitations, a problem associated with a high elevation difference between pump and the fluid surface. Small DC Submersible water pumps push fluid to the surface as opposed to jet pumps having to pull fluids.

Working principle:- The submersible pumps used in ESP installations are multistage centrifugal pumps operating in a vertical position.

Although their constructional and operational features underwent a continuous evolution over the years, their basic operational principle remained the same.

Produced liquids, after being subjected to great centrifugal forces caused by the high rotational speed of the impeller, lose their kinetic energy in the diffuser where a conversion of kinetic to pressure energy takes place. This is the main operational mechanism of radial and mixed flow pumps.

The pump shaft is connected to the gas separator or the protector by a mechanical coupling at the bottom of the pump. Well fluids enter the pump through an intake screen and are lifted by the pump stages.

Other parts include the radial bearings (bushings) distributed along the length of the shaft providing radial support to the pump shaft turning at high rotational speeds.

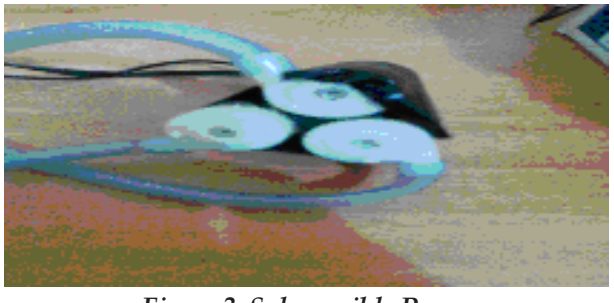

Figure 3. Submersible Pump

2.9 Water Flow Sensor : The main water flow sensor by copper body and plastic forming, water flow rotor components, steady flow components and hall components. It into water dispenser, coffee machine and household appliances the water used for measuring the water flow.

When water flows through the rotor components, magnetic rotor rotating, and speed along with the flow of a linear change. Hall element output corresponding pulse signal feedback to the controller, the size of the flow of water by controller judgment, adjusts proportional valve control of electric current.

Water flow sensor fundamentally solves the differential water-gas valve flap type high pressure and start water valve easy disoperation appear dry and shortcomings. It has reflected sensitive, long service life, action quick, safe and reliable, joins convenient traffic advantages such as the start low, deeply the general user affection.

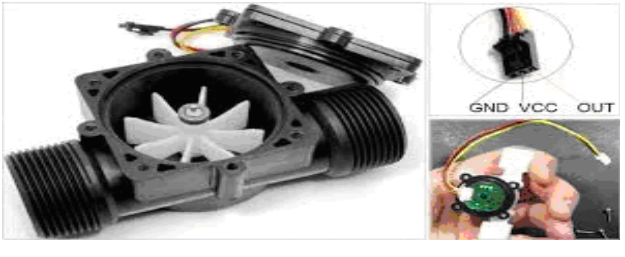

Figure 4. Water Flow Sensor

The main components of turbine rotor flow switch shell, magnetic rotor, brake ring composition. Use water flow switch mode, its performance than the mechanical differential pressure plate structure, and decrease the size. As the water through the turbine switch shell, promote magnetic rotor, different pole near the hall element hall element when conduction, and leave the hall components disconnect.

Thus, can measure the rotor speed. According to the measured data of the rotor speed and water flow, the output signal (voltage) curve, can be sure water dispenser, coffee machine and household appliances start water pressure, hydraulic pressure and startup corresponding start the flow of water and rotor the start of the speed.

The Hall Effect is the production of a voltage difference (the Hall voltage) across an electrical conductor, transverse to an electric current in the conductor and a magnetic field perpendicular to the current. It was discovered by Edwin Hall in 1879.

Hall sensors are commonly used to time the speed of wheels and shafts, such as for internal combustion engine ignition timing, tachometers and anti-lock braking systems. They are used in brushless DC electric motors to detect the position of the permanent magnet. In the pictured wheel with two equally spaced magnets, the voltage from the sensor will peak twice for each revolution. This arrangement is commonly used to regulate the speed of disk drives.

When a beam of charged particles passes through a magnetic field, forces act on the particles and the beam is deflected from a straight path. The flow of electrons through a conductor is known as a beam of charged carriers. When a conductor is placed in a magnetic field perpendicular to the direction of the electrons, they will be deflected from a straight path. As a consequence, one plane of the conductor will become negatively charged and the opposite side will become positively charged. The voltage between these planes is called Hall voltage.

When the force on the charged particles from the electric field balances the force produced by magnetic field, the separation of them will stop. If the current is not changing, then the Hall voltage is a measure of the magnetic flux density. Basically, there are two kinds of Hall Effect sensors. One is linear which means the output of voltage linearly depends on magnetic flux density; the other is called threshold which means there will be a sharp decrease of output voltage at each magnetic flux density.

2.10 Relay: Relay circuit is as shown in the figure 5.Features of this relay are as follows:

• Compact with high power (3 Ampere to 10 Ampere)

• l6 types of contact materials available for home electronics and automotive applications

• Design conforms to the following safety standards

• UL114 No. E63615

• UL508 No. E63614

• CSA No. LR64026

• Japan Electric Appliance Control Law (150–300 V)

• Tube packaging suitable for automatic insertion equipment is available.

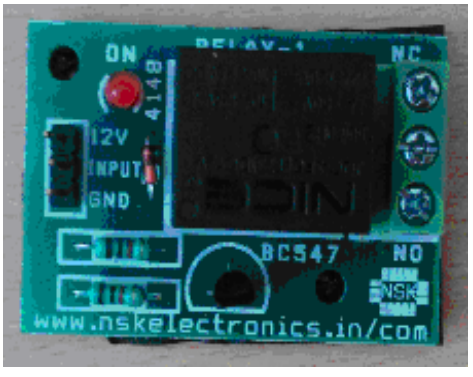

Figure 5 .Relay

Relay is an electromagnetic device which is used to isolate two circuits electrically and connect them magnetically. They are very useful devices and allow one circuit to switch another one while they are completely separate. They are often used to interface an electronic circuit (working at a low voltage) to an electrical circuit which works at very high voltage. For example, a relay can make a 5V DC battery circuit to switch a 230V AC mains circuit. Thus a small sensor circuit can drive, say, a fan or an electric bulb

3. RESULTS

3.1 Test Bed Set Up : Test bed set up for water flow monitoring system is as shown in the below figure 6 and 7. Test bed consists of one water flow monitoring sensors with netduino module. Water flow monitoring sensors sense the parameters and transmit it to the GPIO pin of the netduino module.

Figure 6. Controlling, monitoring and indication setup

Figure 7.Test Bed Set Up

The real time pipeline arrangement consists of one water pump, a water flow sensor, three taps in order to show leakage and excess consumption of water. A small water tank is fitted in order to supply the water through the pipeline.

At the beginning the water is allowed to flow through the pipeline by pumping it with the help of the water pump motor. The water pump is used to supply the water through the pipeline at a constant pressure in order to estimate the water flow rate through the pipe. This water flow rate is measured and monitored by the water flow sensor whose output is in litres per minute.

The output was found to be in the range of 1.7 to 2.2 litres per minute for normal water flow. The value of water flow that was recorded by the water flow sensor for normal water flow was 1.8 l/min,1.9 l/min, 2.0 l/min ,2.2 l/min. There is a change in the flow rate due to the slight variation of pressure that is being pumped through the pipeline system.

A threshold value is set based on this water flow rate to identify the leakage as well as excess water draw from the user. The threshold for leakage is set to 1.6 l/min and that for excess is set for 2.3 l/min. The water pump provided is used in order to control and stop the water flow in case of excess water flow or leakage of water. When the water flow rate exceeds beyond the permissible 2.2 l/min the indication of this case is given by the glowing of red LED and the sounding of buzzer.

When the water flow rate is 1.6 l/min or less than

that then the water pump stops pumping the water through the pipeline and an indication is given to the user by the glowing of red LED and the sounding of buzzer. The water pump has been given a delay of 8 second to switch back on in this prototype.

In order to operate the water pump to close and open to let the water flow, we use a arduino microcontroller board. This arduino board gives the required amount of power to control the motor pump. The arduino board is connected to the relay circuit which is in turn connected to the motor pump.

When the water flow rate is within the threshold value the green LED is on indicating that the correct amount of water is flowing in the pipeline. When the flow rate is less than the threshold value that is when the leakage occurs the red LED glows as well the buzzer makes a noise alerting the user as well as the water pump is closed. When the sensor value is more than the threshold value the red LED glows as well as the buzzer buzzes alerts the user.

This information is accessible by the user anytime due to the use of Internet Of Things, hence using the particular IP address the user can monitor the rate of water flow in the pipeline arrangement be it in an industrial set up or in a household setup. The user can see and monitor the data remotely as well using mobile phones. The approximate location where the water leakage and excess water flow is occurring can be identified too.

In this age of internet and automated things we have developed an automated IP based water flow monitoring and controlling system by integrating new age technology with the purpose to save one of the most valuable commodity on earth that is water.

Output Tabulation:

Entry Number	Status of Taps	Sensor Readings	Status of LEDS & BUZZER
1	Only Tap 2 Open (Normal Water Flow)	1.8 L/min-2.2L/min	GreenLED= ON, Red LED = OFF, Buzzer = OFF
2	Tap 1 slightly OPEN and Tap 2 OPEN (Sensitivity)	1.6 L/min-1.7L/min	GreenLED= ON, Red LED = OFF, Buzzer = OFF
3	Both Tap 1 and Tap 2 OPEN (Water Leakage)	1.1 L/min-1.4L/min	Green-LED=OF, Red LED = ON, Buzzer = ON
4	Tap 2 and Tap 3 OPEN (Excess Water Flow)	2.3 L/min-2.4 L/min	Green-LED=OFF, Red LED = ON, Buzzer = OFF

5.CONCLUSION AND FUTUREWORK

5.1 Conclusion : Water is one of the most important basic needs for all living beings. But unfortunately a huge amount of water is being wasted by uncontrolled use. The main issue that is being addressed in this project is about developing an efficient sensor based water monitoring system. Here we monitor the water flow through the pipeline be it in industrial or household network my using a water flow sensor . By using the monitoring, controlling and alerting system we can easily prevent the water leakage as well as excessive water consumption by the user which will I nturn save the richest treasures that is water for our generation.

The proposed prototype successfully records, stores and processes the water flow data from the system. This helps in assessing for the treatment by visualizing real time data of water flow sensor. The proposed model is low cost, low power consumption device (ofless than 230 μA of electric current at 2.2V) which is miniaturized and non-invasive in nature. This project is demonstrated by considering multiple situations like over flow, water leakage. The device is successful in recording the sensor data in real time and helps for classification.

5.2 Future work : The system is implemented for a single water leakage monitoring parameters. More parameters can be included for water leakage monitoring. This can be performed as further extension of the project.

For real time deployment of the water leakage monitoring system, more number of water leakage monitoring sensors, sensor nodes are required. Therefore the real time implementation of the wireless system can be considered as the future work of this project.

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REFERENCES

[1] Gouthaman.J, Bharathwajanprabhu.R & Srikanth.A "Automated urban drinking water supply control and water theft identification system" Proceeding of the 2011 IEEE Students' Technology Symposium, IIT Kharagpur pp.87-91, 2011.

[2] S.Leirens, C. Zamora, R.R. Negenborn, and B. De Schutter "Coordination in urban water supply networks using distributed model predictive control" Proceedings of the 2010 American Control Conference, Baltimore, Maryland, pp. 3957–3962, 2010.

[3] Shicheng Dong, Hao Jin "Design of wireless monitoring system for urban water supply based on embedded technology" International Conference on Measurement, Information and Control (MIC), pp.348-351, 2012

[4] Lingjuan Wu, Jennifer Trezzo, Diba Mirza, Paul Roberts, Jules Jaffe, Yangyuan Wang, Fellow and Ryan Kastner IEEE Members."Designing an Adaptive Acoustic Modem for Underwater Sensor Networks".

[5] Peng Jiang , Hongbo Xia , Zhiye He and Zheming Wang "Design of a Water Environment Monitoring System Based on Wireless Sensor Networks" Sensors, ,pp. 6411-6434, 2009.

[6] H.G.Rodney Tan, C.H.Lee and V.H.Mok, "Automatic Power Meter Reading System Using GSM Network", 8th International Power Engineering Conference (IPEC),pp-465-469, 2007.

[7] Ma Ming, "Design of embedded system application platform based on ARM", Manufacturing Automation, vol.34, pp 15-16, 2012.

AMOLED FOR BACKPLANES AND COLOR PATTERNING TECHNOLOGIES – A REVIEW

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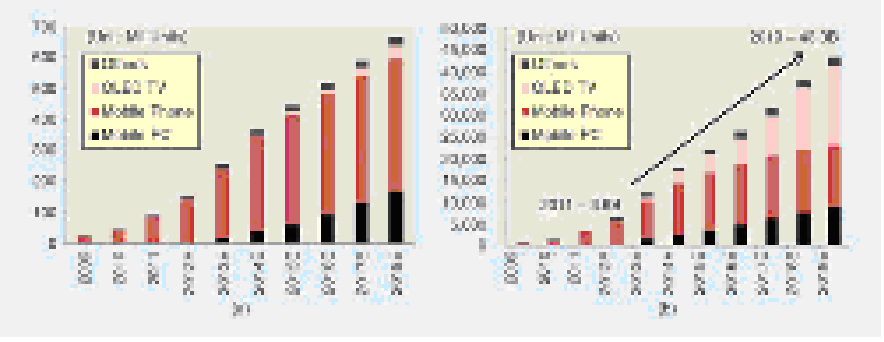
Recent advances in backplanes and color patterning technologies have led to the rapid development of display applications, such as active-matrix liquid-crystal displays (AMLCDs) and active-matrix organic light-emitting diode (AMOLED) displays. Companies such as Samsung Display, LG Display, Japan Display, AU Optics, BOE Technology Group, and ChimeiInnolux are fiercely competing with each other to dominate the market. Recently, Displaysearch reported that the OLED market was worth more than $5 billion in 2012 and would be worth more than $40 billion by 2019. In this paper, recent progress in backplane technologies for OLED displays is reviewed with special emphasis on Si- and oxide-based semiconductors. State-of-the-art OLED device architectures and pixel patterning technologies for large-area AMOLED displays are also evaluated.

Recent advances in backplanes and color patterning technologies have led to the rapid development of display applications, such as active-matrix liquid-crystal displays (AMLCDs) and active-matrix organic light-emitting diode (AMOLED) displays. Companies such as Samsung Display, LG Display, Japan Display, AU Optics, BOE Technology Group, and ChimeiInnolux are fiercely competing with each other to dominate the market. Recently, Displaysearch reported that the OLED market was worth more than $5 billion in 2012 and would be worth more than $40 billion by 2019, as shown in Fig. 1. In this paper, recent progress in backplane technologies for OLED displays is reviewed with special emphasis on Si- and oxide-based semiconductors. State-of-the-art OLED device architectures and pixel patterning technologies for large-area AMOLED displays are also evaluated.



1. Thin-Film Transistor Technologies for AMOLED Displays

Active-matrix organic light-emitting diode (AMOLED) displays use a current-driving method, while active-matrix liquid-crystal displays (AMLCDs) use a voltage-driving method [1,2]. AMOLED displays consist of a thin-film transistor (TFT) backplane, organic light-emitting diodes (OLEDs), and an encapsulating fixure. The pixel circuit, which is a major part of the backplane, provides digital switching and a stable current supply. The role of the OLEDs is light emission from current flowing from the pixel circuit. Typically, the characteristics of OLEDs strongly depend on the current density through the driving TFT. Accordingly, the electrical performance and uniformity of the transistor circuits is important for AMOLED displays. In this section of the report, recent progress on various TFT technologies for large-area AMOLEDs is described.

1.1. Si-based TFT Technologies : Amorphous Si (a-Si) TFTs are used for the backplanes of conventional AMLCDs. However, a-Si TFTs have limitations for large high-resolution AMOLED displays due to their low field-effect mobility (< 1.0 cm2/Vs) and poor reliability in bias illumination stress (BIS) tests. Accordingly, polycrystalline Si (poly-Si) TFTs, which have high mobility (~100 cm2/Vs) and better reliability, are more suitable for AMOLED displays. Although diverse methods of producing low-temperature poly-Si (LTPS) for AMOLED displays have been studied, several problems remain, such as the electrical non-uniformity originating from the distribution of different grain sizes. This drawback prevents poly-Si from producing uniform electroluminescence (EL) and causes non-uniform brightness within the panel. To overcome this problem, a pixel compensation circuit is essential for AMOLED backplanes [3,4].

Figure 2(a) shows the simple pixel structure for AMOLED displays. This consists of a switching transistor (T1) delivering data to a pixel and a driving transistor (T2) to drive the current for the OLED. A typical compensation circuit for eliminating the non-uniformity of the driving transistor threshold voltage is shown in Fig. 2(b). It requires two additional transistors (T3, T4) to store the threshold voltage of the driving transistor using the method of diode connection and one capacitor (C2) to deliver the data to the pixel using the method of capacitive coupling to preserve the stored threshold voltage. Figure 3 shows the timing diagram for Fig. 2(b), which consists of a reset, compensation of the threshold voltage, the input data, and the light emission.

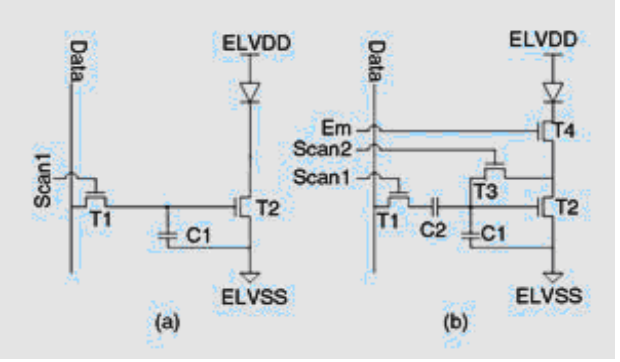


Figure 2. (a) The simple pixel structure for AMOLED displays, (b) the typical compensation circuit.

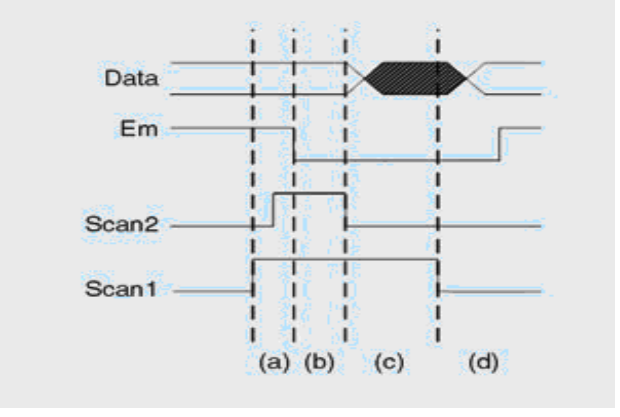


Figure 3. The timing diagram for the compensation circuit; (a) reset, (b) compensation of the threshold voltage, (c) input data, (d) emis

1.2. AMOLED Display Products : AMOLED displays provide an optimized realization of video due to their vivid color, high contrast, wide-view angle, and fast motion-picture response time. They have superior portability and ultra-thin form factors due to the external elimination of the backlight unit (BLU). AMOLED displays for mobile phones have been developed with the current trend for high resolution and large displays due to the popularization of smart phones such as the "seeing cell phone", which include multimedia content such as the Internet and video (Table 2). PenTile technology is being applied to mobile phone AMOLED panels to provide better moving pictures at limited pixel resolutions. Due to the limitations of the fine metal mask (FMM), discussed in section 2.3.1, a method to decrease the sub-pixel size and integrate only two sub-pixels (red and green/blue and green, compared to three sub-pixels of the "RGB-stripe") has been applied (Fig. 7). Since the human eye is most sensitive to green, mapping the green on a one-to-one basis and forming one-third fewer red/blue sub-pixels than conventional RGB shows similar or better apparent resolution.

Model	Galaxy S	Galaxy S2	Galaxy S3	Galaxy Note3
Display size (inch)	4.0	4.3	4.8	5.6
Resolution	480 × 800	480 × 800	720 × 1280	720 × 1280
Pixel structure	Pentile	RGB-stripe	Pentile	RGB-stripe
PPI (the number of RGB)	233	217	306	267

Table 2. The OLED smart phone made-in Samsung.

Flexible OLEDs with enhanced portability have also been developed. These include displays that are bendable, lightweight, and unbreakable. In the 2013 Consumer Electronics Show (CES), Samsung demonstrated a flexible OLED known as "YOUM" (Fig. 8).

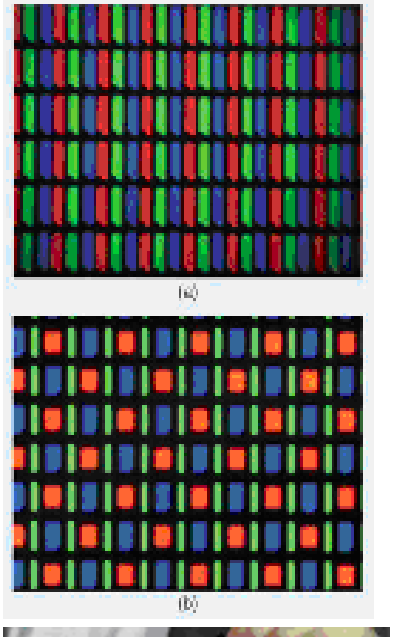


Figure 7. (a) RGB-stripe pixel (b) pentile pixel.

Figure 8. The flexible OLED phone 'YOUM'

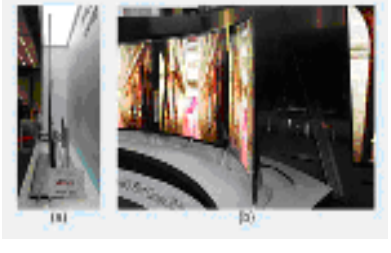


Figure 9. (a) The paper slim OLED TV, (b) the curved OLED TV.

AMOLEDs for TVs are being developed with the current trend to improve the appearance and three-dimensionality of displays. AMOLEDs are being used because they are thin and have fast motion-picture response times compared to LCDs. Figure 9 shows a paper-slim OLED TV and a curved OLED TV (released at the 2013 CES). The curved OLED TV has an optimized picture quality and delivers a comfortable viewing experience because the distance between the user and the TV screen is the same from almost any angle.

II. Device Architecture and Pixel Patterning Processes for Large-area AMOLEDs : As the light-emitting efficiency and integrity of OLEDs improves [34–36], the use of a top-emitting OLED configuration is one approach to maximize the aperture ratio, which reduces the required luminance level and provides improved external emission efficiency and color purity by micro-cavity effects [37–39]. Recent exhibitions of commercial AMOLED TV products suggest that the era of using AMOLEDs in ultimate large-size displays is near. However, a number of technical hurdles must still be overcome to achieve low-cost production with high yield and superior performance and resolution (e.g., more than 4K × 2K or 3840 × 2160 pixel resolution for TV). Therefore, more efficient OLED material/device structures as well as optimum color patterning technologies will play an important role. In this part of the report, recent progress on modern OLED device architectures and patterning processes for large-area AMOLEDs is discussed.

2.3. RGB Pixel Patterning

Processes for Large OLEDs : Compared with a white/color filter OLED, RGB individual patterning is advantageous in terms of the intrinsically superior color range and highly efficient behavior. Several RGB patterning methods and issues for commercial production are discussed in the following section.

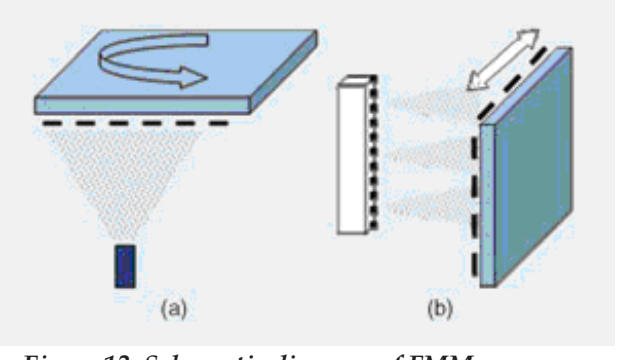


Figure 13. Schematic diagram of FMM processes for (a) point source with horizontal deposition (b) vertical deposition with linear source.

2.3.1. Fine Metal Mask Process : Currently, the pixel patterning for full-color AMOLEDs is obtained by using the fine metal mask (FMM) method with a point source; this is part of the mainstream for mass-production of commercial devices. Small molecular materials are thermally deposited under a vacuum of 7–10 torr. However, this process suffers from a lot of material waste. Additionally, distortion and bending of the FMM for large panels creates a shadow effect, causing a dead space that result in limited aperture ratios for the pixel design. To date, 460 × 730 mm or larger glass panels can be used for FMM color patterning. The limiting factors of the panel size are the weight of the mask frame, bending and stretching, and thermal expansion. Vertical deposition with an FMM, small mask scanning (SMS), and hybrid deposition with laser-induced thermal imaging (LITI) are major candidates for a suitable process for larger glass substrates or higher resolution pixel patterning with masks. Figure 13 illustrates an FMM process with horizontal/vertical deposition.

2.2.2. Laser-induced Patterning : One of the major approaches for pixel patterning without an FMM is LITI, which was initially developed by 3M and Samsung SDI [59–61] and adopted for high-resolution AMOLED development by Samsung Display. The material deposited on the donor film is conveyed to a receptor surface, where the pattern resolution can be precisely controlled by a laser. Unlike other laser-assisted patterning [62,63], the integrity of the transferred layer (on the donor film) with the receptor substrate is maintained during the entire patterning process; the donor and receptor are held in intimate contact by a vacuum. The transfer process for LITI is ultra-fast; the estimated heating rate by the laser is 7 × 107 °C/s, and the approximate temperature on the organic layer is around 135°C. The donor film is composed of a base film, a laser-to-heat conversion (LTHC) layer, an interlayer, and an OLED color transfer layer (RGB, which can be deposited either by thermal evaporation or solution coating). The RGB color transfer layer fabricated on top of the donor sheets for laser transfer should be a moderate molecular weight material, because the transferred layer will not have clear patterns when the cohesive force of the film is too strong, which is typically the case for purely polymeric materials. Figure 14 shows a schematic diagram of the LITI process and a generated stripe pattern with edge roughness due to defect limits or a non-contact area on the transferred layer. Although LITI costs more and requires more precise process control, the OLED performance and stability is significantly improved so that the LITI technique is a good alternative for fabricating high-resolution devices or hybrid patterning (in which some of the organic/emission layers are fabricated without a mask and the remaining layers are patterned by LITI).

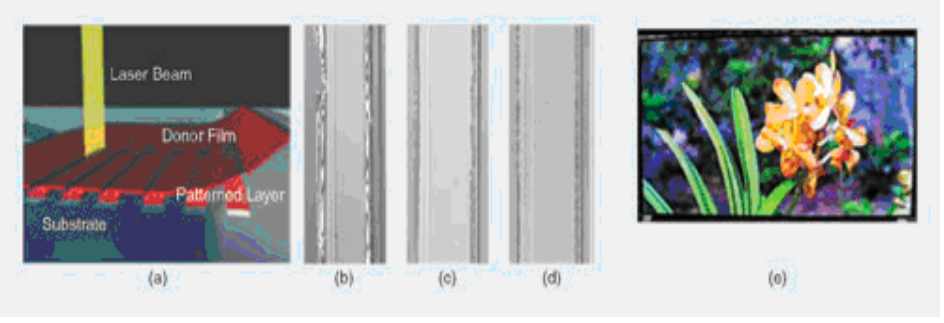


Figure 14. Schematic diagram of the LITI process (a) and micrographs indicating that the line patterns quality obtained. Polymeric emitter (Mw > 105)/ polystyrene (Mw = 2500) ratio for the fabrication of soluble green OLED transfer layer on donor film (b) of 1:1 (wt/wt) [edge roughness; ~ 13 um], (c) of 1:1.5 (wt/wt) [edge roughness; ~ 7 um], and (d) 1:2 (wt/wt) [edge roughness; ~ 3 um], (c) of 1:1.5 (wt/wt) [edge roughness; ~ 13 um] [59] (e) 40-inch prototype AMOLED by LITI.

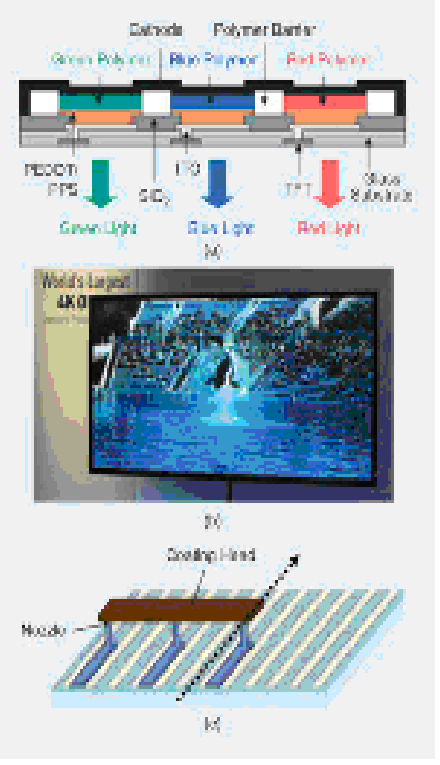


Figure 15. (a) Schematic picture of RGB multi-color polymeric OLED by inkjet [64]. (b) 4K OLED, 56 inch panel presented by Panasonic at CES 2013. (c) Schematic diagram of nozzle printing for high-speed OLED production [65].

2.3.3. Solution Printing Process : Figure 15. (a) Schematic picture of RGB multicolor polymeric OLED by inkjet [64]. (b) 4K OLED, 56 inch panel presented by Panasonic at CES 2013. (c) Schematic diagram of nozzle printing for high-speed OLED production [65].

For the fabrication of large OLED panels, solution-processed printing gives high yields with low cycle times for evaporation or transfer processes. Inkjet printing is an attractive deposition technique for organic semiconductors [64] and provides non-contact, mask-less, and drop-on-demand printing with lower consumption of materials (See Fig. 15(a) for the basic scheme). Although there have been many reports about polymeric OLEDs obtained through inkjet printing, technical limitations, such as film/stripe instability, sensitivity to surface energy conditions, and the intrinsic low performance of soluble OLED material still exist. Optimized ink formulation and development of high-performance OLED ink materials are important issues. Recently, a 4K OLED 56-inch panel produced through an inkjet printing process was demonstrated by Panasonic (Fig. 15(b)), suggesting the cost-competitiveness of OLEDs over LCDs. Continuous nozzle printing developed by Du Pont is another candidate for high-speed RGB color patterning processes [65]. In nozzle printing, solutions of RGB materials are continuously jetted through an array of nozzles moving at high speed, providing a process that is less sensitive to the surface energy of the solution and substrate layer.

Conclusions : Recent progress in backplanes and color patterning technologies for OLED displays has been reviewed. Because the market for OLED displays is fast growing and the major industrial players, such as Samsung Display, LG Display, Japan Display, AU Optics, BOE Technology Group, Panasonic, and ChimeiInnolux, have already demonstrated AMOLED panels, the competition between each technology used for the backplanes and color patterning is of increasing importance today.

BASIC STUDY OF JUNCTION FIELD EFFECT TRANSISTOR (JFET)

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Junction gate field-effect transistor (JFET) is the simplest type of field-effect transistor. This is three-terminal-semiconductor device that can be electronically used as controlled switches, amplifiers, or voltage-controlled resistors. PN junction diode has properties that it injects minority carriers with forward bias and variation of depletion width with reverse bias. These properties play important role in working of the device. FET is a majority carrier device and called unipolar transistor. It is voltage controlled current device having extremely high input impedence.

Keywords: Transistor, PN junction, Biasing, Depletion, Terminal

JFET is exclusively voltage-controlled device in which there is no need for biasing current. Electric charge flows through a semiconducting channel between source and drain terminals. By applying a reverse bias voltage to a gate terminal, the channel is "pinched off, so that the electric current is impeded or switched off completely. A JFET is usually on when there is no potential difference between its gate and source terminals. If a potential difference of the proper polarity is applied between its gate and source terminals, the JFET will become more resistive to current flow, which means that less current will flow in the channel between the source and drain terminals. Thus, JFETs are sometimes referred to as depletion-mode devices. JFETs can have n-type or p-type channel. In the n-type, if the voltage applied to the gate is less than that applied to the source, the current will be reduced. A JFET has a large input impedance (order of 1010 ohms), which means that it has a negligible effect on external components or circuits connected to its gate.

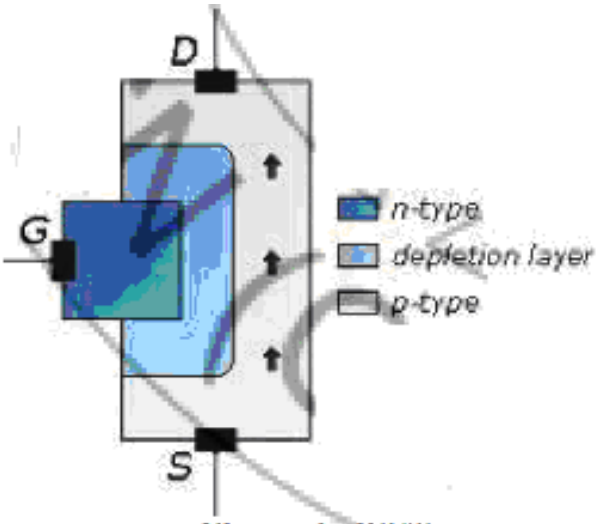


Figure 1: JFET

1.1 Construction : Theoretically the construction of JFET is quite simple, but in reality it is very difficult, requiring very pure materials and clean room techniques. JFET is made in different forms, some being

made as discrete or single components and others, using planar technology as integrated circuits.

•JFET Diffusion construction: It is the simplest form of construction for a Junction FET (JFET) using diffusion techniques. It uses a small slab of N type semiconductor into which are infused two P type areas to form the Gate. Current (electrons) flows through the device from source to drain along the N type silicon channel. As only one type of charge carrier (electrons) carry current in N channel JFETs, these transistors are also called "Unipolar" devices.

•JFET planar construction: in this technology the load current flows through the device from source to drain along a channel made of N type silicon. In the planar device the second part of the gate is formed by the P type substrate. P channel JFETs are also available and the principle of operation is the same as the N channel type described here, but polarities of the voltages are of course reversed, and the charge carriers are holes.

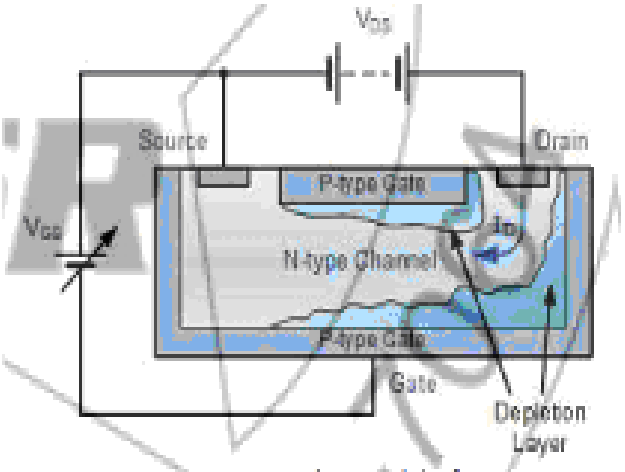
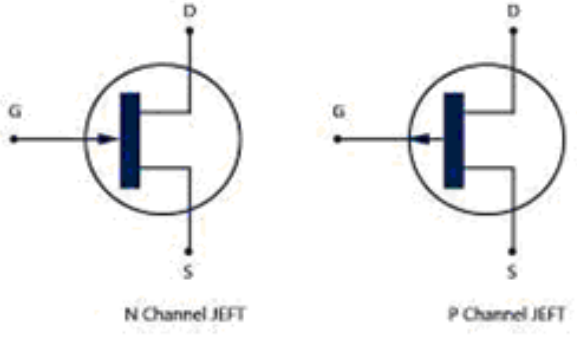


Figure 2: Construction model of JFET

1.2 Schematic symbols



JFET-N-Channel and P-channel Schematic Symbol

1.3 Polarity convention:

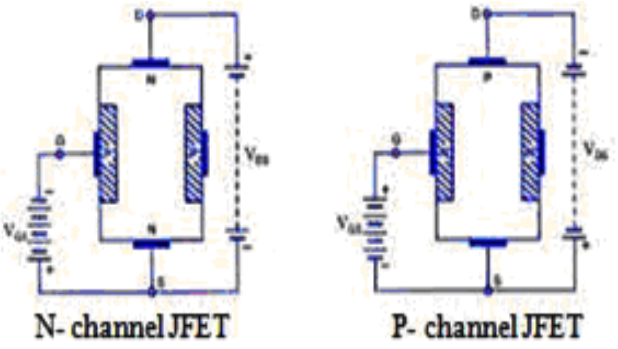


Figure 3: polarity for JFET

1.4 JFET working : JFET operation is just like that of a garden hose. The flow of water through a hose can be controlled by squeezing it to reduce the cross section, similarly the flow of electric charge through a JFET is controlled by constricting the currentcarrying channel. The current also depends on the electric field between source and drain.

Construction of the conducting channel is accomplished using the field effect: a voltage between the gate and source is applied to reverse bias the gate-source pn-junction, thereby widening the depletion layer of this junction encroaching upon the conducting channel and restricting its cross-sectional area. The depletion layer is so-called because it is depleted of mobile carriers and so is electrically nonconducting for practical purposes.[1]

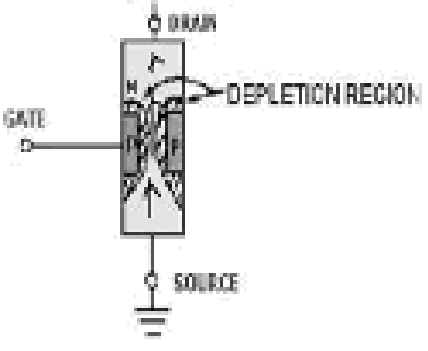


Figure 4: JFET with no bias voltage

When the depletion layer expands the width of the conduction channel, "pinch-off" is achieved and drain to

source conduction stops. Pinch-off occurs at a particular reverse bias (VGS) of the gate-source junction. The pinch-off voltage (Vp) varies considerably, even among devices of the same typeTo switch off an n-channel device requires a negative gate-source voltage (VGS). Conversely, to switch off a p-channel device requires positive VGS. In normal operation, the electric field developed by the gate blocks source-drain conduction to some extent. Some JFET devices are symmetrical with respect to the source and drain.

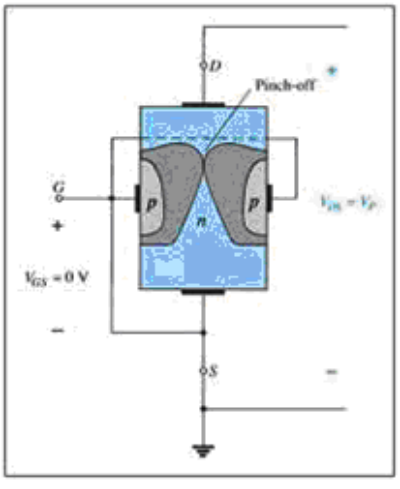


Figure 5: JFET when channel is pinched-off.

But the channel does not totally pinched off because if channel is totally pinched off then no current flows through the channel and there will be no voltage drop through the channel and diode will not be reverse bias now and it forms a symmetrical shape instead of wedge shape. Therefore a minimum amount of current flows through the junction which is called pinched off current and the region is known as saturation region.

2. Characteristics of JFET

JFET characteristics are shown in the figure:

shorted gate JFET characteristics are shown in the figure

Initially when drain source voltage Vds is zero, there is no attracting potential at the drain,so no current flows inspite of the fact that channel is fully open. So drain current Id iszero. For small applied voltage Vds, N bar acts as simplesemiconductor resistor, and drain current increases linearlywith increase in Vds up to the knee point. Region to the leftof the curve is called channel ohmic region because in thisregion the JFET behaves as an ordinary resistor.

With increase in drain current ohmic voltage drop betweensource and channel region reverse the gate junction. But thisbiasing is not uniform throughout. Reverse bias more atdrain end than that the source end.

Eventually a voltage Vds is reached at which the channel ispinched off. Drain current Id no longer increases withincrease in Vds. It gain a constant saturation value. And thevoltage ia known as pinch off voltage (Vp) here. And thisregion is called pinch-off region and sometimes calledsaturation region. In this region JFET operates as constantCurrent device. If drain source voltage is increased further, astage comes where gate- channel junction breaks down. Inthis region drain current increases rapidly and JFET may getdestroyed. And region is known as breakdown region.It is very interesting to observe that JFET behaves asordinary register in ohmic region, constant current source inpinch- off region and behaves as constant voltage source in breakdown region.

3. Conclusion :

JFET is a field effect transistor which is a voltage controlledcurrent source having extremely high input impedanceunlike BJT it is a unipolar junction transistor which is usedin many electronic devices as an amplifier.

4. Future Scope : JFET is most popular device in today's electronic world andit will be used for amplifing device and voltage variableregistor in future and in many applications in future.

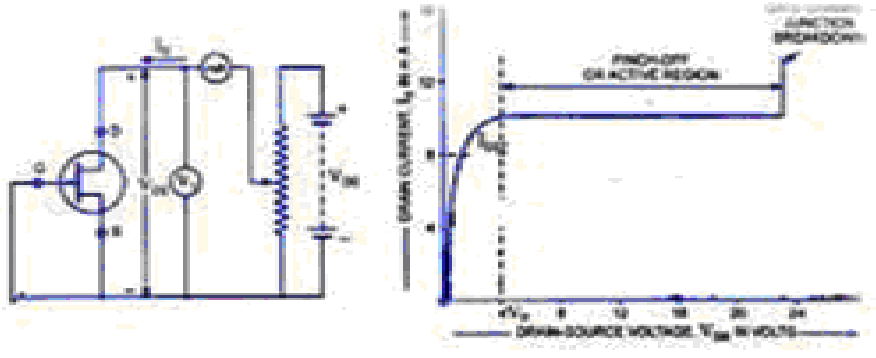


Figure 6: JFET characteristics with shorted gate.

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THEME :-12

VARAHAMIHIRAM

IT, BT, NT, FT and Frontier Sciences

Sl No	Title of the Paper	Authors	Page No
1.	WIRELESS NETWORK VIRTUALIZATION: A SURVEY, SOME RESEARCH ISSUES AND CHALLENGES	Bhavani R	239 - 243
2.	ENISIS,USEAND DISUSES OF BIOTECHNOLOGY	Devi Pooja S, Kumuda R Amrutha G.B	243 - 245
3.	SMART TAKE	Inchara N Bhushan Chaitra	245 - 247
4.	A SURVEY ON DSI IN WSN AND AD-HOC NETWORK	Mamatha E & Manjula K R	248 - 252
5.	A NOVEL BASED INTRUSION DETECTION SYSTEM FOR AODV	Prasanna Lakshmi.G.S Veena K, Shanta Kumar B Patil	252 - 256
6.	NANOTECHNOLOGY	Samreentaj K.C. Poornima Y.N	256 - 257
7.	WAVELET BASED COLOR VIDEO STEGANOGRAPHY	Shilpa M N Ravi Kumar B M	257 - 262
8.	A SURVEY ON RESEARCH ISSUES, CHALLENGES, ARCHITECTURE, PLATFORMS AND APPLICATIONS OF CLOUD COMPUTING	Anusha A& Shreya M S	262 - 268

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WIRELESS NETWORK VIRTUALIZATION: A SURVEY, SOME RESEARCH ISSUES AND CHALLENGES

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Since wireless network virtualization enables abstraction and sharing of infrastructure and radio spectrum re-sources, the overall expenses of wireless network deployment and operation can be reduced significantly. Moreover, wireless network virtualization can provide easier migration to newer products or technologies by isolating part of the network. Despite the poten-tial vision of wireless network virtualization, several significant research challenges remain to be addressed before widespread deployment of wireless network virtualization, including isola-tion, control signaling, resource discovery and allocation, mobility management, network management and operation, and security as well as non-technical issues such as governance regulations, etc. In this paper, we provide a brief survey on some of the works that have already been done to achieve wireless network virtualization, and discuss some research issues and challenges. We identify several important aspects of wireless network virtual-ization: overview, motivations, framework, performance metrics, enabling technologies, and challenges. Finally, we explore some broader perspectives in realizing wireless network virtualization.

Index Terms—Wireless network virtualization, abstraction and sharing, isolation, cognitive radio and networks, cloud computing.

In the information and communications technology (ICT) sector, virtualization has become a popular concept in dif-ferent areas, e.g., virtual memory [1], virtual machines [2], virtual storage access network [3] and virtual data centers [4]. Virtualization involves abstraction and sharing of resources among different parties. With virtualization, the overall cost of equipment and management can be significantly reduced due to the increased hardware utilization, decoupled functionalities from infrastructure, easier migration to newer services and products, and flexible management [1]–[4]. In wired networks, virtualization has occurred for decades, e.g., virtual private networks (VPNs) over wide area networks (WANs) and virtual local area networks (VLANs) in enterprise networks [5], [6]. Recently, network virtualization has been ac-tively used in Internet research testbeds, such as G-Lab [7] and 4WARD, and applied in the cloud computing environment. It aims to overcome the resistance of the current Internet to fundamental architecture changes. Network virtualization has been considered as one of the most promising technologies for the future Internet.

With the tremendous growth in wireless traffic and services, it is natural to extend virtualization to wireless networks. With wireless network virtualization, network infrastructure can be decoupled from the services that it provides, where differentiated services can coexist on the same infrastructure, maximizing its utilization. Consequently, multiple wireless virtual networks operated by different service providers (SPs) can dynamically share the physical substrate wireless networks operated by mobile network operators (MNOs). Since wireless network virtualization enables the sharing of infrastructure and radio spectrum resources, the capital expenses (CapEx) and operation expenses (OpEx) of wireless (radio) access networks (RANs), as well as core networks (CNs), can be reduced signif-icantly. Moreover, mobile virtual network operators (MVNOs) who may provide some specific telecom services (e.g., VoIP, video call, over-the-top services) can help MNOs attract more users, while MNOs can produce more revenue by leasing the isolated virtualized networks to them and evaluating some new services. Meanwhile, wireless network virtualization pro-vides easier migration to newer products or technologies while supporting legacy products by isolating part of the network. In addition, the emerging heterogeneous wireless networks need a convergent and powerful network management mechanism, which can be provided by wireless network virtu-alization

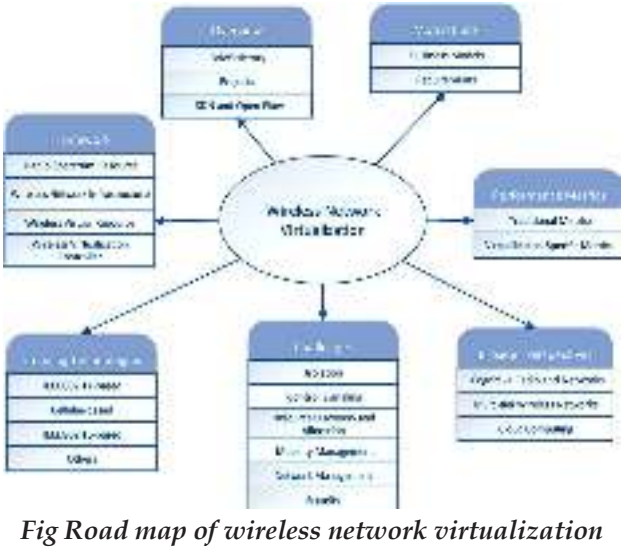

Fig Road map of wireless network virtualization

II. HISTORY OF WIRED NETWORK VIRTUALIZATION: Virtualization has occurred in wired networks for decades. Some examples of wired network virtualization include virtual local area networks (VLANs), virtual private networks (VPNs), active and programmable networks, and overlay networks, which are described in the following.

1.VLAN: A VLAN refers to a domain where a group of hosts with a common interest are allowed to be logically brought together under a single broadcast domain regardless of their physical connectivity.

2.VPN: In a VPN, a private network, whose hosts are dis-tributed in multiple sites, connects through private and secured tunnels (links) over public communication networks (e.g., the Internet or PSDN Depended on different layers, VPNs can be classified into four classes: Layer 1 VPNs, Layer 2 VPNs [20], Layer 3 VPNs and higher layer VPNs . It should be noted that Layer 1 VPNs have no guarantee between data plane connectivity and control plane connectivity, which means that each service network has independent address space and L1 resource view, separating policies and completing isolation from other VPNs. This is the main difference between Layer 1 VPNs and Layer 2/3 VPNs.

3.Active and Programmable Networks: In response to user demands, the need of creating, deploying, and managing novel services on the fly drives the research of active and programmable networks. The fundamental discussion of pro-grammable networks is that separating communications hard-ware from control software and allowing multiple parties to run possibly totally different protocols on the same network elements without any conflict. The open signaling approach and the active networks approach are the two kinds of implementa-tions of active and programmable networks [23].

4.Overlay network: A virtual network that creates a virtual topology based on the physical topology of another network can be considered as an overlay network where nodes are connected through virtual links, which correspond to paths in the underlying network. Overlays are typically implemented in the application layer [6].

III. MOTIVATION : The motivation of wireless network virtualization is that the Business models with different roles in the wireless network market and the functions of these roles will be presented. Moreover, we will discuss the re-quirements that need to be met to implement wireless network virtualization.

IV.RELATED WORK

A. What is Wireless Network Virtualization?

Wireless network virtualization can have a very broad scope ranging from spectrum sharing, infrastructure virtualization, to air interface virtualization. Similar to wired network vir-tualization, in which physical infrastructure owned by one or more providers can be shared among multiple service providers, wireless network virtualization needs the physical wireless infrastructure and radio resources to be abstracted and isolated to a number of virtual resources, which then can be offered to different service providers. In other words, virtualization, regardless of wired or wireless networks, can be considered as a process splitting the entire network system. However, the distinctive properties of the wireless environment, in terms of time-various channels, attenuation, mobility, broadcast, etc., make the problem more complicated. Furthermore, wireless network virtualization depends on specific access technologies, and wireless network contains much more access technologies compared to wired network virtualization and each access tech-nology has its particular characteristics, which makes conver-gence, sharing and abstraction difficult to achieve. Therefore, it may be inaccurate to consider wireless network virtualization as a subset of network virtualization.

In this paper, we consider wireless network virtualization as the technologies in which physical wireless network in-frastructure resources and physical radio resources can be abstracted and sliced into virtual wireless network resources holding certain corresponding functionalities, and shared by multiple parties through isolating each other. In other words, virtualizing wireless network is to realize the process of ab-stracting, slicing, isolating and sharing the wireless networks. Since wireless network resources are sliced into multiple slices, the terms of virtual slice and virtual network have the similar meanings of virtual wireless network resources.

B. What are the Requirements of Wireless Network Virtualization?

Wireless network virtualization can be developed based on a specific business model. There are some requirements that need to be met to implement wireless network virtualiza-tion. Depending on the scope of virtualization, these require-ments can be classified as basic requirements and additional requirements.

Basic requirements: a)Coexistence: In wireless network virtualization, phys-ical infrastructures should allow that multiple independent virtual resources coexist on substrate physical networks [46]. Actually, it is clear that the purpose of virtualizing network is to make multiple systems to run on the same phys-

ical resources.

b)Flexibility, manageability and programmability: Free-dom in different aspects of networking needs to be pro-vided in wireless network virtualization through the decoupling customized control protocols from the underlying physical configurations in the underlying physical network. Also, con-vergence allows virtual wireless networks to be stable in case of any instability happening.

c)Mobility: Virtual wireless networks should support not only traditional mobility but also mobility between MVNOs or SPs. Mobility management should allowed virtual mobility that is between WVNs or SPs and geographical mobility at the same time.

d)Resource utilization: Wireless network virtualization should guarantee the efficient use of physical radio resources, computing resources and other resources. The architecture needs to cope with the tradeoff between complexity and effi-ciency in dynamic resource scheduling.

c. Framework of wireless network virtualization : In this section, a framework is summarized for wireless network virtualization. This framework is based on the architec-tures proposed by existing studies, and reflects the basic ideas, components and relationship in wireless network virtualization; but, unfortunately, this framework may not represent all of the architectures, because each architecture has special pur-poses, original intension and ideas. Generally, the framework of wireless network virtualization can be composed of four main components: radio spectrum resource, wireless network infras-tructure, wireless virtual resource, and wireless virtualization controller, as shown in below Fig.

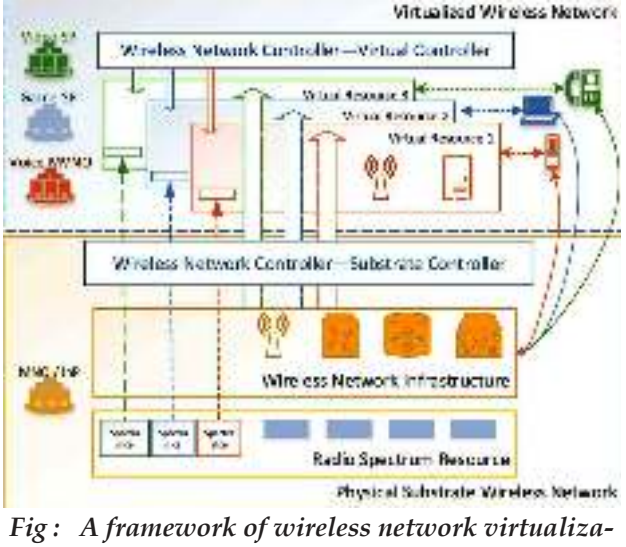

Fig : A framework of wireless network virtualization.

D. Wireless Network Infrastructure : Wireless network infrastructure refers to the whole wire-less physical substrate network, including sites (towers and antennas), base stations (macrocell, smallcell, relay, RF, base-band processors, radio resource controllers, etc. in cellular networks), access points (in wireless local area networks (WLANs)), core network elements (gateway, switchers, routers, etc.), transmission networks (backhaul and links between RANs and CN).These infrastructure components implemented physically are the "foundation" of wireless networks and occupy the majority of the investment of MNOs. In modern wireless networks, a single whole wireless network (including RAN, CN and TN) may be possessed by one MNO, or some parties may own part of the whole wireless network, e.g., some parties own the CN while some parties only have the TN

E. performance metrics of wireless network virtualization : In traditional wireless networks, several metrics are used to evaluate the performance of a network. Obviously, these met-rics can also be used to measure wireless network virtualization.

1. Costs: Costs are the total investment from wireless net-work operators for the infrastructure constructing and network operating, including CapEx and OpEx

2. Revenue: In addition to the reduced costs, the increased revenues compared to traditional networks is another purpose of wireless network virtualization.

3.Coverage and capacity (throughput): Coverage refers to the whole geographical area where the wireless network services can cover.

4.Deployment efficiency: Deployment efficiency (DE) met-ric measures the ratio between system throughput (or coverage) and deployment costs (including both CapEx and OpEx)

5.Spectrum efficiency: Spectrum efficiency (SE) metric can be defined as the ratio between system throughput (or coverage) and bandwidth.

6.Energy efficiency: Energy efficiency (EE) metric can be defined as the ratio between system throughput (or coverage) and energy consumption

7. Signaling latency: Signaling latency refers to the delay of control signals among entities that hold the functions of network management.

F.Challenges of wireless network Virtualization:

1) Isolation: Isolation is the basic issue in virtualization that enables abstraction and sharing of resources among different parties.

2) Control signaling: Connectivity needs to be established between SPs and InPs before a virtual network can be created.

3) Resource discovery and allocation: To realize wireless network virtualization, InPs or MVNOs should discover the available active and passive resources in the underlaying phys-ical wireless networks.

4)Mobility management: Mobility management is an im-portant issue in wireless networks that ensures successful de-livery of new communications to users

5)Network management:

Network management is always a big challenge for the carriers. Management of wireless network virtualization is crucial to guarantee the proper operation of the physical infrastructure, the host virtual wireless networks and the wireless services supported by the virtual networks.

G. Enabling technologies in wireless network virtualization:

Radio Access Technologies	Ref	Networking and Purposes	Isolation	Contributions
IEEE 802.11	[81], [82]	WLAN / Experimental	MAC layer / TDM	Enabling access point virtualization
	[50], [83], [84]	WLAN / Testbed	Spctrum / FDM	Moving the testbed-as-a-service to the wireless environment and enabling virtualization of network operating systems
	[85]	WLAN / Testbed	Time-slot / TDM	Implementing virtualization mechanisms on a large-scale 802.11 wireless testbed
	[86]–[88]	WLAN / Testbed	Time-slot / TDM	Enabling TDM-based link virtualization
	[51]	WLAN / Testbed	Spatial / SDM	A comparison between space-division and time-division is given
	[89], [90]	Multihop Network / Experimental		Experimental results are given
	[91]	WMN / Testbed	Time-slot / asynchronous time sharing	Proposing asynchronous time sharing between several slices on a node
	[92]	WMN / Testbed	TDM	Embedding the virtual networks under unreliable wireless links
	[93]	WMN / Testbed	FDM	Proposing a heuristic algorithm based channel allocation solution
3GPP LTE	[69], [94]–[96]	Cellular / Commercial	PRB	Enabling eNodeB virtualization
	[97]	Cellular / Commercial	PRB	Introducing the bankruptcy game into the resource allocation of LTE virtualizaiton
	[76]	Cellular / Commercial	Packet	Using FlowVisor to slice eNodeB to certain number of virtual eNodeBs
	[71], [98]	Cellular / Commercial	Packet	Enabling SDN in RAN
	[70]	Cellular / Commercial	Packet	Abstracting out base stations as a virtual big base station
IEEE 802.16 (WiMAX)	[99], [100]	Cellular / Commercial	Traffic types	Introducing the virtual network traffic shaper
	[12], [43], [101]	Cellular / Commercial	Flow	Enabling simultaneous reservations of two classes slices without modifying the MAC schedulers
	[102], [103]	Cellular / Commercial	Sub-carriers	Enabling partially slicing and combination of sub-carries and power allocation
Heterogeneous	[104]	Cellular / Commercial	Sub-carriers	Proposing cognitive virtualization platform
	[105]	Cellular / Commercial	Sub-carriers	Enabling dynamic resource reallocation
	[68]	Cellular / Commercial	Multilevel	Enabling virtualization by using the concept of OpenFlow
Others	[74], [106]		Sub-channel	Proposing a rate region, which is computed as the set of rate that can be achieved by any spectrum allocation
	[107]		Sub-channel	Handling the online requests of wireless virtualization
	[108]		TDM / SDM	Enabling maximal resources utilization
	[109], [110]	WMN	Context	Splitting networks into several virtual networks based on context demands

V. CONCLUSION : This paper addresses wireless network virtualization, which is becoming an important concept that enables abstraction and sharing of infrastructure and radio spectrum resources, re-duced expenses of wireless network deployment and operation, easier migration to newer services and products and flexible managements. We began our discussion with an overview of network virtualization. Here, we presented a brief history and current projects of network virtualization with emphasis on SDN and OpenFlow. We then discussed the motivations of wireless virtualization. In particular, we presented the business models with different roles and the functions of these roles in the wireless network market. Next, we discussed the frame-work of wireless network virtualization with four main compo-nents, radio spectrum resource, wireless network infrastructure, wireless virtual resource, and wireless virtualization controller. We then discussed some performance metrics that are can be used to compare different architectures, virtualization mechanisms, resource allocation algorithms, management systems, customization flexibility, energy saving, interfaces, etc.

In summary, research on wireless network virtualization is quite broad and a number of research issues and challenges lay ahead. Nevertheless, it is in favor of the wireless community to swiftly address these challenges to adopt these technologies. This article attempts to briefly explore the current technologies related to wireless network virtualization and we discuss future research that may be beneficial in pursing this vision

VI.REFERENCES

[1] C. Morin and I. Puaut, "A survey of recoverable distributed shared virtual memory systems," IEEE Trans. Parallel Distrib. Syst., vol. 8, no. 9, pp. 959–969, Sep. 1997.

[2] J. E. Smith and R. Nair, "The architecture of virtual machines," Computer, vol. 38, no. 5, pp. 32–38, May 2005.

[3] A. G. Dimakis, K. Ramchandran, Y. Wu, and C. Suh, "A survey on net-work codes for distributed storage," Proc. IEEE, vol. 99, no. 3, pp. 476– 489, Mar. 2011.

[4] G. Schulz, The Green and Virtual Data Center. Boca Raton, FL, USA: CRC Press, 2010.

[5] N. Chowdhury and R. Boutaba, "Network virtualization: State of the art and research challenges," IEEE Commun. Mag., vol. 47, no. 7, pp. 20– 26, Jul. 2009.

[6] N. M. K. Chowdhury and R. Boutaba, "A survey of network virtualiza-tion," Comput. Netw., vol. 54, no. 5, pp. 862–876, Apr. 2010.

[7] G-lab, . [Online]. Available: http://www.german-lab.de/

ENISIS,USEAND DISUSES OF BIOTECHNOLOGY

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BIOTEHNOLOGY IS THE USE OF LIVING SYSTEMAND ORGANISMS AND TO DEVOLOP OR MAKE PRODUCT OR ANY TECHNOLOGICAL SYSTEM.

GENESIS: 961 Reorganisation of cubian academy of sciencs founded in(1861)13 in stittutes were established within a years under the cuban ministry of health. Cuban institute for research on sugarcane derivatives (icidca) nation al centre for scientific reserch (cenic). UNEP contituted an AD-HOC working groupn of technology and legal experts to prepare to an international legal instrument for convervation and sustainable use of biodiversity which resulted in "convention on biological diversity (cbd).cbd came into force.

1.Biotechnology:Various Applications : Article Shared by the recombinant DNA technological processes have made great impact in the area of healthcare by mass production of safe and more effective therapeutic drugs.Further, the recombinant therapeutics does not induce unwanted immunological responses. Now about 30 recombinant therapeutics have been approved for human use all over the world. In India, 12 of these are presently being marketed

2.Genetically Engineered Insulin : Role of Sharpy-Shafer, Banting, Best and Macleod. Sharpy-Shafer (1916) first expressed the opinion that diabetes is caused by failure of the islets of pancreas to secrete a substance named by him as insulin. Insulin is secreted by the Beta cells of the islets of Langerhans of the pancreas. In 1921, Banting and Best succeeded in preparing a pure extract of insulin from the pancreatic islets of a dog with the help of Macleod. Banting and Macleod won the 1923 Nobel Prize in Medicine or Physiology.

3.Structure of Insulin: Human insulin is made up of

51 amino acids arranged in two polypeptide chains, A having 21 amino acids and B with 30 amino acids. The two polypeptide chains are interconnected by two disulphide bridges (Fig. 12.9) or S-S linkages. An S-S linkage also occurs in A chain. The hormone develops from a storage product called proinsulin.Proinsulin has three chains, A, B and C. C -chain with 33 amino acids is removed prior to insulin formation. Bacteria cannot be made to synthesise insulin from its gene because of the presence of introns. Bacteria do not possess enzymes for removing intron mediated transcription.

Molecular structure of insulin was worked out by Sanger. Tsansynthesised human insulin first time.

3.1 Production of Human Insulin:

(i) Isolation of Donor or DNA segment: involves essentially the following stages:

(ii) Formation of Recombinant DNA : Both the vector and donor DNA segments are cut in the presence of restriction endonuclease. In the presence of ligase DNA segments of both are joined to form rDNA.

(iii) P(iv) Introduction of rDNA in the recipient organism roduction of Multiple Copies of rDNA:

Next step in the process is production of multiple copies of this recombinant DNA.: rDNA A useful DNA segment is isolated from the donor or.

(v) Screening of the transformed cells: The recipient (host) cells are screened in the presence of rDNA and the product of donor gene

4. Gene Therapy : stranded pieces of DNAs (sometimes RNAs) labelled with radio isotopes such as 32p. Molecular probes are available for many genetic disorders such as Duchenne muscular dystrophy cystic fibrosis, Tay-Sachs disease. The analytical techniques used for the identification of a specific DNA, an RNA or a protein from thousands of each are collectively called blotting technique. In Southern blotting extraction of DNA from the cells (say leucocytes) occurs. Latter on labelled DNA hybrid complexes are formed which can be identified on exposure to X-ray film. In Northern blotting RNA is identified by labelled DNA or RNA probe. In Western blotting, protein is identified with the Only introduction of a new gene into the somatic cells is allowed at present. Genetic modification in the germ cells of the offspring is not permissible.

5.Forensic Medicine (Identification of Murders, Rapists, etc.): Biotechnology has proved to be a boon in solving crimes, legal disputes, etc. Establishing the identity of victims (e.g., of murder, accidents, etc.), criminals (e.g., in cases of rape, murder, etc.), father (in cases of paternity dispute) etc. is unable to solving the problems of crimes/cases. A biotechnological procedure, called DNA finger-printing or DNA profiling, is a highly sensitive, fool-proof, absolutely accurate and extremely versatile approach to this problem.

6.Monoclonal Antibodies: Antibodies derived from a single clone of cells which recognize only one kind of antigen, are called monoclonal antibodies. The technique of producing monoclonal antibodies by Fusing normal antibody-producing cells with cells from canceroustumors was introduced by Georges Kohler and Cesar Milstein in 1970. The major steps in the production of monoclonal antibodies with hybrid cultures are mentioned below:

(i) First of all a mouse rat or some other animal is injected with specific antigen (against which the antibodies are required).

(ii) The animal starts developing antibodies against the antigen in B-lymphocyte cells in spleen,

(iii) The spleen of animal is removed and its B-lymphocyte cells are isolated

(iv) Similarly, the cells producing bone marrow cancer (myeloma cells) are isolated. These cells should not be able to synthesise their own nutrients,

(v) The two types of cells (i e myeloma cells and antibody-producing cells) are made to fuse in cultures. The fused cells are called hybridomas.

(vi) The entire culture is shifted to a medium deficient in the nutrient needed by the myeloma cells where myeloma cells cannot survive. In this medium all the un-fused myeloma cells die and only hybridoma cells survive, (vii) The surviving hybridoma cells are allowed to multiply separately and each clone is tested for its ability to produce a desired antibody.

(viii) The clones which show positive results are isolated and cultured for large scale production of the antibody.

Monoclonal antibodies are highly specific for specific antigens and can be easily cultured outside the body. These antibodies are, therefore, more effective and ideal for diagnosis of some specific diseases. One of the most effective applications of monoclonal antibodies is immune suppression for kidney transplantation.

7.Interferons (IFNs): Interferons are the antiviral glycoproteins (called cytokines) functioning as immune regulators or lymphokines produced by the infected cells in response to viral infections (discovered in 1957 by Alec Issacs and Jean Lindenmann). These proteins are produced by most body cells on exposure to viruses.

There are three major classes of interferons

(i) Interferons-a (IFN-a): This kind of interferon is produced when leucocytes and lymphocytes are exposed to virus.

(ii) Interferon-b (IFN-b): These are produced by fibroblasts, epithelial cells, macro- phytes and leucocytes in response to viral infection

(iii) Interferon-g (IFN-g): These are produced by T-lymphocytes induced by antigenic stimulation

8.Use of Polymerase Chain Reaction (PCR): PCR is a technique by which any piece of DNA can be quickly amplified (copied many times) without using cells. The DNA is incubated in a test tube with a special kind of DNA polymerase enzyme, a mixture of deoxyribonuleotides for use as raw material, and short pieces of synthetic single stranded DNA to serve as primers for DNA synthesis. PCR can make billions of copies of a DNA segment in a few hours.

To clone a DNA segment in bacteria takes days. When the source of DNA is scanty or impure, it can be amplified by PCR technique. Amplification can make the identification of DNA easier. Since the sequence of HIV DNA is known, its amplification by PCR can help detect HIV DNA in blood or tissue samples.

DNA technology can help identify individuals with genetic disorders before the appearance of symptoms, even before birth. It is also possible to identify symptomless carriers of potentially harmful recessive alleles, such as of haemophilia, phenylketonuria (PKU). PCR is also helpful in DNA fingerprinting.

9.Making a Choice of Baby's Sex: Recently techniques have also been developed which will not require preferential abortion but will allow preferential fertilization by male (carrying Y chromosome) or female (carrying X chromosome) determining sperms. There are techniques available now, which allow separation of sperms carrying Y chromosomes, from the ejaculate of a man (through Ericson's method developed by R. Ericson of U.S.A) to be used for insemination of ovulating women.

This technique (using quinacrine stain) has been used with 80% success in 47 sperm centres in the world including one in Mumbai. Ericson has actually established a company named Gametrics Ltd, in California, U.S.A. which specializes in separating sperms with Y chromosome and hundreds of male children have been produced with its help.

Applications of Recombinant DNA Technology/ Genetic:

1. Molecular Analysis of Diseases: DNA research has helped in understanding the molecular basis of diseases like sickle cell anaemia, thalassemias, etc.

2. Production of Proteins in Abundance: Using recombinant DNA technique several proteins have been produced in abundance for curing the diseases. These are insulin, growth hormone, interferon's, vaccines, erythroprotein and blood clotting factors.

3. Laboratory Diagnostic Application: DNA technology makes the diagnosis of many diseases (e.g., AIDS) simple and quick.

4. Gene Therapy: The genetic diseases like sickle cell anaemia can be cured through gene therapy

5. Prenatal Diagnosis of Diseases: DNA collected from the amniotic fluid surrounding the foetus can be used for predicting the genetic diseases.

6. Application to Forensic Medicine: DNA technology has greatly helped to identify criminals by DNA fingerprinting and settle the disputes of parenthood of children.

10.Conclusion: According to the efsa panel on GMOs, Similar hazards can be assoiated with cisigenic and conventionally bred plants Novel hazards can be assoiated with intergenic and transgenic plants The breeding techineques can have variable frequiences and severities of unitredeffects .

The effect from breeding techinques and can not be preditable .ricks to human and animal health will depend up on thevexplosurefrequiency .

SMART TAKE

Inchara N Bhushan and Chaitra
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In INDIA maximum road accidents occur when overtaking, Better be alert every time you try to overtake or any other driver is speeding past your vehicle on the roads. Numbers show that maximum crashes and deaths on roads took place in 2015 when drivers were overtaking and the second highest cases of fatalities happened while "diverging" or when jumping lanes. So in order to avoid such mishaps we have come up with an idea of reducing accidents during overtaking

According to the latest report on country's road accidents and deaths, over 48,000 people died in crashes caused due to overtaking and 'diverging' during 2015. "These accidents are also directly linked to speeding. There are two ways to address this concern. Either drivers must be sen-

sitized or there has to be strict enforcement of traffic laws. Unfortunately, our drivers have no sense of how to change lanes, which is also main reason for such accidents," said an official of the transport research wing. SOURCE: The Times of India news corp.

As a vehicle by the passing years has not only remained as a means of transportation to carry people. But has become the integral part of every human beings need. It carries people who are everything to a family, a state, a country , or even the whole world. The loss of such people casts an unsolvable bankruptcy on an entire family, state, or a nation . . So in order to avoid such mishaps we have come up with an idea of reducing accidents during overtaking.

PRINCIPLE : Our project aids in improving the drivers knowledge of the obstacles beyond his line of sight and naked eye measuring capabilities and environmental conditions like night, fog and rain where the human eye capability of accessing things falls down. It can be used to detect any moving or stationary vehicles that may be lingering around in the driver's path of overtaking. Additionally it can also give the precise speed, distance, and direction of the incoming vehicle.

All this without the driver steering his vehicle to face the oncoming threat .it thus proves to be a smarter and less riskier way of overtaking and avoiding any stray traffic on the highways and improve the safety of driving.

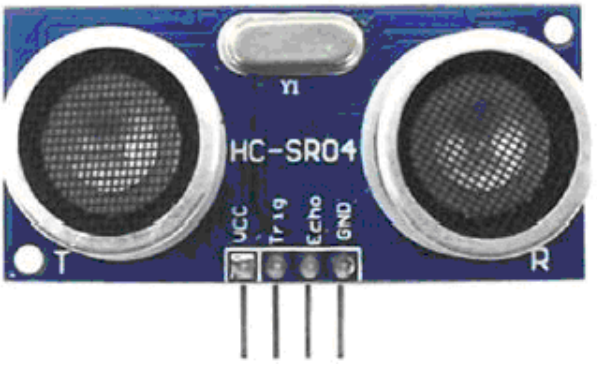
TECHNICAL GIGS : Coming to the technical aspects of the project , we have' made use of precisely 2 ultrasonic sensors working with arduino microcontroller and a Bluetooth module connected to an android platform which forms the visual display. Talking of the real time implementation costlier technology can make the project an asset of smart driving.

Ultrasonic sensor (HC-SR04): Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

• Using IO trigger for at least 10us high level signal,

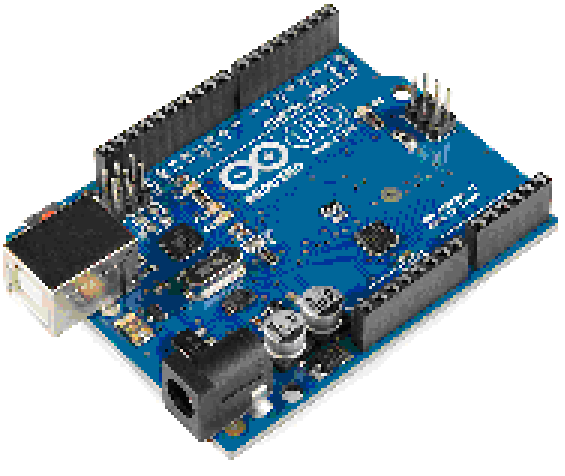
• The Module automatically sends eight 40 kHz Square waves and detect whether there is a pulse signal back.

• IF the signal is back, through high level , time of high output IO duration is the time from sending ultrasonic signal to returning. Test distance = (high level time × velocity of sound (340M/S) / 2



Arduino Microcontroller: Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices.

The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog input/output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++.



Arduino to Ultrasonic Sensor Connection:

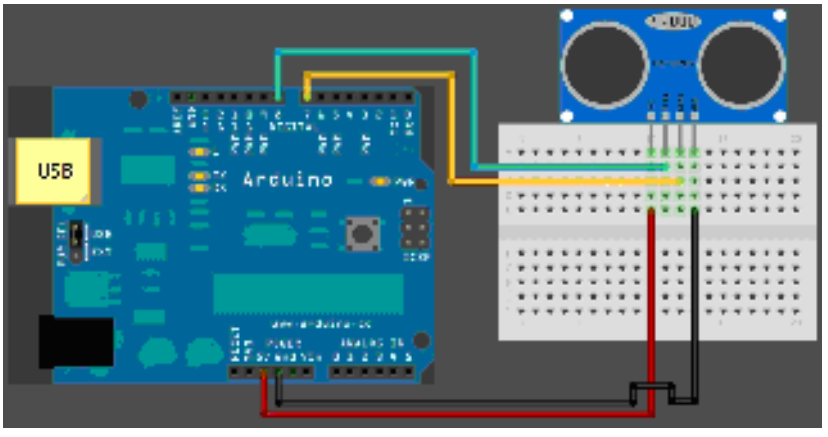
You Need 4 Jumper wires to conect the SR04 Ultrasonic Sensor to the Arduino:

1 From the SR04 VCC pin to the Arduino 5v

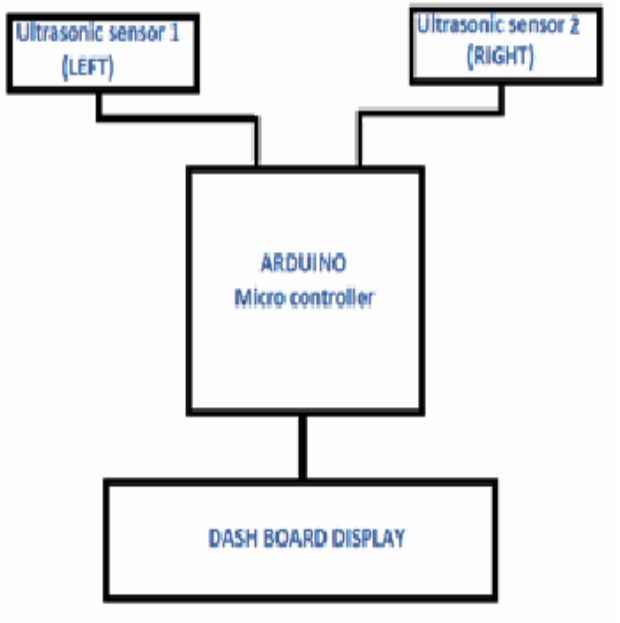
1 From the SR04 GND pin to the Arduino GND

1 From the SR04 TRG pin to the Arduino Digital pin 12

1 From the SR04 ECHO pin to the Arduino Digital pin 11



Basic Block Diagram For Smart Take:



WORKING: The module is aimed at detecting the on lying traffic and any stray traffic on roads, hence the working is enumerated on the basis of measurement of distance, direction and speed of the ahead lying traffic.

The two ultrasonic sensors which are planned to be mounted on the two rearview mirrors of the host automobile are continuously transmitting and receiving the ultrasonic waves at an efficient baud rate. The measure provided by the sensor output is in terms of time taken to traverse the distance between itself and the next rangeable obstacle.

The measure provided by these sensors can be made use by the microcontroller loaded with the well designed algorithm to calculate the needed distance, realative velocity and the direction of the ahead lying traffic.

The whole idea of finding the distance and relative velocity is based on the famous phenomenon of "Doppler effect".

The microcontroller is loaded with the code following the algorithm developed to trigger the ultrasonic sensors and use their output to calculate the required variables. The process is instantaneous and is a perfectly suitable module for real time implementation as the microcontroller is worked at a sufficiently high baud rate.

All the variables both measured and calculated are displayed on the display inhibited in the dash board of the host vehicle. The automobile can then be controlled as per requirements by the driver.

SUMMARY: Related to the above discussed project it can be well suitably called as an modern day requirement of a smart transportation system . it is aimed at improving the road safety and can avoid many mishaps during transporataion.

It proves to be a very effiecient asset to an automobile as it takes active participation in real time and wont let the user down in any conditions where the driver alone cannot be depended on. Signals are a very good friend to human sice ages and now also these electronic ultrasonic signals can be use fot the betterment of transportation and are highly reliable .

This module particularly does not depend on any of the environmental conditioned like light, rain , fog or even a transmitting medium for its signals as they are electro magnetic signals as a matter of fact.

If well designed and developed with cost effective technology , this idea could prove to be a life saving one for many.

References

[1] References 1: Ray asher, "ultrasonic sensors for chemical and process plant", 1 january 1997.

[2] Massimo banzi, "Getting started with Arduino",1 july 2014.

[3] Macro Schwartz," Arduino Networking",21 aug 2014.

[4] C++ The Programming Language By Bjarne Stroustrup

[5 http:/ www.howtomechotronics.com,wikiepedia,google.

A SURVEY ON DSI IN WSN AND AD-HOC NETWORK

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Data Security is an essential component of any network deployments, but must be carefully considered the communication reduces its risks while also getting the benefits. Its related incidents that make news headlines are of those national important like cyberwarfare, wikileaks is the classic example of this, which reveals how serious can inside a security threat really get. There has been laid many security techniques for wireless ad-hoc network have been proposed so far but none of them has been successful in combating the different types of attacks that a wireless ad-hoc network often faces.

In an Wireless ad-hoc network it is not an centralized wireless network which has large number of nodes. The network is ad-hoc because it does not rely on a pre-existing infrastructure, such as routers in wired networks or access points in managed wireless networks. Instead, each node participates in routing by forwarding data for other nodes, and so the determination of which nodes forward data is made dynamically based on the network connectivity.

This paper focuses on various Data Security Issues (DSI) in Wireless and ADhoc Network(WADN). As issues proves helpful for forth coming research, this paper work as a backbone to elaborate the various networks areas.

Keywords: Ad hoc network; Data Security Issue, WSN,WADN

In our day-to-day life, we lead a life in technological trends with fast communication like wireless networks, Manet, ADhoc ,WSN etc. These trends enabled our people to live a top end life, where this life is lead by the word "DATA" or Information. This has become the main reason for the rapid growth of this technology, especially wireless technology.

Wireless networks serve as the transport mechanism between devices and among devices and the traditional wired networks (enterprise networks and the Internet).

Wireless Networks: They are many and diverse but are frequently categorized into three groups based on their coverage range: Wireless Wide Area Networks, Wireless Personal Area Networks, and Wireless Sensor Network.

Wireless technologies are changing rapidly[1]. New products and features are being introduced continuously. Many of these products now offer security features designed to resolve long-standing weaknesses or address newly discovered ones. Yet with each new capability, a new threat or vulnerability is likely to arise. Wireless technologies are evolving swiftly. Therefore, it is essential to remain abreast of the current and emerging trends in the technologies and in the security or insecurities of these technologies.

ADhoc Networks: Ad hoc networks[2] are a new paradigm of wireless communication for mobile hosts (which we call nodes). In an ad hoc network, there is no fixed infrastructure such as base stations or mobile switching centers. Mobile nodes that are within each other's radio range communicate directly via wireless links, while those that are far apart rely on other nodes to relay messages as routers. Node mobility in an ad hoc network causes frequent changes of the network topology.

Below Figure 1 shows such an example: initially, nodes A and D have a direct link between them. When D moves out of A's radio range, the link is broken. However, the network is still connected, because A can reach D through C, E, and F. Military tactical operations are still the main application of ad hoc networks today. For example, military units (e.g., soldiers, tanks, or planes), equipped with wireless communication devices, could form an ad hoc network when they roam in a battlefield. Ad hoc networks can also be used for emergency, law enforcement, and rescue missions. Since an ad hoc network can be deployed rapidly with relatively low cost, it becomes an attractive option for commercial uses such as networks or virtual classroom.

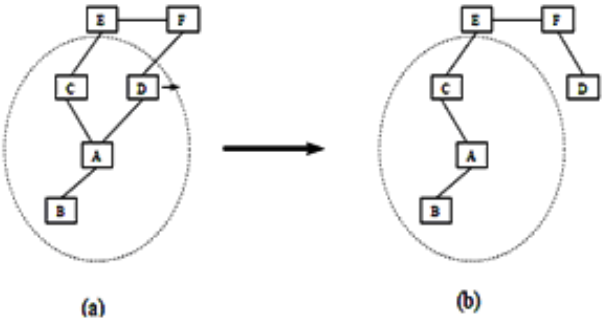

Figure 1. The network initially has the topology in (a). When node D moves out of the radio range of A, the network topology changes to the one in (b)

Wireless ADhoc Network[3]: It is a decentralized wireless network which comprises of a large number of nodes. The network is ad-hoc because it does not rely on a pre-existing infrastructure, such as routers in wired networks or access points in managed (infrastructure) wireless networks. Instead, each node participates in routing by forwarding data for other nodes, and so the determination of which nodes forward data is made dynamically based on the network connectivity. Each node has certain computational ability and comprises of a processor, communicational module and a battery supply. These nodes are small, low cost , low power and has functionalities such as communicate over short distances , perform data processing ,sense environmental data, etc.

Rest of the paper is organized as follows. We explain Literature review in section 2 and describe the issues, Critical Evaluation in section 3, and finally we present our conclusions in section 4.

2.LITERATURE REVIEW : A numerous researches have been presented in the literature for WADN (wireless ADhoc Network) and its security issues. A brief review of some recent researches is presented here. In the last few years, wireless and ADhoc has grown from being a promising business concept to one of the fast growing segments of the Network and IT industry. But as more and more information on individuals and companies are placed in this network, concerns were beginning to grow about just how safe an environment it was. Despite of all the hype surrounding the networks, different users were still reluctant to deploy their information/data in the WADN. Security was one of the major issues which reduce the efficient of WADN and complications with data privacy and data protection continue to plague the globe. But what's really important is to realize that apart from these, there's also a plethora(more abundance) of instances of individuals and organizations that have been the victims of data theft and mis-use. Those are the incidents to really worry about, because you could very well be the next victim. Here are five ways your data could be compromise:

- The threat from within(data theft/siphoning)
- Friend turns foe (cyber-stalked)
- Data security threats from mobile devices
- Security implications of BYOD(Bring Your Own Device)
- Cloudy consequences

Wireless networks are widely used in the area where they will examine for special task[4]. However due to lack of resistant packaging and insecure nature of wireless communication channels, these networks are more prone to internal and external attacks from an environment(figure 2). The security necessities of a wireless network can be categorized as follows:

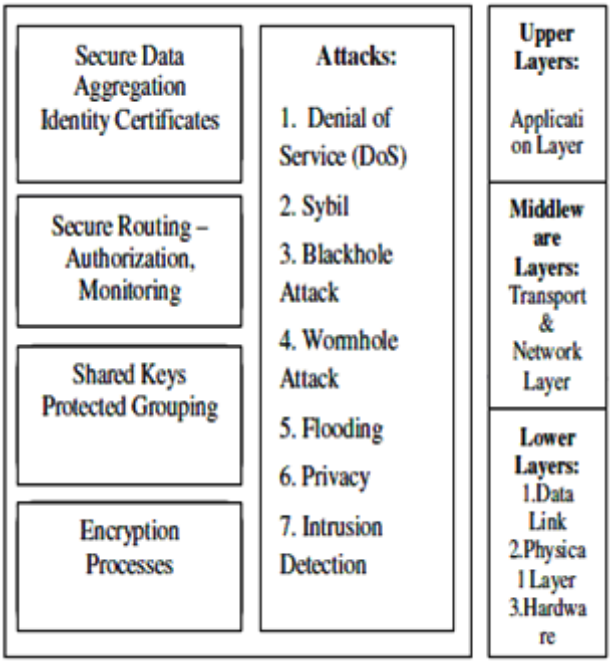

Figure 2. Security at various levels in Network

A. Data Authentication: Message authentication is fundamental for various applications in networks. Authentication is required for many administrative responsibilities (e.g. network reprogramming or controlling node duty cycle).In a network, an adversary can simply inject messages, so the receiver wants to make confident that the data used in any decision-making process originates from the accurate source [4]. Data authentication prevents illegal parties from participating in the network along with genuine nodes should be capable to detect messages from unauthorized nodes.

B. Integrity: Data in transmit can be changed by the adversaries. Data integrity makes sure the receiver that the received data is not changed in transit by an enemy. Data Authentication can also provide Data Integrity.

C. Data Confidentiality: Confidentiality means keeping information hidden from unauthorized party [4]. The normal approach for keeping sensitive data hidden is to encrypt the data with a secret key, hence achieving confidentiality. That kind of issue is very important in network security.

D. Availability: Introduction to encryption algorithms in the wireless network makes it more costly. Some approaches prefer to modify the code to reuse as much code as possible. Several approaches try to

build use of additional communication to get the similar goal. What's more, various approaches force strict limitations on the data access, or suggest an incompatible scheme (such as a central point scheme) in order to shorten the algorithm. But all these approaches weaken the availability of a and network for the following reasons:

•Supplementary computation consumes additional energy. If no additional energy exists, the data will no longer be available.

•A particular point crash will be introduced if using the central point scheme. This greatly threatens the availability of the network. The necessity of security not only affects the function of the network, but also is highly important in maintaining the availability of the whole network [5].

• Additional communication also consumes more energy.

E. Data Freshness: Even if confidentiality and data integrity are assured, we also require guaranteeing the freshness of each message [4]. Data freshness implies that the data is recent, and it ensures that an adversary has not replayed old messages. To make sure that no old messages replayed a timestamp can be added to the packet.

Data Security Issues in Wireless Network : Energy efficiency: The requirement for energy efficiency suggests that in most cases computation is favored over communication, as communication is three orders of magnitude more expensive than computation. The requirement also suggests that security should never be overdone - on the contrary, tolerance is generally preferred to overaggressive prevention. More computationally intensive algorithms cannot be used to incorporate security due to energy considerations.

No public-key cryptography: Public-key algorithms remain prohibitively expensive on nodes both in terms of storage and energy. No security schemes should rely on public-key cryptography. However it has been shown that authentication and key exchange protocols using optimized software implementations of public-key cryptography is very much viable for smaller networks.

Physically tamperable: Since nodes are low-cost hardware that are not built with tamper-resistance in mind, their strength has to lie in their number. Even if a few nodes go down, the network survives. The network should instead be resilient to attacks.

Multiple layers of defence: Security becomes an important concern because attacks can occur on different layers of a networking stack as defined in the Open System Interconnect model. Naturally it is evident that a multiple layer of defence is required, i.e. a separate defence for each layer. The issues mentioned here are in general applicable to almost all sorts of domain irrespective of their traits.

Wireless ad-hoc network has a wide range of applications. [3,5,7] It is used in the military field, in ecological survey, in health related cases such as human physiological data monitoring and many other miscellaneous applications. Most applications where these nodes are used are very critical and the data gathered from them are valuable and confidential therefore needs to be protected from outside attacks. There are many possible attacks that one can expect in an wireless environment.

A subset of such threats includes Denial of Services (DoS), node capturing, time synchronizing attacks, injecting malicious traffic as well as routing threats. These outside security issues can only be handled by authenticating outside user /nodes. The main aim of authentication is to let nodes themselves detect maliciously injected or spoofed packets. But due to limited resources available in each node it is very challenging to apply user authentication scheme in each node. The security necessities of a wireless AD-hoc network can be categorized as follows:

A. Availability: Ensures survivability despite Denial Of Service (DOS) attacks. On physical and media access control layer attacker can use jamming techniques to interfere with communication on physical channel. On network layer the attacker can disrupt the routing protocol. On higher layers, the attacker could bring down high level services e.g.: key management service.

B. Confidentiality: Ensures certain information is never disclosed to unauthorized entities.

C. Integrity: Message being transmitted is never corrupted.

D. Authentication: Enables a node to ensure the identity of the peer node it is communicating with. Without which an attacker would impersonate a node, thus gaining unauthorized access to resource and sensitive information and interfering with operation of other nodes.

E. Non-repudiation: Ensures that the origin of a message cannot deny having sent the message.

Non-impersonation: No one else can pretend to be another authorized member to learn any useful information.

F. Attacks using fabrication: Generation of false routing messages is termed as fabrication messages. Such attacks are difficult to detect.

Data Issues Security in ADhoc Network

Vulnerability of Channels: [7] As in any wireless network, messages can be eavesdropped and fake messages can be injected into the network without the difficulty of having physical access to network components.

Vulnerability of nodes: Since the network nodes usually do not reside in physically protected places, such as locked rooms, they can more easily be captured and fall under the control of an attacker.

Absence of Infrastructure: Ad hoc networks are supposed to operate independently of any fixed infrastructure. This makes the classical security solutions based on certification authorities and on-line servers inapplicable.

Dynamically Changing Topology: In mobile ad hoc networks, the permanent changes of topology require sophisticated routing protocols, the security of which is an additional challenge. A particular difficulty is that incorrect routing information can be generated by compromised nodes or as a result of some topology changes and it is hard to distinguish between the two cases.

3. CRITICAL EVALUATION

Ref	Context of Research	Problem Discussed	Research Type
1	Service delivery models survey in WADN	Different Security risks that pose a threat to the WADN.	Theoretical study
2.	Security in Enterprise WADN	Security Techniques for applications in WADN	Theoretical study
3.	Web Security issues in WADN.	Wireless Security problems,	Theoretical study
4.	Research Issues WADN	Security Challenge, Data Challenges Performance Challenges	Theoretical study
5.	Study of Security Issues in WADN	Security Issue mainly faced in the Industry.	Theoretical study
6.	The Potential of Homeomorphic Encryption in WADN	Security issues affecting and proposed homomorphism encryption.	Theoretical study
7.	Challenges and Security Issues in WADN Computing	Focusing on the types of WADN and service service deliveries.	Theoretical study

4. CONCLUSION : In this study different security issues research papers were studied briefly. In both larger and smaller scale organizations they are using ADhoc environment because of large advantage of WADN. The wireless and ADhoc network has different security issues in threats in user view, one can say that lack of security is the only worth mentioning disadvantage of WADN. The bond between service providers and users is necessary for providing better WADN security. Here we analyse the security issues, threats and challenges in wide acceptance of WADN, because there may be loss of data and privacy.

This paper proposed the comparison between wireless network and ADhoc network . Also this paper includes various security issues and requirements of the above networks. Also this issues and requirements will be helpful to beginners to elaborate their research work.

Researchers Scholars and IT security professionals must press forward towards practical achievements in security and privacy to users. Our study identifies top security concerns of WADN, these concerns are security risks, techniques, problems, challenges and security issues of WADN and its services.

REFERENCES

[1]. Abhishek Jain, Kamal Kant and M. R. Tripathy, Security Solutions for Wireless Sensor Networks., 978-0-7695-4640-7/12 $26.00 © 2012 IEEE,

[2]. Himadri Nath Saha and Dr. Debika Bhattacharyya, Information A Novel Approach for Attacks Mitigation in Mobile Ad Hoc Networks Using Cellular Automata. International Journal of Ad hoc, Sensor & Ubiquitous Computing (IJASUC) Vol.3, No.2, April 2012

[3]. Jayashree V. Shiral and Bhushan N. Mahajan, A Review on - Comparative Study of Issues in Cellular, Sensor and ADhoc Networks, David C. Wyld, et al. (Eds): CCSEA, SEA, , DKMP, CS & IT 05, pp. 199–205, 2012.

[4]. Mayank Saraogi "Security In Wireless Sensor Networks ", University of Tennessee, Knoxville.

[5]. Kalpana Sharma, M.K. Ghose, Deepak Kumar, Raja Peeyush Kumar Singh,Vikas Kumar Pandey. "A Comparative Study of Various Security Approaches Used in Wireless Sensor Networks". In IJAST, Vol 7, April 2010.

[6]. Computer Security Division Information Technology Laboratory National Institute of Standards and Technology Gaithersburg, MD 20899-8930 November 2002 U.S. Department of Commerce Donald L. Evans, Secretary Technology Administration

[7].Hua Chen, Hui Xu, Ting Zhang, Baolin Sun, Performance of Network Coding in Ad Hoc Network Multipath Routing Protocol, 978-1-4577-1415-3/12/$26.00 ©2012 IEEE

A NOVEL BASED INTRUSION DETECTION SYSTEM FOR AODV

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Mobile Ad hoc Networks (MANET) is one of the most vital and exclusive applications. On the contrary to traditional network architecture, MANET does not need a stable network infrastructure; the self-configuring ability of nodes in MANET made it popular among critical mission application like military use or emergency retrieval.

AODV is an important on demand routing protocol. Security is a central requirement for mobile Ad Hoc networks. Intrusion Detection System aimed at securing the AODV protocol has been studied by Stamouli et al using specification based technique.

In this paper, the work of Stamouliethas been extended and the proposed protocol is called IDAODV (Intrusion Detection AODV).In our work, we make use of Knowledge-based intrusion detection. Our Intrusion Detection and Response Protocol for MANETs have been demonstrated to perform better than that proposed in terms of false positives and percentage of packets delivered. IDAODV performs real time detection of attacks in MANETs running AODV routing protocol

Since the appearance in 1970 in the form of ALOHANET, wireless packet radio networks have come a long way in terms of numbers, applications, and the feature set, among other things. The two largest attractions of wireless communication have been mobility and ease of deployment – laying cables is not only laborious and time consuming, but their maintenance is equally bothersome.

In any but the most trivial networks (point-to-point links), some mechanism is required for routing the packets from the source to the final destinations. This includes discovery and maintenance of routes along with associated costs. In what is called an 'infrastructure based'Wireless network, the job of routing is assigned to dedicated nodes called access points (AP).

Configurations of the APs are much less dynamic than there, possibly mobile, end-point nodes. APs are like base stations which keep track of nodes 'associations/disassociations, authentication etc. and control the traffic flow between their clients as well as between fellow APs.

The term wireless network implies a computer network in which the communication links are wireless. The term Ad Hoc comes from the fact that there is no fixed infrastructure for forwarding/ routing the packets. Figure 1.1 shows an infrastructure-based and an AdHoc wireless network. In AdHoc networks, each node is willing to forward data to other nodes, and so the Determination of which nodes forward data is made dynamically based on the network connectivity.

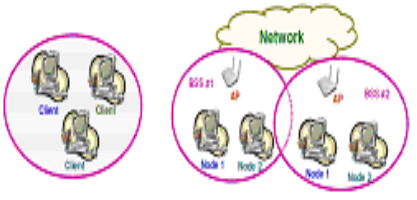

Figure 1.1 - Ad Hoc and Infrastructure Network Topologies

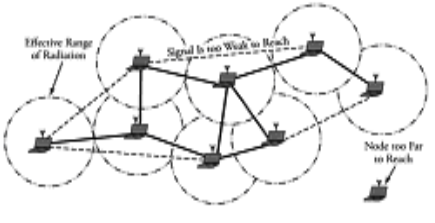

Figure 1.2 – A Typical MANET

RELATED WORK: AODV [15] can be thought of as a combination of both DSR and DSDV. It borrows the basic on-demand mechanism of Route Discovery and Route Maintenance from DSR, plus the use of

hop-by-hop routing, sequence numbers, and periodic beacons from DSDV. AODV is an on-demand routing protocol, which initiates a route discovery process only when desired by a source node. When a source node S wants to send data packets to a destination node D but cannot find a route in its routing table, it broadcastsa Route Request(RREQ) message to its neighbors, including the last known sequence number for that destination. Its neighbors then rebroadcast the RREQ message to their neighbors if they do not have a fresh enough route to the destination nodeenough route is a valid route entry for the destination node whose associated sequence number is equal to or greater than that contained in the RREQ message.)

This process continues until the RREQ message reaches the destination node or an intermediate node that has a fresh enough route. Every node has its own sequence number and RREQ ID1. AODV uses sequence numbers to guarantee that all routes are loop-free and contain the most recent routing information. RREQ ID in conjunction with source IP address uniquely identifies a particular RREQ message.

The destination node or an intermediate node only accepts the first copy of a RREQ message, and drops the duplicated copies of the same RREQ message. Each node that forwards the ROUTE REQUEST creates a reverse route for itself back to node S; after accepting a RREQ message, the destination or intermediate node updates its reverse route to the source node using the neighbor from which it receives the RREQ message.

The reverse route will be used to send the corresponding Route Reply (RREP)message to the source node – when the ROUTE REQUEST reaches a node with a route to D, that node generates a ROUTE REPLY that contains the number of hops necessary to In order to maintain routes, AODV normally requires that each node periodically transmit a forwarded packets to a destination using that link is notified via an UNSOLICITED ROUTE REPLY containing an infinite metric for that destination.

Upon receipt of such a ROUTE REPLY, a node must acquire a new route to the destination using Route Discovery as described above. HELLO message, with a default rate of once per second. Failure to receive three consecutive HELLO messages from a neighbor is taken as an indication that the link to the neighbor in question is down. Alternatively, the AODV specification briefly suggests that a node may use physical layer or link layer methods to detect link breakages to nodes that it considers neighbors.

When a link goes down, any upstream node that has recently reach D and the sequence number for D most recently seen by the node generating the REPLY. Meanwhile, it updates the sequence number of the source node in its routing table to the maximum of the one in its routing table and the one in the RREQ message. When the source or an intermediate node receives a RREP message, it updates its forward route to the destination node using the neighbor from which it receives the RREP message. It also updates the sequence number of the destination node in its routing table to the maximum of the one in its routing table and the one in the RREP message. A Route Reply Acknowledgement (RREP-ACK) message is used to acknowledge receipt of a RREP message. The state created in each node along the path from S to D is hop-by-hop state; that is, each node remembers only the next hop and not the entire route, as would be done in source routing.

MOTIVATION: Mobile Ad Hoc networks (MANETs) are vulnerable due to its fundamental characteristics, such as open medium, dynamic topology, distributed operation and constrained capability. AODV is an important on demand routing protocol. Security is a central requirement for mobile Ad Hoc networks. Security and robustness will impact the design of the standard for Ad Hoc networks is the main motivation in this paper.

PROBLEM STATEMENT: Intrusion Detection System aimed at securing the AODV protocol has been studied by Stamouli et al [1] using specification based technique. They conclude that AODV performs well at all mobility rates and movement speeds. However, we argue that their definition of mobility (pause time) does not truly represent the dynamic topology of MANETs. In this paper, the work of Stamouli et al [1] has been extended and the proposed protocol is called IDAODV (Intrusion Detection AODV).

In our work, we make use of Knowledge-based intrusion detection. Our Intrusion Detection and Response Protocol for MANETs have been demonstrated to perform better than that proposed in [1] in terms of false positives and percentage of packets delivered.

Since the earlier work by Stamouli et al [1] do not report true positive i.e. the detection rate, we could not compare our results against that parameter with their method, IDAODV performs real time detection of attacks in MANETs runningAODV routing protocol. The prototype has also given some insight into the problems that arise when trying to run real applications on an AdHoc network. The algorithm also imposes a very small factor for the resource constrained nodes.

INTRUSION DETECTION AODV (IDAODV) : In this paper we propose and discuss IDAODV, an Intrusion Detection mechanism for Wireless Mobile Ad Hoc Networks. IDAODV is based on State Transition Analysis Technique, which was initially developed to model host-based and network-based intrusions in a wired network environment. Of all the routing protocols proposed for MANETs, AODV has been very popular and has become an Internet standard. This also has been the reason for AODV becoming more and more vulnerable to attacks.

Problem Statement/ AODV Routing Attacks : AODV presents many opportunities to attackers. We first identify a number of misuse goals that an inside attacker may want to achieve [8].

1)Route Disruption: Route Disruption means either breaking down an existing route or preventing a new route from being established.

2) Route Invasion: Route invasion means that an inside attacker adds itself into a route between two endpoints of a communication channel.

3) Node Isolation: Node isolation refers to preventing a given node from communicating with any other node in the network. It differs from Route Disruption in that Route Disruption is targeting at a route with two given endpoints, while node isolation is aiming at all possible routes.

4) Resource Consumption: Resource consumption refers to consuming the communication bandwidth in the network or storage space at individual nodes. For example, an inside attacker may consume the network bandwidth by either forming a loop in the network.

5) Denial of Service : To achieve goals, the following misuse actions or attacks may be performed

Packet Dropping Attack : In a packet dropping attack, the attacker simply drops the received routing message. Packet dropping is detected by checking whether a neighbor forwards packets towards the final destination. To be able to do this, it is necessary to maintain a neighbor table. This attack can be divided into various subcategories as follows:

If an attacker applies such attacks to all the RREQ messages it receives, this kind of misuses equivalent to not having the attacking node in the network. An inside attacker may also selectively drop RREQ messages. Attackers that launch such misuses are in nature similar to the selfish nodes.

If the attacker applies this attack to RREP message, it can in some cases lead to route disruption.

The attack can also be applied to data packets, where an inside attacker prevents a victim node from receiving data packets from other nodes for a short period of time. The attacker may make the following modifications after it receives a RREQ message from the victim node:

(1) Increase the RREQ ID by a small number; (2) Replace the destination IP address with a non-existent IP address; (3) Increase the source sequence number by at least one; (4)Set the source IP address in IP header to a non-existent IP address.

The attacker then broadcasts the forged message. When the neighbors of the attacker receive the faked RREQ message, they update the next hop to the source node to the non-existent node, since the faked RREQ message will have a greater source sequence number. Due to the non-existent destination IP address, the faked message can be broadcast to the farthest nodes in the adhoc network. When other nodes want to send data packets to the source node, they will use the routes established by the faked RREQ message, and the data packets will be dropped due to the non-existent node. This attack, however, cannot fully isolate the victim node due to local repair mechanisms in the AODV protocol.

The other nodes will initiate another round of route discovery if they note that the data packets cannot be delivered successfully. In addition, the victim node may still be able to send data packets to other nodes. Several of the atomic misuses of RREQ messages use RREQ messages to add entries the routing table of other nodes.

These entries are different from those established through normal exchange of RREQ and RREP messages. In particular, the lifetime of these entries is set to a default.Thus, to make such entries effective, an attacker needs to launch the atomic misuses periodically.

Details of IDAODV : We now describe the details of the design and implementation of the proposed IDAODV. IDAODV detects attacks against the AODV routing protocol in Wireless Mobile Ad Hoc Networks. The components of IDAODV are discussed in the following sections.

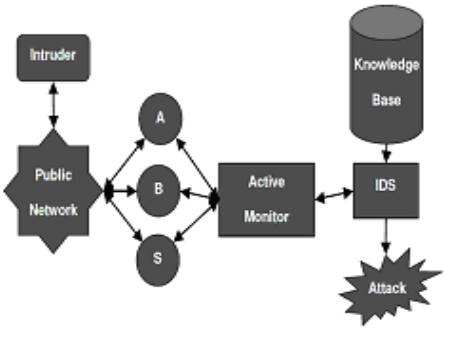

Figure 4.3: Architecture of IDAODV

Network Monitor : The nature of Ad Hoc networks prohibits any single IDS node to observe all messages in a request-reply flow. Therefore, tracing of RREQ and RREP messages in a request-reply flow has to be performed by distributed network monitors (NM). Figure 4.3 depicts the architecture of a network monitor. Network monitors passively listen to IDAODV routing message and detect incorrect RREQ and RREP messages. Messages are grouped based on the request-reply flow to which they belong. A request reply flow can be uniquely identified by the RREQ ID, the source and destination IP addresses.

Finite State Machine : Specification-based approach provides a model to analyze attacks based on protocol specifications. A network monitor employs a finite state machine (FSM) [4] for detectingincorrect RREQ and RREP messages [3, 5, 6, and 7].

It maintains an FSM for each branch of a request-reply flow. A request flow starts at the 'Source' state. It transits to the 'RREQ Forwarding' state when a source nodebroadcasts the first RREQ message (with a newREQID).

When a forwarded broadcasting RREQ is detected, it stays in 'RREQ Forwarding' state unless a corresponding RREP is detected. Then if a uncast RREP is detected, it goes to 'RREP Forwarding' state and stays there until it reaches the source node and the route is set up. If any suspicious activity or an anomaly is detected, it goes to the 'Suspicious or Alarm' states. When an NM compares a new packet with the old corresponding packet, the primary goal of the constraints is to make sure that the AODV header of the forwarded control packets is not modified in an undesired manner.

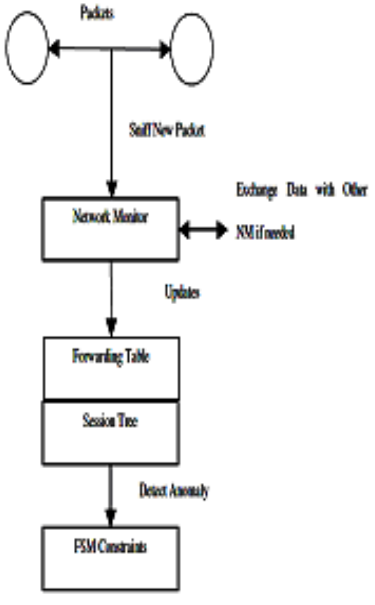

Figure 4.4: Network Monitor

If an intermediate node responds to the request, the NM will verify this response from its forwarding table as well as with the constraints in order to make sure that the intermediate node is not lying. In addition, the constraints are used to detect packet drop and spoofing. The finite state machine is depictedin Figure 4.4. Stamouli [1] has not used network monitor to trace RREQ and RREP message in a request reply flow for distributed network. Whereas in the proposed FSM, we used the above flows Figure 4.4.

PROPOSED ALGORITHM: For the intrusion detection to identify the sequence number attack, we analyzed two algorithms.

Notations : The following notations have been used for the description of the algorithms.

For a set of paths denoted by P, where, path P is an ordered set of nodes,

The length of P is defined in terms of number of hops and denoted by $|P|$

For $0 \le i \le |P|$, P[i] is the i^{th} node in the path

Assumptions

The following assumptions have been made for the algorithms.

1. $\forall P1, P1 \subset P, P1 \subset P$
   e.g. if P1 = [A, B, C] and P2 = [A, B, C, D], remove P1
2. $\forall P_i, P_j \in P, P_i[|P_i| - 1] \neq P_j[|P_j|$
   e.g. if P1 = [A, B, C] and P2 = [A, B, D, F], remove C from P1
3. $\forall P_i \in P, |P_i| > 1$

Algorithm 1:Detection of Routing Packets Dropped

- Check a path from the farthest node to the nearest
  - $\forall p \subset P$, check p[|p|]
  - If an ACK is received $\forall p \subset p$ and $\forall p[|p|]$, p is Closed
- Otherwise, check p[|p| - 1]
- If an ACK is not received from p[i+1] but received from p[i], $0 \le i < |p|$, select p[i]

Algorithm 2: Node Selection

If p[i] is responsive but p [i+1] is not, there are three possibilities:

- p[i] is Bad
- p[i+1] is Lost
- The link p[i+1] - p[i] is broken

CONCLUSION & FUTURE ENHANCEMENT : An Intrusion Detection System aiming at securing the AODV protocol has been developed using specification-based technique. It is based on a previous work done by Stamouli et al [1]. The IDS performance in

detecting misuse of the AODV protocol has been discussed. In all the cases, the attack was detected as a violation to one of the AODV protocol specifications. Our Intrusion Detection and Response Protocol for MANETs have been demonstrated to perform better than the ones proposed by Stamouli et al in terms of false positives and percentage of packets delivered. Since Stamouli et al do not report true positive i.e. the detection rate, we could not compare our results against that parameter with their method.

The work can be extended to study the robustness of Wireless Ad Hoc Networks for all types of protocols. A study can be conducted on the relationship between the average detection delay and the mobility of the nodes. More types of attacks including group attacks can be studied and their relations to the vulnerability of the protocols can be ascertained. A complete system can be designed to implement intruder identification.

REFERENCES

[1] I. STAMOULI. Real-time intrusion detection for ad hoc networks. Master's thesis, University of Dublin, September, 2003.

[2] PERKINS, C. E., AND BHAGWAT, P. DSDV Routing over a Multihop Wireless Network of Mobile Computers. In Perkins [20], 2001, ch. 3, pp. 53–74.

[3] TSENG, CHIN-YANG, ET AL. A Specification-based Intrusion Detection System for AODV, In Proceedings of the 1st ACWorkshop on Security of Ad hoc and Sensor Networks (SASN'03). Fairfax, VA. 2003.

[4] K. ILGUN, R. A. KEMMERER, AND P. A. PORRAS. State Transition Analysis: A Rule-Based Intrusion Detection Approach. IEEE Transactions on Software Engineering, 21(3):181–199, 1995.

[5] C. KO, M. RUSCHITZKA, AND K. LEVITT, "Execution Monitoring of Security-Critical Programs in Distributed Systems: A Specification-based Approach," In Proceedings of the 1997 IEEE Symposium on Security and Privacy, May 1997, pp. 134-144.

[6] D. DREEF ET AL, "Utilizing the Uncertainty of Intrusion Detection to Strengthen Security for Ad HocNetworks", Third International Conference, ADHOCNOW2004, Vancouver, Canada, July 22-24, 2004, pp.82-95.

[7] R. RAO AND G. KESIDIS, "Detection of malicious packet dropping using statistically regular traffic patterns in multihop wireless networks that are not bandwidth limited", Brazilian Journal of Telecommunications, 2003.

[8] CHARLES E. PERKINS, "Ad Hoc on Demand Distance Vector (AODV) Routing". Internet draft, draft-ietf-manet-aodv-01.txt.

NANOTECHNOLOGY

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Nano world deals with tiny objects which are nanometric in size at least in one dimension.The science of nanomaterials deals with generation and properties and phenomenon exhibited by them because of their small size. Nanotechnology has gained great importance due to potential applications in different areas like chemical and textile industries,medicaldiagnostics.History of nanometrials can be traced back to the Roman period,colloidal materials were used to dye fabrics,colour glass and treat arthritics.ForExample:Lycurguscup,DamascusSword. Nano world is different from other world like space in this we use Sophisticaltelescopes,here we use microscopes.Nano means 'dwarf'. It is one billionth of a meter or 10-9 m.Nanometer is a scale used to measure objects in nanoworld . Single strand human hair is 20000 nanometers in diameter. Nano science is traced to a lecture of Richard P Feynman famous physicist in 1959 at annual meeting at California institute of technology USA. Nano materials such as one dimension and two dimension are present. Applications of Nano technology are Nanocosmetics,Textiles,Nanosensors,Drugdelivery,cancertheraphy,Tissue engineering ,water purification ,Nanocomputers, MRI.

The science of nanomaterials deals with their generations and properties and the phenomena exhibited by them due to their size.the subject of nano science and technology has gained a great importance because of the potential applications in different areas such as chemical and textile industries,material industries ,medical diagnostics,drug and gene delivery electronics.

HISTORY OF NANO MATERIALS: It was since Roman period where colloidal materials were used to dye fabrics, colour glass and to treat arthritis.

Ex: The Lycurgus cup, The sword of Damascus sword.

In 1959 Richard Feynman gave a lecture at California Institute of technology.Nano technology an attempt to mimic nature.

Nature offers many successful examples of nano objects at work. If we need to build machines with com-

ponents on a cellular scale, we need to develop new materials and new technologies. The invention of the integrated circuit in 1958,advances in micro electronics,use of photolithography and invention of sophisticated microscopes resulted in miniaturisation of the computer chips. The size of computer chips reduced from 10000nm in 1971 to 65nm in 2003.

Cells are the perfect examples of busy multi taskingnanosystems. They are very tiny. Information is stored in them. They are capable of replicating themselves. cells provide the blue print for developing nanosystems that can do all the tasks at the atomic level that cells perform in biological system.

NANOMATERIALS: They are also called as quantum dots. They are spherical and diameter will be 1-50nm range. They may be prepared by various materials such as metals, metal oxides,semi conducting and magnetic materials.One dimensional materials like carbon Nanotubes.Carbon nanotubes are of two types single walled carbon nanotubes &multi walled carbon nanotubes.

NANOBIOTECHNOLOGY : Nanobiotechnology as the name suggests is the fussion of nanotechnology and biotechnology.It is fairly new area of research and technological opportunity.there are innumerable examples of nanoscale processes and structures that govern biosystems. The living cell has hundereds of nanomachines powering its multiple functions. it represents highly presicenanoscalefabrication.Reserchers use the knowledge gained by molecular biology in studying molecules in the range of nanomaterials to create new nanoscale devices to understand life processes at the nanoscale. Nanobiotechnologyis an indiscipllinary area where there is close collaboration between life scientists, physical scientists, and engineers. The inspiration and ideas for specifically fabricated nanodevices to analyse biological systems.

Applicaions of nanotechnology:-

1.Nanocosmetics: Nanotechnology has revolutionized cosmetics industry and helped it to take altogether new path. Cosmetics industry has harnessed the technology to use nanoparticles as delivary systems. Nanosomes are nanoparticles approximately 800times smaller than human hair.

2.Cancer therapy: Nano science and technology is expected to have a major impact on cancer treatment by developing drugs with nanosized molecules with more targeted efficiency and less side effects and toxicity. Major problems with cancer treatment being used (Chemotheraphy and radiation therapy) are that the drugs are released in more than required quantities and are not area specific.

3. Tissue Engineering: Tissue Engineering is emerging as an excisting option in health care to restore or replace damaged or injuried anatomic structure, tissue or even organs. This new treatment applies to the principles of biology and engineering to develop substitutes for damaged tissues that can carry out the functions of the original tissues.To do this successfully,tissue engineering must mimic tissue properties at the nano scale.

Other applications of Nanotechnology are

*Textiles

*Nanosensors.

*Drug Delivery.

*Silver nanoparticlesand water purification.

*Lab-on-chip or LOC.

*Nanocomputers.

*MRI with magnetic nanoparticles.

*Nanomaterials for energy

Nano world differs from other world.Nanometer is a scale used to measure objects in the nanoworld.A single stranded human hair is around 20000 nm in diameter

Conclusion: Nanomaterials have been used by human beings for centuries without knowing the dimensions of the materials they used.

References:

1. Book by C.N.R.RAO –nanoworld.

2. http://navakarnataka.com

WAVELET BASED COLOR VIDEO STEGANOGRAPHY

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Wavelet Based Color Video steganography is the algorithm developed to hide a secret color video sequence within another cover color video sequence. An approach to apply a wavelet transforms in order to decompose the cover video sequence and then replace the less significant wavelet band with "secret" video frames. On the receiver side, process is reversed and the hidden color video recovered from stego color video. And it is done for both sequence and random embedding techniques, finally experimental results of both embedding techniques is discussed, results shows that the wavelet based color video Steganography is better robust and complexity.

Keywords— cover video, stego video,Haar Wavelet, DWT, PSNR

Steganography is introduced by a Greek word and it implies the secured composing. Steganography is a craft of concealing information in a secured media (picture, sound, and video, content). The secured media is picked in such a way, to the point that it has power to hide the information and robustness that gives good quality of stego image. As in the up and coming years the need of information concealing, copyright insurance, and confidentiality expands, steganography assumes a vital part in this field on account of its someone of a kind components. The fundamental reason for Steganography is that, which signifies 'writing in hiding' is to hide information in a cover media with the goal that others won't have the capacity to notice it. While cryptography is about ensuring the substance of messages, steganography is about hiding their extremely presence [1].

Steganography is one of the strategy in which the information is covered up in the cover object with the utilization of secret key. The extractor should to have secret key to remove the information.

Privileged secrets can be covered up inside a wide range of cover data. The accompanying formula gives an extremely non specific depiction of the bits of the steganography procedure:

cover_medium+ hidden_data + stego_key = stego_ medium

In this context, the cover medium is the document in which the hidden_data will be encrypted utilizing the stego_key. The resultant file is the stego_medium. Figure 1.1 demonstrates the block diagram of steganography system.

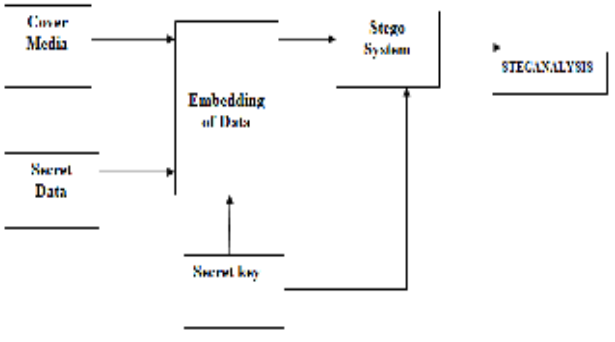

Fig.1. steganography system

Video steganography is a technique where carrier file will be video in which the secret information can be hidden. In the proposed system cover and secret file both are video file is used. When video is used as the cover file, there will be additional security [2] as structure of video file is quite complex compared to other types of media. Another important aspect in steganography is storage capacity of cover file and secret file. Larger the storage capacity of cover file, greater the amount of data that can be hidden it. Video files have more storage capacity than audio and image as data can be hidden in one or more frames of the cover video.

A modification to the traditional LSB technique- by replacing LSB bits by LSB+3 bits has been proposed [3]. Utilization of integer wavelet transforms in videosteganography has also been presented [4] and the possibilityof extending the scheme to color images proposed. Use ofdiscrete cosine transform (DCT) in combination with LSB has been reported [5], although in this scheme only text data have been hidden as well as retrieved from the cover video file.

The developments to hide more complex data inside a video can be achieved by the implementation of two-dimensional discrete wavelets transforms (DWT2). The more detailed discussion of the DWT2working and implementation in this work is illustrated in the following sections.

The rest of the paper is organized as follows. Proposed embedding and extraction algorithms are explained in section II. Experimental results are presented in section III. Concluding remarks are given in section IV.

II. PROPOSED ALGORITHM

A. Discrete Wavelets Transforms : Another possible area for video steganography embedding is that of the wavelet stream. The DWT [3] gives a image into a lower plan estimation image(LL) and also horizontal(HL), vertical (LH) and diagonal(HH) purpose of interest parts. The strategy can then be reiterated to enroll diverse scale wavelet de-structure, as in the 2 scale wavelet transform exhibited in Figure 2.

Wavelet transform is one of the set up strategies to finish time-frequency transformation of a signal or image. As a rule it is thought to be better than Fourier transform because of the way that wavelets can catch frequency and in addition location in-time data about the broke down waveform or image [6]. Truth be told transform domain strategies have been appeared to hold better to decryption endeavors and attacks[7], [8]. A portion of the regularly utilized discrete wavelet changes incorporate Haar, Daubechies and Symlets wavelets.

One of the most established and easiest wavelet transform is the Haar wavelet. This transform cross multiplies a function or a given waveform with the

Haar wavelet with different shifts and stretches. Primary idea of Daubechies wavelets is like that of Haar wavelets however the two techniques vary in the way scaling and wavelets are characterized. Here, a scaling capacity called "father" wavelet produces multi resolution orthogonal perceptions [9]. Symlets are a part of the wavelet family and an altered version of Daubechies with upgraded symmetry [10], [11].

LL 2	HL 2	HL 1
LH 2	HH 2	
LH1		HH 1

Fig 2.2 Scale 2-Dimensional Discrete Wavelet Transform

B. Wavelet Based Steganography : Wavelet transform is normally refined through two phases - quantization and encoding. Strategies for embedding information or data which should be hidden up are typically connected after the wavelet transform. The coefficients got after the application of discrete wavelet transform are adjusted by stego information - information which requires hiding up with the expect to be recreated once the information has been gotten toward the end of the hiding procedure. The hidden information is recovered by turning around the hiding procedure and applying the inverse discrete wavelet transform application on the stego image [12][13]. This procedure is illustrated in Figure 3.

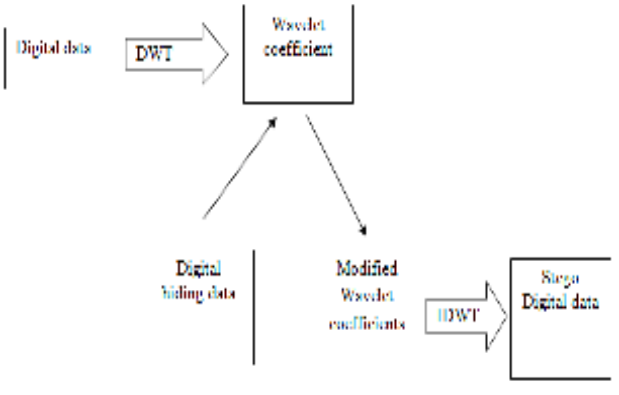

Fig 3: Embedding process using DWT and IDWT.

Color video and secret video is broken down into red, green, blue channels. Only the red channels are extracted from the cover color video and wavelet transformed into four wavelet bands. The total numbers of cover color video frames are divided into 3 equal blocks. All the frames of the color video are wavelet transformed and wavelet bands are obtained. Red, green and blue channels of the secret video are embedded by using random embedding or sequential embedding of the HH bands. At the receiver side inverse discrete wavelet transform is performed and stego red channels are reconstructed with the modified bands. Stego red channels are concatenated with untouched green and blue channels to obtain stego video frames. Finally frames are arranged sequentially to obtain stego video and is identical to the cover color video.

C. Embedding algorithm : Embedding data or information which needs to be hidden are usually applied after the wavelet transformation. The coefficients obtained after the application of discrete wavelet transforms are modified according to the stego data - data which requires hiding with the aim to be reconstructed once the data has been received at the end of the hiding process.

Steps in embedding:

(1) Select the cover image/video.

(2) Select the secret image/video.

(3) Separate source image into 4 bands using DWT i.e (LL, HL, LH, HH)

(4) Select the band to embed the secret image/video.

(5) Insert the secret image/video in the source image/video as shown in Figure 4

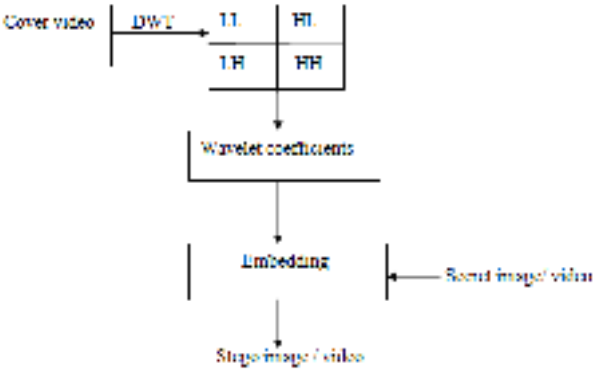

Fig.4: Embedding Process

D. Extraction algorithm : The hidden data is extracted by reversing the hiding process and applying the inverse discrete wavelet transform (IDWT) application on the stego image/video.

Steps in extraction:

(1) Embedded media is subjected to IDWT.

(2) Stego channels are reconstructed with modified bands.

(3) Cover media and secret media is separated in the extraction process.

(4) The frames are arranged sequentially to obtain the stego media and it is identical to the cover media. It is illustrated in Figure 5.

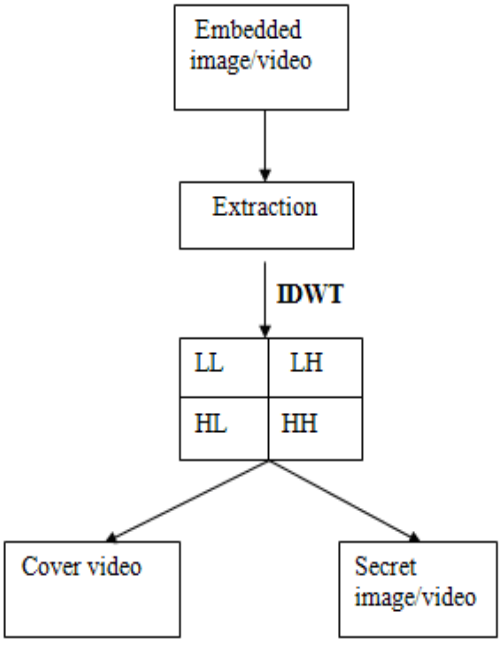

Fig.5. Extraction algorithm Block Diagram

III. EXPERIMENT AND RESULT : The test set for this evaluation experiment video randomly selected from the internet. Matlab 14.0 software platform is use to perform the experiment. The PC for experiment is equipped with an Intel P4 2.4GHz Personal laptop and 2GB memory.

In evaluation of a steganography technique, it is always expected that the perceptual quality of the resulting stego file should be good. Greater the PSNR value better the quality of the stego video which makes the embedded data imperceptible.

The perceptual imperceptibility of the stego data can be obtained by comparing the cover video to its embedded counterpart so that their visual differences can be determined. Additionally, as an objective measure, the MSE,PSNR between the stego frame and its corresponding cover frame are studied. To measure perceptual quality of stego video, two metrics are commonly used.

$$MSE(m) = \frac{1}{N}\sum_{i,j}(Y_{out}(i,j,m) - Y_{in}(i,j,m))^2$$

$$PSNR(m) = 10\log_{10}\left(\frac{(2^B-1)^2}{MSE(m)}\right)$$

The proposed method is tested using five secret videos for a cover video (Rhinos.avi). The cover video chosen is in AVI (Audio Visual Interleaved) format. The size of the cover video is 240×320 and this video has 114 frames which are nothing but still images. The experimental results are shown in Table 4.1.

Table 1: Comparison of the Sequence embedding and Random Embedding Techniques for cover video rhinos.avi

Secret videos (Test videos)	Sequence Embedding		Random Embedding	
	PSNR	MSE	PSNR	MSE
dfs.avi	48.9437	0.8358	48.0516	1.02
Swirlique.avi	40.0161	6.5294	39.4704	7.40
Pkc.avi	35.3230	19.2387	34.5652	22.9
Cookie.avi	37.1205	12.7184	36.7070	13.9
Pkcmpeg.mpg	35.3949	18.9231	34.5230	23.1

The proposed method is tested using five secret videos for a cover video (Rhinos.avi). The cover video chosen is in AVI (Audio Visual Interleaved) format. The size of the cover video is 240×320 and this video has 114 frames which are nothing but still images. The experimental results are shown in Table 4.1.

The above table contains the PSNR and MSE values for different Secret videos, throughout the project the cover video is same and the cover video size is 3MB. Different size of secret video are taken for testing, we can observe from the above table that the PSNR and MSE values will change from one secret video to the other it will mainly depend on the size, quality and type of the secret video.

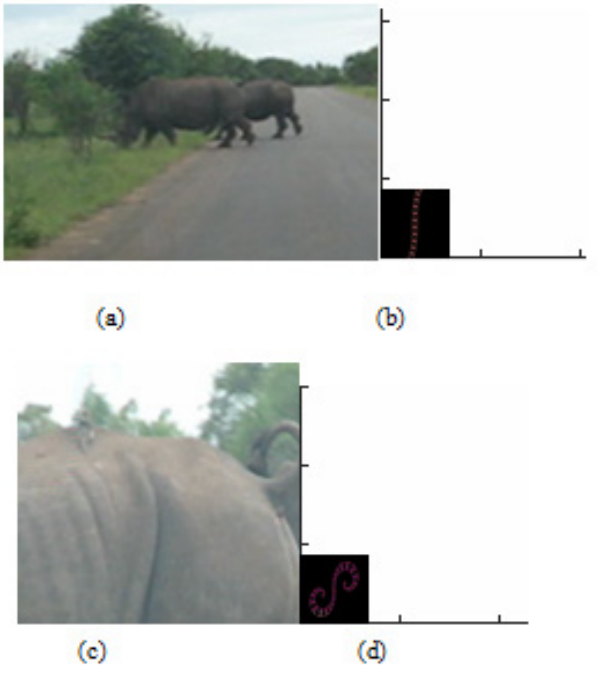

Fig. 6. (a) Original video (b) dfs.avi secret video (c) stego video(d) extracted video for sequence embedding.

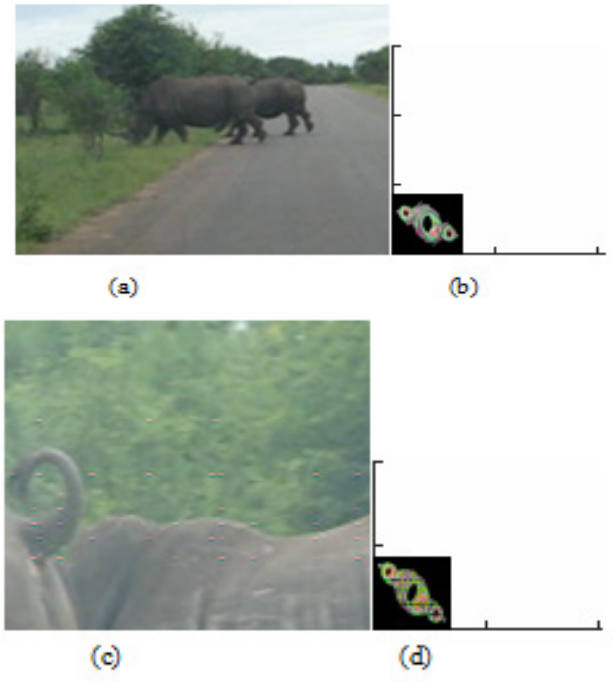

Fig. 7. (a) Original video (b) cookie secret video (c) stego video (d) extracted video for random embedding

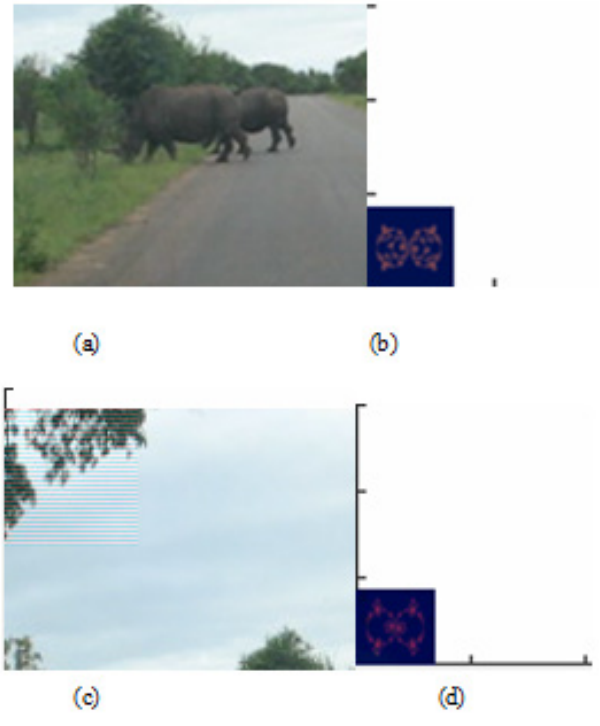

Fig. 8. (a) Original video (b) Swirlique secret video (c) stego video(d) extracted video

IV.CONCLUSION : In Video steganography security and robustness is more important.LSB,LSB+3, integer wavelet transform, discrete cosine transform (DCT) in combination with LSB techniques are used in video steganography by using these technique security can be achieved but it is not so robust for video steganography.

Implementation of wavelet based video steganography has been done in two ways Sequence embedding and random embedding.

Sequence embedding is tested which shows good results in PSNR,MSE and shows less distortion compared to random embedding technique as shown in table 4.1.random embedding technique shows more distortion compared to sequence embedding, but less susceptible from attacker view. The proposed technique shows promising results on quality and accuracy.

V. REFERENCE

[1] [1] I.J Cox, Digital Watermarking and Steganography, 2nd ed. Amsterdam, Netherlands: Morgan Kaufmann Publishers, 2008.

[2] [2] K. S. Petitcolas and A. P. Fabien, Information Hiding Techniques for Steganography and Digital Watermarking, Boston: Artech House, 2000.

[3] P. Bhautmage, A .Jeykumar, and A. Dahatonde, "Advanced Video Steganography Algorithm," International Journal of Engineering Research and Applications(IJERA), vol. 3, no. 1, pp. 1641-1644, February 2013.

[4] K. L. Narayanan, G. Prabakaran, and R Bhavani, "A high capacity video steganography based on interger wavelet transform," Journal of Computer Appilications, vol. 5, no. EICA2012-4, February 2012.

[5] P. V. Bodhak and B. L Gunjal, "Improved protection in video steganography using DCT and LSB," International Journal of Engineering and Innovative Technology (IJEIT), vol. 1, no. 4, April 2012.

[6] N. Moldovyan and A. Moldovyan, Innovative Cryptography, Boston: Charles River Media, 2007.

[7] [12] S. Thepade and S. Chavan, "Appraise of multifarious image steganography techniques," International Journal of Engineering Research and Applications, vol. 3, no. 2, pp.1067-1174.

[8] [13]H.B.Kekre, A.B.Patankar and Koshti ,"Performance comparison of simple orthogonal transforms and wavelet transforms for image steganography," International Journal of Computer Applications, vol. 44,no.6,April2012

[9] [14] H. Jahankhani, Handbook of Electronic Security and Digital Forensics, Singapore: World Scientific, 2010.

[10] [15] B. J. Blake, Secret Language, Oxford, UK:

Oxford University Press,2010.

[11] [16] F. Keinert, Wavelets and multiwavelets, London, UK: Chapman &Hall/CRC,2004.

[12] M. Holschneider, Wavelets: An Analysis Tool, Oxford, UK: Clarendon Press,1995.

[13] [18] M. D. Valle, R. M. Guerrero, and J. M. G. Salgado, Wavelets Electronic Resource: Classification, Theory and Applications, Hauppauge, N.Y: Nova Science Publishers, 2012.

A SURVEY ON RESEARCH ISSUES, CHALLENGES, ARCHITECTURE, PLATFORMS AND APPLICATIONS OF CLOUD COMPUTING

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Cloud computing is the development of parallel computing, distributed computing, grid computing and virtualization technologies which define the shape of a new era. Cloud computing is an emerging model of business computing. In this paper, we explore the concept of cloud architecture and compares cloud computing with grid computing. We also address the characteristics and applications of several popular cloud computing platforms. In this paper, we aim to pinpoint the challenges and issues of cloud computing. We identified several challenges from the cloud computing adoption perspective and we also highlighted the cloud interoperability issue that deserves substantial further research and development. However, security and privacy issues present a strong barrier for users to adapt into cloud computing systems. In this paper, we investigate several cloud computing system providers about their concerns on security and privacy issues.

Keywords— Computing, Cloud Computing Security , Service Level Agreement (SLA), Infrastructure as a Service (SaaS)

Clouds are large pools of easily usable and accessible virtualized resources. These resources can be dynamically reconfigured to adjust to a variable load (scale), allowing optimum resource utilization. It's a pay-per-use model in which the Infrastructure Provider by means of customized Service Level Agreements (SLAs) offers guarantees typically exploiting a pool of resources. Organizations and individuals can benefit from mass computing and storage centers, provided by large companies with stable and strong cloud architectures. Cloud computing incorporates virtualization, on-demand deployment, Internet delivery of services, and open source software. From one perspective, cloud computing is nothing new because it uses approaches, concepts, and best practices that have already been established. From another perspective, everything is new because cloud computing changes how we invent, develop, deploy, scale, update, maintain, and pay for applications and the infrastructure on which they run. Cloud computing is a technology that uses the internet and central remote servers to maintain data and applications. Cloud computing allows consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing storage, memory, processing and bandwidth.

II. CLOUD COMPUTNG SERVICES :

A. Infrastructure-as-a-Service : The Infrastructure as a Service is a provision model inwhich an organization outsourcers the equipment used to support operations, including storage, hardware, servers and networking components. The service provider owns the equipment and is responsible for housing, running and maintaining it. The client typically pays on a per-use basis.

Characteristics and components of IaaS include:

1. Utility computing service and billing model.
2. Automation of administrative tasks.
3. Dynamic scaling.
4. Desktop virtualization.
5. Policy-based services.
6. Internet connective

Infrastructure-as-a-Service like Amazon Web Services provides virtual server instances with unique IP addresses and blocks of storage on demand. Customers use the provider's application program interface (API) to start, stop, access and configure their virtual servers and storage. In the enterprise, cloud computing allows a company to pay for only as much capacity as is needed, and bring more online as soon as required. Because this pay-for-what-you-use model resembles the way electricity, fuel and water are consumed it's sometimes referred to as utility computing. Infrastructure as a Service is sometimes referred to as Hardware as a Service (HaaS).

B. Plateform-As-A-Service : Platform as a Service

(PaaS) is a way to rent hardware, operating systems, storage and network capacity over the Internet. The service delivery model allows the customer to rent virtualized servers and associated services for running existing applications or developing and testing new ones.Platform as a Service (PaaS) is an outgrowth of Software as a Service (SaaS), a software distribution model in which hosted software applications are made available to customers over the Internet. PaaS has several advantages for developers. With PaaS, operating system features can be changed and upgraded frequently.

Geographically distributed development teams can work together on software development projects. Services can be obtained from diverse sources that cross international boundaries.Initial and ongoing costs can be reduced by the use of infrastructure services from a single vendor rather than maintaining multiple hardware facilities that often perform duplicate functions or suffer from incompatibility problems. Overall expenses can also be minimized by unification of programming development efforts. On the downside, PaaS involves some risk of "lock-in" if offerings require proprietary service interfaces or development languages. Another potential pitfall is that the flexibility of offerings may not meet the needs of some users whose requirements rapidly evolve.

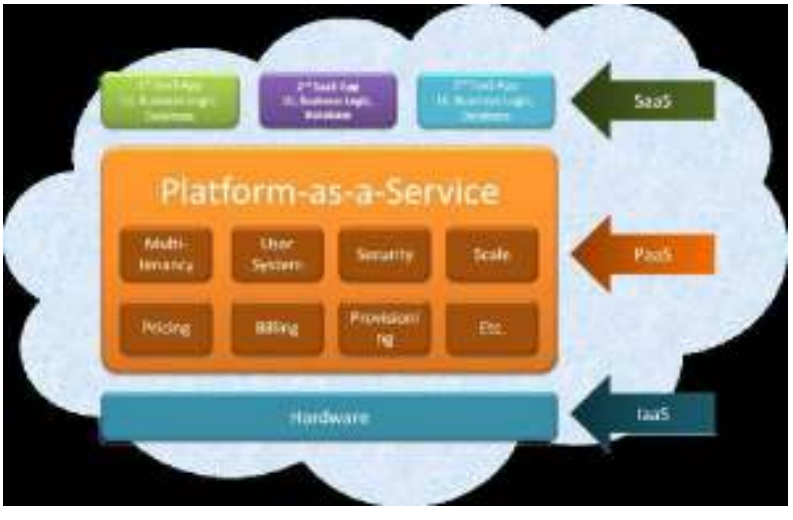

Fig 1: Cloud Computing Services

C. Software-As-A-Service : No Software as a service sometimes referred to as"software on demand," is software that is deployed over the internet and/or is deployed to run behind a firewall on a local area network or personal computer. With SaaS, a provider licenses an application to customers either as a service on demand, through a subscription, in a "pay-as-you-go" model, or at no charge. This approach to application delivery is part of the utility computing model where all of the technology is in the "cloud" accessed over the Internet as a service. SaaS was initially widely deployed for sales force automation and Customer Relationship Management (CRM). Now it has become commonplace for many business tasks, including computerized billing, invoicing, human resourcemanagement, financials, content management,collaboration, document management, and service desk management.

III. CLOUD COMPUTNG SECURITY ISSUES : In the last few years, cloud computing has grown from being a promising business concept to one of the fastest growing segments of the IT industry. Now, recession-hit companies are increasingly realizing that simply by tapping into the cloud they can gain fast access to best-of-breed business applications or drastically boost their infrastructure resources, all at negligible cost. But as more and more information on individuals and companies is placed in the cloud, concerns are beginning to grow about just how safe an environment it is.

A. Security : Where is your data more secure, on your local hard driver or on high security servers in the cloud? Some argue that customer data is more secure when managed internally, while others argue that cloud providers have a strong incentive to maintain trust and as such employ a higher level of security. However, in the cloud, your data will be distributed over these individual computers regardless of where your base repository of data is ultimately stored. Industrious hackers can invade virtually any server, and there are the statistics that show that one-third of breaches result from stolen or lost laptops and other devices and from employees' accidentally exposing data on the Internet, with nearly 16 percent due to insider theft .

B. Privacy : Different from the traditional computing model, cloud computing utilizes the virtual computing technology, users' personal data may be scattered in various virtual data center rather than stay in the same physical location, even across the national borders, at this time, data privacy protection will face the controversy of different legal systems. On the other hand, users may leak hidden information when they accessing cloud computing services. Attackers can analyze the critical task depend on the computing task submitted by the users .

C. Reliability : Servers in the cloud have the same problems as your own resident servers. The cloud servers also experience downtimes and slowdowns, what the difference is that users have a higher dependent on cloud service provider (CSP) in the model of cloud computing. There is a big difference in the CSP's service model, once you select a particular CSP, you may be locked-in, thus bring a potential business secure risk.

D. Legal Issues : Regardless of efforts to bring into line the lawful situation, as of 2009, supplier such as Amazon Web Services provide to major markets by developing restricted road and rail network and letting users to choose "availability zones" . On the other hand, worries stick with safety measures and confidentiality from individual all the way through legislative levels.

E. Open Standard : Open standards are critical to the growth of cloud computing. Most cloud providers expose APIs which are typically well-documented but also unique to their implementation and thus not interoperable. Some vendors have adopted others' APIs and there are a number of open standards under development, including the OGF's Open Cloud Computing Interface. The Open Cloud Consortium (OCC) is working to develop consensus on early cloud computing standards and practices.

F. Compliance : Numerous regulations pertain to the storage and use of data require regular reporting and audit trails, cloud providers must enable their customers to comply appropriately with these regulations.

Managing Compliance and Security for Cloud Computing, provides insight on how a top-down view of all IT resources within a cloud-based location can deliver a stronger management and enforcement of compliance policies. In addition to the requirements to which customers are subject, the data centres maintained by cloud providers may also be subject to compliance requirements.

G. Freedom : Cloud computing does not allow users to physically possess the storage of the data, leaving the data storage and control in the hands of cloud providers. Customers will contend that this is pretty fundamental and affords them the ability to retain their own copies of data in a form that retains their freedom of choice and protects them against certain issues out of their control whilst realizing the tremendous benefits cloud computing can bring .

H. Long-term Viability : You should be sure that the data you put into the cloud will never become invalid even your cloud computing provider go broke or get acquired and swallowed up by a larger company. "Ask potential providers how you would get your data back and if it would be in a format that you could import into a replacement application.

IV. CLOUD COMPUTNG MODELS

A. Public Cloud : A public cloud is one based on the standard cloud computing model, in which a service provider makes resources, such as applications and storage, available to the general public over the Internet. Public cloud services may be free or offered on a pay-per-usage model.

The main benefits of using a public cloud service are:

1. Easy and inexpensive set-up because hardware, application and bandwidth costs are covered by the provider.

Scalability to meet needs.

2. No wasted resources because you pay for what you use.

The term "public cloud" arose to differentiate between the standard model and the private cloud, which is a proprietary network or data center that uses cloud computing technologies, such as virtualization. A private cloud is managed by the organization it serves. A third model, the hybrid cloud, is maintained by both internal and external providers. Examples of public clouds include Amazon Elastic Compute Cloud (EC2), IBM's Blue Cloud, Sun Cloud, Google AppEngine and Windows Azure Services Platform

B. Community Cloud: Private cloud (also called internal cloud or corporate cloud) is a marketing term for a proprietary computing architecture that provides hosted services to a limited number of people behind a firewall. Advances in virtualization and distributed computing have allowed corporate network and datacenter administrators to effectively become service providers that meet the needs of their "customers" within the corporation. Marketing media that uses the words "private cloud" is designed to appeal to an organization that needs or wants more control over their data than they can get by using a third-party hosted service such as Amazon's Elastic Compute Cloud (EC2) or Simple Storage Service (S3).

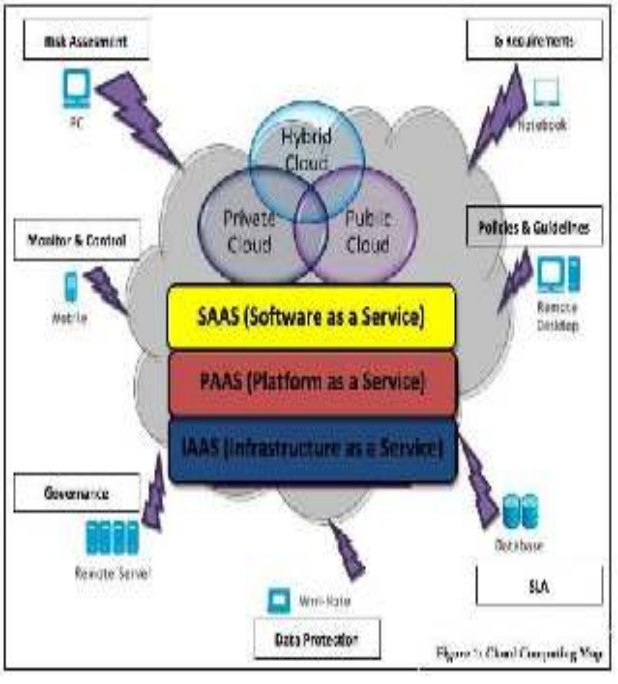

Fig. 2 Cloud Computing Models

C. Hybrid Cloud : A hybrid cloud is a Cloud Computing environment in which an organization provides and manages some resources in-house and has others provided externally. For example, an organization might use a public cloud service, such as Amazon Simple Storage Service (Amazon S3) for archived data but continue to maintain in-house storage for operational customer data. Ideally, the hybrid approach allows a business to take advantage of the scalability and cost-effectiveness that a public cloud computing environment offers without exposing mission-critical applications and data to third-party vulnerabilities.

D. Private Cloud : A community cloud may be established where several organizations have similar requirements and seek to share infrastructure so as to realize some of the benefits of cloud computing. With the costs spread over fewer users than apublic cloud (but more than a single tenant) this option is more expensive but may offer a higher level of privacy, security and/or policy compliance. Examples of

community cloud include Google's "Gov Cloud".

V. ALL CLOUD MODELS ARE NOT THE SAME

Although the term Cloud Computing is widely used, it is important to note that all Cloud Models are not the same. As such, it is critical that organizations don't apply a broad brush one-size fits all approach to security across all models. Cloud Models can be

Fig. 3 Cloud Computing Models

segmented into Software as a Service (Saas), Platform as a service (PaaS) and Integration as a Service (IaaS). When an organization is considering Cloud Security it should consider both the differences and similarities between these three segments of Cloud Models:

VI. IAAS COMPONENTS : IaaS delivery model consists of several components that have been developed through past years, nevertheless, employing those components together in a shared and outsourced environment carries multiple challenges. Security and Privacy are the most significant challenges that may impede the Cloud Computing adoption. Breaching the security of any component impact the other components' security, consequently, the security of the entire system will collapse. In this section we study the security issue of each component and discuss the proposed solutions and recommendations.

A. Service Level Agreement (SLA) : Cloud Computing emerges a set of IT management complexities, and using SLA in cloud is the solution to guarantee acceptable level of QoS. SLA encompasses SLA contract definition, SLA negotiation, SLA monitoring, and SLA enforcement. SLA contract definition and negotiation stage is important to determine the benefits and responsibilities of each party, any misunderstanding will affect the systems security and leave the client exposure to vulnerabilities. On the other hand, monitoring and enforcing SLA stage is crucial to build the trust betweenthe provider and the client. To enforce SLA in a dynamic environment such Cloud, it is necessary to monitor QoS attributes continuously. Web Service Level Agreement (WSLA) framework developed for SLA monitoring

and enforcement in SOA. Using WSLA for managing SLA in Cloud Computing environment was proposed in by delegating SLA monitoring and enforcement tasks to a third party to solve the trust problem. Currently, cloud clients have to trust providers' SLA monitoring until standardizing Cloud Computing systems and delegating third-parties to mediate SLA monitoring and enforcement.

B. Utility Computing : Utility Computing is not new concept; it played an essential role in Grid Computing deployment. It packages the resources (e.g., computation, bandwidth, storage, etc...) as metered services and delivers them to the client. The power of this model lies in two main points: First, it reduces the total cost, i.e., instead of owning the resources, client can only pay for usage time (pay-as-you-go). Second, it has been developed to support the scalable systems, i.e., as an owner for a rapid growing system you need not to worry about denying your service according to a rapid increase of users or reaching peak in demand. Obviously, Utility Computing shapes two of the main features of the Cloud Computing (e.g., scalability, and pay as- you-go). The first challenge to the Utility Computing is the complexity of the Cloud Computing, for example, the higher provider as Amazon must offer its services as metered services. Those services can be used by second level providers who also provide metered services. In such multiple layers of utility, the systems become more complex and require more management effort from both the higher and the second level providers. Amazon DevPay5, an example for such systems, allows the second level provider to meter the usage of AWS services and bill the users according to the prices determined by the user. The second challenge is that Utility Computing systems can be attractive targets for attackers, so an attacker may aim to access services without paying, or can go further to drive specific company bill to unmanageable levels. The provider is the main responsible to keep the system healthy and well functioning, but the client's practice also affects the system.

C. Cloud Software : There are many open source Cloud software implementations such as Eucalyptus and Nimbus 6; Cloud software joins the cloud components together. Either Cloud software is open source or commercial closed source. We can't ensure the vulnerability and bugs in available software, furthermore, cloud service providers furnish APIs (REST, SOAP, or HTTP with XML/JSON) to perform most management functions, such as access control from a remote location . For example, client can use the Amazon EC2 toolkits, a widely supported interface, to consume the services by implementing own applications or by simply using the web interfaces offered by the provider. In both cases, user uses web services protocols. SOAP is the most supported protocol in web services; many SOAP based security solutions are researched, developed, and implemented. WS-Security, a standardextension for security in SOAP, addresses the security for web services. It defines a SOAP header (Security) that carries the WS-Security extensions and determines how the existing XML security standards like XML Signature and XML Encryption are applied to SOAP messages. Well known attacks on protocols using XML Signature for authentication or integrity protection would be applied to web services consequently affecting the Cloud services. Finally, an extreme scenario in showed the possibility of breaking the security between the browser and the clouds, and followed by proposal to enhance the current browsers security. Indeed, these attacks belong more to the web services world, but as a technology used in Cloud Computing, web services' security strongly influences the Cloud services' security.

D. Platform Virtualization : Virtualization, a fundamental technology platform for Cloud Computing services, facilitates aggregation of multiple standalone systems into a single hardware platform by virtualizing the computing resources (e.g., network, CPUs, memory, and storage). Hardware abstraction hides the complexity of managing the physical computing platform and simplifies the computing resources scalability. Hence, virtualization provides multi tenancy and scalability, and these are two significant characteristics of Cloud Computing As the hypervisor is responsible for VMs isolation, VMs could not be able to directly access others' virtual disks, memory, or applications on the same host. IaaS, a shared environment, demands an accurate configuration to maintain strong isolation. Cloud service providers undertake a substantial effort to secure their systems in order to minimize the threats that result from communication, monitoring, modification, migration, mobility, and DoS. In this section, we discuss virtualization risks and vulnerabilities that affect particularly IaaS delivery model in addition to the recent proposed solutions to guarantee security, privacy, and data integrity for IaaS.

VII. SECURITY MODEL FOR IAAS: As a result of this research, we also discuss a Security Model for IaaS (SMI) as a guide for assessing and enhancing security in each layer of IaaS delivery model as shown in Fig.4. SMI model consists of three sides: IaaS components, security model, and the restriction level. The front side of the cubic model is the components of IaaS which were discussed thoroughly

in the previous sections. The security model side includes three vertical entitieswhere each entity covers the entire IaaS components. The first entity is Secure Configuration Policy (SCP) to guarantee a secure configuration for each layer in IaaS Hardware, Software, or SLA configurations; usually, miss-configuration incidents could jeopardize the entire security of the system. The second is a Secure Resources Management Policy (SRMP) that controls the management roles and privileges. The last entity is the Security Policy Monitoring and Auditing (SPMA) which is significant to track the system life cycle. The restriction policy side specifies the level of restriction for security model entities. restriction starts from loose to tight depending on the provider, the client, and the service requirements. Nevertheless, we hope SMI model be a good start for the standardization of IaaS layers. This model indicates the relation between IaaScomponents and security requirements, and eases security improvement in individual layers to achieve a total secure IaaS system.

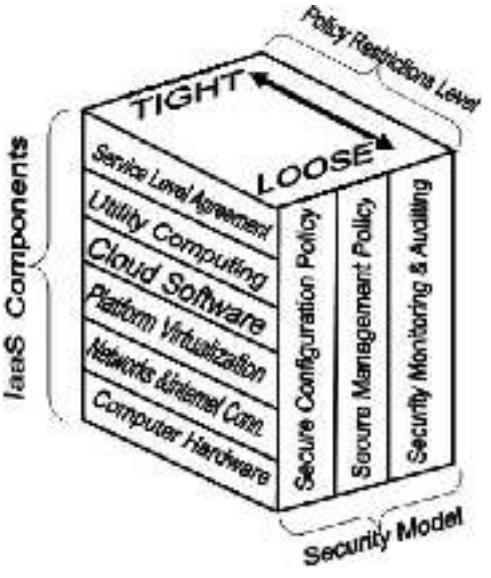

Figure 4. Security Model In IAAS

As a result of this research, we propose a Security Model for IaaS (SMI) as a guide for assessing and enhancing security in each layer of IaaS delivery model as shown in Fig. 4. SMI model consists of three sides: IaaS components, security model, and the restriction level. The front side of the cubic model is the components of IaaS which were discussed thoroughly in the previous sections. The security model side includes three vertical entities where each entity covers the entire IaaS components. The first entity is Secure Configuration Policy (SCP) to guarantee a secure configuration for each layer in IaaShardware,software or SLA Configurations;usually,miss-configaration incidentsCould jeoparadize the entire security of the system.

TABLE I
THREATS AND SOLUTIONS SUMMARY FOR IAAS

IaaS Component	Threats / Challenges		Solutions	
Service Level Agreement (SLA) Utility Computing	Monitoring and enforcing SLA. Monitor QoS attributes. Measuring and billing with Multiple levels of providers. On-demand billing system availability.		Web Service Level Agreement (WSLA) framework. SLA monitoring and enforcement in SOA. Amazon DevPay.	
Cloud Software	Attacks against XML. Attacks against web services.		XML Signature and XML Encryption. SOAP Security Extensions.	
Networks & Internet connectivity	DDOS. Man-In-The-Middle attack (MITM). IP Spoofing. Port Scanning. DNS security.		Logical Network segmentation and Firewalls. Traffic encryption. Network monitoring. Intrusion Detection System and Intrusion Prevention System (IPS).	
Virtualization	Security threats sourced from host: • Monitoring VMs from host. • Communications between VMs and host. • VMs modification.	Security threats sourced from VM: • Monitoring VMs from other VM. • Communication between VMs. • Virtual machines Mobility. • Resources Denial of Service (DoS). • VMs provisioning and migration.	Security threats sourced from host: • Trusted Cloud Computing Platform. • Terra. • Trusted Virtual Datacenter (TVDc). • Mandatory Access Control MAC.	Security threats sourced from VM: • IPSec. • Encryption. • VPN. • Xen Security through Disaggregation. • LoBot: architecture for secure provisioning & migration VM.
Computer Hardware	Physical attacks against computer hardware. Data security on retired or replaced storage devices.		High secure locked rooms with monitoring appliances. Multi-parties accessibility to encrypted storage. Transparent cryptographic file systems. Self-encrypting enterprise tape drive TS1120.	

The second is a Secure Resources Management Policy.(SRMP) that controls the management rolls and previleges. The last entity is the Security Policy Monitoring and Auditing (SPMA) which is significant to track the systemlife cycle.

This model indicates the relation between IaaS components and security requirements, and eases security improvement in individual layers to achieve a total secure IaaS system.

VIII. CONCLUSION : In This paper we discuss about Various Layers of Infrastructure as a Service. We can also Provide Security by having a public key infrastructure (PKI) on each layer that we discuss in this paper. The SLA's discuss only about the services provided and the waivers given if the services not met the agreement, but this waivers don't really help the customers fulfilling their losses. In this Paper we also discuss the Security holes associated with Iaas implementation. The security issues presented here concern the security of each IaaS component in addition to recent proposed solutions.

REFERENCES

[1].M. Jensen, J. Schwenk, N. Gruschka, and L. Lo Iacono, On TechnicalSecurity Issues in Cloud Computing. IEEE, 2009.

[2]. Greg Boss, Padma Malladi, Denis Quan, Linda Legregni, Harold Hall,"CloudComputing", http://www.ibm.com/developerswork/websphere/zones/hip ods/library.html, October 2007, pp. 4-4

[3]G. Frankova, Service Level Agreements: Web Services and Security, ser. Lecture Notes in Computer Science. Berlin, Heidelberg: Springer Berlin Heidelberg, 2007, vol. 4607.

[4]. "Service Level Agreement and MasterServiceAgreement",http://www.softlayer.com/sla.html, accessed on April 05, 2009.

[5]. S. Berger, R. Caceres, D. Pendarakis, R. Sailer, E. Valdez, R. Perez, W. Schildhauer, and D. Srinivasan, "Security for the cloud infrastrcture: trusted virtual data center (TVDc)." [Online]. Available: www.kiskeya.net/ramon/work/pubs/ibmjrd09.pdf

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AUTHOR INDEX

Aarthi V	196
Aarti.V	215
Aisha Siddekha	168
Amitha V. Ms	12
Amrutha G.B	243
Anantha K.P	200
Anusha A	262
Archana. S	154
Aruna.R	174
Asha. Mrs	45
Balaji.N	215
Banumathy. K	190
Bhagavath	184
Bhavani R	239
Chaitra	184, 245
Sushmitha	184
Cynthia Merlin D.K	200
Deeksha V Kademane	200
Deepasri Prabhakar	42
Devi Pooja S	243
Divya. Ms	219
Divyashree. D. M	139
Faria Begum	185
Gana K P	20
Gangabhavani. S	190
Geetanjali. L	206
Gnanendra Reddy R	187
Goda Devi. S. Ms	123
Govardhan P	187
Harisha.K	200
Harshitha T.N	185
Hemalatha B.R	110, 149, 185
Hemalatha M.S	86
Inchara N Bhushan	245
Jahnavi T	203
Jamuna. Dr	84
Jyothi Vishwanath. Dr	128
Jyothi.B	22
Jyothilakshmi. R	149
JYOTHSNA. R. V	50
Kavya S.R	110
Kavya.M	185
Keerthana M.M	22
Kodidela Sri Divya	107
Kumuda R	243
Kusuma H.T	161
Lavanya Vaishnavi D A. Mrs	215
Madhu N.R	178
Madhuri Anand. Mrs	97
Mallika B.A	164
Mamatha E	248
Manasa. A	213
Manjula K R	248
MEDAM NAGA SHARMILA	54
Meenakshi H	178
Megha M.A	151
Meghana P	161
Meherjyoti Sangle. Dr	64
Mohana K S	187
Nandini N	206
Neelannavar	174
Noothan Rao. Dr	35, 91
Owais Majid Kamili	190
Pamulasaikiran	142
Pasha. M. A	168
Patel Moodlachar H.S	54
Poornima Y.N	256
Poorvaja B	101, 104
Pothuru Thilak Naidu	107
Prabhavathi S.N	86
Prananvi. Y	154
Prasadkumar Hatti	215
Prasanna Lakshmi.G.S	252
Prateekha Khadi	119, 131
Prateeksha Prakash	225
Prathima M Bidarimath. Smt	16
Praveen	230
Prem Venkataram. R	56
Priya Shovna	225
Priyanka.S	151
Puneeth kumar M.C	135
Purnima. R. Dr	7
RACHANA S	54
Rajani B R	101, 104
Rajith S	113
Ramyashree P	196
Rashmi K	187
Rashmi S	196
RASHMI. N	50
Ravi Kumar B M	259
Renganayaki. S	81
Rohinie Raj J.J. Miss	32
Ruksar Sultana	135
Saikumar B K	58

SaiRohith 184
Samreentaj K.C 256
Saritha kumari M. 67
Savita Kanthi 119, 131
Seema Kousar 215
ShaikDilshad 203
Shanta Kumar B Patil 252
Shashidhar Shekhar 174
Shashikala. A. R 161, 164
Sherlyn Priyadarshini 56
Shilpa M N 20
Shilpa M N 257
Shilpa N 86
Shreya M S 262
Shruti Koraddi 119, 131
Shrutikeerthi . M. A. Dr 6
Shymalarathna Kumari. Dr 73
Sindhu K P 223
Siva Saketh Reddy. K 139
Sridhar. B. S 161
SriPriya 164
Sudhakar R 42
Sumaiya F. Ms 219
Suresh. T. N 190
Swarnashree 58
Swati V J 234
Teja Y K 113
Tejaswini 223
Thripura. V 128
Ushadevi. M. V. Dr 16
Varalakshmi.K.R 225
Veena K 252
Veena M 230
Vijayalaxmi AHM. Dr 12, 32
Vinutha C.V 142
Vishwanath. K 190
Yashika B N 234