

AN INDEX FOR DISSECTION OF VOLTAGE STABILITY AND REACTIVE POWER REMUNERATION OF DISTRIBUTION NETWORK BASED ON SYNTHESIS LOAD MODEL

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ABSTRACT

Distribution networks experience distinct change from a low to high load level every day. Hence, a major concern in power distribution networks is voltage stability issues and reactive power remuneration. It is significantly critical to take both distribution network and loads into consideration to determine reasonable reactive compensation capacity for distribution network. In this paper in the first phase of work an attempt has been made for performing voltage stability analysis of different distribution system based on synthesis load model. Taking example of a typical radial Distribution network, it has been shown that the node having the minimum value of VSI is the most sensitive. In the second phase of work the critical values of total real power load and total reactive power load for various cases is found, the system will collapse beyond the computed values of critical power. The performance of the voltage stability index is tested on different types of loads and different substation voltage levels. Results are obtained on IEEE 33-bus and IEEE 69-bus radial distribution systems

Key Words: Radial Distribution System, Voltage Stability Index, Critical Bus, Reactive Power, Synthesis Load Model.

I INTRODUCTION

The deregulated market requires a great deal of attention to satisfy reliability, security and optimization objectives. As is well known, the voltage stability problem may become more and more frequent in this new scenario. Voltage stability has become a critical issue for electrical power transmission and distribution systems because of: (i) continuing increases in demand; (ii) the transfer of high powers between several interconnected areas; (iii) have resulted in investment delays; and (iv) high penetration of emerging new and renewable energy sources in both distribution and transmission systems.

Voltage stability of a distribution system is one of the keen interests of industry and research sectors around the world. It concerns stable load operation, and acceptable voltage levels all over the distribution system buses. The distribution system in a power system is loaded more heavily than ever before and operates closer to the limit to avoid the capital cost of building new lines. When a power system approaches the voltage stability limit, the voltage of some buses reduces rapidly for small increments in load and the controls or operators may not be

able to prevent the voltage decay. In some cases, the response of controls or operators may aggravate the situation and the ultimate result is voltage collapse. Voltage collapse has become an increasing threat to power system security and reliability. Many incidents of system blackouts because of voltage stability problems have been reported worldwide (Takahashi K., Nomura Y, 1987). In order to prevent the occurrence of voltage collapse, it is essential to accurately predict the operating condition of a power system. So electrical engineers need a fast and accurate voltage stability index (VSI) to help them monitoring the system condition. Nowadays, a proper analysis of the voltage stability problem has become one of the major concerns in distribution power system operation and planning studies. Currently, most electrical power systems operate very close to their stability limits and it is crucial to keep both efficiency and security at appropriate levels (S.Sakthiveleta., 2011). The objective in power systems operation is to serve energy with acceptable voltage and frequency to consumers at minimum cost. Thus, an accurate knowledge of how far the current system's operating point is from the economic and environmental constraints, that voltage instability limit is crucial to system operators, which often need to assess if the system has a secure and feasible operation point following a given disturbance, such as a line outage or sudden change in system loading (L. A. Ll. Zarate, and C. A. Castro, 2006).

A fast method to determine the voltage stability limit of power system was proposed by Haque (M. H. Haque, 1995). Analytical approach to voltage collapse proximity determination is proposed for radial networks by Gubina, et al. (F. Gubina, and B. Strmcnik, 1997). (Moghavvemi, et al., 2001) proposed bus/line stability indices which is obtained from the solution of the line receiving end reactive power equation (Q_r) and the line receiving end active power equation (P_r) of the reduced two-bus equivalent network. In (M. Chakravorty, and D. Das, 2001) proposed a new stability index based on well-known bi-quadratic equation relating the voltage magnitudes at the sending and receiving ends and power at the receiving end of the branch. Two simple methods to evaluate two efficient voltage collapse proximity indicators are presented in (A. Augugliaro et al., 2007) to find the the weakest node, where voltage instability phenomenon can occur bringing the whole system to the voltage collapse, and evaluate the maximum loading capability of the entire system or of the weakest node, beyond which voltage collapse takes place. A new bus stability index is developed by Chaturvedi, et al. (A. Chaturvedi et al, 2006) from the line receiving bus voltage equation of Kirchoff's voltage law for a particular branch section. A new static voltage stability index of a RDS is developed (M. M. Hamada et al., 2010] by Hamada et al., to faithfully evaluate the severity of the loading situation, thereby predicting for voltage instability at definite load value. A new VSI for all the buses proposed (G.A. Mahmoud, 2012) for radial distribution networks by Mahmoud using the catastrophe theory. Investigation of different load models on voltage stability of unbalanced radial distribution system is presented by Gunalan, et al. in (S. Gunalan, et al., 2010) a CTP Flow approach for voltage stability analysis of unbalanced three-phase power systems is presented in (X. P. Zhang et al., 2005). A three-phase constrained optimal power flow is proposed to analyse voltage stability in an unbalanced power system (G. Carpinelli, et al., 2006). The voltage stability analysis in unbalanced radial distribution systems using secant predictor is given in by (Mamdouh Abdel-Akher, 2013).

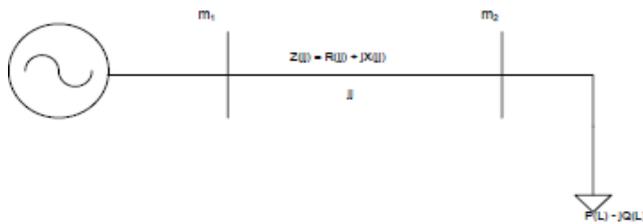
The load on a power system is constantly changing. There is no such thing as a "steady state" load. Seasonal effects, weekly/daily, and legal/religious holidays, play an important role in load patterns. Most electric utilities serve customers of different types such as residential, commercial, and industrial. To study the system more realistic we have to consider these different load models together along with load curve variation. Distribution

networks comprise of loads like industrial, commercial, residential and lightning loads are generally weak in nature because of high resistance to reactance ratio. Each of these loads is at its maximum at different times of the day and this may cause feeder overloading which may result in voltage collapse. Voltage stability is one of the important factors that dictate the maximum permissible loading of a distribution system. Using this VSI, the buses of the system which are weak in nature can be identified. Voltage stability of a system depends on load model, the network topology and settings of reactive compensation devices.

In this paper, Load modelling is carried out and MATLAB programs are developed for three different load models constant power, constant current and constant impedance for comparison. It is shown that the node, at which the value of voltage stability index is minimum, is more sensitive to voltage collapse. Composite load modeling is considered for voltage stability analysis. It is also shown that the load flow solution with feasible voltage magnitude for radial distribution networks is unique.

II MATHEMATICAL MODEL

For a distribution line model in fig 1. Distribution Networks are assumed to be balanced and can be represented by a single line diagram.



$$I(jj) = \frac{V(m1) - V(m2)}{r(jj) + jx(jj)} \quad (1)$$

$$P(m2) - jQ(m2) = V * (m2) \times I(jj) \quad (2)$$

From equation (1) and (2),

$$\frac{|V(m1)| \angle \delta(m1) - |V(m2)| \angle \delta(m2)}{r(jj) + jx(jj)} = \frac{P(m2) - jQ(m2)}{V * (m2)} \quad (3)$$

$$|V(m1)| \times |V(m2)| \cos\{\delta(m1) - \delta(m2)\} - |V(m2)|^2 + j \sin\{\delta(m1) - \delta(m2)\} = P(m2)r(jj) + Q(m2)x(jj) + j\{P(m2)r(jj) - Q(m2)x(jj)\} \quad (4)$$

$$|V(m1)||V(m2)| \cos\{\delta(m1) - \delta(m2)\} - |V(m2)|^2 = \{P(m2)r(jj) + Q(m2)x(jj)\} \quad (5)$$

$$|V(m1)||V(m2)|\{\sin\{\delta(m1) - \delta(m2)\}\} = \{P(m2)x(jj) - Q(m2)r(jj)\} \quad (6)$$

Squaring and adding (5) and (6)

$$|V(m1)|^2 |V(m2)|^2 = \{|V(m2)|^2 + P(m2)r(jj) - Q(m2)x(jj)\} |V(m2)|^2 + \{P^2(m2) + Q^2(m2)\} \{r^2(jj) + x^2(jj)\} = 0$$

Let

$$b(jj) = |V(m1)^2| - 2\{P(m2)x(jj) - Q(m2)x(jj)\}$$

$$c(jj) = \{P^2(m2) + Q^2(m2)\}\{r^2(jj) + x^2(jj)\}$$

From equation (3), (4), (5) and (6)

$$|V(m2)^4| - b(jj)|V(m2)|^2 + c(jj) = 0 \quad (7)$$

V (m2) has four solutions,

$$\begin{aligned} & \left[\left(\frac{1}{2} \right) [b(jj) - \{b^2(jj) - 4c(jj)\}^{0.5}] \right]^{0.5} \\ & \left[\left(\frac{1}{2} \right) [b(jj) - \{b^2(jj) - 4c(jj)\}^{0.5}] \right]^{0.5} \\ & \left[\left(\frac{1}{2} \right) [b(jj) + \{b^2(jj) - 4c(jj)\}^{0.5}] \right]^{0.5} \\ & \left[\left(\frac{1}{2} \right) [b(jj) + \{b^2(jj) - 4c(jj)\}^{0.5}] \right]^{0.5} \\ |V(m2)| = & \left[\left(\frac{1}{2} \right) [b(jj) + \{b^2(jj) - 4c(jj)\}^{0.5}] \right]^{0.5} \end{aligned} \quad (8)$$

Only feasible solution of load flow when,
 $b^2(jj) - 4c(jj) \geq 0$

$$\{|V(m1)^2| - 2P(m2)r(jj) - 2Q(m2)x(jj)\}^2 - 4\{P^2(m2) + Q^2(m2)\}\{r^2(jj) + x^2(jj)\} \geq 0$$

$$|V(m1)|^4 - 4\{P(m2)r(jj) - Q(m2)x(jj)\}^2 - 4\{P(m2)r(jj) - Q(m2)x(jj)\}|V(m1)|^2 \geq 0$$

$$\begin{aligned} VSI(m2) = & |V(m1)|^4 - 4\{P(m2)r(jj) - \\ & Q(m2)x(jj)\}^2 - 4\{P(m2)r(jj) + \\ & Q(m2)x(jj)\}|V(m1)|^2 \end{aligned} \quad (9)$$

VSI(m2) ≥ 0 for nodes m2=2,3,4.....NB

By using this voltage stability index, one can measure the level of stability of radial distribution networks and there by appropriate action may be taken if the index indicates a poor level of stability

$$V(m2) = V(m1) - I(jj)Z(jj) \quad (10)$$

$$V(m2) = V(m1) - I(jj)[R(jj) + X(jj)] \quad (11)$$

$$m1 = IS(jj)$$

$$m2 = IR(jj)$$

load current of any receiving end node m2 of branch j is

$$IL(m2) = \frac{PL(m2) - jQL(m2)}{V^*(m2)} \quad (12)$$

The real and reactive power loss of branch jj is expressed by

$$LP = I(jj)^2 R(jj) \quad (13)$$

$$LQ = I(jj)^2 X(jj) \quad (14)$$

The current beyond branch jj

$$I(jj) = \sum_{i=1}^{S(jj)} IL\{IE(jj, i)\} \quad (15)$$

From equation (15) it can be seen that for finding out branch current of branch 1,2,3.....LN1

Nodes beyond branches are to be found out one by one [18].

III LOAD MODELING

For the purpose of voltage stability analysis of radial distribution networks, composite load modeling is considered.

The real and reactive power loads of node 'i' is given as:

$$P(m2) = P_n[a_0 + a_1 V(m2) + a_2 V^2(m2)] \quad (16)$$

$$Q(m2) = Q_n[b_0 + b_1 V(m2) + b_2 V^2(m2)] \quad (17)$$

Where P_n and Q_n are nominal real and reactive power respectively and $V(m2)$ is the voltage at node $m2$. For all the loads, Eq.(17) are modeled as

$$a_0 + a_1 + a_2 = 1.0 \quad (18)$$

$$b_0 + b_1 + b_2 = 1.0 \quad (19)$$

For constant power (CP) load $a_0=b_0=1$ and $a_i=b_i=0$ for $i=1,2$.

For constant current (CI) load $a_1 =b_1=1$ and $a_i=b_i=0$ for $i=0,2$.

For constant impedance (CZ) load $a_2 =b_2=1$ and $a_i=b_i=0$ for $i=0,1$.

IV. SIMULATION RESULTS AND DISCUSSIONS

In this paper the voltage stability index method is applied on IEEE 33-bus and IEEE 69-bus test systems. The total load on 33-bus test radial distribution system is $3.715+j*2.3$ MVA (M. A. Kashem ET AL., 2000) and on 69-bus test radial distribution system is $3.8013+j*2.6936$ MVA (M.E.Baran et al., 1989). Fig.2. shows Voltage profile of 33-bus system for different types of loads i.e. constant power (CP), constant current (CI) and constant impedance (CZ).. Similarly for 69-bus system is shown in Fig.3. Table 1. Presents the value of index is given for all node and which one have the least value of index is known as critical node where the chances of voltage collapse is more frequent. here bus 18 is critical node point for 33 bus and bus 65 is for 69 bus system which have least value of voltage stability index.

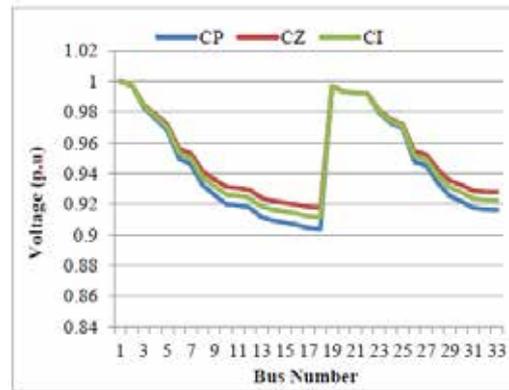


Fig. 2. Voltage profile for 33-bus system

Multiplier power flow analysis in which each node power is multiplied by a factor (λ) as $S = \lambda SB$ and the critical node bus is identified by calculating bus voltage magnitude just before the load flow diverge. This voltage stability index is used for different types of static load models, and constant power, constant current, constant impedance load models is used for different loading conditions.

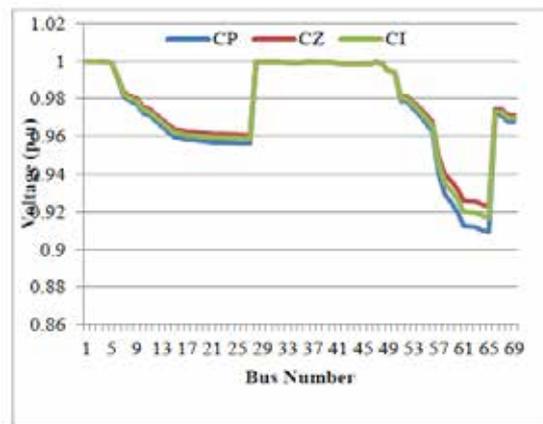


Fig. 3. Voltage profile for 69-bus system

We can observe the variations of index value for four cases constant power, constant current, constant impedance and composite load from Table. 2 critical loading conditions for different types of load and different values of substation voltage. It is seen that the critical loading for constant current load is the maximum and that for constant power load is minimum. The critical loading for constant impedance lies between these two and that for the composite load solely depends on the percentage composition of the three loads. The stability index and consequently the voltage are minimum for constant power load and maximum for constant impedance load and that for constant current load is in between these two. Similarly, the composition of loads governs the position of the stability index for the composite load.

Table 1: Bus voltage stability indices for the base load of the systems

| BusNo. | Radialtestsystems | | | |
|--------|-------------------|----------|--------|----------|
| | 33-Bus | 69-Bus | BusNo. | 69-Bus |
| 23 | 0.988136 | 0.999866 | 3 | 0.999677 |
| 45 | 0.932919 | 0.999732 | 6 | 0.99899 |
| 67 | 0.905002 | 0.999358 | 3 | 0.998357 |
| 89 | 0.877756 | 0.996087 | 7 | 0.998174 |
| 10 | 0.812106 | 0.960781 | 3 | 0.998165 |
| 11 | 0.800678 | 0.925217 | 8 | 0.99538 |
| 12 | 0.755146 | 0.917046 | 3 | 0.994216 |
| 13 | 0.735094 | 0.912813 | 9 | 0.994062 |
| 14 | 0.716628 | 0.894352 | 4 | 0.994029 |
| 15 | 0.713985 | 0.890261 | 0 | 0.993637 |
| 16 | 0.709288 | 0.878729 | 4 | 0.993655 |
| 17 | 0.690324 | 0.868186 | 1 | 0.999158 |
| 18 | 0.683469 | 0.857854 | 4 | 0.994183 |
| 19 | 0.679197 | 0.847687 | 2 | 0.978922 |
| 20 | 0.675071 | 0.845823 | 4 | 0.976818 |
| 21 | 0.668984 | 0.842733 | 3 | 0.916923 |
| 22 | 0.667181 | 0.842693 | 4 | 0.916887 |
| 23 | 0.98606 | 0.84106 | 4 | 0.902437 |
| 24 | 0.971949 | 0.840014 | 4 | 0.890482 |
| 25 | 0.96922 | 0.838325 | 5 | 0.874174 |
| 26 | 0.966732 | 0.838301 | 4 | 0.858486 |
| 27 | 0.919739 | 0.838049 | 6 | 0.780142 |
| 28 | 0.894867 | 0.837501 | 4 | 0.744773 |
| 29 | 0.882759 | 0.83691 | 7 | 0.731345 |
| 30 | 0.806134 | 0.836665 | 4 | 0.715567 |
| 31 | 0.797437 | 0.836597 | 8 | 0.692777 |
| 32 | 0.759293 | 0.999704 | 4 | 0.691992 |
| 33 | 0.733009 | 0.999418 | 9 | 0.690816 |
| 34 | 0.721891 | 0.998934 | 5 | 0.685069 |
| 35 | 0.708935 | 0.998848 | 0 | 0.683347 |
| | 0.70614 | 0.998421 | 5 | 0.890056 |
| | 0.705268 | 0.997398 | 1 | 0.890053 |
| | | 0.996059 | 5 | 0.877552 |
| | | 0.99579 | 2 | 0.877548 |

Table 2: Critical Bus Index Value and Its Bus Voltage For Maximum TPL And TQL Of 69 Bus System

| Loadtype | Substation voltage(pu) | Criticalloadingcondition | | | |
|--------------------------------|------------------------|--------------------------|-----------|----------------|--------------|
| | | TPL (MW) | TQL(MVAR) | SImin=SI65(pu) | Vmin=V65(pu) |
| Constant Power(CP) | 1 | 18.410 | 11.336 | 0.0639 | 0.5028 |
| | 1.025 | 20.037 | 12.476 | 0.0770 | 0.5276 |
| Constant Current (CI) | 1 | 20.399 | 13.155 | 0.1095 | 0.5754 |
| | 1.025 | 21.722 | 13.991 | 0.1165 | 0.5843 |
| Constant Impedance | 1 | 19.090 | 12.706 | 0.2142 | 0.6806 |
| | 1.025 | 19.471 | 12.976 | 0.2446 | 0.7035 |
| Composite Load(40%CP, 30%CIand | 1 | 20.6128 | 13.072 | 0.0798 | 0.5315 |
| | 1.025 | 21.877 | 13.866 | 0.0858 | 0.5413 |
| | 1.05 | 23.174 | 14.683 | 0.0924 | 0.5513 |

V. CONCLUSION

In this paper Voltage stability index is used to compute the most sensitive node of radial distribution system. The most sensitive node and the node having the minimum voltage are identical that have been demonstrated by two examples 33-bus system and 69-bus system for constant power (CP), constant current (CI), constant impedance (CZ) and composite load modeling for substation voltage of 1.0 pu, 1.025 pu and 1.05 pu and results are obtained. The critical loading for constant current load is the maximum and that for constant power load is minimum. The critical loading for constant impedance lies between these two and that for the composite load solely depends on the percentage composition of the three loads.

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AN IMAGE AUTHENTICATION BASED ON DWT DCT AND SVD

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ABSTRACT

Digital watermarking techniques are developed to shield the copyright of multimedia system objects like text, audio, video, etc. during this paper, we tend to propose a replacement digital watermarking formula with grey image supported distinct wavelet remodel (DWT), a pair of dimensions distinct cosine transform (DCT) and singular worth decomposition (SVD) for robust watermarking of digital pictures so as to shield digital media copyright expeditiously. One among the key blessings of the proposed theme is that the hardiness of the technique on wide set of attacks. Experimental results ensure that the projected scheme provides smart image quality of watermarked pictures. Digital watermarking has become an accepted technology for sanctioning multimedia system protection schemes. Whereas most efforts concentrate on user authentication, recently interest in information authentication to make sure information integrity has been increasing. Existing concepts address primarily image information. Therefore, the theme is in and of itself secures to block based local attacks and retains hi-fi of the watermarked image.

Index Terms: Digital image watermarking, DWT, DCT, PSNR, SVD, Multimedia security.

I. INTRODUCTION

In the gift economic process, the provision of the net and numerous image process tools disclose to a bigger degree, the likelihood of downloading a picture from the Internet, Manipulating it while not the permission of the rightful owner. Embedding watermarks in each signals and pictures will cause distortion in them. Multimedia knowledge manipulation has become additional and additional simple and undetectable by the human hear able and visual system because of technology advances in recent years. While this enables various new applications and usually makes it convenient to figure with image, audio, or video knowledge, a certain loss of trust in media knowledge is determined.

In general, a successful watermarking scheme should satisfy the following fundamental requirements.

- 1) **Imperceptibility:** the perceptual difference between the watermarked and the original documents should be unnoticeable to the human eye, i.e. watermarks should not interfere with the media being protected.
- 2) **Trustworthiness:** a satisfactory watermarking scheme should also guarantee that it is impossible to generate forged watermarks and should provide trustworthy proof to protect the lawful ownership.
- 3) **Robustness:** an unauthorized person should not be able to destroy the watermark without also making the document useless, i.e., watermarks should be robust to signal processing and intentional attacks. In particular,

after common signal processing operations have been applied to the watermarked image like filtering, re-sampling, cropping, scaling, geometric transformation, rotation, etc., they should still be detectable.

Generally, watermarking can be classified into two groups: spatial domain methods and transform domain methods.

In the spatial domain approaches, the watermark is embedded directly to the constituent locations. Embedding the watermark within the spatial domain is that the direct methodology. It has various blessings like less procedure price, high capability, more sensory activity quality however less sturdy and it principally suits for authentication applications. It has lot of robust, less management of sensory activity quality and principally suits for copyright application. the foremost frequent used strategies area unit discrete cosine transform (DCT) domain , discrete wavelet transform (DWT) domain , singular worth decomposition (SVD) domain. They currently acquire more widespread used as they forever have smart lustiness to common image process. In this paper a DCT DWT SVD primarily based blind watermarking technique has been used for embedding watermark. Moreover, the algorithm is strong to the common image method cherish Filtering, mathematician noise, Rotation and Salt and Pepper.

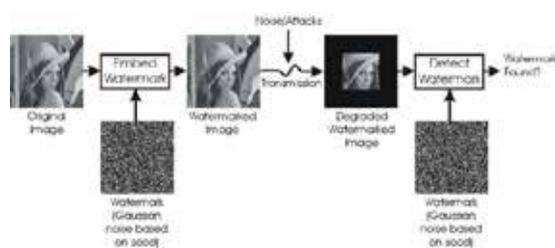


Fig 1. Watermark process

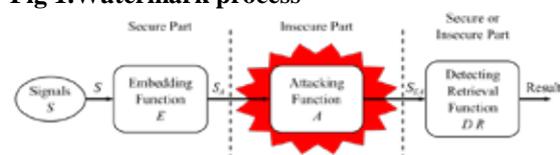


Fig 2. Watermark Lifecycle

II.OVERVIEW

The most frequent used methods are discrete cosine transform (DCT) domain, discrete wavelet transform (DWT) domain, and singular value decomposition (SVD) domain.

2.1 Discrete Wavelet Transform

The basic idea of discrete wavelet transform (DWT) in image process is to multi-differentiated decompose the image into sub-image of different spatial domain and independent frequency district. After the original image has been DWT transformed, the image is decomposed into four sub band images by DWT: three high frequency parts (HL, LH and HH, named detail sub images) and one low frequency part (LL, named approximate sub-image).

| | |
|----|----|
| LL | HL |
| | |



Fig 3. Wavelet decomposition

In Fig. 3, a pair of level ripple rework method of the image is shown, HL, LH, HH square measure the horizontal high frequency, the vertical high frequency and also the diagonal high frequency half severally and LL is that the approximation low frequency half. The energy of the high-frequency half (horizontal, vertical and diagonal part) is a smaller amount, that represent the knowledge of the first image, similar to the feel, edge, etc.

2.2 Separate Circular Function Remodel

The separate operate circular function remodel may be a extremely popular remodel function that transforms a proof from spatial domain to frequency domain and it's been utilized in JPEG commonplace for compression thanks to smart performance. As a true remodel, DCT transforms real information into real spectrum and thus avoids the matter of redundancy. The popular block-based DCT remodel segments a picture non-overlapping block and applies DCT to every block.

2.3 Singular Value Decomposition

It's a factorisation of a true or complicated matrix, with several helpful applications in signal process and statistics. The basic properties of SVD from the perspective of image process applications are: i) the singular values (SVs) of a picture have excellent stability, i.e., once a little perturbation is further to a picture, its SVs don't modification significantly; and ii) SVs represent intrinsic pure mathematics image properties. During this section, we have a tendency to describe a watermark casting and detection theme supported the SVD.

2.4 Image Authentication

Every extracted watermark bit is compared with the embedded one generated by the key. For every group, if the extracted bit doesn't match the embedded one, the entire cluster is taken into account unproved and each group member is marked as associate unproved constant. All the coefficients square measure then mapped back to their original positions within the riffle sub bands by the inverse permutation. The unproved coefficients can willy-nilly scatter over the sub bands. If there's a tampered region in the watermarked image, in each sub band there'll be a region with abundant higher density of unproved coefficients at the situation comparable to the tampered region, as a result of all unproved teams contain one or a lot of coefficients from the tampered region.

III.LITERATURE SURYEY

The digital revolution, the explosion of communication networks, and also the progressively growing passion of the final public for brand spanking new data technologies result in exponential growth of transmission document traffic (image, text, audio, video, etc.). This development is currently therefore necessary that insuring protection and management of the changed knowledge has become a significant issue. Indeed, from their digital nature, transmission documents are often duplicated, modified, remodelled, and subtle terribly simply [1]. During this context, it's necessary to develop systems for copyright protection, protection against duplication, and authentication of content. The aim of watermarking is to incorporate imperceptible data (i.e., imperceptible)

in a very transmission document to confirm an international intelligence agency or just a labelling application [2].

3.1 Notions of Integrity: In the security community, associate degree integrity service is unambiguous outlined jointly, that insures that the sent and received knowledge area unit identical [3].

3.2 Classical examples of malicious manipulations: It is well-known saying that an image is worth a thousand words. Images tend to have more impact on people than text, as it is easier to disregard the content of textual information than to question the origin and authenticity of a photograph [4].

3.3 Generic image authentication system: Various formulations have been proposed by Wu and Liu and Lin and Chang [5]. However, we propose a generic image authentication system. To be effective, a system must satisfy the following criteria:

- **Sensitivity:** the system must be sensitive to malicious manipulations (e.g., modifying the image meaning) such as cropping or altering the image in specific areas.
- **Tolerance:** the system must tolerate some loss of information (originating from loss compression algorithms) and more generally no malicious manipulations (generated, e.g., by multimedia providers or fair users).
- **Localisation of altered regions:** the system should be able to locate precisely any malicious alteration made to the image and verify other areas as authentic.
- **Reconstruction of altered regions:** the system may need the ability to restore, even partially, altered or destroyed regions in order to allow the user to know what the original content of the manipulated areas was.

In addition, some technical features must be taken into account:

- **Storage:** authentication data should be embedded in the image, such as a watermark, rather than in a separate file, as is the case with an external signature .
- **Mode of extraction:** depending on whether authentication data is dependent or not on the image, a full-blind or a semi blind mode of extraction is required.
- **Asymmetrical algorithm:** contrary to classical security services such as copyright protection, an authentication service requires an asymmetrical watermarking (or encryption) algorithm.
- **Visibility:** authentication data should be invisible under normal observation. It is a question of making sure that the visual impact of watermarking is as weak as possible.

IV.EXISTING SYSTEM

The ideal digital watermark is one that is not possible to erase (although within the world this can be troublesome thanks to advancing technology). Further, digital watermarks that square measure invisible shouldn't cause abundant, if any, distortion to a given file or image. Also, "Another, somewhat a lot of appropriate demand is that the proper owner ought to have in his possession a replica of the first image that shouldn't have the other watermark except probably own. With these needs of what's required to make a decent digital watermark, the owner of the file or image can need to decide what sort of computer code is important. For instance, if someone needs to infix associate degree invisible digital watermark on a picture, he/she can need

to decide however robust of a watermark must be imbedded. The stronger the digital watermark, the alot of probability of image distortion.

V. PROPOSED SYSTEM

This section presents the ways for embedding and extraction of hidden information. During this paper a DCT DWT SVD primarily based blind watermarking technique has been used for embedding watermark. We have a tendency to use the DCT DWT SVD for host image and that we choose the centre frequency to implant watermark. The main task of this work has performed into following steps:

5.1 Watermark Embedding

- 1) Apply one-level Haar DWT to decompose the host image A, into four sub-bands i.e. A_{LL} , A_{HL} , A_{LH} , and A_{HH} .
- 2) Consider A_{HL} and is divided into 8×8 square blocks. Perform 2D DCT to each block, collect the DC value of each DCT coefficient matrix $D_1(x, y)$ together to get a new matrix M_1 .
- 3) Now consider A_{LH} and find the Coefficient matrix $D_2(x, y)$ and another new matrix M_2 , same as step 2.
- 4) Apply SVD to M_1 and M_2 , obtain $M_1=U_1S_1V_1T$ and $M_2=U_2S_2V_2T$.
- 5) Let B of size 64×64 to represent the watermark image. Divide the B into two parts: B_1 and B_2 .
- 6) Modify the singular values S_1 and S_2 (in step 5) with B_1 and B_2 respectively and apply SVD to them, $S_1+\alpha B_1=U_1^* S_1^* V_1^{T*}$ and $S_2+\alpha B_2=U_2^* S_2^* V_2^{T*}$
- 7) For the coefficient matrix $D_1(x, y)$ in step 2 and $D_2(x, y)$ in step 3, change each DC value to $M_1^*(x, y)$ and $M_2^*(x, y)$, obtain new coefficient matrix $D_1^*(x, y)$ and $D_2^*(x, y)$ respectively. Apply inverse DCT to each $D_1^*(x, y)$ and $D_2^*(x, y)$ to produce the watermarked middle frequency band A_{HL}^* and A_{LH}^*
- 8) The watermarked image, A_w is obtained by performing the *inverse* DWT using two sets of modified DWT coefficient (A_{HL}^* and A_{LH}^*) and two sets of non-modified DWT coefficient (A_{LL} and A_{HH}).

5.2 Watermark Extraction

- 1) Apply one-level Haar DWT to decompose the Watermarked image (possibly attack) A_w into four sub-bands: A_{LL}^{**} , A_{HL}^{**} , A_{LH}^{**} , and A_{HH} .
- 2) Divide both of A_{HL}^{**} and A_{LH}^{**} into 8×8 square blocks separately, apply DCT to each block. Collect the DC value to get matrix M_1^{**} for A_{HL}^{**} and M_2^{**} for A_{LH}^{**} .
- 3) Apply SVD to M_1^{**} and M_2^{**} , i.e. $M_1^{**}=U_1^{**} S_1^{**} V_1^{T**}$ and $M_2^{**}=U_2^{**} S_2^{**} V_2^{T**}$.
- 4) Compute $C_1=U_1^* S_1^* V_1^{T*}$ and $C_2=U_2^* S_2^* V_2^{T*}$.
- 5) Extract the watermark image from each sub-band, i.e., $B_1^*=(C_1-S_1)/\alpha$ and $B_2^*=(C_2-S_2)$.
- 6) We get the watermark image by combining the results of step 5: $B^*=B_1^*+B_2^*$.

VI. SIMULATION AND ANALYSIS

In order to testing the hardiness of the projected rule, substantial testing is performed. Within the simulation, we tend to check totally different manipulations on the four well-known and normal grey scales image that are "Lena". The initial pictures (host image) are shown in Fig.4 (a), and therefore the watermarked are shown in

Fig. 4(b) severally. The watermark, as shown in Fig. 5(a), is employed in our simulation. Simulation results show that the standard of watermarked image is promising. To check and verify the hardiness of our watermarking rule, the watermarked image is attacked by mathematician Noise, Filtering, Rotation and Salt and Pepper. These are shown in Fig.4. Perceptual quality of the watermarked image is measured by scheming PSNR between host and watermarked image, at the receiver facet, watermark is extracted from the Watermarked image. The PSNR price is calculated at totally different gain issue, once the gain issue price is to be high the PSNR price of the image will increase (Shown in Table I).

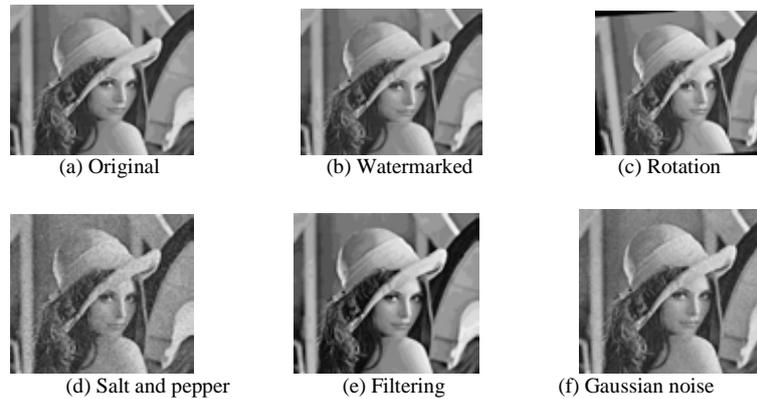


Fig 4: Greyscale image "Lena".

TABLE I: DIFFERENT VALUE OF PSNR FOR DIFFERENT IMAGES

| Image | PSNR (in dB) |
|--------------|---------------------|
| Lena | 51.318 |
| Baboon | 51.209 |
| Opera | 51.193 |
| Boat | 50.998 |

VII. CONCLUSION

In this paper, a unique watermarking technique supported DWT-DCT-SVD is projected. This novel technique offers eminent results scrutiny to ways victimisation totally different cowl pictures. Results show that the new technique is incredibly strong against totally different attacks like mathematician Noise, Salt and Pepper, filtering and Rotation. Therefore, the projected algorithmic program could be a smart technique for authentication of image materials.

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MOO₃- IN₂O₃ BINARY OXIDE THIN FILM DEPOSITION FOR TCO APPLICATION IN SOLAR CELL

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ABSTRACT

Transparent conducting binary MoO₃-In₂O₃ as-deposited and annealed thin films, well suited for window layers were fabricated by employing a simple and inexpensive spray pyrolysis technique using perfume atomizer. The effect of Mo concentration (0.2-3 at. %) on the structural, morphological, optical and photoluminescence properties of the binary oxide thin films have been investigated. XRD reveals that the films are polycrystalline with cubic bixbyite structure. An average visible optical transmission of 97% obtained and is well extended in NIR region. A wide optical band gap (for as-deposited-2.84 eV, annealed-3.61 eV) makes the film suitable for solar cell applications. The scanning electron microscope (SEM) measurements show that the surface morphology of the film changes with Mo concentration and AFM ascertains the surface roughness.

Keywords: MoO₃-In₂O₃ binary films, Optical properties, Perfume atomizer, Solar cell, TCO.

I. INTRODUCTION

In recent years, the research on the development of novel transparent conducting oxides (TCO) has been intensified due to their potential applicability in areas like flat panel displays, smart windows, organic LEDs and Solar photovoltaics [1]. Therefore, research in this direction is strongly accelerated by the rapidly rising demand for enlargement in display size and extension of transmission from the visible to NIR region. For instance, the solar cells having wide-range spectral sensitivity suffer from optical loss in the NIR region due to free carrier absorption (α) in the conventional TCO electrodes such as Sn doped In₂O₃ (ITO), F doped SnO₂ and Al- or Ga-doped ZnO films [2]. This urged the photovoltaic research for developing visible to NIR transparent TCOs for its usage in optoelectronics devices such as multifunction Si or CuIn_{1-x} GaSe₂, while organic and die sensitized solar cells involve the usage of visible to NIR solar energy [3-5]. Hence, motivated by recent demands, the preparation of the simplified spray deposited MoO₃-In₂O₃ films with low optical absorption and longer wavelength transparency as a function of Mo doping concentration has been considered and their related results are presented. A simple and elegant technique employing a perfume atomizer has been chosen to deposit MoO₃- In₂O₃ films and to the best of our knowledge, the study of MoO₃- In₂O₃ thin films using a cost-effective simplified spray pyrolysis [6] has not yet reported.

II. EXPERIMENTAL DETAIL

The Indium III chloride (InCl₃) was used as the source for indium, whereas the molybdenum concentration was achieved using Molybdenum Penta chloride (MoCl₅). Microscopic glass plates (25×25×1.2mm³) cleaned with

acetone were used as substrate. The substrate temperature was fixed at 400 °C and InCl_3 [0.1 at. %] was dissolved in 2ml of concentrated HCl acid by heating at 90 °C for 10 min. The resultant transparent solution diluted with methanol formed the starting solution. For molybdenum oxide, the required amount of MoCl_5 was dissolved in double distilled water, which was then added to the starting solution to make up the final spray solution. The as deposited Molybdenum and indium oxide samples were then annealed at 600 °C for 30 min in vacuum chamber to investigate the annealing effect.

The X-ray diffraction (XRD) patterns were obtained using the computer controlled Phillips x'pert PRO XRD system ($\text{CuK}\alpha$ radiation; $\lambda=1.5405 \text{ \AA}$) in Bragg-Brentano geometry ($\theta/2\theta$ coupled). The Joint Committee on Powder Diffraction Standards (JCPDS) database from the International Centre for Diffraction Data (ICDD) was utilized for the identification of crystalline phases. The transmission data were observed in the range of 300-1100 nm using ultraviolet visible near infrared double beam spectrophotometer (Perkin Elmer). The surface morphology was recorded by employing scanning electron microscope (HITACHI S-3000H). Atomic force microscopic images were obtained using AFM Explorer (ThermoMicroscopes, Sunnyvale, CA, USA) and these were then analyzed to estimate the relative surface roughness.

III. RESULT AND DISCUSSION

3.1 XRD Analysis

$\text{MoO}_3\text{-In}_2\text{O}_3$ binary thin films prepared for different cationic ratios were characterized using XRD in order to get the information about the crystallographic evolution of spinel structure and orientation of crystallites. The XRD patterns of as-deposited and annealed $\text{MoO}_3\text{-In}_2\text{O}_3$ binary films are shown in Fig. 1(a) and (b). The samples of as-deposited $\text{MoO}_3\text{-In}_2\text{O}_3$ binary films at different concentration with constant temperature 400 °C are labeled as MI1, MI2, and MI3. The films prepared for the cationic ratio-0.2 at. % contains both In_2O_3 and MoO_3 phases and exhibited peaks at $2\theta=12.76^\circ, 23.39^\circ, 25.67^\circ, 27.34^\circ$ and 38.9° respectively for (0 1 1), (2 2 0), (6 0 2), (6 1 2) and (0 4 1) planes that correspond to molybdenum oxide phases(Fig. 1(a)). Although (0 2 0), (1 2 1) and (1 2 9) planes are similar to indium oxide phase, no change was observed in In_2O_3 and MoO_3 phases and also in diffraction planes even when the cationic ratios were increased to 0.25 and 0.3 at. %. The peak position of In, MoO_3 phases were compared with the standard card [97-064-4063]. The planes of $\text{MoO}_3\text{-In}_2\text{O}_3$ films coincide well with the JCPDS data [04-010-8422]. The intensity of diffraction peak has increased as the concentration level increased from 0.25 to 0.3 at. %. XRD patterns of as-deposited (Fig. 1(a)) $\text{MoO}_3\text{-In}_2\text{O}_3$ shows the presence of diffraction planes, which are not reported in earlier work [7-11].

The samples of as-deposited $\text{MoO}_3\text{-In}_2\text{O}_3$ binary films annealed at 600 °C for 30 min are labeled as MIa1, MIa2 and MIa3 respectively to investigate the annealing effect. The annealed film prepared with 0.3 at. % contains both In_2O_3 and MoO_3 phases(Fig. 1(b)). In (0 1 1), (2 2 0), (6 0 2), (6 1 2) and (0 4 1), all these planes are coherent to molybdenum oxide phases. The planes (0 2 0), (1 2 9) and (6 4 0) are in indium oxide phase, and the same diffraction patterns and phases appeared even in 0.2 and 0.25 at. %. In 0.25 at. % one more plane (0 4 4) is found to be in indium oxide phases. At 0.2 at. % there are four more peaks, with (2 1 1) and (8 0 4) in indium oxide phase, remaining two planes (1 1 7), (2 2 3) in molybdenum oxide phase as shown in Fig. 1(b). The annealed binary films were oriented along (0 1 1), (6 1 2) and (6 0 2) planes in which (0 1 1) orientation is found to be more predominant. According to the literature, as the dopant occupies interstitial sites of the respective ion, there is a change in the intensity of preferred orientation. However, the dopant occupies

additional interstitial sites which are unoccupied and more intense preferred growth takes place as reported by Agashe et al. [12].

In the present study, it seems that Mo replaces indium at its regular lattice sites upto 0.3 at. % of the Mo doping level. At higher Mo doping level, perhaps the Mo incorporated on additional interstitial sites results (0 1 1) plane which is more prominent in the films. The foregoing discussions lead to the comparison of as-deposited and annealed films. The diffraction peaks of annealed films are sharp and it shows better crystalline behavior than as-deposited films which is shown in Fig. 1(b). The particle size was evaluated using the full width half maximum (FWHM) data according to the Scherrer formulae [13].

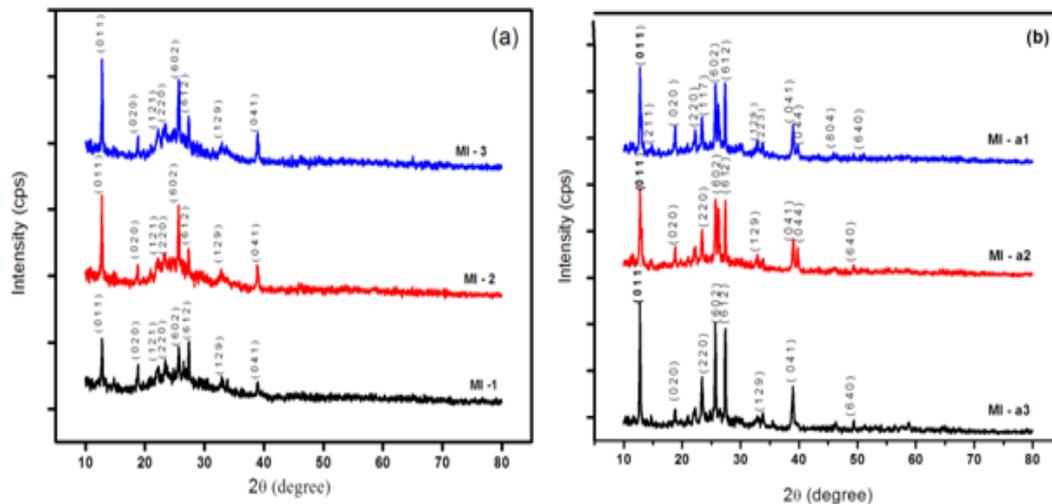


Fig. 1. XRD patterns of (a) as-deposited and (b) annealed $\text{MoO}_3\text{-In}_2\text{O}_3$ binary thin films.

The FWHM (in radians) is inversely proportional to the particle size and is related to the degree of crystalline in polycrystalline thin films [13]. The FWHM values decrease initially upto 350 nm thickness as shown in Fig 2. (a). The increase in grain size can be attributed to the improved crystallinity. As the degree of crystallinity of annealed films are better than as-deposited films, FWHM reaches film thickness of 812 nm [14] and is shown in Fig. 2(b). According to Liu et al.[15], the reason for the improvement in crystallinity is due to the increased ability of the atoms to move towards stable sites in the lattice. The lack of any peak shifting also supports this since incorporation of atoms into interstitial sites should result in some change in the overall lattice parameters of the polycrystalline structure.

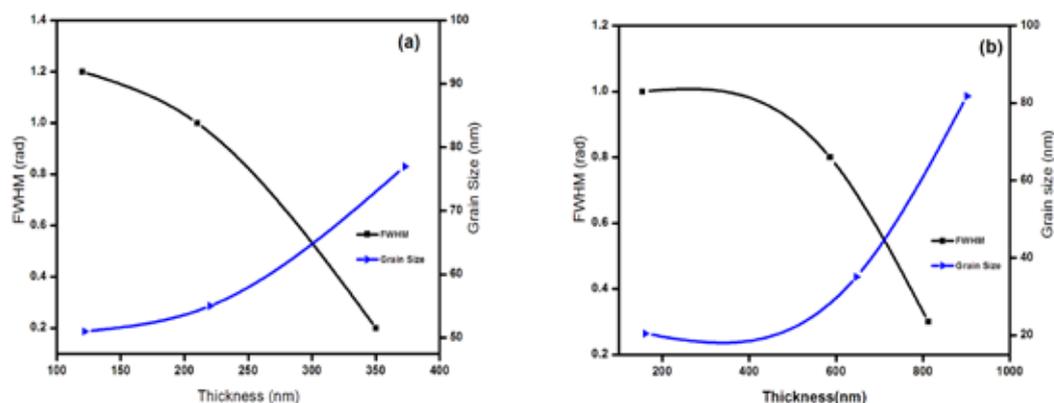


Fig. 2. Variation of FWHM and grain size as a function of thickness shown for (a) as-deposited and (b) annealed $\text{MoO}_3\text{-In}_2\text{O}_3$ binary films.

3.2 UV-Visible Spectra

The transmission spectra of as-deposited and annealed MoO₃-In₂O₃ binary thin films recorded in the wavelength range of 300-1100 nm is shown in Fig 3. (a) and (b). It is observed that as-deposited MoO₃-In₂O₃ films acquired transmittance ~51-79% in the visible region. A maximum average visible transmittance (AVT) of ~86% is observed at 800 nm for the films doped with 0.3 at. % and moderately higher transmittance 69-90% in the visible-infrared region and is depicted in Fig. 3(a). The transmittance is significantly increased upon annealing the MoO₃-In₂O₃ films at 600 °C for 30 min. It is observed that the annealed MIO films have obtained transmittance 65-84% in the UV-Visible region and the maximum average visible transmittance (AVT) of 86% is observed at 675 nm and moderately higher transmittance 75-97% is obtained in the visible infrared region as shown in Fig. 3(b). The transparency of both as-deposited and annealed MoO₃-In₂O₃ binary thin films extends well into near-IR range. So, it is clear that all the samples have very high transmittance in the wavelength region ≥ 1000 nm. From the results of optical analysis, it is shown that the transmission rate is higher in the NIR region (97%), which is a better result obtained from our investigation as it has not yet been reported in earlier works [6- 10]. The optical band gap (E_g) is estimated from the plot of (αhν)² Vs (hν). A value of 2.84 eV is obtained for as-deposited films while the band gap value got increased to 3.61 eV for annealed films. Hence, the wide band gap and highest transmittance of MoO₃-In₂O₃ binary films fabricated by simplified spray technique, make these films possible candidate for window layer of solar cells and also in optoelectronic and solar cell applications.

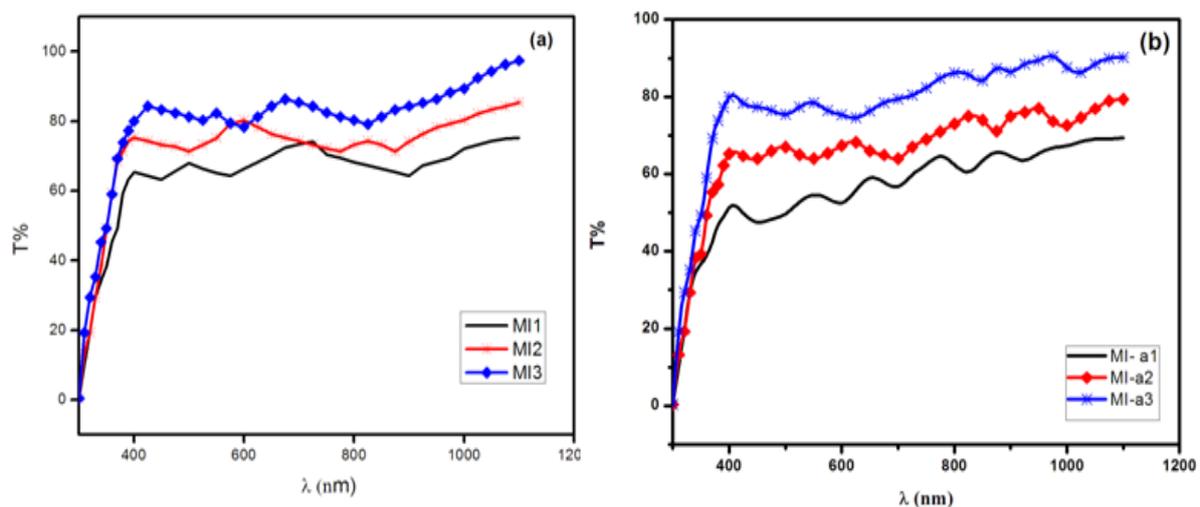


Fig. 3. Variation of transmittance (T %) with wavelength λ (nm) of MoO₃-In₂O₃ binary thin films for: (a) as- deposited and (b) annealed at 600 °C for 30 min.

3.3 Surface Morphological Studies

3.3.1 AFM Studies

Surface morphology of the as-deposited and annealed MoO₃-In₂O₃ binary thin films were investigated using AFM technique. The AFM measurements have been performed on all films with scan area of 5μm×5μm. Fig. 4(a) and (b) show the three dimensional surface morphology of as-deposited and post annealed films respectively. The roughness of the film surfaces were calculated for all films and are found to influence by the use of precursor. AFM images of the as-deposited films reveal a discontinuous grain growth (Fig. 4(a)), while in annealed films the surface diffusion was activated and the surface morphology improves with distinct visible grain boundaries (Fig. 4(b)). This observation of enhanced crystalline nature is in good agreement with the XRD

measurements(Fig. 1(b)). The as-deposited film exhibits the lowest roughness of about 12.786 nm, while the annealed film has highest roughness of 22.293 nm. Therefore, the annealed film has large size particles with roughness about 33.680 nm. The increase in the roughness of the films might be due to the re-arrangement of polycrystalline structure in grains with larger size [16], which is also indicated in XRD measurements. The calculated particle size from AFM measurements is higher than the values calculated from XRD studies indicating that these particles are probably an aggregation of small crystallites on the surface of the films.

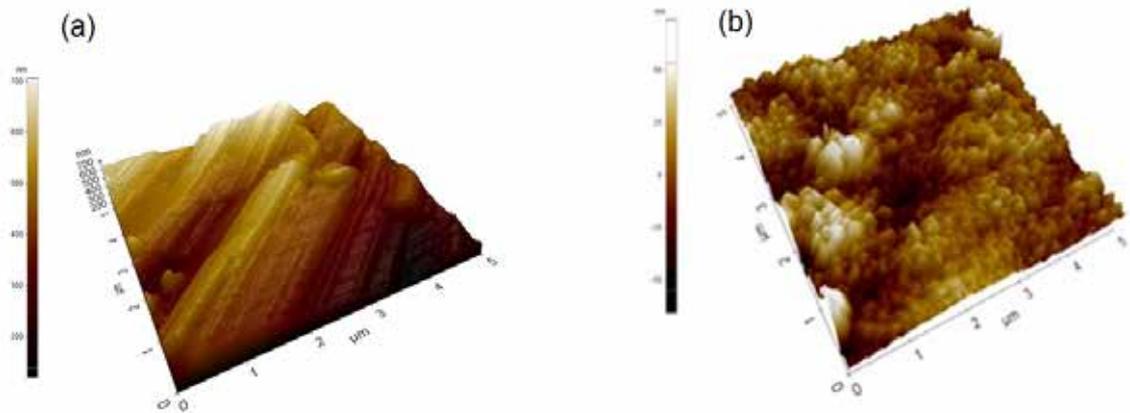


Fig. 4. AFM images of (a) as-deposited and (b) annealed $\text{MoO}_3\text{-In}_2\text{O}_3$ binary thin films

3.3.2 SEM studies

To probe the effect of the morphological properties of as-deposited and annealed $\text{MoO}_3\text{-In}_2\text{O}_3$ binary thin films, SEM studies are carried out. From these microscopic images Fig. 5(a) and (b), it is evident that there is small difference found from the films grown on as-deposited and annealed samples. It can be seen that the surface morphology of the films strongly depends on the concentration of the starting materials. The microstructure of the films consisted of many spherical grains distributed throughout the surface. The grain size of films of as-deposited was larger than that of the annealed film. However, the grain size became smaller with increased concentration because the grain growth was suppressed by the compression stresses generated due to the difference in the ionic radii of indium and molybdenum [17].

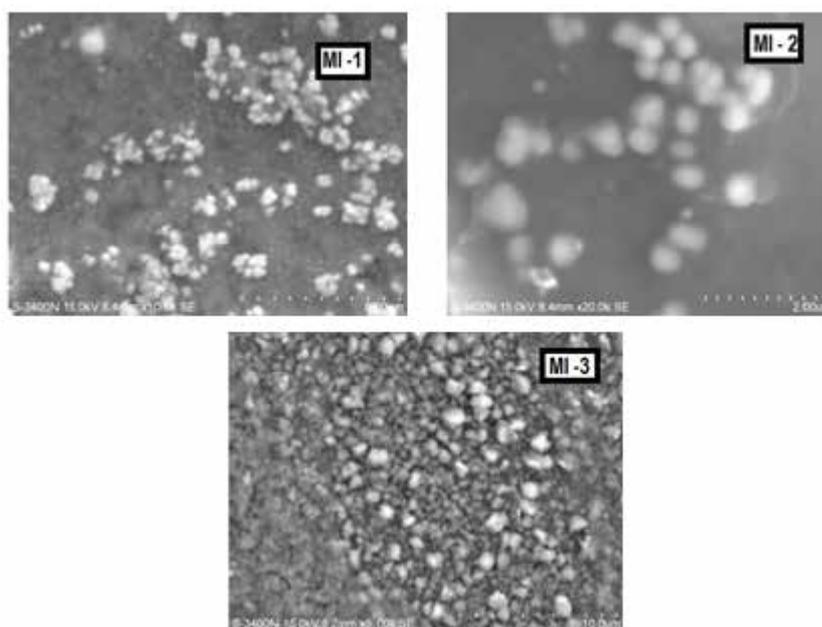


Fig. 5(a). SEM images of as-deposited $\text{MoO}_3\text{-In}_2\text{O}_3$ binary thin films.

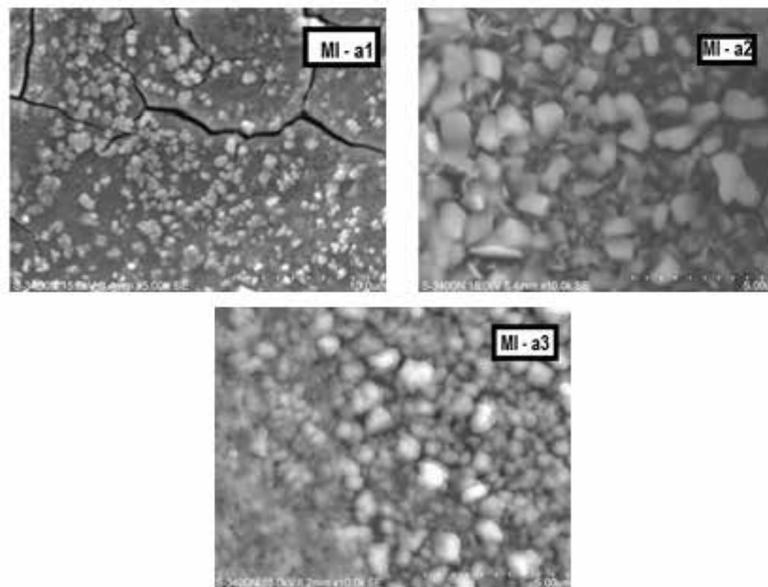


Fig. 5(b). SEM images of annealed MoO₃-In₂O₃ binary thin films.

IV. CONCLUSION

MoO₃-In₂O₃ binary films with good structural, surface morphological and optical properties, suitable for solar cell applications were obtained using an inexpensive, simplified spray pyrolysis technique using perfume atomizer. The XRD studies confirm the polycrystalline nature of In₂O₃ films with cubic bixbyite structure and the presence of Mo or MoO₃. The average NIR transmission is found to be 97% in the wavelength ranging between 1000 and 1100nm and gets increase with increase in concentration. The range of optical transmission and optical band gap (for as-deposited-2.84 eV, annealed-3.61 eV) in these films suggests that the deposited film will be useful in enhancing the performance of optoelectronic device such as TCO application in thin film solar cells. The SEM measurement showed that, upon increasing the concentration, the surface morphology of the films becomes uniform and grains are distributed uniformly throughout the surface. AFM pictures show the porous nature of the films of samples MI3 and MIa3, which make them suitable for gas sensing. The increased thermal energy and larger mobility acquired by the grains during annealing show different surface morphologies. This technique attracts massive production of low-cost, large area MoO₃-In₂O₃ binary thin films for solar cell applications.

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DEVELOPMENT OF IMMERSION CORROSION TEST RIG TO STUDY EFFECT OF HIGH TEMPERATURE AND VELOCITY WATER ON CORROSION RATE OF AL-MG-SI ALLOY

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ABSTRACT

This work is focused to measure the effect of temperature, time, pH and flow rate of water on the corrosion rate of Al-Mg-Si alloy. Although these alloys show good corrosion resistance, they are more prone to pitting corrosion. Standard practice for laboratory immersion corrosion testing of metals as per ASTM G 31-72 standard is useful for pitting corrosion test. But it does not consider effect of temperature, pH and flow rate of water on corrosion rate of specimen under consideration. Hence by considering these parameters changes in the original design as given in standard practice are carried out such that chances of crevice corrosion are also minimized. To study the effect of variation in temperature and velocity of the environment, magnetic heater stirrer device is used. Results of this test are useful to find the relation of individual parameter or combination of parameters with corrosion rate of specimen in various working environments.

Keywords: Al-Mg-Si alloys, Corrosion Test, Flow Rate, Pitting corrosion, Temperature.

I. INTRODUCTION

Corrosion is the primary means by which metals deteriorate due to their chemical reaction with environment. No metal surface or metal-alloy component is totally immune to corrosion issues. Almost any aqueous environment can promote corrosion, which occurs under numerous complex conditions. When metal comes in contact with aqueous environment, corrosion becomes life limiting factor. Aluminum alloys are widely used in different industry field owing to their excellent corrosion resistance to the barrier oxide film strongly bonded to the surface. Their tendency to corrosion in the presence of halide ions limits their applications especially in sea water and atmosphere condition. As a general rule, aluminum is resistant to water solutions in the pH range of 4.5 to 8.5[1]. Alloying elements such as Zn, Cu, Mg, and Si added to aluminum to improved mechanical properties but they reduce localized corrosion resistance [2]. All aluminum alloys are attacked by water with high pH. Water containing heavy metal ions such as copper, lead, tin and nickel will lead to pitting [1]. Aluminum alloys of 5XXX and 6XXX series show good corrosion resistance, but exhibit more pitting corrosion [3]. For a particular metal; test rig according to ASTM G31-72 standard considers variation in time and weight loss to calculate corrosion rate [4]. However; along with these parameters Corrosion rate of material also depends on flow characteristics, temperature, concentration and aeration of fluid [1]. Hence it is necessary to

find relation of these parameters with corrosion rate of metal. In case of storage tanks, since the water inside is steady, simple immersion corrosion test is sufficient. However, In case of devices having motion of fluid like containers, agitators etc. fluid is unsteady and will cause change in corrosion rate of metal. Hence to study corrosion rate under these circumstances modifications in basic test rig given in ASTM G31-72 standard are done. The present apparatus is developed to study the effect of temperature, flow rate and pH of water on corrosion rate of metal in contact.

II. EXPERIMENTAL

Experimental set up is developed to study the effect of temperature and flow rate of water on corrosion rate. Standard set-up for immersion corrosion test is given in ASTM G 31-72 standard which gives the relation between corrosion rate of metal and time of exposure of metal in corrosive media by considering the mass loss during test. However modifications in the standard test rig are done to find relation between temperature, pH and flow rate of corrodent and corrosion rate of particular metal. Also with this set-up it is possible to find the combined effect of above mentioned parameters on the corrosion rate of metal.

2.1 Sample Preparation

We have taken an artificially aged Al-Mg-Si alloy AA6082 for sample experimentation. For the experiment specimen of (03*25*50) mm dimensions is selected. Sample is to be fabricated using 3mm thick sheet of required metal. For both tests the sheet of 25*50 mm² are required. Pieces should be cut out from sheet. These pieces should be cleaned, dried and stored in air tight bag to avoid adverse effect of dust and atmosphere.

2.2 Experimental Set-Up

The plate is kept vertical on the seats inside the bicker, as shown in fig. 01. Flow in tank is simulated with a glass bicker. Glass bicker of 2 liter capacity is used to conduct experiment. 3 seats are made inside glass bicker by using acrylic.

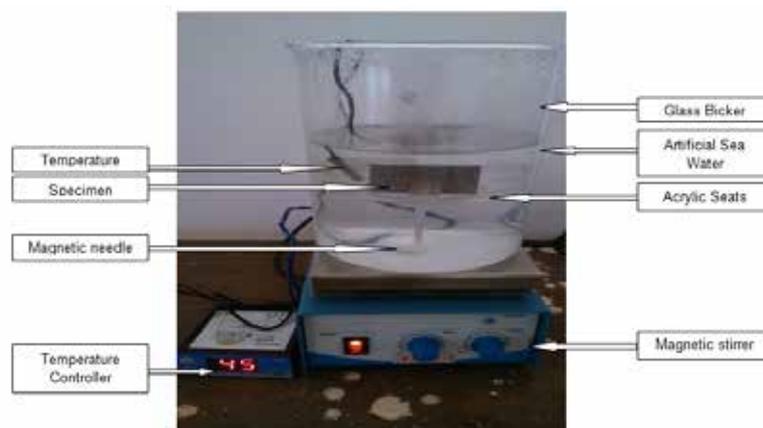


Fig. 01: Test Rig For Flow Of Water Through Tank

To obtain effect of flow and to facilitate rotation of needle, the seats are placed at a certain height from base. Magnetic needle of 24 mm length and 9 mm diameter is kept at the bottom of bicker to achieve desired flow rate by stirring action. The bicker is kept closed to prevent water from evaporation and contamination. Provisions are made on top surface to insert pH meter and temperature switch. A magnetic stirrer heater device is placed below bicker to obtain heating and stirring action simultaneously. Temperature switch is used to maintain desired

temperature, and it is coupled with heater knob of magnetic stirrer heater. Manual as well as automatic control is provided to obtain and/or change desired heating rate. For testing the specimen at high pH value artificial sea water is prepared according to standard procedure [5]. Gravimetric salts used for preparation of water are shown in Table 01. pH of the prepared sea water was maintained at 8.33.

Table 01: Formula for 1 kg of 35.00% artificial sea water

| Salt | Molecular Weight | gm/Kg of Solution |
|---------------------------------|------------------|-------------------|
| NaCl | 58.44 | 23.926 |
| Na ₂ SO ₄ | 142.04 | 4.008 |
| KCl | 74.56 | 0.677 |
| NaHCO ₃ | 84.00 | 0.196 |
| KBr | 119.01 | 0.098 |
| H ₃ BO ₃ | 61.83 | 0.026 |
| NaF | 81.99 | 0.003 |

2.3 Experimental Procedure

Specimen is cleaned with acetone and its initial weight is measured. Specimen is then fixed on seats provided in bicker. Bicker is filled, with water of measured pH value, such that specimen should get completely immersed in water. Temperature probe is immersed in water. To avoid evaporation as well as contamination of water bicker is closed with top cover. Temperature is set to desired value in temperature switch and heating rate is adjusted with knob manually. Rotations of needle are set to desired value by adjusting stirring knob. After immersion for desired time period specimen is removed from bicker and cleaned with acetone to measure final weight. Difference between initial and final weight will give weight loss. By taking temperature, pH value, flow rate and time as variables; number of experiments can be performed to check effect of a particular parameter on corrosion rate. For testing we have taken temperature and flow rate as variables. Test is carried out at 4 different temperature conditions by varying water temperature viz. 30°C, 37°C, 44°C, 50°C Corrosion. Test was carried out for 72 hrs at a constant water temperature on 3 Specimens simultaneously. For checking the effect of flow rate of water on corrosion rate of specimen two sets of test were performed one at NO flow condition and other at 120rpm.

III. RESULT AND DISCUSSION

Corrosion rate test data is tabulated in table 02. Corrosion rate in table 02 is calculated from weight loss according to ASTM standard equation,

$$C.R. = \frac{8.76 \times 10^{-4} \times W}{A \times T \times D}$$

Where, T is the time of exposure in hours, A is the area in cm², W is the mass loss in grams, D is the density in gm/cm³.

Table 02: Effect Of Water Temperature On Corrosion Rate Of 6082-T6 Aluminum Alloy Precipitation Hardened At 520°C

| Temperature | pH | Flow rate (RPM) | Initial weight (gms) | Final Weight (gms) | Weight Loss (gms) | Corrosion Rate (mm/year) |
|-------------|------|-----------------|----------------------|--------------------|-------------------|--------------------------|
| 30 | 8.33 | 0 | 10.0674 | 10.0659 | 0.0015 | 0.054 |
| | | 90 | 10.0982 | 10.0962 | 0.0020 | 0.072 |
| 37 | 8.33 | 0 | 10.085 | 10.0806 | 0.0044 | 0.158 |
| | | 90 | 10.0590 | 10.051 | 0.0080 | 0.288 |
| 44 | 8.33 | 0 | 10.0120 | 10.0118 | 0.0122 | 0.438 |
| | | 90 | 09.9484 | 09.9284 | 0.0200 | 0.720 |
| 50 | 8.33 | 0 | 10.0910 | 10.0851 | 0.0059 | 0.214 |
| | | 90 | 10.0920 | 10.0841 | 0.0079 | 0.263 |

Fig. 02 gives the graph of Corrosion rate (mm/year) versus water Temperature ($^{\circ}\text{C}$) for two different flow rates of water. Corrosion rate increases nonlinearly with increase in temperature up to 44°C and then drops down. For corrosion systems, increasing the temperature increases rate of oxidation reaction. However oxide film formation results into passivity which is responsible for decreasing the corrosion rate on further increasing the temperature.

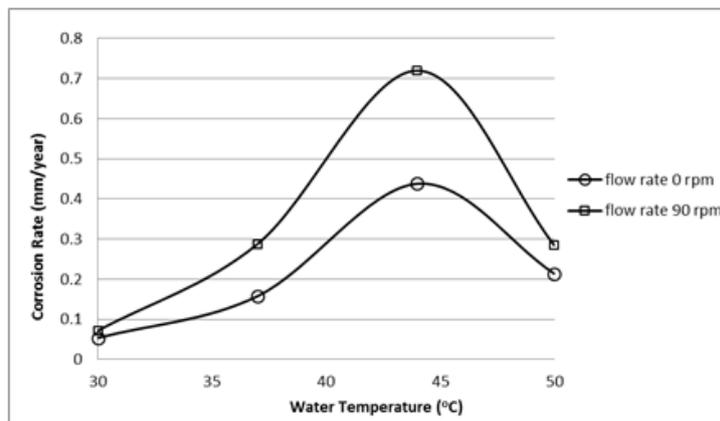


Fig. 02: Graph Of Corrosion Rate Versus Water Temperature For Precipitation Hardened 6082-T6 Al Alloy In Water Of Flow Rate 0 Rpm And 90 Rpm

Increasing the flow rate of corrodent causes increase in the rate of corrosion. Increasing the flow rate increases corrodent velocity and since mechanical action of high corrodent velocity removes passive layer; corrosion rate increases. Concentration of corrodent has strong effect on corrosion rate of metal, but not always in the direction perceived [1]. Hence more results should be obtained by varying temperature, flow rate and pH of water to obtain combined and/or individual effect of them on corrosion rate.

IV. CONCLUSION

The result of the current study leads to the following conclusions:

Corrosion rate increases at first with increasing temperature, but decreases afterwards due to passive film formation on the surface of metal.

With increasing flow rate new surface is always exposed to corrodent due to removal of ; hence increasing flow rate increases corrosion rate.

Test rig is useful to find combined or individual relation of flow rate, pH and temperature of corrodent with corrosion rate of metal.

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A STUDY ON QUALITY OF WORK LIFE AMONG EMPLOYEES WITH REFERENCE TO MANUFACTURING SECTORS

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ABSTRACT

After Industrial Revolution, the importance of human factor reduced because of the vast mechanization. Various problems like job dissatisfaction, boredom, absenteeism, lack of commitment etc came up. It is nothing but having a work environment where employee activities become more important. This means implementing procedures or policies that make the work less routine and more rewarding for the employee. These procedures or policies include autonomy, recognition, belongingness, development and external rewards. Through Q.W.L, people involved get a sense of satisfaction in their work. Work then becomes not a burden but a means by which the abilities of a person can find expression. QWL is just humanizing the work.

As people develop themselves in new directions, new problems and issues arise, requiring them to develop new competencies to meet the changing requirements, aspirations and problems. The world has progressed in many unique ways and directions in the last three decades. It has developed technologically, economically and industrially. It is also richer in terms of human capabilities, facilities and quality of living. During this research, 14 key factors have been chosen, which are influencing QWL in current scenarios. This paper is basically analyzing about work culture and personal life in the manufacturing sectors. Research is limited to Chennai area and sample size is 100 employees.

Keywords: *Organizations, Human Capabilities, Environment, Quality Of Living, Manufacturing*

I. INTRODUCTION

1.1 Quality of Work Life

Historically, work has occupied an important place in the life of human beings. How people have thought and felt about the working experience has also been an age old concern for both workers and managers. The term quality of work life (QWL) was probably coined originally at the first international conference on QWL at Arden House in 1972 (Davis &Cherns, 1975). Mills (1978) probably coined the term quality of work life and suggested that it had moved permanently into the vocabulary of unions and management, even if a lot of the people using it were not exactly sure what territory it covered. During the twentieth century, our social science conceptualizations regarding work have been labeled scientific management, human relations, socio-technical systems theory, and now possibly holistic learning organizations. Cherns (1978) argued that:

QWL owes its origins to the marriage of the structural, systems perspective of organizational behavior with the interpersonal, human relations, and supervisory-style perspective.

1.2 Factors Affecting Quality of Work Life

14 key factors affect the quality of work life. These factors are:

1. Fair and reasonable pay compared to others doing similar work.
2. Concern over losing one's job in the next months and years.
3. Sexual harassment or discrimination at the workplace.
4. Interesting and satisfying work.
5. Trust in senior management.
6. People at the workplace wish to get on together.
7. Recognition of efforts by intermediate manager/supervisor
8. Career prospects
9. Amount of control over the way in which work is done.
10. Health and safety standards at work.
11. Balance between the time spent at work and the time spent with family and friends.
12. Intermediate manager/supervisor's treatment of staff.
13. Amount of work to be done.
14. Level of stress experienced at work.

A happy and healthy employee will give better productivity, make good decisions and positively contribute to the organizational goal. An assured good quality of work life will not only attract young and new talent but also retain the existing experienced talent.

1.3 Review Of Literature

Hackman and Oldham (1976) (5) drew attention to what they described as psychological growth needs as relevant to the consideration of Quality of working life. Several such needs were identified; Skill variety, Task Identity, Task significance, Autonomy and Feedback. They suggested that such needs have to be addressed if employees are to experience high quality of working life.

Taylor (1979) (6) more pragmatically identified the essential components of Quality of working life as; basic extrinsic job factors of wages, hours and working conditions, and the intrinsic job notions of the nature of the work itself. He suggested that a number of other aspects could be added, including; individual power, employee participation in the management, fairness and equity, social support, use of one's present skills, self development, a meaningful future at work, social relevance of the work or product, effect on extra work activities. Taylor suggested that relevant Quality of working life concepts may vary according to organization and employee group.

Warr and colleagues (1979) (7), in an investigation of Quality of working life, considered a range of apparently relevant factors, including work involvement, intrinsic job motivation, higher order need strength, perceived intrinsic job characteristics, job satisfaction, life satisfaction, happiness and self-rated anxiety. They discussed a range of correlations derived from their work, such as those between work involvement and job satisfaction, intrinsic job motivation and job satisfaction, and perceived intrinsic job characteristics and job satisfaction.

Mirvis and Lawler (1984) (8) suggested that Quality of working life was associated with satisfaction with wages, hours and working conditions, describing the “basic elements of a good quality of work life” as; safe work environment, equitable wages, equal employment opportunities and opportunities for advancement.

Baba and Jamal (1991) (9) listed what they described as typical indicators of quality of working life, including: job satisfaction, job involvement, work role ambiguity, work role conflict, work role overload, job stress, organizational commitment and turn-over intentions. Baba and Jamal also explored reutilization of job content, suggesting that this facet should be investigated as part of the concept of quality of working life.

Ellis and Pompli (2002) (10) identified a number of factors contributing to job dissatisfaction and quality of working life in nurses, including: Poor working environments, Resident aggression, Workload, Unable to deliver quality of care preferred, Balance of work and family, Shift work, Lack of involvement in decision making, Professional isolation, Lack of recognition, Poor relationships with supervisor/peers, Role conflict, Lack of opportunity to learn new skills.

Sirgy et al.: (2001) (11) suggested that the key factors in quality of working life are: Need satisfaction based on job requirements, Need satisfaction based on Work environment, Need satisfaction based on Supervisory behavior, Need satisfaction based on Ancillary programmes, Organizational commitment. They defined quality of working life as satisfaction of these key needs through resources, activities, and outcomes stemming from participation in the workplace. Maslow’s needs were seen as relevant in underpinning this model, covering Health & safety, Economic and family, Social, Esteem, Actualization, Knowledge and Aesthetics, although the relevance of non-work aspects is play down as attention is focused on quality of work life rather than the broader concept of quality of life.

Bear field, (2003) (12) used 16 questions to examine quality of working life, and distinguished between causes of dissatisfaction in professionals, intermediate clerical, sales and service workers, indicating that different concerns might have to be addressed for different groups. The distinction made between job satisfaction and dissatisfaction in quality of working life reflects the influence of job satisfaction theories.

Herzberg et al. (1959) (13) used “Hygiene factors” and “Motivator factors” to distinguish between the separate causes of job satisfaction and job dissatisfaction. It has been suggested that Motivator factors are intrinsic to the job that is job content, the work itself, responsibility and advancement. The Hygiene factors or dissatisfaction-avoidance factors include aspects of the job environment such as interpersonal relationships, salary, working conditions and security. Of these latter, the most common cause of job dissatisfaction can be company policy and administration, whilst achievement can be the greatest source of extreme satisfaction. An individual’s experience of satisfaction or dissatisfaction can be substantially rooted in their perception, rather than simply reflecting their “real world”. Further, an individual’s perception can be affected by relative comparison – am I paid as much as that person - and comparisons of internalized ideals, aspirations, and expectations, for example, with the individual’s current state

Sirgy, Efraty, Siegel & Lee, 2001 (11) and **Warr, Cook & Wall** (1979) (7). It has generally been agreed however that Quality of Working Life is conceptually similar to well-being of employees but differs from job satisfaction which solely represents the workplace domain.

Lawler, (1982) (15) Quality of Working Life is not a unitary concept, but has been seen as incorporating a hierarchy of perspectives that not only include work-based factors such as job satisfaction, satisfaction with pay and relationships with work colleagues, but also factors that broadly reflect life satisfaction and general feelings of well-being.

Danna & Griffin, (1999) (16) More recently, work-related stress and the relationship between work and non-work life domains. **Loscocco&Roschelle**, (1991)(17) have also been identified as factors that should conceptually be included in Quality of Working Life.

Beukema (1987) describes QWL as the degree to which employees are able to shape their jobs actively, in accordance with their options, interests and needs. It is the degree of power an organization gives to its employees to design their work. This means that the individual employee has the full freedom to design his job functions to meet his personal needs and interests. This definition emphasizes the individual's choice of interest in carrying out the task. However, this definition differs from the former which stresses on the organization that designs the job to meet employees' interest. It is difficult for the organization to fulfill the personal needs and values of each employee. However if the organization provides the appropriate authority to design work activities to the individual employees, then it is highly possible that the work activities can match their employees' needs that contribute to the organizational performance.

Heskett, Sasser and Schlesinger (1997) define QWL as the feelings that employees have towards their jobs, colleagues and organizations that ignite a chain leading to the organizations' growth and profitability. A good feeling towards their job means the employees feel happy doing work which will lead to a productive work environment. This definition provides an insight that the satisfying work environment is considered to provide better QWL.

1.4 Need For The Study

Quality of Work Life is to help people towards achieving the aim of the organization. This study is needed to find out the employee opinion about the Quality of Work Life.

The study was conducted to know the employees perception towards their work environment, the level of job satisfaction of the employees towards the benefits and facilities provided by the organization.

This study is needed to spot out the areas for improvement to the management for modification so that the employees will be provided with the improved working condition which will lead to higher productivity and greater organizational effectiveness.

II. OBJECTIVES OF THE STUDY

Primary objective:

- Ø To gain an insight into the current work policies and practices, as well as work-life balance issues
- Ø To identify the effects of quality of work-life initiatives on employees

Secondary objectives:

- Ø To assess the satisfaction level of employees towards their job

- Ø To come up with strategies to improve quality of work life in organization
- Ø To create a positive attitude in the minds of the employees

III. RESEARCH METHODOLOGY

Research Design: “A research design is the arrangement of conditions for collection and analysis data in a manner that aims to combine relevance to the researcher purpose with economy in procedure”.

Research Type

In this study **Descriptive Research** has been used which involves surveys and fact-findings of different kinds. The major purpose of descriptive research is the description of the state of affairs, as it exists at present. The main characteristics of this method are that the researcher has no control over the variable he can only report what has happened or what is happening.

Sampling Design/Method

The sampling method adopted was **Judgmental Sampling** technique.

- **Tools Used For Analysis:**

Chi-square Method, Correlation Analysis

- **CHI Square Analysis:**

- **NULL Hypothesis:**

Ho: There exists no association between Satisfactory Performance Appraisal and Job Satisfaction.

- **Alternative Hypothesis:**

H₁: There exists an association between Satisfactory Performance Appraisal and Job Satisfaction.

Case Processing Summary

| | Cases | | | | | |
|---|-------|---------|---------|---------|-------|---------|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Satisfactory Performance Appraisal * Satisfied with Job | 132 | 100.0% | 0 | .0% | 132 | 100.0% |

Satisfactory Performance Appraisal * Satisfied with Job Cross tabulation

| | Satisfied with Job | | | | | Total | |
|---|--------------------|----------|---------|-------|----------------|-------|------|
| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree | | |
| Satisfactory Performance Appraisal | Disagree Count | 3 | 15 | 5 | 0 | 0 | 23 |
| | Expected Count | 2.6 | 2.6 | .9 | 5.8 | 11.2 | 23.0 |
| | Agree Count | 12 | 0 | 0 | 33 | 64 | 109 |

| | | | | | | | |
|-------|-------------------|------|------|-----|------|------|-------|
| | Expected Count | 12.4 | 12.4 | 4.1 | 27.3 | 52.8 | 109.0 |
| Total | Count | 15 | 15 | 5 | 33 | 64 | 132 |
| | Expected Count | 15.0 | 15.0 | 5.0 | 33.0 | 64.0 | 132.0 |

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|----------------------|----|-----------------------|
| Pearson Chi-Square | 115.320 ^a | 4 | .000 |
| Likelihood Ratio | 107.101 | 4 | .000 |
| Linear-by-Linear Association | 44.703 | 1 | .000 |
| N of Valid Cases | 132 | | |

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is .87.

IV. INFERENCE

The **Chi-square Analysis** indicates

Significance Value, $p=.000$

When tested at 95% confidence limit, the level of significance being .05, the calculated value is less than table value, which implies that there is a statistically significant association between Satisfactory Performance Appraisal and Job Satisfaction.

Thus we **accept alternative hypothesis**.

Note: Degree of Freedom=4, two-tailed test is considered.

CORRELATION ANALYSIS: Correlations

| | | Superior Support | Satisfied with Job |
|--------------------|---------------------|------------------|--------------------|
| Superior Support | Pearson Correlation | 1 | .090 |
| | Sig. (2-tailed) | | .306 |
| | N | 132 | 132 |
| Satisfied with Job | Pearson Correlation | .090 | 1 |
| | Sig. (2-tailed) | .306 | |
| | N | 132 | 132 |

From the above table, it is inferred that there exists a **positive correlation** between Superior Support and Job Satisfaction of the employee.

Independent Variable: Superior Support

Dependent Variable: Satisfied with Job

This means that if the superior guides, supports and motivates an employee to achieve work responsibilities and cares for the career advancement of the individual, it enhances satisfaction of the employee with job.

V. FINDINGS

This study improves the quality of work life in manufacturing sectors. The employees feel that the superiors need to motivate on their work load. It enhances the satisfaction of the employees during the job. Employees require support from the management for career advancement for their developments. Employees are in need of a better performance appraisal for encouraging them towards goal achievement.

VI. SUGGESTIONS

- Ø More importance needs to be given to the individual than the machines at the work place.
- Ø It is suggested that the company give training to employees on the usage of safety equipments.
- Ø It is suggested to the company to make the work environment more adaptable to the workers.
- Ø Having a better friendly performance appraisal system will enhance the job satisfaction of employees.
- Ø The concern can allot work load based on a scientific time study so that the operators are comfortable with their work load.
- Ø The wages of operators needs to be reworked based on an incentive linked to the output.
- Ø Promoting a friendly atmosphere at the work place so that their ideas and feelings can be solved for a better working environment.
- Ø It is suggested to the firm to educate workers about not over straining themselves at the work place as it may lead to health problems.

VII. CONCLUSION

Overall study of quality of work life is highly efficient and effective in manufacturing sectors and the employees are satisfied with their organization. This can be assured from the above analysis and if the suggestions given are implemented in a correct manner the organization can extend their success in the future.

The scarcity of resources has made many forecasters to predict that in the future, managers will be forced to change their basic philosophy.

These forecasters urge that new philosophy lays emphasis on "Quality of work life". This forecast probably will be proved accurate, at least to the extent that managers of the future will have to be more cautious as to how scarce resources should be used.

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THE COOLING SYSTEM OF PHOTOVOLTAIC MODULE AND THEIR EFFECTIVE EFFICIENCY

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ABSTRACT

Solar energy is one of the energy which can be use in various forms like solar lamps, solar cookers etc. For that purpose PV panel is required. Each module is related by its dc output power under standard test conditions (STC) and typically ranges from 100 to 320 watts. In this project, photovoltaic panel were used to integrate the extraction of light energy and thermal energy. The need of this project is to study of thermoelectric cooling effect to remove heat in the photovoltaic. The use of thermoelectric cooling system improves the power capacity of photovoltaic by 2%-20% and enhances the power efficiency of the photovoltaic by 2.29%-3.37%. Through the combine application of photovoltaic and thermal technologies, the total energy of the overall system can be improved by 37%-60%.

Keywords - Efficiency, solar voltage Thermoelectric Energy Conversion, Thermoelectric module, Temperature sensor.

I. INTRODUCTION

Recently, human being required different types of energy demand and which increases rapidly. Due to use of conventional energy (nonrenewable energy).The energy gets crises for useful structure. Due to increasing of population the energy demand also increases and the graph of non renewable energy sources get decreases. The solar energy is the renewable energy source and it is easily available in nature. It is also the most important renewable source energy and it is free from pollution, it also helpful to decrease the green house effects. In this paper, solar system is one of the ways to generate electricity through directly of the sun rays, so due to sun energy we generate electricity and heat also. The output of PV system depends on solar irradiance, operating voltage due to high and low temperature. The conversion efficiency of ideal solar panel is 18% due to its quick heating property the efficiency is less therefore to increase efficiency we use thermoelectric module .Following details explain about thermoelectric module.

1.1. Peltier (Thermoelectric) History

Early 19th century scientists, Thomas Seebeck and Jean Peltier, first discovered the phenomena that basis for the today's thermoelectric industry. Seebeck found that if you placed a temperature gradient across the junctions of two dissimilar conductors, Electrical current would flow to Peltier, on other hand, learned that passing current through two dissimilar electrical conductors, caused the heat to be either emitted or absorbed

at the junction of materials. It was only after mid-20th Century advancements in Semiconductor technology; however, those practical applications for thermoelectric devices became feasible. With the modern techniques, we can now produce thermoelectric “modules” that deliver efficient solid state heat-pumping for both cooling and heating; many of these units can also be used to generate DC power at reduced efficiency. New and often elegant uses for thermoelectric continue to be developed each day.

1.2. Peltier (Thermoelectric) Structure

Heat absorbed at the cold junction is pumped to the hot junction at a rate proportional to carrier current passing through the circuit and the number of couple. The semiconductor materials are N and P type because either they have more electrons than necessary to complete a perfect molecular lattice structure (N-type) or not enough electrons to complete a lattice structure (P-type). The extra electrons in the N-type material and the holes left in the P-type material are called "carriers" and they are the agents that move the heat energy from the cold to the hot junction of the area. The heat absorbed at the cold junction is pumped to the hot junction at a rate proportional to carrier current passing through the circuit and the Number of couple. Good thermoelectric semiconductor materials such as bismuth telluride greatly impede conventional heat conduction from hot to cold area, and it provides an easy flow for the carriers. These materials have carriers with a capacity for transferring more heat.

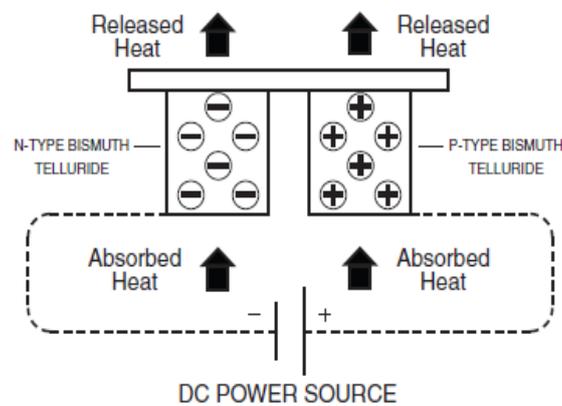


Fig.1: Peltier Structure

II. AN OVERVIEW OF PROPOSED WORK

A new approach to thermoelectric power generation using large area of the pn junctions is presented. And which has higher efficiency and lower cost in compare to other methods of TE power generation. Initially, we investigate the effect of temperature on the efficiency of a conventional solar cell and also to calculate the overall efficiency of the system.

In this project, both hardware and software setups are used. The hardware setup consists of PV panel, peltier module, temperature sensor, ADC, microcontroller, relay and the LCD display. With the help of hardware setup observe the voltage drop at high temperature and low temperature and also observation of efficiency.

In the software setup, MATLAB software is used to understand the graphical nature of temperature by simulation. For that Embedded C programming is prefer to use.

The following steps to make a module:

- c) The hardware and software setup are used.

- Q Hardware setup consists of different components.
- Q Observe the voltage drop at high temperature and low temperature also.
- Q Observe efficiency of the system.

2.1. Principle of Solar Energy Generation

Solar panel convert light energy into electrical energy i.e. dc volt. Therefore we get dc volt from solar panel and solar charge controller control dc volt and current and given to battery for charging and solar charge control also give the output voltage to load.

III. HARDWARE REQUIREMENT

- THERMOELECTRIC MODULE
- MICROCONTROLLER IC 89C51
- TEMPERATURE SENSOR
- ADC IC
- RELAY
- LCD DISPLAY

3.1. Peltier (Thermoelectric) Module

The heat absorbed at the cold junction is pumped to hot junction at a rate proportional to carrier current passing through the circuit of the model. The semiconductor materials are N and P type because either they have more electrons than necessary to complete a perfect molecular lattice structure (N-type) or not enough electrons to complete a lattice structure (P-type). The extra electrons in the N-type material and the holes left in the P-type material are called "carriers" and they are the agents that move the heat energy from the cold to the hot junction of the area. The heat absorbed at the cold junction is pumped to the hot junction at a rate proportional to carrier current passing through the circuit and the Number of couple. Good thermoelectric semiconductor materials such as bismuth telluride greatly impede conventional heat conduction from hot to cold area, and it provides an easy flow for the carriers. These materials have carriers with a capacity for transferring more heat.

The high performance of the thermoelectric coolers, produced allows us to increase the rate of cooling and reach a larger temperature difference in the relation to the environment. Thermoelectric coolers are optimized for source voltage 12V and perform high cooling as well heating at low power consumption.

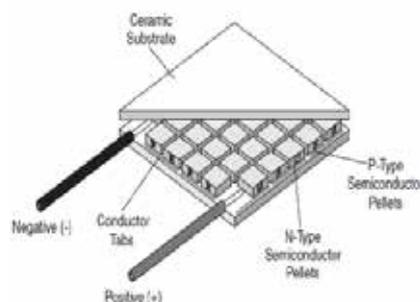


Fig. 2: Diagram Construction

3.2. Micro Controller (IC 89c51)

Microcontroller is used to monitor heating and cooling inside the structure. It also controls the relay driver to change the mode (Heating mode or cooling mode).

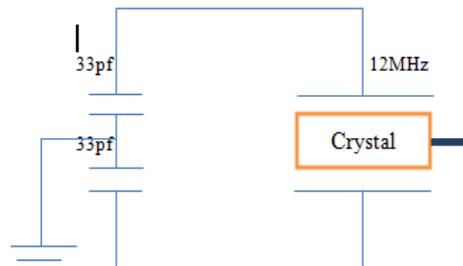


Fig. 3: Crystal Oscillator Circuit

In the above circuit, the crystal oscillator that supplies frequency to trigger the logic gates in microcontroller. The oscillator to generate the 12MHz frequency in between pin no.18, 19 of microcontroller. The IC 89c51 also to controlled the relay switch and giving signals to the LCD Display.

3.3. Temperature Sensors (LM 35)

In this system the temperature inside the aluminum cabinet is measured by using LM35 sensor whose output is given to microcontroller through ADC (0809) to interpret it into Celsius values. The general description includes the LM35 series are precision integrated-circuit temperature sensors and whose output voltage is linearly proportional to the Celsius ($^{\circ}\text{C}$) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in $^{\circ}$ Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Celsius($^{\circ}\text{C}$) scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^{\circ}\text{C}$ at room temperature and $\pm 3/4^{\circ}\text{C}$ over a full -55 to $+150^{\circ}\text{C}$ temperature range. LM35's has low output impedance and linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with the single power supplies, or with the plus and minus supplies. As it draws only $60\ \mu\text{A}$ from this supply, and it has very low self-heating, less than 0.1°C (Celsius) in still air.

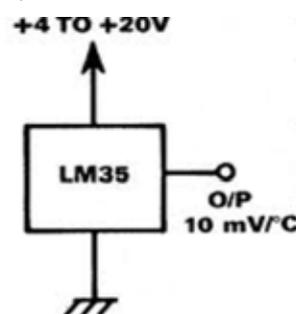


Fig. 4: LM35DZ Circuit Diagram

3.4. Relay (10a, 24vdc)

The Relay is used to reverse the supply to change the mode i.e. to switch form heating processes to cooling and vice versa. RW Series Relay covers switching capacity by 10A in spite of miniature size to comply with user's wide selection. It is used for the Domestic Appliances, in Office Machines, in Audio Equipment, and Coffee-Pots, Control units, etc..Here the relay is used to the purpose of activation of the switch In this project the relay is used to controlled of the peltier module .If the temperature of panel will increase then the

microcontroller fed the signal to the relay from ADC IC 0809 and relay will turn on and to start the peltier module for cooling purpose of panel.

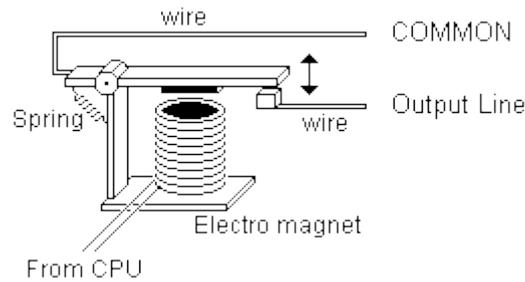


Fig. 5: Relay Circuit Diagram

3.5. LCD Display

A liquid crystal display (commonly abbreviated LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector.

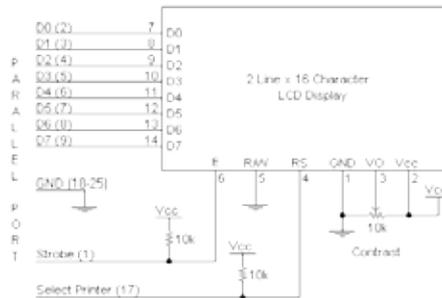


Fig. 6: Interfacing LCD with Microcontroller IC 89c51

It is utilized in battery powered electronic devices because it uses small amounts of electric power. In this system LCD is used to display the current temperature values in °C along with indication whether system is in heating mode or cooling mode. It receives input regarding this information from the micro controller.

IV. WORKING OF THE MODEL

The source for our heater system is renewable energy resource, here PV cells are used. The power from the solar panel is given to two batteries (12V, 7.25A). From batteries the power is delivered to peltier modules (3 no's) connected in parallel each attached to their respective heat sinks. Once the module gets the supply, it starts functioning (either heating or cooling according to its respective mode). The battery also supplies DC fan +fin (Heat Sink). Microcontroller receives 5V from the A.C power source i.e. through Step down transformer (230V to 12V),

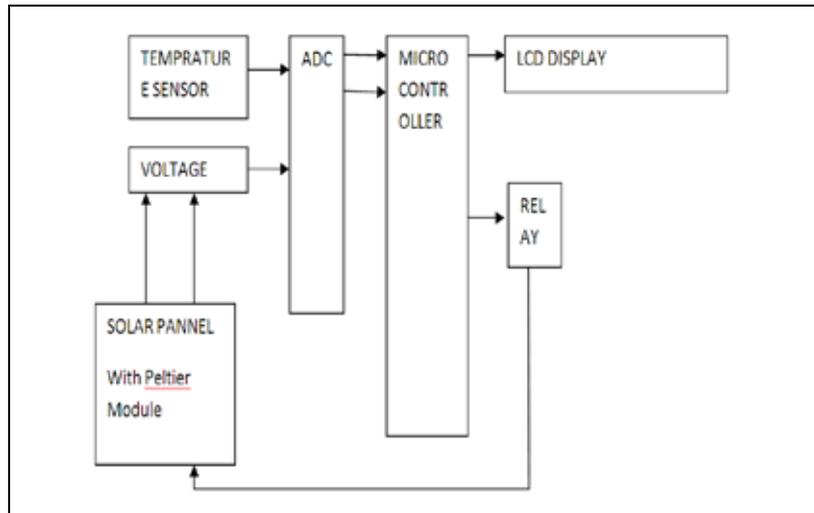


Fig. 7: Block Diagram

Which monitors cooling and heating of the system. Temperature sensor-LM35 series are precision integrated-circuit the temperature sensors, whose output voltage is the linearly proportional to the Centigrade (°C) temperature is kept inside the System, whose output is given to microcontroller which is programmed to interpret the voltage into Centigrade temperature values displayed in the LCD Display. In the cooling mode, microcontroller allows power to the module till the temperature reaches minimum temperature and it maintains the same. For heating process, the supply given to the modules are reversed with the help of relay. Once the terminals are reversed, the heating process starts. During heating, Microcontroller allows power to the module till the temperature reaches maximum point and it maintains the same. Such that the temperature is maintained inside the system.

V. COMPARISM RESULTS

| TEMPERATURE | VOLTAGE |
|-------------|------------|
| 45°C | 40.58 VOLT |
| 35°C | 41.99 VOLT |
| 25°C | 43.40 VOLT |

Fig. 8: Table

VI. SIMULATION RESULT



Fig. 9: From mat lab simulation diagram, we can absorb that when temperature is 45 degree centigrade then voltage decreases about 40.58 volt.

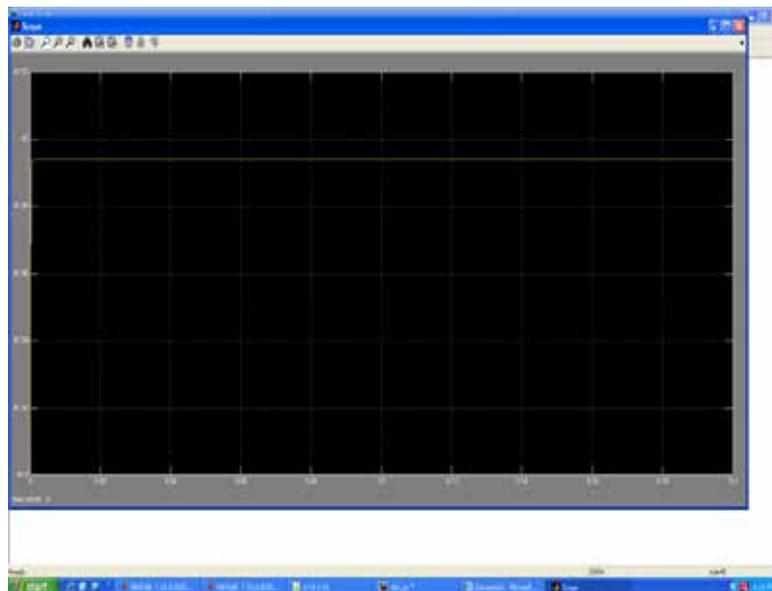


Fig. 10: From mat lab simulation diagram, we can absorb that when temperature is 35 degree centigrade then voltage increases about 41.99 volt.

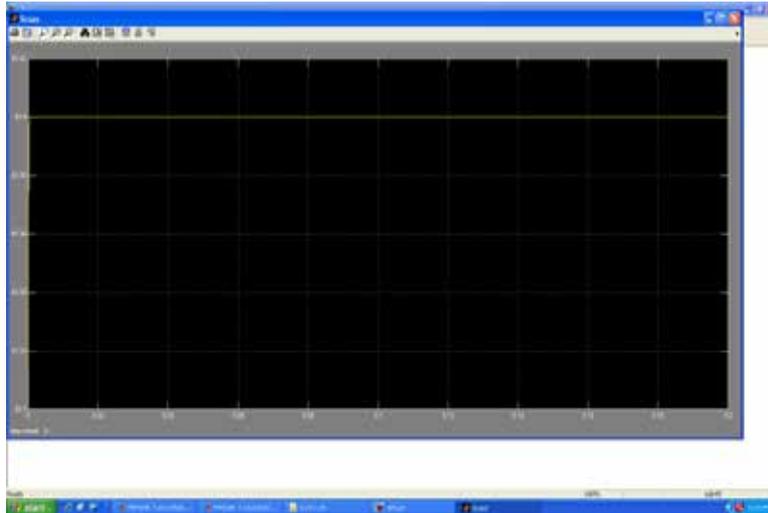


Fig. 11: From mat lab simulation diagram, we can absorb that when temperature is 25 degree centigrade then voltage increases about 43.4 volt.

From the above three simulation diagram we conclude that as temperature increases then the voltage decreases and if the temperature decreases then voltage increases and due voltage increases the overall system efficiency is also increases.

VII. RESULT

From experimental values it is proved that with the use of thermoelectric cooling system improves the power capacity of photovoltaic by 2%-20% and enhances the power efficiency of the photovoltaic by 2.29%-3.37%. Through the combine application of photovoltaic and thermal technologies, the total energy of the overall system can be improved by 37%-60%.

VIII. CONCLUSION

In this paper, we conclude that as the use of thermoelectric (TE) cooling system improves the power capacity of the Photovoltaic by 2%–20% and enhances the power generation efficiency of the photovoltaic by 2.29%–3.37%. Through the combined application of photovoltaic and thermal technologies and the total energy of the overall system can be improved by 37%–60%. Also the total efficiency depends on type of module integration and material type also assumption of the backside is sufficiently cooled such that it is at ambient temperature of the system.

IX. FUTURE SCOPE AND APPLICATIONS

In future we can build a real time model replacing both air conditioner and room heater in one system, i.e. Thermo Electric Hot and Cold Room Conditioner. The units of energy production can be developed in the various regions by using. Peltier(thermoelectric) modules. In these days the society faces the energy crisis but also harmful effects of the pollution. The thermoelectricity is a “Green Technology” to generate electricity without any of the harmful effect. The educational institutions, furnace regions, metro cities, industrial areas of the city, universities and other locations can be selected for the establishment of such

energy centers where the waste heat can be easily available and can be recycled after conversion to the same system

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THE DESIGN OF POWER DC BUS SYSTEM TO INCREASE THE SOLAR EFFICIENCY BY USING DC-DC CONVERTER

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ABSTRACT

Non conventional energy based on photovoltaic system with storage energy battery is necessary to load requirement for supply to electric grid. Due to use of dc-ac convertor, the efficiency does not improve. The power conditioning is done by a dc-dc converter and a dc-ac inverter stages to produce the desired ac source. This is also done even when the load is of dc type, such as typical portable electronic devices that require ac adaptors to be powered from the ac mains. The aim of this project is to propose a hybrid PV-battery-powered dc bus system, that eliminates the dc-ac conversion stage, resulting in lower cost and improved overall energy conversion efficiency. A high-gain hybrid boost fly back converter is introduced with higher voltage conversion ratio than conventional boost convertor topology.

Keywords: DC Bus System, Dc-Dc Converter, Hybrid Fly Back Boost Converter, Solar Cell, PV Power System.

I. INTRODUCTION

Recently, we know that due to population growth, Industrialization, and Increasing leaving of standard the electricity demand is sharply increase. To fulfill these demand conventional sources of energy contributes around 80% demand. The conventional sources are coal, petroleum, natural gas etc .As this sources are non renewable there is fear that they will get exhausted eventually in the next century .so ,predicting the future demand and future scenario of energy ,it is mandatory to promote the renewable sources of energy ,as these sources has much potential. Solar energy is the most readily available and free source of energy, since prehistorically times. It is estimated that solar energy equivalent to over 15000 times the world annual commercial energy consumption reaches the earth every year. Solar energy stored in the form of dc. This dc energy is converted into ac as per our load requirement. But in ac fluctuation is more that results in poor efficiency and voltage instability. To avoid and get maximum output, we concentrate in this paper mainly on dc to dc convertor. However, when a renewable energy source such as solar power is available and since it is dc in nature. For that PV panel is required. The PV panel varying wattages available from a few watts

to several hundred watts per panel. A DC load center for hooking up the batteries, and charge controller, and PV panels. Note that AC is not handled by your DC load center.

1.1. Buck Converters (DC-DC) structure

A buck converter (dc-dc) is shown in Fig. Only a switch is shown, for which a device as described earlier belonging to transistor family is used. Also a diode (termed as freewheeling) is used to allow the load current to flow through it, when the switch (i.e., a device) is turned off. The load is inductive (R-L) one. In some cases, a battery (or back emf) is connected in series with the load (inductive). Due to the load inductance, the load current must allowed path, which provided by diode. Otherwise, in absence of above diode, the high induced emf of the inductance, as load current tends to decrease, it may cause damage to switching device. If switching device used is thyristor, this circuit is called as a step-down chopper, as output voltage is normally lower than the input voltage. Similarly, this dc-dc converter is termed as buck one, due to reason given later one, due to reason given later.

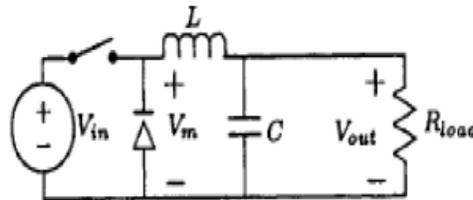


Fig .1: Buck Converters (DC-DC)

II. AN OVERVIEW OF PROPOSED WORK

A new approach to power generation using solar structure and DC-DC converter is presented. And which has higher efficiency and lower cost in compare to other methods of AC power generation. Initially, we investigate the effect of voltage on the efficiency of the system. And also calculate to the overall efficiency of the system.

In this project, both hardware and software setups are used. The hardware setup consists of PV panel, DC-DC converter, comparator, DC Bus, microcontroller, relay. With the help of hardware setup observe the output voltage and also observation of efficiency.

In the software setup, MATLAB software is used to understand the graphical nature of temperature by simulation. For that Embedded C programming is prefer to use.

The following steps to make a module:

1. The hardware and software setup are used.
2. Hardware setup consists of different components.
3. Observe the compares of voltage
4. Observe efficiency of the system.

III. HARDWARE REQUIREMENT

- DC-DC Converter
- Microcontroller IC 89c51
- Comparator
- PV panel with Battery
- Relay
- Digital Multi-meter

3.1. DC-DC Converter

DC-DC Converter is an electronic circuit which converts a source of direct current (DC) from one voltage level to another. DC to DC converters are important in portable electronic devices such as cellular phones, laptops computers, which are supplied with power from batteries primarily. Such electronic devices often contain the several sub-circuits, each with its own voltage level requirement different from that supplied by the battery or an external supply (sometimes higher or lower than the supply voltage). Additionally, the battery voltage declines as its stored power is drained. Switched DC-DC converters offer a method to increase voltage from a partially lowered battery voltage thereby saving space instead of using multiple batteries to accomplish the same thing. Most DC-DC converters also regulate the output voltage. Some exceptions include high-efficiency LED power sources. In that paper the DC-DC Converter supply electricity to the battery with is connected to the relay as well as Auxiliary supply. As shown in the fig.

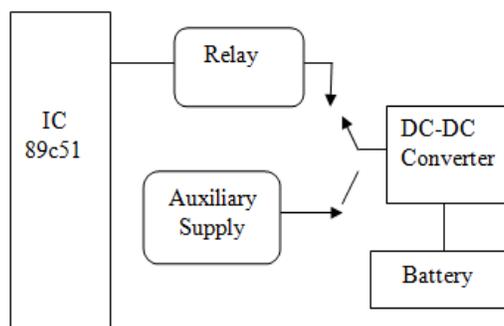


Fig. 2: Basic Structure of the System

3.2. Microcontroller IC 89C51

The microcontroller IC 89c51 receive signal from Amplifier LM324 in the form of one (1) at a set limit of 6volt dc from solar panel through LM324.If the panel generates t low signal than 6 volts then this LM324 gives zero(0) signal to the microcontroller IC 89c51. The IC also used to control the relay device for switching purpose. It consists of crystal oscillator device this device to generate the trigger signals of 12MHz.

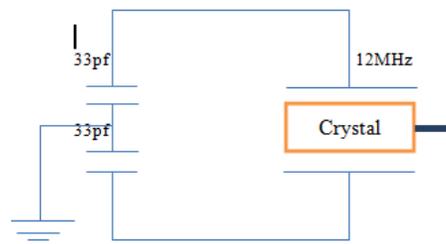


Fig.3:Crystal Oscillator

3.3. Comparator

In this paper, two comparator amplifier IC LM324 is used. The comparator amplifier IC LM324 which finally goes to battery and the second amplifier IC LM324 gives signal from auxiliary supply to the battery. This two comparator compares the signals from solar and auxiliary supply and gives the output.

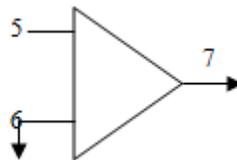


Fig. 4: LM 324

3.4. PV panel with Battery

The Solar energy is the most readily available and free source of energy, since prehistorically times. Solar energy stored in the form of dc. This dc energy is converted into ac as per our load requirement. The solar panel receiving the sun rays and which generate 6volts dc which signals to provide amplifier. These amplifiers IC LM324 send the signal to the microcontroller.

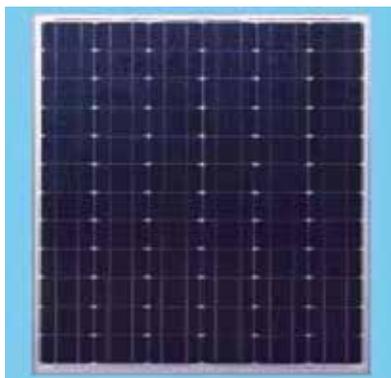


Fig. 5: Solar Panel

The solar energy is used to generate the electrical signal and this electrical energy stored in the battery”.

3.5. Relay

The Relay is used to reverse the supply to change the mode i.e. to switch from DC supply to the auxiliary supply. It is used for Domestic Appliances, Office Machines, Audio Equipment, Coffee-Pots, Control units, etc. Here the relay is used to the purpose of activation of the switch. In this project the relay is used to control of the DC signals.

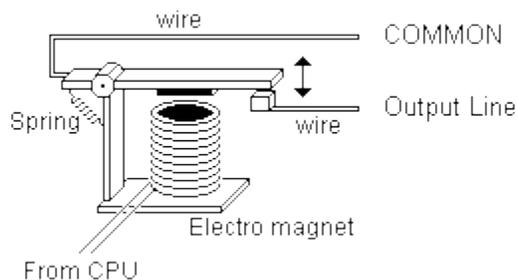


Fig. 6: Relay Circuit Diagram

3.6. Digital Multimeter

The digital millimeter reads the output from the battery .here the use of millimeter for to read the value of two signals one is from solar system and another is from auxiliary supply and compares both values with the help of tow comparator amplifiers IC LM324 and display the beneficial value of the system.

IV. WORKING OF THE MODEL

From block diagram it consists of different types of blocks like solar panel, comparators, microcontroller IC 89c51, relay, rectifier, DC-DC converter, battery. Firstly the solar panel receives sunlight to convert into electricity and these energy fed to the first comparator amplifier LM324.the comparator fed the signal to microcontroller IC 89c51.the IC69c51 take signal from comparator amplifier and fed to the relay device in the form of 1 signal at a constant voltage 6v.During the operation relay connected to the DC-DC converter with battery & the load gives the constant energy from battery device.

If the solar panel generates the less energy than 6v dc the first comparator fed the signal to microcontroller IC89c51 in the form 0 signal. Then that time relay will switch from DC-DC converter at the same auxiliary supply is connected to the DC-Dc converter and this device stored the energy in the battery, finally this result compare through two comparator amplifier with the help of digital multi-meter.

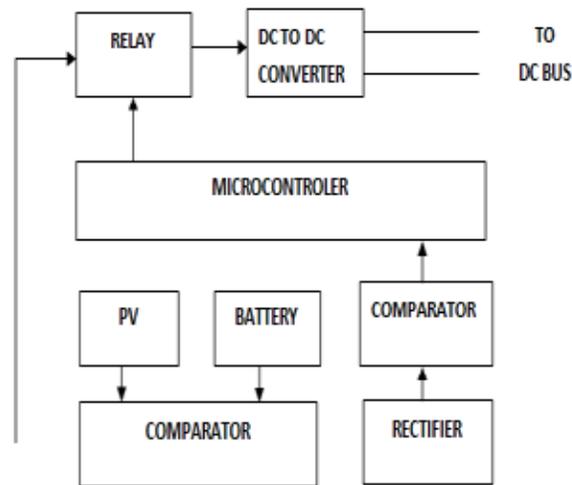


Fig .7: Block Diagram

V. COMPARISM RESULT

| IRRADIANCE | CURRENT | VOLTAGE |
|------------|---------|---------|
| 1000 | 1 | 16 |
| 800 | 1 | 14 |
| 600 | 0.5 | 10 |

Fig. 8: Table

VI. SIMULATION RESULTS



Fig.9: Due to high irradiance voltage increases
(Irradiance = 1000, Voltage = 16v, Current = 1amp)

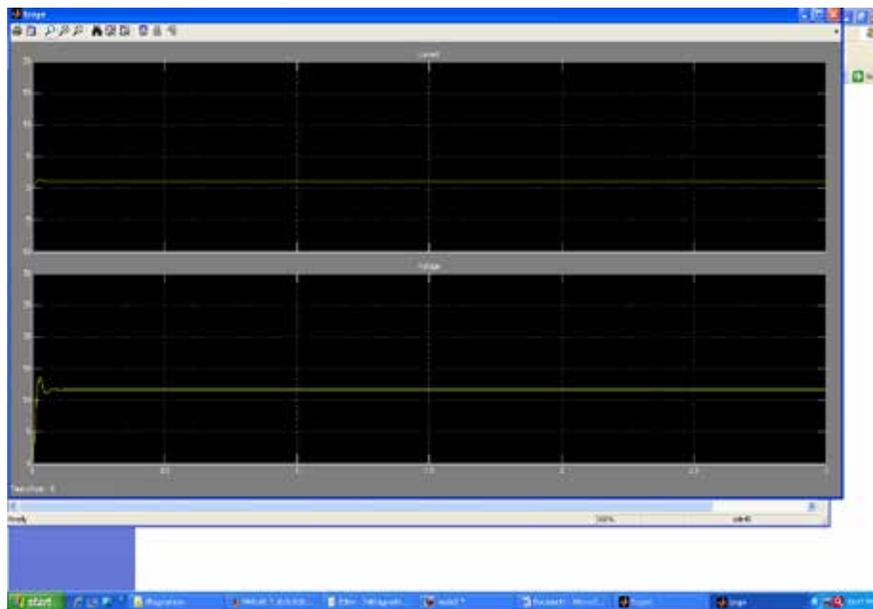


Fig.10: Due to high irradiance voltage decreases

(Irradiance = 800, Voltage = 14v, Current =1amp)

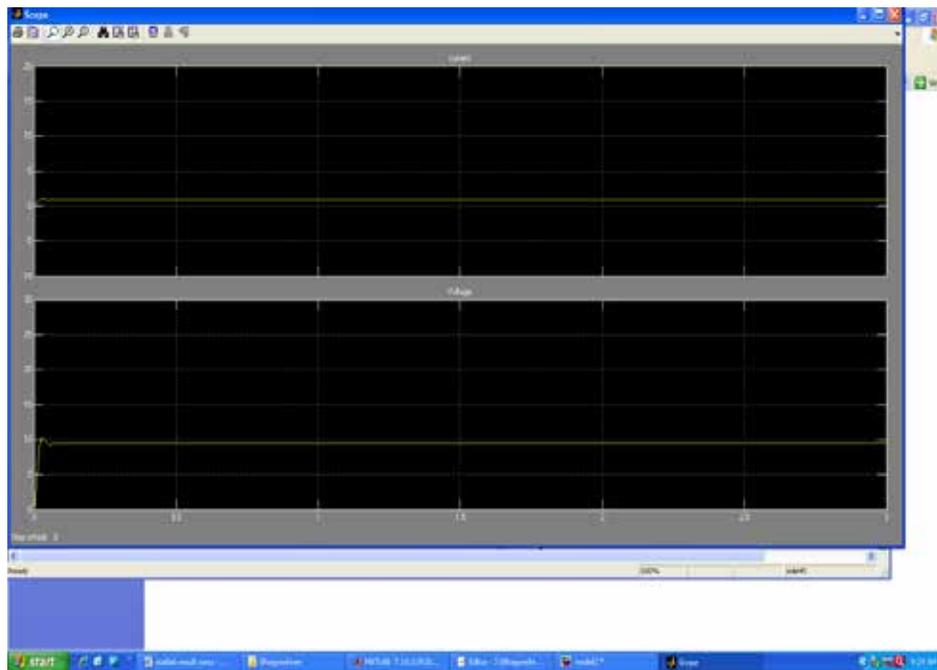


Fig.11: Due to high irradiance voltage decreases

(Irradiance =600, Voltage = 10v, Current =0.5amp)

VII. RESULT

From hardware result and mat lab simulation result we observed that the due to used of DC-DC converter and a hybrid PV-battery-powered dc bus system, that eliminates the dc–ac conversion stage, resulting in lower cost and improved overall energy conversion efficiency.

VIII. CONCLUSION

We conclude that, when the load is of dc type, such as typical portable electronic devices that require ac adaptors to be powered from the ac mains. The aim of project is to propose a hybrid PV-battery-powered dc bus system that eliminates the dc–ac conversion stage, resulting in lower cost, improved overall energy conversion efficiency. A high-gain hybrid boost–fly back converter is, also introduced with several times higher voltage in higher dc bus levels and lower cable conduction losses.

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OPTIMAL MEETING LOCATION DETERMINATION USING STEALTH GEO POINTS SYNCHRONIZATION

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ABSTRACT

Location privacy in Location Based Services (LBS) is the ability to protect the association between user's identity, servers, database, query sources thereby preventing an impending attacker from easily linking users of LBS to certain locations. Smart Phones have become most important gadget for maintaining the daily activities, highly interconnected urban population is also increasingly dependent on these gadgets to regulate and schedule their daily lives. These applications often depend on current location of user or a class of user. Use of Smart Mapping technology is also increasing in large area; this system provides an easy accessible online platform that can be used by head office, regional managers. This survey paper projects the privacy-preserving algorithm to find the most favorable meeting location for a class of users. GSM calculates the location of all users.

Keywords: *Location Privacy, Global System for Mobile Communication (GSM), Mobile Determination, User Authentication, Security.*

I. INTRODUCTION

Location-based services (LBS) are a general class of computer program-level services that use location data to control features; these services include applications that depend on the user location to provide a service/information that is relevant to the user at that location. LBS normally use mobile equipments and provide position capability to provide the service or information to the user. LBS can be used for personal purpose or professional purposes. LBS is an information service and has a number of uses in social networking today as an services of entertainment, which is accessible with mobile equipments through the mobile network and which uses information on the geographical position of the mobile device. This has become much more important with the expansion of the Smartphone and tablet markets. LBS are used in a various field such as health, entertainment, object search, work, personal life, etc. LBS consist of services to identify a location of a object or person, such as discovering the nearest banking ATM machine or the whereabouts of a any person or employee. LBS include parcel tracking and vehicle tracking services [1]. Two popular features of location-based services are *location check-ins* and *location sharing*. Users can share their current location by checking the location with family and friends or obtain location-specific services from third-party providers.

Location privacy is the ability to prevent other parties from learning one's current or past location. Generally, Location Based Service (LBS) gives an information service about the physical location of a user [9].

The remaining paper is organized as follows: Section II describes the related work. Section III presents the proposed work. Section IV describes the proposed solution of the system. Lastly section V presents the conclusion.

II. RELATED WORK

Igor Bilogrevic, Murtuza Jadliwala [1] proposed privacy-preserving algorithms for determining an optimal meeting location for a group of users. They perform a thorough privacy valuation by formally quantifying privacy-loss of the proposed approaches. They address the privacy issue in LSBSs by focusing on a specific problem called Fair Rendez-Vous Point (FRVP) problem. Given a location preferences for set of users, the FRVP problem is help to find out a location among the proposed ones such that the greatest distance between this location and all other users' locations is minimized.

Rinku Dewri and Ramakrishna Thurimella [2] proposed a user-centric location based service architecture where a user can observe the impact of location inaccuracy on the service before deciding the geo coordinates to use in a query. They construct a search application based on user-centric location-based service architecture where a user can observe the impact of location inaccuracy on the service accuracy.

Jing Liu, Zechao Li, Jinhui Tang [3] authors focus on the personalized tag recommendation task and try to identify geo-location-specific, user-preferred, with semantically relevant tags for a images by leveraging rich contexts of the freely available community-contributed photos. For users and geo-locations, they have different favored tags assigned to a images, and propose a subspace learning method to individually uncover the both types of preferences.

Linke Guo, Chi Zhang [4] proposes a privacy-preserving revocable content sharing scheme in geosocial networks. Proposed scheme allows mobile users to share their encrypted location-based contents on an untrusted server without revealing genuine information of location, and further enables other users of mobile device who physically check in at the particular location to search and decrypt the content if they have the equivalent attributes.

Muhammad Ridhwan Ahmad Fuad and Micheal Driberg [5] present the development of the remote For Mobile Communications (GSM) Modem and Google Map vehicle tracking system which integrates the Global system.

Wei Xin, Cong Tang, TaoYang [6] uses LocSafe method, a "missed-connections" service is used which grantees based on Radio Frequency Identification technology, in order to prove an sharing among users in the past. LocSafe is combination of three parts: RFID Tags, social service provider LE Collectors.

They use RFID technology to detect entities and use attribute-based encryption and broadcast encryption to create trust and protect users, privacy. We evaluate LocSafe by a study of "missed-connections" troubles and study of system implementation.

Wei Li, Wei Jiao, Guangye Li [7] Location-Based Service(LBS) combined with mobile devices and internet become more and more trendy, and are widely used in traffic navigation, intelligent logistics and query of the point of interest. However, most users worry about their privacy when using the LBS because they should provide their precise location and query content to the undependable server. This paper analyses the query association attack model for the constant query in mobile LBS.

Jianliang Xu, Xueyan Tang [8] identifies and addresses three new issues concerning location cloaking approach. First, study the representation of cloaking regions and show that a circular region generally leads to a small result size for region-based queries. Second, develop a mobility-aware location cloaking technique to

resist trace analysis attacks. Two clocking algorithms, namely first one is MaxAccu_Clock and second one is MinComm_Clock, are designed based on different performance objectives. Finally, develop an efficient polynomial algorithm for evaluating circular-region-based kNN queries.

Hanunah Othman, Habibah Hashim, Jamalul-lail Ab Manan [9] studies recent schemes designed to present location privacy and anonymity to LBS users. The main idea is to solve recent practical problem by proposing a new framework of LBS Middleware called Trusted Anonymizer (TA) secured by Trusted Computing (TC) technologies.

Leone C. Monticone, Richard E. Snow [10] provides an analysis of the case where the MRs operate in or above circular service areas on the surface of a spherical Earth. The analysis provides an accurate and competent way, to compute true minimum distance ratios which is less complex than performing the calculations on the sphere, The method uses to convert the original minimization problem into a simpler problem of minimizing a ratio of Euclidean distances is a stereographic projection, which is expressed as a function of a single real variable, over the boundaries of discs (i.e., circles) in the complex plane.

III. PROPOSED WORK

This proposed system will hide the location of users by using stealth geo-synchronization. Great circle algorithm will be use for calculating the distance between multiple geo-locations. Then by using polygon centroid calculation, central point will be determined. This system will provide the central location which will be approximately same for all users by considering user preferences; it will also provide privacy about users location.

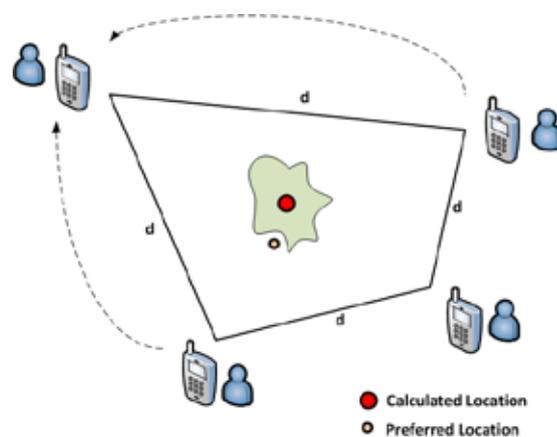
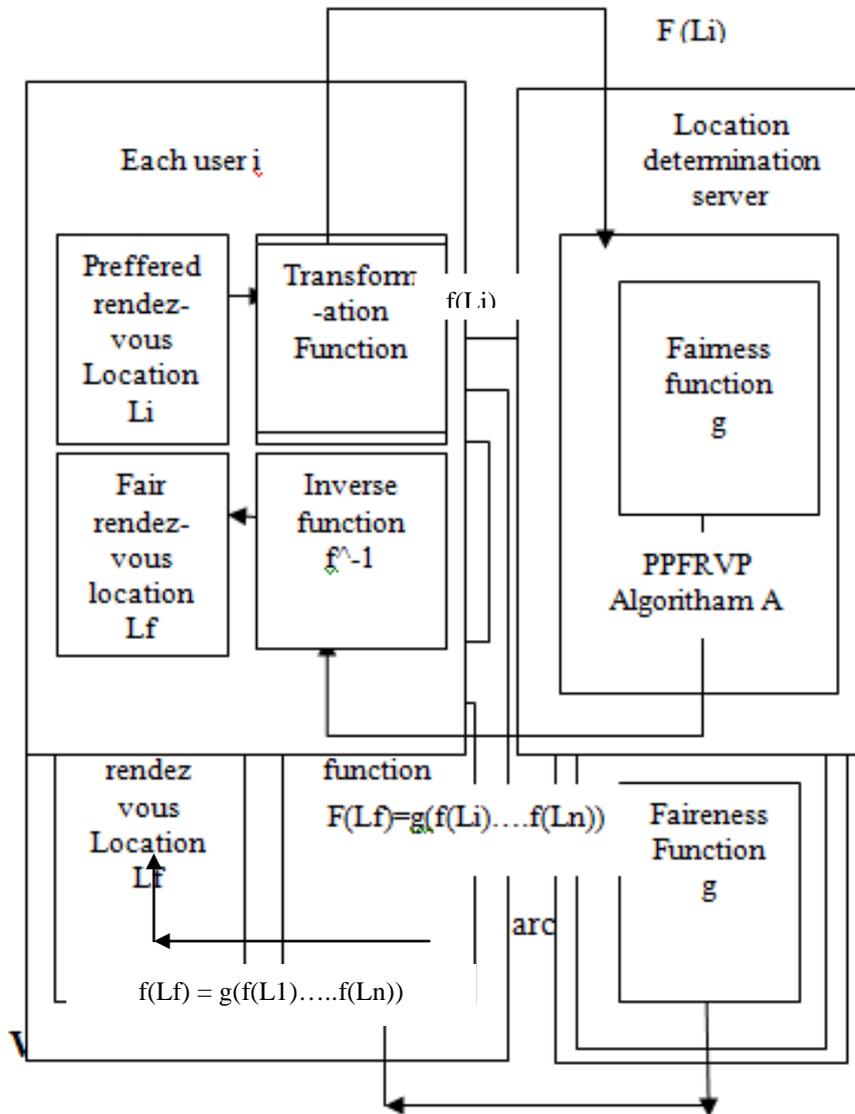


Figure 1: Proposed System Process Diagram

Above figure shows the overall working process of proposed system. This process includes multiple stages of execution. As per shown consider a condition there are five users in group planning to meet in centrally preferred location then one user from all will become master user and after which all user will share their location with master user and master user will execute the process. After execution system will calculate the central location by calculating the centroid of the polygon created by the user's connection. Once system get the central location it will ask user about his preferred location and after this using Google mapping API system will find out the nearest location selected by the user and once it found system will inform all user about final meeting location and if user wants he can view the travelling path to the location.

IV. OVERVIEW OF ARCHITECTURE

In this work, we consider the problem of finding a rendezvous point among a set of user-proposed locations, such that (i) the rendez-vous point is *fair* with respect to the given input locations, (ii) each user learns only the final rendez-vous location and (iii) no participating user or third-party server learns private location preference of any other user involved in the computation. We refer to an algorithm that solves this problem as Privacy-Preserving Fair Rendez-Vous Point (PPFRVP) algorithm. In general, any PPFRVP algorithm A should accept the inputs and produce the outputs.



From the idea of the proposed system we are clear with two outcomes. These two outcomes are discussed below.

1) Provide central feasible location

Central feasible location will be calculated by using great circle algorithm and polygon centroid calculation. Then by using Google map API users location will be track.

2) Provide privacy to all users

Privacy can be provided by using stealth geo-synchronization.

VI. CONCLUSION

The proposed system will provide a location based service. This system will provide the central location or the location which is nearer to all users by using great circle algorithm and users location will be determined by using Google map API and GSM. Location privacy is the ability to prevent other parties from learning one's current or past location. Generally, Location Based Service (LBS) gives an information service about the physical location of a user. Proposed system will also provide privacy about user's location.

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IMPROVEMENT IN MICROGRID DUE TO RENEWABLE ENERGY SOURCES IN DISTRIBUTED GENERATOR NETWORK

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ABSTRACT

The non conventional sources are important now days because the raw material required is less and power demand is more to compensate with the increasing demand of power, so renewable energy sources are important Micro grid which resembles a power system consisting of several distributed generators connected together and this micro grid operates in connecting mode which is connected to the main grid. Distributed economic dispatch for a micro grid with renewable energy penetration to enhance performance in grid connected and isolated condition. This paper presents study of different parameters under the effect of wind and solar penetration form. To understand and analyze proper effect of renewable energy sources in micro grid a fixed speed wind turbine equipped with squirrel cage induction generator and solar system with maximum power tracker are used. The simulations are performed in MATLAB/SIMULINK environment.

Keywords: Micro Grid, Renewable Energy, Voltage Variation, Wind Penetration.

I. INTRODUCTION

Environmental quality is contingent on economic growth and at the same time economic growth may be constrained by environmental quality Currently India in a state of transition from traditional to modern energy sources that will require major structure change to the economy and energy system.

That's why we use the possible combinations of hybrid system along with micro hydro systems such as solar PV, wind energy system. Electricity generated from power house is transmitted with the help of transmission line to final consumers. But the main problem is faced with transmission line is losses and voltage instability due to overloading which ultimately supplies poor voltage till it reaches the consumers. So it becomes necessary to reduce the load of transmission line at distribution level with the help of new technique such as inserting renewable resources at distribution level often called as distributed generation. This DG includes different advantages such as power reduction, voltage support thus increasing overall efficiency. Here distributed generation which refers to small scale (1kw-50kw) electric power generators which produce electricity at close to consumers site and in general they include micro turbines ,induction generators which is now replaced by renewable energy sources such as solar, wind etc. Micro grid is nothing but group of interconnected load with specifically defined boundaries with respect to grid

connection and disconnection in order to enable in both grid connected and disconnected mode .this micro grid occupies a significant position in distribution system which is nothing but auxiliary part of whole distribution system.

1.1. Advantage of Micro grid System

- A major advantage of a micro grid and its ability, during utility grid disturbance, to separate, isolate itself from utility seamlessly with little or no disruption to the loads within the micro grid
- In peak load it prevents utility grid failure by reducing the load on the grid.
- Significant environmental benefits made possible by the use of low or zero emission generators.
- The use of electricity and heat permitted by the close proximity of the generator to the user there by increasing the overall energy effectiveness.

1.2. Renewable energy sources

These resources are naturally occurred in universe and are abundant and long lasting

Which can be harnessed by special means to satisfy our increasing demand of energy .this may include solar energy, wind energy, biogas and tidal energy etc.

1.2.1. Solar energy

Solar energy is available in abundance and considered the easiest and cleanest means of tapping non-conventional energy. For direct conversion of solar radiation into usable form the routes are solar thermal and solar photovoltaic, solar architecture .these solar cells converts sun's energy into electricity and some solar system includes large solar collectors to convert into electricity having longer life and silent operation, positive environmental impact with applications in space program, remote location where grid is difficult to get, lighting road sign and road light.

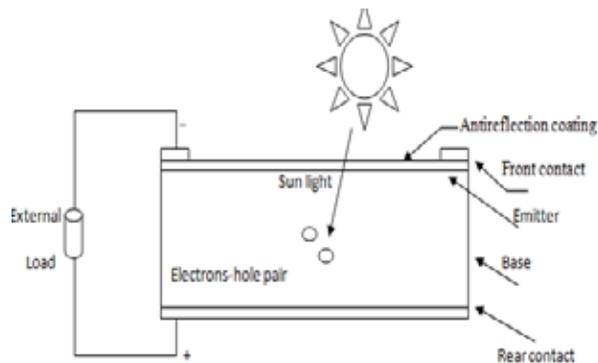


Fig. 1: Cross section of a solar cell

The basic steps in the operation of a solar cell are:

- Generation of the light-generated carriers;

- The collection of light-generated carries to generate current;
- Generation of the large voltage across the solar cell; and
- Dissipation of the power in load and in parasitic resistances.

1.2.2. Wind energy

Wind turbine converts wind energy into electrical energy using the wind energy conversion systems (WECSs). Wind energy has been popular. Usually induction generators are used in the WECSs. The main part of wind turbine is tower, rotor, and nacelle. Nacelle accommodates the mechanical transmission and the generator. Wind turbine captures kinetic energy of the wind flow through rotor blades and transfers energy to induction generator through gearbox. Generator shaft is driven by wind turbine to the generate electric power. The Wind turbines may have horizontal axis or vertical axis configuration of the system. Average of the commercial turbine size was 300 kW until the mid 1990s, but recently machines of the larger capacity, up to the 5 MW and more, have been developed and installed.

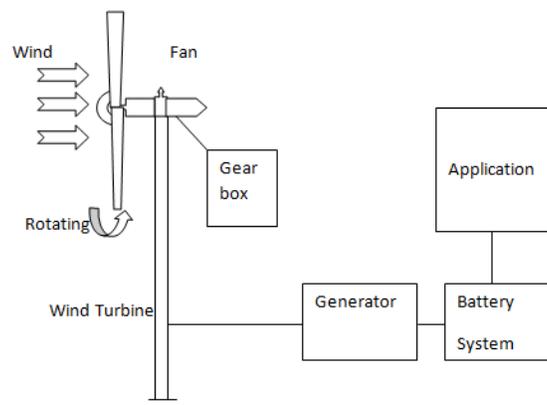


Fig. 2: Wind Generator

II. OVERVIEW OF PROPOSED WORK

Renewable energy sources, wind or hybrid penetration on micro grid is very important to study for the characteristics performances so as to cope with modern trends of power sectors so that, its effect can be studied for improvement of grid characteristics which is facing the problem of overloading, voltage instability, reliability and efficiency. Thus it becomes necessary to introduce various sources to overcome the problem. The supply demand balance can be maintained and the system dynamic performance can be improved. Simulation results demonstrate the effectiveness of the proposed control solution. However, when a micro grid operates in islanded mode of operation, the supply-demand must be balanced therefore; each of the components in the micro grid should be cooperated to achieve this goal. The present paper deals with study of parameters, that can be evaluated for subsystems performances like the effect of changes in generation on the system voltage due to solar penetration. The impact of nature of wind penetration, on dynamic performance of the system. The impact of amount of power generation into the system through solar penetration. Disturbances due to cloud cover in PV system on the grid

performances. Impact of loss of generation or load on frequency response. These changes due penetration of high wind and solar energy in micro grid are observed for the improvement and performance enhancement to reduced load on transmission line and prevent power loss.

2.1 Working Principle

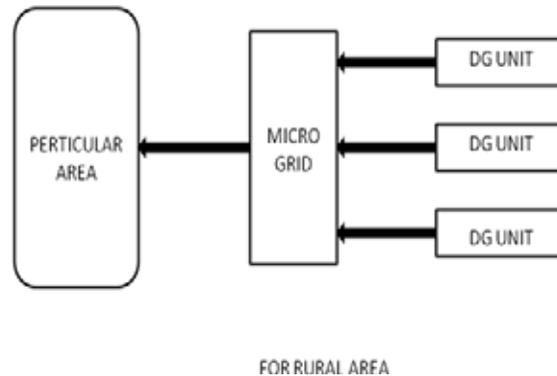


Fig .3: For the Rural Area

This basic system considers rural area with available wind and solar power. The first block of DG unit includes solar power defined as DG1 and can considered as zone1. Second block include wind power defined as DG2 as zone2. third block as combined solar and wind generation defined as DG3 as zone3. here solar and wind power is used as base power. Micro grid is a part of system but its characteristics is different from main distribution system. To generate power from wind a fixed speed wind turbine is equipped with squirrel cage induction generator and photovoltaic cell is equipped with MPPT and is connected to grid. The area where grid is not connected to grid system in that case we generate electricity form renewable energy like solar, wind etc. From that renewable sources we generate electricity to provide to different users.

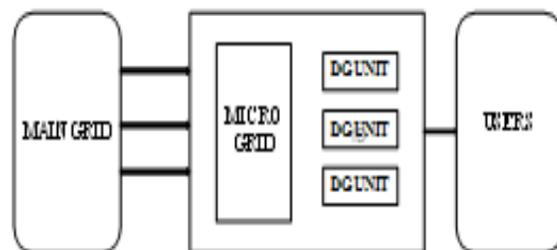


Fig. 4: For urban Area

From fig we observe that different blocks of system are connected to each other. It consists of micro grid consisting of different DG set like solar, wind, and biogas. On the main grid transmission load is very high due to which voltage stability decreases with low efficiency thus giving problem to users at distributed end. So to maintain the

voltage signal and to give constant voltage stability to users without any disturbances set of micro grid consisting of DG set like solar, wind .with the help of these sources it helps to users to get a stable supply.

III. MODELING OF SIMULATION

3.1 Objectives of Simulation

To analyze performance of micro grid on, it should be studied thoroughly. In the present work, micro grid is formed with suitable assumptions using Simulink showing feasibility of grid connected and standalone mode of operation. The main objective of this section is to study the feasibility of the proposed model analysis under grid connected mode and islanded mode. MPPT techniques are needed to maintain the PV array's operating at its MPPT. Many MPPT techniques have been proposed in the literature; example is the Perturb and Observe (P&O) methods Incremental Conductance (IC) Methods, Fuzzy Logic Method, etc. In this paper most popular of MPPT technique (Perturb and Observe (P&O) method converter) will involve in comparative Study. Few comparisons such as voltage, current and Power output for each different combination have been recorded. Multi changes in duty cycle, irradiance, temperature by keeping voltage and current as main sensed parameter been done in the simulation. The MPPT techniques will be compared, by using MATLAB tool Simulink, considering the variant of circuit combination.

IV. SIMULATION RESULTS

Irradiance=928



Fig.5: Current and Voltage

(Irradiance=928)



Fig.6: Power

The result shows the amount of power generation through solar penetration.



Fig.7: Output voltage changes on solar penetration.



Fig.8: Current and voltage

(Irradiance=902)



Fig.9: Power

Result shows the amount of power generation on solar penetration.



Fig.10: Change of output voltage on solar penetration.

V. CONCLUSION AND FUTURE SCOPE

Thus the impact of various parameters like voltage stability, amount of power generation into the system, disturbance due to cloud cover, in grid connected as well as in islanded operation by inserting wind and solar as base power individually as well as coupled is observed which is different in nature. Where as in faulted condition the penetration of RES in both grid and islanded operation is adversely affected but it is more in islanded form. Many research work have been in past and much work has yet to be accomplished with tidal, biogas. Much area of interest have to done to fulfill demand of energy

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FACTORS AFFECTING PERFORMANCE OF RSA CRYPTOSYSTEMS

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ABSTRACT

Communication is one of the necessities of human being. The effectiveness of computer communication over the network is mainly based on the type of cryptosystem selected for the encryption, decryption & also the proper implementation of the algorithm. The internet made the communication more flexible and resourceful. Security of information now a day is one of the most vital aspects for any organizations. Every now and then agencies try to develop the cryptosystems for the full proof communication of information on any medium. This paper focuses on various factors affecting the performance of RSA Cryptosystem. Also analyses the comparison study for some of the cryptosystems.

Keywords: *Cryptanalysis, Decryption, Encryption.*

I. INTRODUCTION

A cipher is an algorithm for performing encryption or decryption — a series of well-defined steps that can be followed as a procedure. A cryptosystem consists of three algorithms: one for key generation, one for encryption, and one for decryption. Therefore, the term "cryptosystem" is most often used when the key generation algorithm is important. Many ciphers have been developed so far in the field of communication to enhance the security of the information that has been transmitted through the internet. In non-technical usage, a "(secret) code" typically means a "cipher". Within technical discussions, however, the words "code" and "cipher" refer to two different concepts. Codes work at the level of meaning — that is, words or phrases are converted into something else and this chunking generally shortens the message. In spite of adopting large block size, wide key length, complex substitution and other key aspects in designing the ciphers, the security of the information and network security is still a challenge. It has been indicated that the security of algorithms and performance of a given algorithm depends on variety of parameters like keys sizes, encryption & decryption techniques used & above all the selection of algorithm plays the most important role for securing our data. This paper shows the analytical results of the cipher which was picked on the basis above parameters.

II. PRINCIPLES OF PUBLIC KEY CRYPTOSYSTEM

Invention of PKC by Whitefield Diffie and Martin Hellman in 1976, solved the past problems key managements and digital signatures of classical cryptosystem. Asymmetric algorithms rely on one key for encryption and a different but related key for decryption. It is computationally infeasible to determine the decryption key given only knowledge of the cryptographic algorithm and the encryption key. Under RSA either of the two related keys can be used for encryption, with the other used for decryption.

A public key cryptosystem is a pair of families $\{E_k\}$ and $\{D_k\}$, $K \in$ key space K , of algorithms representing invertible transformations

$E_k : P \rightarrow C$ and $D_k : C \rightarrow P$

- i. For every K , E_k is the inverse of D_k .
- ii. For every K , it is easy to compute E_k and D_k .
- iii. For almost every K , each easily computed algorithm equivalent to D_k is computationally infeasible to derive from E_k .
- iv. For every K , it is feasible to compute inverse pairs E_k and D_k from K .

III. KEYS USED IN CRYPTOSYSTEM

The keys used in various cryptosystems basically depend on its internal structure like what size of key should be appropriate when secrecy is concerned, Key size is a very important part which affects the security of the cipher. Picking larger keys might create the problems in encryption & decryption etc. is the majors who we need to keep in mind while using any type of cryptosystem. For example, public keys used in the RSA system are the product of two prime numbers. Thus public key systems require longer key lengths than symmetric systems for an equivalent level of security. 3072 bits is the suggested key length for systems based on factoring and integer discrete logarithms which aim to have security equivalent to a 128 bit symmetric cipher. Elliptic curve cryptography may allow smaller-size keys for equivalent security, but these algorithms have only been known for a relatively short time and current estimates of the difficulty of searching for their keys may not survive. Many ciphers employ separate key generation algorithm which works in parallel with the associated encryption and decryption algorithm. Response time & processing time mainly decides the efficiency of the algorithm used.

IV. CONFUSION AND DIFFUSION

In cryptography, confusion and diffusion are two properties of the operation of a secure cipher which were identified by Claude Shannon in 1949. Confusion property makes the cryptanalysis very difficult and thus makes the algorithm stronger. Confusion refers to making the relationship between the key and the ciphertext as complex and involved as possible. This can be achieved by the use of a complex scrambling algorithm that depends on the key and the input. Diffusion means that the output bits should depend on the input bits in a very complex way. In a cipher with good diffusion, if one bit of the plaintext is changed, then the ciphertext should change completely, in an unpredictable manner. An example of diffusion is to encrypt a message $M = m_1, m_2, m_3, \dots$ of characters with an averaging operation

$$y_n = (\sum_{i=1}^k m_{n+i}) \bmod 26$$

adding k successive letters to get a ciphertext letter y_n

V. THE STRENGTH OF RSA CRYPTOSYSTEM

There are three approaches to attack the RSA cryptosystem, which are briefly discussed here:

5.1 Brute Force Attack

The success & failure of brute force attack depends upon the length of key space used by the respective cryptosystem. By using a large key space, it is possible to avoid this attack. RSA crypto system uses the key as large as possible for the performance and to avoid brute force attack.

5.2 Factoring Attack

In RSA cryptosystem, in order to decipher the message one needs the private key of the recipient, which being exclusively in the hand of the recipient of the message. To determine the private key of any user, an attacker requires the factor of n. So now the question arises that can it be possible to produce the private key d from the public key e or to calculate the value of $\phi(n)$ i.e. p & q are the relative prime numbers & $\phi(n) = (p-1)(q-1)$. Choosing a large size of n is an ultimate solution for the security of RSA cryptosystem.

5.3 Precaution in Choosing the Prime Numbers

While selecting the prime number p & q should be differencing in length by a few digits. They should be closer. The product of (p-1)(q-1) should be small & the gcd of (p-1)(q-1) should be small.

VI. RESULTS

Some of speed results of RSA cryptographic algorithms. All were coded in C++, compiled with Microsoft Visual C++ 2005 SP1 (whole program optimization, optimize for speed), and ran on an Intel Core 2 1.83 GHz processor under Windows Vista in 32-bit mode.

| Operation | Milliseconds/Operation | Megacycles/Operation |
|-----------------------|------------------------|----------------------|
| RSA 1024 Encryption | 0.08 | 0.14 |
| RSA 1024 Decryption | 1.46 | 2.68 |
| RSA 2048 Encryption | 0.16 | 0.29 |
| RSA 2048 Decryption | 6.08 | 11.12 |
| RSA 1024 Signature | 1.48 | 2.71 |
| RSA 1024 Verification | 0.07 | 0.13 |
| RSA 2048 Signature | 6.05 | 11.06 |
| RSA 2048 Verification | 0.16 | 0.29 |

Table Shows The Application For Public-Key Cryptosystem

| Algorithm | Encryption/Decryption | Digital Signature | Key Exchange |
|----------------|-----------------------|-------------------|--------------|
| RSA | Yes | Yes | Yes |
| Elliptic Curve | Yes | Yes | Yes |
| Diffie-Hellman | No | No | Yes |
| DSS | No | Yes | No |

VII. CONCLUSION

Security of information in transit is a very important task in secured communication. Many Ciphers are available which have been developed by using arithmetic and logical operations. The two important desirable properties of the RSA cryptosystems are its speed and security. Speed refers to the time taken by the algorithm to convert a given plaintext to cipher text. The Key plays a very important role in encryption and decryption operations. The Security of the algorithm is based on the key size. The increase in the key size reduces the speed of the algorithm but in turn increases the security. Thus the aim of the designer is to design efficient cryptosystems with acceptable speed and appreciable security strength with large key length. Implementation procedures also play a major role in RSA cryptosystems design.

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