

ENHANCING SOCIAL COMPETENCE OF ENGINEERING STUDENTS THROUGH HOLISTIC EDUCATION

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ABSTRACT

A student is much more than just his/her intellect. A true education is one which caters to the development of cognitive, affective and psychomotor domains of an individual. Many profound thinkers and educators accept this holistic view of education. There is abundant research done to capture the various dimensions, depth and impact of holistic education in the development of various aspects of an individual - physical, emotional, mental, psychological, environmental, social and economical. The need, importance, dimensions, value and impact of social competence in the overall development of an individual through education is deconstructed in this paper. An attempt is made to present the outcome of an experimental research on holistic education and its impact on the social competence of engineering undergraduate students. The research design was single group pre-test, post-test and delayed post-test experimental design. The sample was drawn from the students pursuing first year engineering programme from a University in India. Statistically significant impact was observed on the social competence of the students after the holistic education training intervention. The findings of the present research have implication for education and training of emerging adults.

Key words: *Holistic Education, Social Competence, Social Competence Scale*

I. INTRODUCTION

Higher education institutions should strive to realize the holistic and integrated development of students. Integral formation, involves complete and solid formation of every aspect of a student's personality, to form an essential component of fundamental and distinctive educational philosophy. Higher education has undergone a lot of changes these days. The ultimate goal of education is not in just preparing students to get good placement with a good salary package. Instead, it should aim at developing various kinds of competencies. According to Devassy, (2012) the relentless search for truth, meaning, human dignity and values has been almost scratched from the primary objective of higher education[1]. Thapan (2001) speaks about the philosopher J. Krishnamurti's vision that "education cannot be only about reading and learning from books, but about the whole of life, and should prepare students to meet the challenges of living in a complex social world" [2]. True education for human beings is not only conveying and transmitting knowledge but also cultivating the intellectual, moral, and spiritual realm beyond one's physical body.

For this study, a small survey was conducted among 538 students studying in Christ University, Bangalore in India by Devassy (2012) [3]. Among the students who responded to the survey, there were five top perceived priorities for higher education. They are; ethical and moral development, social skills, personal skills, academic excellence and carrier development. Thus, keeping the expectations of stakeholders in mind the study was taken to experiment on developing a training program in the name of holistic education to enhance social competence and other skills in engineering students.

II. HOLISTIC EDUCATION

Holistic Education deals with the growth of every person's intellectual, emotional, social, physical, artistic, creative and spiritual dimensions. It actively engages students in the intellectual development process and encourages personal and collective responsibility. Its aim is to nurture healthy, whole, curious persons who can learn whatever they need to know in any new situation. Hare J. (2010) uses Miller's words to describe the features of holistic education. Miller has proposed that holistic education nurtures the broad development of the students and focuses on their intellectual, emotional, social, physical, creative or intuitive, aesthetic and spiritual potentials. It promotes the importance of relationships at all levels within a learning community in which the educator and student work together in an open and collaborative relationship [4]. The goal of holistic education is to nurture individuals to be intellectually competent, spiritually mature, morally upright, psychologically integrated, physically healthy and socially acceptable (CMI Vision, 1991) [5]. Hence, the focus is to enable an individual to go beyond the acquisition, generation and application of knowledge but to transcend to higher level of human understanding and service that one is capable of. Eisler gives three goals that are fundamental to education for the 21st century. They are (a) helping children grow into healthy, caring, competent, self-realized adults (b) providing them with the knowledge and skills that can see them through this time of environmental, economic, and social upheavals (c) equipping them to create for themselves and future generations a sustainable future of greater personal, social, economic, and environmental responsibility and caring (Eisler, 2005) [6].

According to Kim (2010) certain higher-order skills are critical to the development of human capital and citizenship in the twenty-first century. We have to learn to use our critical thinking and analytical reasoning skills to assemble and reconcile seemingly contradictory information to deal with problems that are not easily defined. We must be able to cogently communicate with others as we together solve the problems we share. Higher education must include teaching students how to access data, to judge what is most useful and appropriate, to think critically, and to write cogently and coherently [7].

III. SOCIAL COMPETENCE

According to Goldfriend & D'Zurilla (1969) social competence is "the effective response of the individual to specific life situations. Socially competent person manages well the circumstances which they encounter daily and possesses a judgment which is accurate in meeting occasions as they arise and rarely miss the expedient course of action" [8]. The socially competent individual is one who is able to make use of environmental and personal

resources to achieve a good developmental outcome (Waters & Sroufe, 1983) [9]. In a study of several hundred parents of high school-aged students, Krumboltz, Ford, Nichols, and Wentzel (1987) [10] found that social competence in the form of cooperation, respect for others, and positive interpersonal relationships were selected by almost all parents as an essential outcome for students to achieve, over and above academic accomplishments. In the same study, the teachers have also stated the 'ideal' students as having these following desirable outcomes besides other performance oriented and motivational qualities-socially assimilative characteristics such as sharing, being helpful to others and adhering to rules (Wentzel, 2000) [11].

As cited by Devassy and Raj (2012), social competence could be subdivided into eight dimensions expressing various skills. They are (a) School Competence - It refers to a student's ability to cope with academic, social and interpersonal contexts of the school or college. (b) Team Organizing Competence - it refers to the confidence with which a student can form teams. It also includes the acceptance in the team, emerging as a leader in the team, success in giving an identity for the team and readiness to take up leadership roles in school/college and elsewhere for a social cause. (c) Peer to peer social competence - It refers to the ability of the adolescent to initiate positive interactions, form affiliations to peer groups. It is the ability to easily make friends, keep friends, make new friends, being accepted by friends, and interact with friends socially. (d) Social Cognition Competence - It is the ability of a student to respect and promote the rights of others including those older to them and those who stand against them and resolve to promote and protect social equality and growth. In other words it is one's capability to respect the other in any circumstance. (e) Home related Social Competence - The ability to develop positive, holistic, open interactions with parents and siblings, to relate to all at home freely and feel free to express the emotions. (f) Socio-Emotional competence - It is the ability of the student to manage, balance, regulate and express emotions in the right proportions, correctly and effectively in social situations and interactions. (g) Social forethought and Compassion - compassion, empathy, forgiveness, caring, altruism are all considered dimensions of social competence. It covers the ability of the student to be sensitive to and understand the needs of others, to care for them, be non-judgmental, be non-violent in social interactions and interact with an attitude of forgiveness and empathy. (h) Social Flexibility- It is the ability to adapt smoothly and speedily to diverse social contexts and demands. The ability to manage conflicts in day to day life also comes under this component [12].

IV. NEED AND SIGNIFICANCE OF THE STUDY

Mentoring the students in the initial stages of their college life is indispensable. Students face difficulties in their first year of University on many issues. They join for higher studies with a lot of dreams and expectations. They come from wide range of educational backgrounds: some from International Baccalaureate program, honors program, State syllabus, Central syllabus and so on. There are cases where high school success or failure doesn't apply to college. This is the time one begins the transition into adulthood. The decisions that a student makes and the actions he or she takes during the first year of college will have a major impact on the rest of his or her college experience and the future career.

Adolescence is the period of growth. It is a challenge to grow in competencies, leadership skills, personal and interpersonal skills and various other skills. It is the period of human development during which a young person must move from dependency to independence, autonomy and maturity. However, adolescents have frequently been called “the terrible teens” (Hurlock 1981) [13]. This is the most formative and impressionable age when the maximum amount of physical, psychological and behavioral changes take place. The very young adults in colleges need proper support and guidance from the elders during their transition stage. During this period the role of the educational institution in nurturing, facilitating and enhancing the competence, and various life skills is very important. Though, there is an increased awareness about the need and scope of holistic education in the institutions of higher learning, there is shortage of trained professionals and teaching materials.

There is a tendency among technical students, especially engineering students, to spend most of their time and energy to acquire technical knowledge than developing a good personality. In the present technological and mechanistic society an engineering student tries to learn to be a good computer or a good machine. There is less training for a living or training for life. Thus, students need to have holistic education program included in their training period to have better values and skills. So far, there are no research studies available on holistic education in relation to social competence of engineering students. The researcher hopes that this study will fill the gap and give a substantial contribution in this field. This research will create a greater awareness among the academicians, administrators and managers of technical educational institutions about the need for a mandatory course in holistic education, which will enhance social competencies.

V. OBJECTIVES

1. To measure social competence of engineering students.
2. To develop a package on holistic education.
3. To find out the impact of holistic education on social competence.

VI. HYPOTHESIS

There is no significant impact of holistic education on social competence of engineering students.

VII. METHOD

7.1 Tool for Data Collection

The social competence of students was measured by the Adolescent Social Competence Scale (ASCS) constructed and standardized by Devassy and Raj (2012) [13]. The scale with 37 items in five-point scale in the line of Likert Scale, measures eight dimensions of adolescent social competence.

7.2 Participants

Fifty five students in the age group of 17 to 18 attending first year engineering program from a University in Bangalore were selected for the present research. All these students participated in the intervention programme. Among the participants 31 were males and 24 were females. They belong to different branches of engineering and

represent various states of India. Informed consent was taken from the students, the dean and the concerned coordinator of the programme.

7.3 Research Design

The research design employed in the present study was one group pre-test post-test delayed post-test experimental design. Standardized tool on social competence was administered before giving the intervention and the same was administered immediately after the intervention program. After four weeks of intervention the same tool was re-administered again. Normality of scores is tested with Shapiro Wilk test of normality. Significance of the differences at various phases of the research is tested with repeated measure of ANOVA and Friedman's ANOVA. Partial eta squared and Kendall's coefficient of concordance was used as a measure of effect size.

7.4 Procedure

Initially, informed consent was taken from the participants and the university authorities. The measure of social competence was given to the participants for self rating. After that, the treatment was given in four units. The first unit had six sessions; Social Competence- Introduction, Adaptability and Adjustability, Relationships, Emotions, Art of Forgiving and Self Esteem of two hours each emphasizing the social competence aspect. The second unit also had six sessions; On Leadership Skills, Followership and Leadership, Goal Setting, Communication Skill, Critical/creative thinking and Decision making, Humility and Self Assertion of two hours each Emphasizing more on leadership skills. The third unit consisted of five sessions; Introduction on Values, Personal Values –I, Personal Values –II, Social Values and Spiritual Values of two hours each concentrating on personal values. The fourth unit consisted mainly of outdoor activities; Rural Camp/ Village Exposure for two days and one night. One day tour was also organized to an Amusement Park. They spent one full day in developing confidence, team work and other skills.

Each unit is reviewed through case studies, worksheets, questionnaires, quizzes, role-plays, poster and collage making and a unit test. There was a comprehensive written exam after all the sessions on Holistic education. The tool of social competence was administered after the completion of the intervention programme. After four weeks of intervention, once again the tool was administered to find the sustainability of the impact of the programme.

VIII. RESULTS

Summary of Repeated measure ANOVA and Friedman's ANOVA performed for social competence is presented below.

Table 1

Social competence at pre test, post test and delayed post test phases with all components

Variables	Phases						η^2	Sig.
	Pre test		Post test		Delayed post test			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		

School	27.16	3.617	35.02	2.343	35.35	2.171	98.452	.000
Team	17.91	3.966	24.40	2.506	24.87	2.365	100.615	.000
Peer	18.57	2.722	23.98	1.408	24.02	1.446	103.714	.000
Cognition	11.19	1.395	14.16	.834	14.29	.737	102.583	.000
Home	15.03	2.575	19.40	1.075	19.40	1.029	104.733	.000
Emotional	10.14	1.801	13.00	1.257	13.29	1.301	94.640	.000
Forethought	14.84	2.024	18.97	1.154	19.15	1.113	105.653	.000
Flexibility	13.09	2.550	17.71	1.140	17.80	1.238	98.982	.000
Total	127.93	12.311	166.62	7.909	168.16	7.797	96.185	.000

Friedman's ANOVA presented in the Table 1 indicates that scores of social competence increased significantly from pre-test to post-test phase and post-test to delayed post- test phase of the research for all sub variables under this study namely school social competence, team organizing social competence, peer to peer socialization competence, social cognition competence, home related social competence, socio-emotional competence, social forethought and compassion competence, and social flexibility competence. The total of Friedman's ANOVA presented in the table 1 shows that scores of social competence increased significantly from pre-test to post-test phase and post-test to delayed post- test phase of the research, $\chi^2(2) = 96.185, p = .000$. It is observed that the effect size of the intervention on social competence is 87.4 percentage and $W = .874$.

IX. CONCLUSIONS

This experimental research was aimed at finding the impact of Holistic Education on the social competence of Engineering students. A null hypothesis was formulated and tested for its statistical significance. The results show that the Holistic Education intervention has impacted the social competence of engineering students and hence the null hypothesis was rejected. Also, it is observed that holistic education has enhanced significantly all the important eight components of social competence of the students.

The intervention study was limited to a small sample. Hence, it may not be concluded that Holistic Education can positively impact the social competence of all engineering students, though the intervention in the present study had positive impact. This intervention study was conducted in only one particular university. The results may not be also

generalized to other populations. The result may vary based on the socio-economic condition of students and the culture and value system of each university or college.

X. IMPLICATIONS

The study has implications for both practice and further research. The intervention can be incorporated in engineering education and training to enhance various competencies of students. The researcher recommends the course curriculum developed for holistic education to all technical institutions in India and abroad. Further research could be done to find the impact of Holistic education on other students of non technical back grounds. We could also include some more modules to improve other skills and competencies of students. It would be desirable to make a comparative research to find the difference in the impact of Holistic Education in various colleges and universities with different specialization of study. The same research can be extended on a larger population for better generalization of the results.

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OPERATION OF PC THROUGH A LIP MOUSE: A REVIEW

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ABSTRACT

A Lip mouse system is a non-obtrusive method that helps a user to work on a computer using movements and gestures made with his/her mouth only, especially for handicapped people; it is a great source of interaction with a Computer. The system tracks the computer user's movements with a video camera and translates them into the movements of the mouse pointer on the screen. The entire procedure includes detection, gesture recognition, region extraction, localization, shape approximation and cursor movement. This paper presents a review of the work done on a Lip Mouse for a computer and also presents the advantages and disadvantages of various approaches.

Keywords: *Extraction, Face Detection, Human Computer Interface, Localization, Segmentation.*

I INTRODUCTION

A Human Computer Interface (HCI) system called "The Lip Mouse" is evaluated in this paper. It tracks a user's movements with a video camera and translates them to the movements of the mouse pointer on the screen. Human-Computer Interface (HCI) systems are key components in allowing persons with severe disabilities to communicate with family, friends and caregivers. In many cases, persons with severe disabilities are non-verbal and have limited voluntary movement that greatly hinders their ability to share their needs and desires with others. An assistive HCI device like the "Camera Mouse" [1, 3] not only allows severely disabled people to communicate their wants, but also allows them to use the computer for educational and recreational and other purposes.

Lip image segmentation and lip movement tracking is a cumbersome task, mainly because of a very small contrast between lips and a face skin. The earlier approaches required user preparation, such as placing marks on a user face or particular make-up, but the newer approaches don't.

Lip image is usually segmented by the means of transforming RGB color space into desired space such as-CIE-LUV, HSV or YCbCr. Authors have also proposed a new transformation called a chromatic curve map. An automatic lip segmentation algorithm has been described based on the wavelet multi-scale edge detection across the discrete Hartley transform [4].

Another method for lip segmentation utilizes creating a lip shape model and fitting it to a lip image. Lip shape models may be based on deformable templates, active contour models or active shape models and they generally use a set of feature points to approximate the lip contours [5].

Color dissimilarity between lip and skin and a spatial distance from an ellipse approximating lip shape in order to facilitate lip segmentation has been combined by another method. In this method various mouth shapes are used for lip reading. Another system is able to control the mouse based on eye and mouth movements.

Lip Mouse is based on the principle of any usual camera mouse. A camera mouse system is usually composed a video camera for capturing video frames and a processing unit like a computer which uses image processing algorithm to convert the motion events in video frames to mouse operations. The algorithm is usually formed from two different modules- a visual tracking module and a mouse control module. The visual tracking module retrieves motion information from the video, and the mouse control module specifies the rules of control [1]. Face detection proposed by Viola and Jones based on statistic methods is most popular among the face detection approaches. This face detection is a variant of the AdaBoost algorithm which achieves rapid and robust face detection. They proposed a face detection method based on the AdaBoost learning algorithm using Haar features that detected the face successfully with high accuracy. However the accuracy of the method is still not enough when this method is used to detect facial feature [14].

A Lip Mouse is thus a great means of Human Computer Interface and helps the handicapped people to use computer easily.

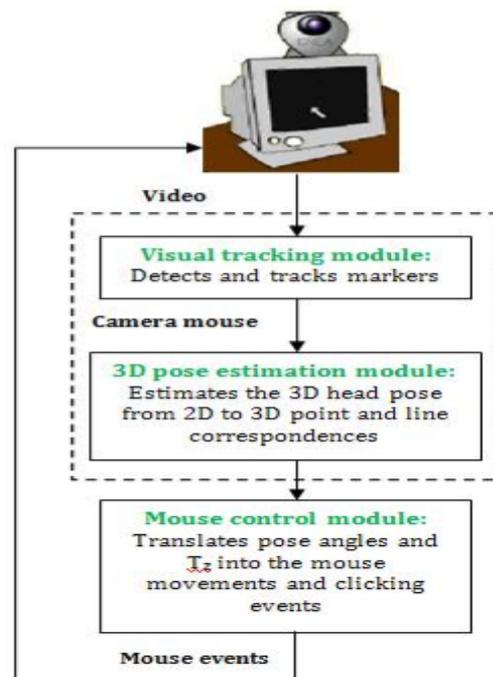


Figure 1: The block diagram of a camera mouse implementation [6].

II HUMAN COMPUTER INTERFACE ELUCIDATION

As technology is getting to play an important role in enhancing the quality of life, more and more research is being directed towards natural Human-Computer Interaction. People usually hope to use the most natural and convenient ways to express their intentions and interact with the environment. The most traditional means of giving commands to household appliances is button pressing, and is used in the remote control panel.. Such kind of operation, however, is not easy to use, especially for elders or visually disabled people who are not able to distinguish the buttons on the device. In this regard, gesture-based interaction offers an easy and alternative way in a smart environment for such people [2].

Lip Mouse is a novel, patent-pending, contactless, human-computer interface that allows a user to work on a computer using movements and gestures made with his or her mouth only. Lip Mouse is an application running on a standard PC computer. It requires only one hardware component: a display-mounted, standard web camera that captures images of the user face. The main task of Lip Mouse is to detect and analyze images of user's mouth region in a video stream acquired from a web-camera. All movements of mouth (or head) are converted to movements of the screen cursor. Various parameters regarding speed of the cursor movement may be set according to user preferences [2]. Lip Mouse also detects different mouth gestures. Each gesture may be associated with an action, which may be freely chosen by a user. Possible actions include clicking or double-clicking various mouse buttons, moving mouse wheel and others. Many actions may be defined as single or continuous ones. The single actions are executed only once, in the very moment when a new gesture is detected; continuous actions are executed as long, as a gesture is kept. For example, opening mouth gesture may be connected with an action executing left mouse button click in the moment or single click of the mouse, when the mouth is opened, or with an action that keeps left mouse button pressed as long, as a user keeps his/her mouth open. Additionally, based on the mouth (head) movement speed, Lip Mouse detects two other gestures (head shaking "Yes" and "No") that consist in shaking a head energetically in vertical or horizontal direction [7].

It allows a user to configure Lip Mouse according to his preferences. In the right part of the window, vertically-flipped video frames from the camera are displayed (a user sees his mirror-like reflection). In the frames, the mouth region is denoted with a rectangle, and the lip shape is denoted with an ellipse. Before a user starts working with Lip Mouse, a short calibration lasting about 30 seconds needs to be executed. During the calibration, the user is asked to perform some head movement and gestures according to the instructions seen on the screen. The purpose of the calibration is to tune Lip Mouse to detect gestures made by the user in the current lighting conditions. The target users for the tool are people who, for any reason, cannot or do not want to use traditional input devices. Therefore Lip Mouse is a solution enabling severely disabled and paralyzed people to use a computer and communicate with the surrounding world. No user adaptation, such as placing marks on the face, is required in order to successfully work with Lip Mouse [8].



Figure 2: Lip Mouse application main window [1]

III AN OVERVIEW OF LIP MOUSE METHODOLOGY

Figure 3 presents a scheme of the algorithm used in Lip Mouse. First, a user's face is detected in every image frame captured by a web camera. Further stages of the algorithm are restricted to the ROI containing the user's face. Then, a mouth region is localized and its shift from the reference mouth position is calculated. This shift is directly used to move a screen cursor. Simultaneously, a small region (blob) placed on user lips are found in

mouth region. This region is used as a starting condition for an iterative method for lip shape extraction. Lip shape and lip region image features are used by an intelligent decision system utilizing an artificial neural network to classify gestures made by a user [9].

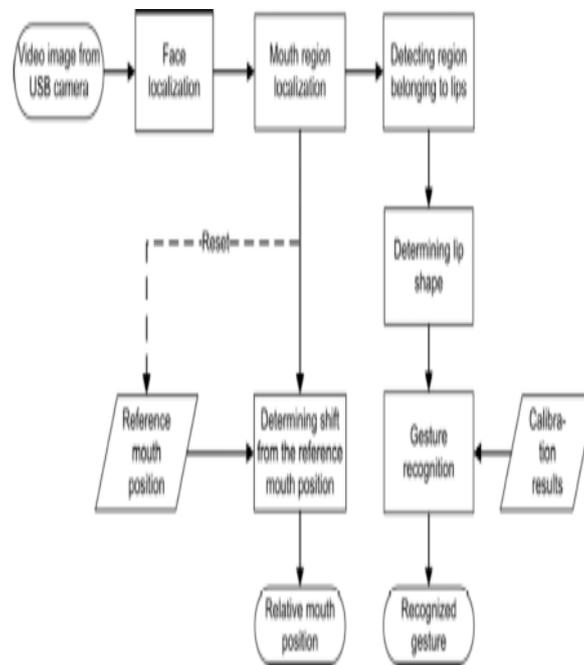


Figure 3: Block diagram of Lip mouse methodology [1].

IV DETECTION, LOCALISATION, EXTRACTION AND RECOGNITION

A cascade of boosted classifiers working with Haar-like features is used to detect a user's face in images captured by a web camera. It is a very efficient and effective algorithm for visual object detection. Each classifier in the cascade consists of a set of weak classifiers based on one image feature each. Features used for face detection are grey-level differences between sums of pixel values in different, rectangle regions in an image window. The window slides over the image and changes its scale. Image features may be computed rapidly for any scale and location in a video frame using integral images [1]. For each window, the decision is made whether the window contains a face; all classifiers in the cascade must detect a face for the classification result to be positive. If any classifier fails to detect a face, the classification process is halted and the final result is negative. Classifiers in the cascade are trained with Ada Boost algorithm that is tuned to minimize false negatives error ratio. Classifiers in the cascade are combined in the order of increased complexity; initial classifiers are based on a few features only [8]. This makes possible for the algorithm to work in the real time because it allows background regions of the image to be quickly discarded while spending more computation on promising regions. Face detection algorithm finds location of all faces in every video frame. It is assumed, that only one person is present in the camera field of view therefore only the first face location is used for further processing. In order to increase speed of the face detection and to make sure that the face is large enough to recognize lip gestures, the minimal width of a face was set to the half of the image frame width. Sample results of face detection and mouth region. The mouth region is localized arbitrary in the lower part of the face region detected. It is defined by the half-ellipse horizontally centered in the lower half of the face region. The width

and the height of the half-ellipse is equal to the half of the height and half of the width of the face region, respectively. Only the mouth region of each video frame is used for lip gesture recognition [6].

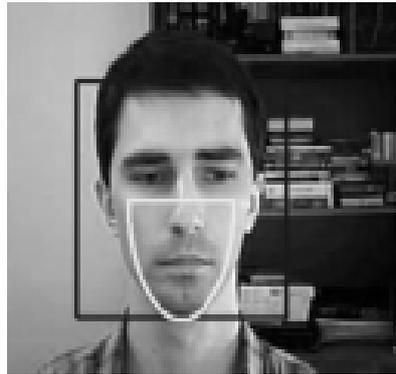


Figure 4: Face detection and mouth region finding [2].

The Lip gesture is recognized by using any of the techniques such as Artificial Neural Network etc. A feature vector for the ANN contains parameters describing image region containing lips only. A feed-forward ANN with one hidden layer is used to detect lip gestures. Each image frame is classified independently [3].

The lip region is then extracted using ellipse phenomenon. An ellipse is formed around the lips which can be varied according to the shape of the lip. . The centre of the square is located at the centre of the ellipse, and the length of sides is equal to the half of the width of the whole mouth region [5].

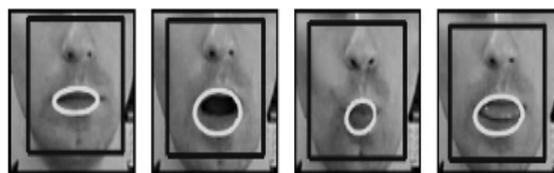


Figure 5: Lip shape detection [5].

In order to facilitate lip gesture recognition by ANN, an algorithm for determining region of the image containing lips only must be very precise and has to be robust against head movements in the vertical and horizontal directions. In order to locate lips, a series of face image transformations is performed. First, an image is smoothed with Gaussian filter and converted from RGB color space to the CIE LUV space. The U component of LUV space and the third component C3 of DHT transform are used for further processing, because they provide distinct, linear separation of lip and non-lip areas. These two components are multiplied in order to increase the differences.

The lip image features are thus extracted using image extraction and the cursor movements are made. A reference position is set and the distance in reference to this position is responsible for how far the mouse cursor moves [10].

V LIP CONTROL SYSTEM USING A JOYSTICK

Another method can be using a Lip Joystick. A great advantage of the joystick is the possibility of soft and free movements in any direction. Chin control and mouth joystick depend on neck move human-computer interface with a headset and a joystick positioned in front of the lower lip. The studies to develop the prototype showed that the lip control must be head mounted in order to capture the lower lip muscles movements. The joystick, as an interaction method, was chosen because it is easy to use, provides an intuitive control, is compatible with the lips movements; the body must be fixed and the head must be able to move freely [5].

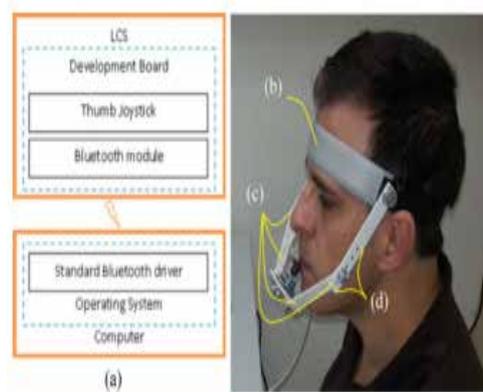


Figure 5: (a) Architecture (b) Head support (c) Joystick support (d) Calibration holes [7]

VI ADVANTAGES AND DISADVANTAGES

Lip mouse is a very feasible method for the physically disabled people to communicate with a computer. It is a novel, patent-pending, and contactless human-computer interface that allows a user to work on a computer using movements and gestures made with his or her mouth only [1].

Thus it becomes simpler for the people with any of the disabilities, especially the users with Tetraplegia. But there are certain limitations also for the same. Vibration during the drive and body spasms (common in spastic tetraplegia) can generate false commands. Outside the wheelchair, the user has no control, due to the dependence of the apparatus on the wheelchair structure [3].

VII CONCLUSION AND FUTURE WORK

Various techniques for the lip gesture that have been studied here prove to be very useful and easy for use. In future, the work can be done on improving each of the techniques and new ideas can be discovered to make the methods easy. Various methods include Viola Jones, skin pixel detection etc. and each of the method have their own advantages and limitations. The system can be made faster and accurate, different search algorithm techniques can be used [12] and also can design the library software to auto-generate a folder for most used hand gesture by the user and discarding the least used one. This would make the search process faster and better for the user. Future work includes not only improvement of the designed strategy but also taking into account more challenges such as dynamic gestures. The final objective involves a system does not generate false commands and detects the lip gestures efficiently.

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PRIVACY-PRESERVING OPTIMAL MEETING LOCATION DETERMINATION ON MOBILE DEVICES

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ABSTRACT

Protecting privacy in location based services is an important requirement in wireless communication. Many privacy preserving approaches exist that allow protecting privacy in location based services. These applications often rely on current (or preferred) locations of individual users or a group of users to provide the desired service, which jeopardizes their privacy users do not necessarily want to reveal their current (or preferred) locations to the service provider or to other, possibly un-trusted users. The main aim of privacy-preserving algorithms is determining an optimal meeting location for a group of users.

Privacy evaluation is performed by formally quantifying privacy-loss of the proposed approaches. The performance of privacy preserving algorithms is determined by implementing and testing their execution efficiency on Nokia smart phones.

Keywords-Jeopardizes, Mobile application, Privacy

I. INTRODUCTION

The rapid growth of smart phone technology in urban communities has enabled mobile users to context aware services on their devices. Context aware service is a computing technology which incorporates information about current location of a mobile user to provide more relevant service to the user. Service providers make use of this context aware service to provide context-dependent services for mobile subscribers. Location sharing based services (LSBS), for example are used by millions of mobile subscribers every day to obtain location-specific information [1].

Privacy protection is of great importance for such service users in mobile and wireless networks. However, as mobile devices are highly autonomus and heterogeneous, it is challenging to design generic protection techniques and achieve high level of privacy protection. Investigate the problem of privacy loss in location sharing based services. Formulate the privacy issue in LSBSs by focusing on a specific problem called the Fair Rendez-Vous Point (FRVP) problem. Given a set of user location preferences, the FRVP problem is to determine a location preferences, the FRVP problem is to determine a location among the proposed ones such that maximum distance between this location and all other user's location is minimized, i.e. it is fair to all users. The main goal is to provide practical privacy-preserving techniques to solve the FRVP problem, such that neither a third-party, nor participating users, can learn other users locations. Participating users only learn the optimal location.

Privacy of a user's location or location preferences, with respect to other user's and the third-party service provider, is a critical concern in location-sharing-based applications. For instance, such information can be used to de-anonymize users and their availabilities, to track their preferences or to identify their social networks.

Without effective protection, even sparse location information has been shown to provide reliable information about a user's private sphere, which could have severe consequences on the user's social, financial and private life. Even service providers who legitimately track user's location information in order to improve the offered service can inadvertently harm user's privacy, if the collected data is leaked in an unauthorized fashion or improperly shared with corporate partners.

II. RELATED WORK

Bingham and Martin (2001) [2] considered the all-inclusive travel costs for multiple participant meetings. Bingham and Martin method is based on costs measured in currency, and it optimizes for minimizing total travel cost for all participants, considering such components as airfare, hotel, local transportation, meals, etc. It is appropriate for planning larger meetings (such as conferences, conventions, and trade shows) since any "errors" for each participant are offset by reciprocal errors for other participants, and for a large number of participants, the overall cost is negligible. However, their method is not practical when groups are small, or when other travel costs (e.g., participant time) are a more important consideration.

Chithambaram and Miller (2005) [3] introduced a system to find the meeting location that is the closest to the geographic center of several participants. Their method averages the latitudes and longitudes of each participant. It proposes the "best" meeting place by selecting the nearest location to the center from a list of points of interest.

Kaufman and Ruvolo (2006) [4] introduced a method to optimize location selection, considering the current locations of the participants (obtained from GPS coordinates or the location of other events in the participants' calendars). Their method calculates the proposed location based on proximity to the participants and availability of the resources needed at the location. Their method serially applies "filters" such as airfares, but does not solve in aggregate such potentially conflicting multi-criterial costs as money, time, or social constraints. These preferential weights have potential to "zero out" optimal location meeting sets.

Santos and Vaughn (2007) [5] presented a survey of existing literature on meeting-location algorithms and propose a more comprehensive solution for such a problem. **Friends Together:** If five friends want to get together at a restaurant. Two will be leaving from their workplaces, another is arriving at the local airport, one is finishing class at the university, and another will be leaving from home. Some will be driving, some will be taking public transportation, and some will have a choice. And all can walk. They want to get together immediately to eat. There are over 1,000 restaurants in this metro area, and many are acceptable to all. Where shall they go?

III. PROBLEM DESCRIPTION

Privacy of a user's location or location preferences, with respect to other user's and the third-party service provider, is a critical concern in location-sharing-based applications. For instance, such information can be used to de-anonymize users and their availabilities, to track their preferences or to identify their social networks.

Without effective protection, even sparse location information has been shown to provide reliable information about a user's private sphere, which could have severe consequences on the user's social, financial and private life. Even service providers who legitimately track user's location information in order to improve the offered service can inadvertently harm user's privacy, if the collected data is leaked in an unauthorized fashion or improperly shared with corporate partners.

The main goal is to provide practical privacy preserving techniques to solve the FRVP problem, such that neither a third-party, nor participating users, can learn other users' locations; participating users only learn the optimal location. The privacy issue in the FRVP problem is representative of the relevant privacy threats in LSBSs.

IV. PROPOSED SYSTEM

The privacy issue in LSBSs is solved by focusing on a specific problem called the *Fair RendezVous Point (FRVP)* problem. Given a set of user location preferences, the FRVP problem is to determine a location among the proposed ones such that the maximum distance between this location and all other users' locations is minimized, i.e. it is *fair* to all users. The goal is to provide practical privacy-preserving techniques to solve the FRVP problem, such that neither a third-party, nor participating users, can learn other users' locations, participating users only learn the optimal location. The privacy issue in the FRVP problem is representative of the relevant privacy threats in LSBSs.

The FRVP problem is formulated as an optimization problem, specifically the k-center problem and then analytically outlines the privacy requirements of the participants with respect to each other and with respect to the solver (in this case, a third-party service provider). Then two algorithms are used for solving the above formulation of the FRVP problem in a privacy-preserving fashion, where each user participates by providing only a single location preference to the FRVP solver or the service provider. Two algorithms take advantage of the homomorphic properties of well-known cryptosystems, such as BGN, ElGamal and Paillier, in order to privately compute an optimally fair rendez-vous point from a set of user location preferences. Practically efficiency and performance of two algorithms is tested by means of a prototype implementation on a test bed of Nokia mobile devices.

V. CONCLUSION

Mobile has become a vital communication tool which everyone prefers to possess and carry along. The privacy issue in the Fair Rendez-Vous Problem (FRVP) is addressed effectively. The solutions are based on the homomorphic properties of well-known cryptosystems. The implementation and evaluation and the performance of algorithms are based on real time process.

The proposed solutions preserve user preference privacy and have acceptable performance in a real implementation. Moreover, the proposed algorithms are extended to include cases where users have several prioritized locations preferences. Finally, based on an extensive user-study, the proposed privacy features are crucial for the adoption of any location sharing or location-based applications.

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ACKNOWLEDGEMENT

The authors would like to thank Kalpataru Institute of Engineering & Technology, Bangalore for their co-operation and support.

PARTICLE FILTERING BASED AUTOMATED IRIS TRACKING AND BLINK DETECTION

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ABSTRACT

Eye blinking is a physiological necessity for humans. This system is intended to provide an alternate input modality to allow people with severe disabilities to access a computer. The system is efficient for Human Computer Interface (HCI) that can detect and track the human eyes. It can also capture the eye blinks and duration of the blinks, using them to provide input to the computer in the form of a mouse click. The system consist of mainly three phases eye detection, blink detection and eye tracking .The system is capable to work under variable lightning conditions and several different face orientations in a real-time sequence of images. The system is designed for use by people that are severely paralyzed. The system works with inexpensive USB cameras and runs at a frame rate of 30 frames per second.

Keywords— *Hci, Eye Detection, Eye Tracking, Blink Detection, Template Creation , Particle Filters*

I. INTRODUCTION

The motivation for the system proposed here is to provide an inexpensive ,unobtrusive means for disabled people to interact with simple computer applications in a meaningful way that requires minimal effort.The eye detection stage uses an automatic initialization phase triggered by the analysis of involuntary blinking of the current user of the system which creates an online template of the eye to be used for tracking.This phase occurs each time the current correlation score of the tracked eye falls below a defined threshold in order to allow the system to recover and regain its accuracy in detecting the blinks.The eye tracking is a mechanism for finding and tracking human eye in a set of real time images.The process of tracking human eye can be used to estimate the direction of interest of the eye gaze.Eye tracking can be applied to a wide variety of areas including human vigilance, driver fatigue detection and assisting people with any type of disability.The eye tracking is implemented through the use of particle filters.that are under variable lightning conditions.The detection and analysis of blink duration is based on observation of correlation scores.As the users eyes closes during the process of a blink its similarity to the open eye decreases.It regains its similarity to the open eye as the blink ends and the users eye becomes fully open again.

II. RELATED WORKS

To detect the eyes and to track the eyes several methods are there:

2.1 Eye Detection Methods

During the last years an iterative thresholding [1] algorithm was there to detect the eye regions on a human face. This method is robust under variable lightning conditions and without any marks in the user's face. Another method to detect human eyes is using Mean shift [2]. This method detects facial features through image processing techniques and then separates eye from the face.

For eye detection cascaded Haar classifiers [3] can also be used, proposed by Viola and Jones. The main principle behind Haar classifier object detection is the Haar-like features. Haar-like features can be used to detect and recognize specific features in facial images such as nose and eyes. The cascading of the classifiers allows that the detection system only selects the main points of interest in an image that have highest probability to be defined for all Haar-features that constitute an object. To train the classifiers are used two different set of images defined as negative and positive images. Positive images contain the objects to be detected, here the faces and the eyes. Negative images do not contain the objects that we are interested in their detection.

2.2 Eye Tracking Methods

Detection and tracking of the human eye is a complex task and normally the existing eye tracking system has a high cost and requires high computational resources. A method for gaze tracking using neural networks [4] was proposed earlier. Results demonstrate that neural networks can be successfully applied in the estimation of the position of the eye gaze using as input a sequence of people images. Kalman filtering [5] and Mean shift tracking can be also used for eye tracking. The eye tracking system is fast on the control of the eye movements, automated and it needs small computational requirements. A discrete Kalman filter is developed for the recursive estimation of the eye regions. Its application allows encompass the system information and the measurement noise in its dynamics model, and deal with signals that change with time.

III. SYSTEM ARCHITECTURE

This system mainly consist of three parts

- Eye Detection
- Blink Detection
- Eye Tracking

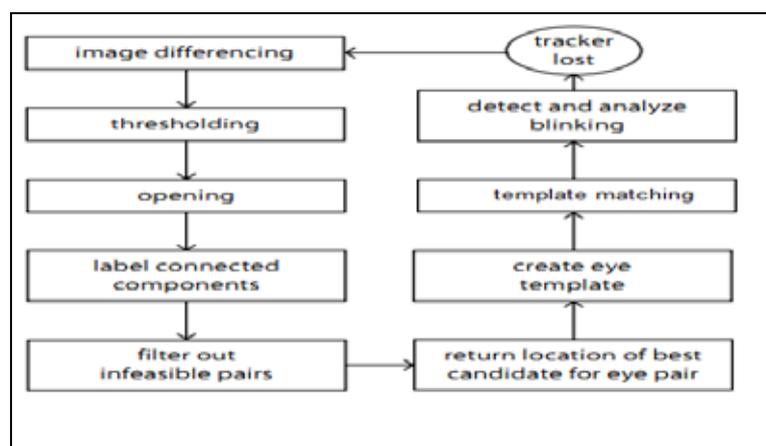


Fig 1: Overview of Main Stages of the System

3.1 Eye Detection

The eye detection technique used in this system is based on the online creation of a template of the open eye to be used for the subsequent tracking and template matching that is carried out at each frame. The first step in analyzing the blinking of the users is to locate the eyes. It mainly consist of two steps.

- Automatic Initialization
- Template Creation
- Template Matching

3.1.1 Automatic Initialization

To locate the eyes the difference image of each frame and the previous frame is created and then thresholded, resulting in a binary image showing the regions of movement that occurred between the two frames. To eliminate a great deal of noise and naturally-occurring jitter that is present around the user in the frame due to the lighting conditions and the camera resolution, as well as the possibility of background movement an Opening Morphological operation [6] is used. For that a 3x3 star-shaped convolution kernel is passed over the binary difference image. this Opening operation also produces fewer and larger connected components in the vicinity of the eyes (when a blink happens to occur).

A recursive labeling procedure is applied next to recover the number of connected components in the resultant binary image. Under the circumstances in which this system was optimally designed to function, in which the users are for the most part paralyzed, this procedure yields only a few connected components, with the ideal number being two (the left eye and the right eye). If other movements occurred it will produce a larger number of components then the system discards the current binary image and waits to process the next involuntary blink in order to maintain efficiency and accuracy in locating the eyes.

For an image with a small number of connected components output from the previous processing steps, the system is able to proceed efficiently by considering each pair of components as a possible match for the user's left and right eyes. The filtering of unlikely eye pair matches is based on the computation of six parameters for each component pair: the width and height of each of the two components and the horizontal and vertical distance between the centroids of the two components. A number of experimentally-derived heuristics are applied to these statistics to pinpoint the exact pair that most likely represents the user's eyes. If there is a large difference in either the width or height of each of the two components, then they likely are not the user's eyes. Also if there is a large vertical distance between the centroids of the two components, then they are also not likely to be the user's eyes, since such a property would not be humanly possible. These observations not only lead to accurate detection of the user's eyes, but also speed up the search greatly by eliminating unlikely components immediately.

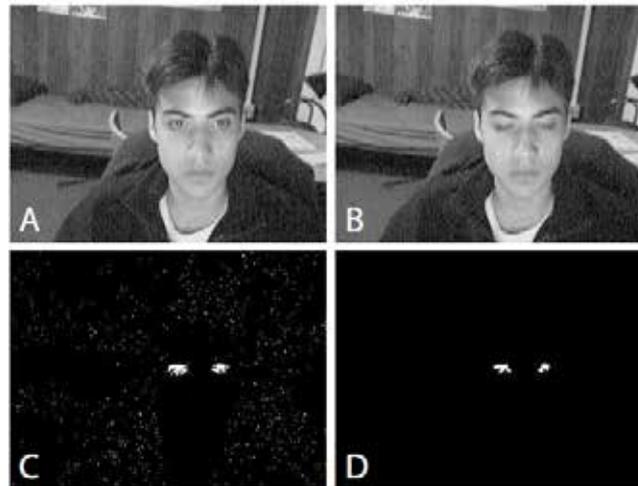


Fig 2: Formation of Connected Components through Frame Differencing and Result of Opening Operation (A) User at frame f . (B) User at frame $f+1$, having just blinked. (C) Initial difference of the two frames f and $f+1$. Note the great deal of noise in the background due to the lighting conditions and camera properties. (D) Difference image used to locate the eyes after performing the Opening operation.

3.2 Template Creation

The results from the previous stage that passes the set of filters then it is a good indication that the user's eyes have been successfully located. The location of the larger of the two components is chosen for creation of the template. The size of the template that is to be created is directly proportional to the size of the chosen component, the larger one is chosen for the purpose of having more brightness information, which will result in more accurate tracking and correlation scores.

The system will be tracking the user's open eye, it would be a mistake to create the template at the instant that the eye was located, since the user was blinking at this moment. Once the eye is believed to be located, a timer is triggered. After a small number of frames elapse, which is judged to be the approximate time needed for the user's eye to become open again after an involuntary blink, the template of the user's open eye is created. Therefore, during initialization, the user is assumed to be blinking at a normal rate of one involuntary blink every few moments. No offline templates are necessary and the creation of this online template is completely independent of any past templates that may have been created during the run of the system.



Fig 3: Open Eye Templates from Very Small To Large In Overall Size

3.3 Template Matching

Template matching is necessary for the desired accuracy in analyzing the user's blinking since it allows the user some freedom to move around slightly. The primary purpose of such a system is to serve people with paralysis, it is a desirable feature to allow for some slight movement by the user or the camera that would not be feasible if motion analysis were used alone. To perform the template matching the normalized correlation coefficient is computed using the formula:

$$\frac{\sum_{x,y} [f(x,y) - \bar{f}_{u,v}] [t(x-u, y-v) - \bar{t}]}{\sqrt{\sum_{x,y} [f(x,y) - \bar{f}_{u,v}]^2 \sum_{x,y} [t(x-u, y-v) - \bar{t}]^2}}$$

where $f(x,y)$ is the brightness of the video frame at the point (x,y) , $\bar{f}_{u,v}$ is the average value of the video frame in the current search region, $t(x,y)$ is the brightness of the template image at the point (x,y) , and \bar{t} is the average value of the template image. The result of this computation is a correlation score between -1 and 1 that indicates the similarity between the open eye template and all points in the search region of the video frame. Scores closer to 0 indicate a low level of similarity, while scores closer to 1 indicate a probable match for the open eye template. A major benefit of using this similarity measure to perform the tracking is that it is insensitive to changing lighting conditions.

This method requires an extensive amount of computation and is performed 30 times per second, the search region is restricted to a small area around the user's eye. This reduced search space allows the system to remain running smoothly in real time since it drastically reduces the computation needed to perform the correlation search at each frame.

3.4 Blink Detection

The detection of blinking and the analysis of blink duration are based solely on observation of the correlation scores generated by the template matching[7] at the previous step using the online template of the user's eye. As the user's eye closes during the process of a blink, its similarity to the open eye template decreases. Likewise, it regains its similarity to the template as the blink ends and the user's eye becomes fully open again. This decrease and increase in similarity corresponds directly to the correlation scores[7] returned by the template matching procedure. Close examination of the correlation scores over time for a number of different users of the system reveals rather clear boundaries that allow for the detection of the blinks. As the user's eye is in the normal open state, very high correlation scores of about 0.85 to 1.0 are reported. As the user blinks, the scores fall to values of about 0.5 to 0.55. Finally, a very important range to note is the one containing scores below about 0.45. Scores in this range normally indicate that the tracker has lost the location of the eye. In such cases, the system must be reinitialized to relocate and track the new position of the eye.



Fig 4: Sample frames of a typical session: (A) The system is in this state during themotion analysis phase.

The red rectangle represents the region that is considered during theframe differencing and labeling of connected components.(B) The system enters this state once the eye is located and remains this way as long as the eye is not believed to be lost. The green rectangle represents the region at which the open eye template was selected and the red rectangle now represents the drastically reduced search space for perform-ing the correlation. (C) User at frame f , with eyes alreadyclosed for the defined voluntary blink duration and (D) user at frame $f + 1$, opening his eyes, with a yellow dot being drawn on the eye to indicate that a voluntary blink just occurred.

The system detects voluntary blinks by using a timer that is triggered each time the correlation scores fall below the threshold of scores that represent an open eye. If the correlation scores remain below this threshold and above the threshold that results in reinitialization of the system for a defined number of frames that can be set by the user, then a voluntary blink is judged to have occurred, causing a mouse click to be issued to the operating system.

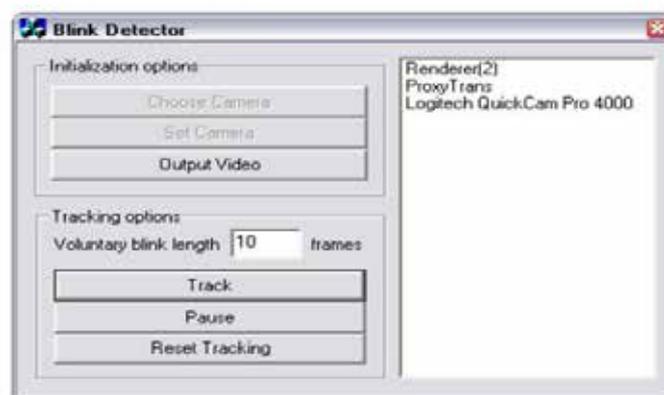


Fig 5: System Interface

3.5 Eye Tracking

For Eye tracking a particle filtering approach is used. Particle filters are sequential analogues of Markov chain Monte Carlo (MCMC) batch methods. They are also known as Sequential Monte Carlo (SMC) methods.

Particle filters are widely used in positioning, navigation, and tracking for modeling dynamic systems. The basic idea of particle filtering is to use point mass, or particles, to represent the probability densities. The tracking problem can be expressed as a Bayes filtering problem, in which the posterior distribution of the target state is updated recursively.

3.5.1 Particle Filters

Bayesian algorithms define an effective framework to deal with dynamic state estimation problems. Bayes filters are applied in the problem of estimating the state of a dynamical system using all available sensory information. The main aim of Bayesian approach consists in recursively estimate the posterior Probability Density Function (PDF) over the state space based on all obtained data. The main aim of particle filtering is to track the behavior of a variable of interest over time. During the last years, particle filters have been applied with great success to several different real world estimation tasks such as visual tracking, speech recognition and mobile robotics.

Particle filters operation relies on the estimation of the posterior probability density over the state space of a dynamic system from sensor information [8]. The goal consists in the representation of probability densities through sets of samples, or particles. One of the main advantages of particle filters is their capacity to approximate a wide range of probability distributions, not just normal distributions as Kalman filters. Particle filters are a variant of Bayes filters, that recursively estimate posterior densities of the state space of a dynamic system :

$$\text{Bel}(x_t) \propto p(z_t|x_t) \int p(x_t|x_{t-1}, u_{t-1}) \text{Bel}(x_{t-1}) dx_{t-1}$$

In the previous equation x_t is the state of the dynamic system, z_t is a sensor measurement and u_{t-1} defines control information that represents the dynamics of the system. The beliefs and the motion model is defined by p . The most basic particle filter can be viewed as a direct formalization of the Bayesian filter. This simple algorithm is normally called the Sampling Importance Resampling (SIR) filter [9]. SIR filter is a Monte Carlo method that can be applied to recursive Bayesian filtering problems. This is the classic particle filtering algorithm where importance sampling is applied. The main requisites of this particle filter consists in the possibility of the likelihood function to be evaluated and that the states can be simulated.

In this work an SIR particle filter is used to track the movements of the eyes. Particle filter is suitable for pupil tracking because variations in pupil position are fast and do not have a specific and particular pattern. On the other hand, the use of particle filters in real-time video images may require a large number of particles to improve the accuracy of the system. However, the use of high sets of particles increase the computational requirements and is necessary to find a consistent number of particles which ensures the proper operation of the eye tracking system.

3.5.2 Eye Dynamics Model

A dynamic system can be described by two mathematical models. One is the state-transition model, which describes the system evolution rules, represented by the stochastic process. The other one is the observation model, which shows the relationship between the observable measurement of the system and the underlying hidden state variables. The dynamic system is observed at discrete times t via realization of the stochastic process.

The state of the eye region is defined as a circle with position (x,y) in pixels. The state vector to be estimated is:

$$\mathbf{X}=(x,y)$$

where x and y are the coordinates, in pixels, of the position of the eye in the real-time video image. The movements of the eyes can be very fast, therefore we only model the eye position and not its acceleration or velocity. The used dynamical model is defined as:

$$\mathbf{X}_{t+1}=\mathbf{X}_t+\mathbf{v}_t, \mathbf{v}_t\sim\mathbf{N}(0,\Sigma_t)$$

Where Σ_t defines the covariance matrix of the gaussian noise \mathbf{v}_t at each instant of time t. The state \mathbf{X}_t of the system can store the coordinates x or y that define the position of the eye in the image. We include time dependence because size changes may vary the movements of the eye region. Through this dynamics model we estimate the position x and y of the eye in the image.



Fig 6: Eye Tracking Results

IV . ADVANTAGES

Eye Tracking adds detailed, quantitative data to the usability testing process. We are no longer limited to just general measures (e.g. success rate, errors) or subjective feedback (e.g. comments and ratings). Rather, we can pair traditional usability findings with Eye Tracking data to gain a fuller understanding of the effectiveness of an interface's design and content. This type of technology will have a big impact in computing. The research above will allow users to effectively research on what areas people focus. This can help when developing websites or displaying information. Eye tracking is a valuable yet cost-effective addition to any usability testing and compliments task-based observation methods well. Eye Tracking can tell whether users are looking at the screen, reading information or scanning information. It can also show the intensity of the user's attention and can determine whether a user is searching for specific information.

- Eye movement is faster than other current input media.
- No training or particular coordination is required of normal users.
- Can determine where the users interest is focused automatically.
- Robust against different lightning conditions.

- It is helpful for people having disabilities to interact with the computer.
- It can be used in android phones for a user friendly interaction.
- No calibration is required for many applications.

V. CONCLUSION

With the rapid advancement of technology and hardware in use by modern computers, the proposed system could potentially be utilized not just by handicapped people, but by the general population as an additional binary input. Higher frame rates and finer camera resolutions could lead to more robust eye detection and tracking that is less restrictive on the user, while increased processing power could be used to enhance the tracking to more accurately follow the user's eye and recover more gracefully when it is lost. The ease of use and potential for rapid input that this system provides could be used to enhance productivity by incorporating it to generate input for a task in any general software program. As the system is robust under variable lighting conditions this can be used in any circumstances.

VI. ACKNOWLEDGEMENT

I am highly indebted to Mr. Gopu Darsan for the guidance and constant supervision as well as for providing necessary information regarding this work and also for the support in completing the work. I would like to express my gratitude towards my parents and friends for their kind co-operation and encouragement which help us in completion of this work.

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A REVIEW ON STEGANOGRAPHY TECHNIQUES USING CRYPTOGRAPHY

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ABSTRACT

Cryptography and steganography are widely used methods to provide data security. The motivation behind cryptography and steganography are same. Both are utilized to secure essential data however in distinctive way. Cryptography only hides the content of message not the existence of message and Steganography hides the existence of message. This paper introduces various methods where cryptography and steganography are combined to encrypt the data as well as to hide the data in image. It provides two levels of security to the information being transmitted. This paper also concentrates on strength of combining cryptography and steganography methods.

Keywords: *Cryptography, Steganography, Advanced Encryption Standard (AES), Least Significant Bit (LSB).*

I. INTRODUCTION

Cryptography and Steganography are well known and widely used techniques that manipulate information in order to cipher or hide their existence respectively. Cryptography is derived its name from Greek words cryptos and Graphy. Cryptography is the practice and study of hiding information. It is the art of converting a plain intelligible in to unintelligible data and again retransforming the data in to its original form. It involve two process- Encryption and Decryption. Encryption is the process of converting plain text into cipher text. Decryption is the reverse process of Encryption. Cryptography provides a number of security goals to ensure the privacy of data, non alteration of data and so on. It provides confidentiality, Integrity. Cryptography can be categorized in to two types:

- Symmetric cryptography
- Asymmetric cryptography.

In Symmetric Cryptography, a single key is used for Encryption and Decryption. In Asymmetric Cryptography, one key is used for encryption and other key is used for decryption. Some terms which are used in context of Cryptography:

- Plain Text: Original Message
- Cipher Text: Encrypted message
- Encryption: It is the procedure of changing plain Text into Cipher Text.
- Decryption: It is the procedure of changing cipher text into plain text.
- Cryptanalysis: the study of analyzing information systems in order to study the hidden aspects of the systems.

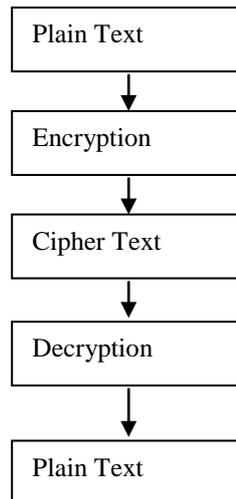


Fig 1 Basic Steps of Cryptography

Steganography is art of writing a hidden message so that only the intended user will be able to know the existence of the original message. It comes from Greek words Steganos and Graphy .Steganos means covered and Graphy means writing. So steganography means covered writing. The objective of steganography is to hide a secret message within a cover-media (Image, audio and video) in such a way that in such a way that others cannot detect the presence of the hidden message. The objective of steganography is to hide a secret message within a cover-media in such a way that others cannot detect the presence of the hidden message.

There are 4 ways to implement steganography:

- Using Text
- Using Images
- Using Audio
- Using Video

Some terms are used on context of Steganography

- Cover Image: Image which is used as a carrier for hidden Information.
- Embedding: It is process of hiding information in text, image, audio and video.
- Extraction: It is the reverse process of embedding.
- Stego-File: After embedding a message in to image, audio and video.
- Steganalysis: Study of detecting hidden message.

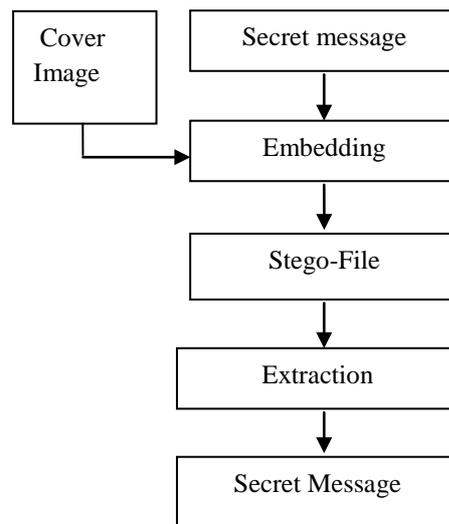


Fig 2. Basic Steps of Steganography

II LITERATURE REVIEW

In [1], A. Joseph Raphael introduces basic terminologies of cryptography and steganography and ensures that the combination of both will provide better security.

In [2], Dr. R. Sridevi, Vijaya Lakshmi Paruchuri, K. S Sadasiva Rao proposed the method of embedding the secret message into an image using LSB technique and then it is encrypted by AES algorithm for better security.

In [3], Mehdi Hussain, Mureed Hussain proposed various technologies which is used in image steganography.

In [4], Lokesh Kumar introduced the concept of encrypting the secret Message using AES and Alteration component technique is used to hide encrypted secret message into cover image

In [5], H.Al-Barhmtoshy, E.Osman and M.Ezzaand proposed a method of combining cryptography and steganography but here the secret message is first compressed then the message is hashed and encrypted using encryption key. Then Encrypted message is embedded in to cover media using stego key.

In [6], Dipti Kapoor Sarmah, Neha Bajpai have introduced a method. This method proposes one more security module between and steganography. This module is responsible for generating 2 keys

In [7], Manoj Ramaiya, Naveen Hemarajani and anil Kishore Saxena proposed the method of encrypting the secret message using AES algorithm and then it is embedded in to image using LSB technique.

III METHODOLOGY

Cryptography and steganography is not capable of hiding the presence of data alone. To enhance the security level of information and to maintain secrecy and privacy of data steganography alone is not sufficient.. Cryptography is used where steganography is inefficient Steganography is used where cryptography is efficient.

Thus a new approach of security enhancement has been proposed by many researchers and it works by combining the cryptography and steganography and results in to more secure transmission of data. The recent approaches generally composed of four main components:

- i) Encryption
- ii) Embedding
- iii) Extraction
- iv) Decryption

This is the basic steps of combining cryptography and steganography, where secret message is first encrypted by using encryption algorithm, then it gives cipher text. Cipher text is embedded with other cover medium i.e text, image, audio and video.

1. AES and LSB

Secret message is encrypted by using AES algorithm, then it gives cipher Text. The text generated by AES is given to steganography module, where the cipher text is embedded in to cover File (Image , audio or video) .If it is embedded with image by using LSB, then it gives stego-Image. This stego-image is extracted at receiver side, then by applying AES algorithm on cipher text, receiver will get the plain text which is secret message.

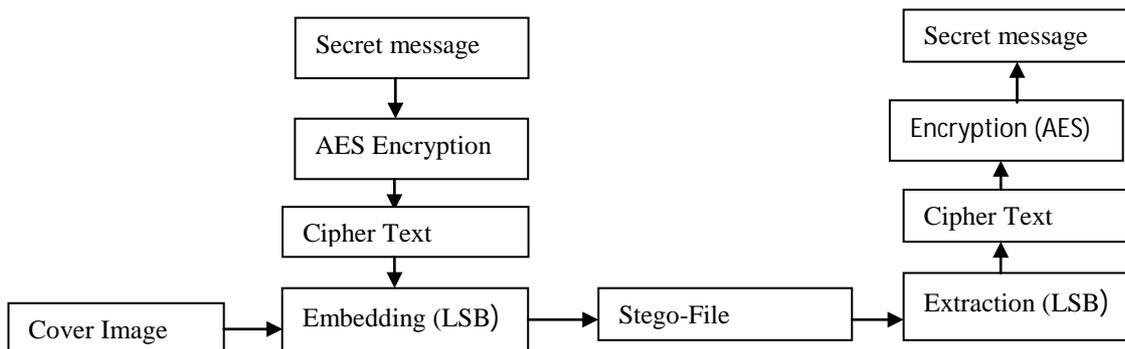


Fig 3: Cryptography using AES and Steganography using LSB

2. Alteration component

The secret information is encrypted by using AES encryption algorithm. Then encrypted message is embedded into cover image by using Alteration component technique and then after applying Stego-Key, Stego-Image is generated. Data is hidden by using Alteration component technique in which pixels have been replaced by key and secret message. Firstly key is converted into binary form and then filled into first array of first pixel, after key the secret message is filled into first component of next pixel. After then, secret message is converted into binary form and its binary form is filled in first component of next pixels. This stego-image is extracted at receiver side, then by applying AES algorithm on cipher text, receiver will get the plain text which is secret message.

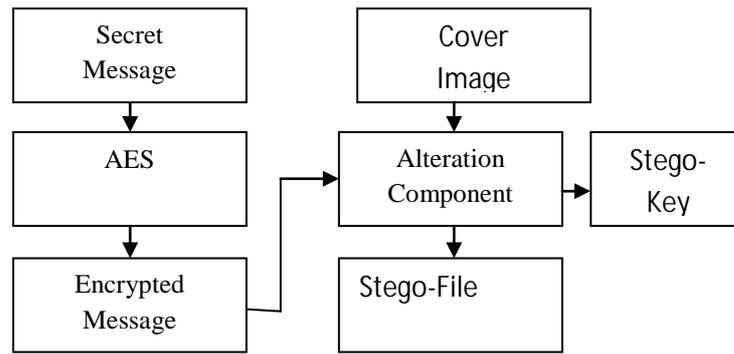


Fig 4: Steganography Using Alteration Component

3. Distortion Process

This is an intermediate module which provides extra security. Firstly, the process separates digits and alphabets from cipher text. And stores the original position of the alphabet and the digits in the form of a secret key (Key 1). A second key (key2) is obtained by separating the first alphabet and adding the remaining alphabets at the end of the separated digits. Then hiding is done by taking seven alphabets from the security module and scrambling the alphabets using a 64-bit key (Key 2). Then, after finding the DCT of a gray scale image while hiding the seven alphabets with inverse DCT, the stego file is generated. Retrieving is done by the opposite procedure: taking DCT coefficients, retrieving the seven alphabets, and rearranging the distorted alphabets using the key. Then, by applying the key1 and key2, cipher text is retrieved, and then the AES algorithm is applied to get the original message.

4. Key Based security algorithm

Secret message is first compressed and then after applying encryption algorithm and key given to the steganography module where data is embedded into cover media and apply stego-key. The extraction is just the reverse process of the embedding process. Here extraction is done with stego-key and then after decryption of message with key is done, and then decompression gives the original message.

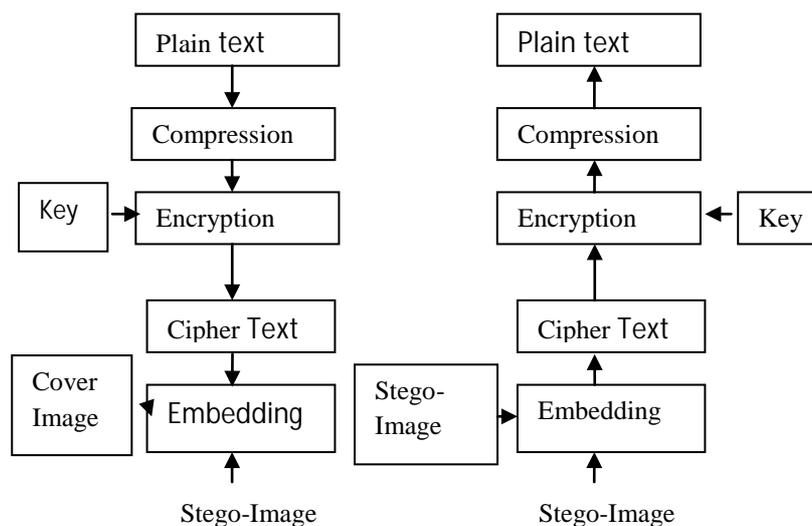


Fig. 5: Key Based Security

IV CONCLUSION

In this paper, we presented various steganography technique combined with cryptography technique, which results in to increasing the security level of information. Thus it is proved that the combination of cryptography and steganography(using AES and LSB, Alteration Component, Distortion Process and Key based security algorithm) gives better security, the data becomes more secure as compared to individually applying cryptography and steganography methods.

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INCLUSIVE BUSINESS: AN EMERGING DIMENSION OF SOCIALLY RESPONSIBLE BUSINESS OPERATION

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ABSTRACT

India is a country where various social issues are present in the form of poverty, unemployment, low resource etc. which are needed to be addressed in order to accelerate the pace of economic growth. Considering the present social conditions and competitive business environment; now it has become very crucial for any business to frame out a plan that can promise sustainable business. Therefore, to achieve the objectives of sustainability corporate sector is now incorporating the concept of inclusive business in their overall business operation. Inclusive business is the business management approach to incorporate low income group of people with low resources into corporate mainstream business operation. The purpose of the present paper is to describe the overall status of inclusive business in India. Present study is descriptive in nature with analysis based on various secondary sources. The inference drawn from analysis includes that how firms may incorporate inclusive business concept in its economic operation to establish socially responsible business. The study will provide fundamental base for undertaking future research on the subject of inclusive business and sustainable supply chain; entrepreneurship & inclusive business.

Keywords: Inclusive Business, Livelihood, Low Income Group, Supply Chain, Sustainable

I. INTRODUCTION

According to world business council for sustainable development (WBCSD) “inclusive business ventures create new markets, employment opportunities and affordable products and services to spur entrepreneurship and sustainable livelihoods in developing countries.”¹

The term inclusive business “refers to profitable core business activity that also tangibly expands opportunities for the people at base of economic pyramid (bop) as producers, suppliers, workers, distributors, consumers –or even as innovators.”²

As we all know that India is a developing country and the poverty and inequality is critical challenge for sustainable development and global stability. Any countries development majorly depends upon its economic growth and strategic soundness. Business is like an engine of economic growth, which plays a critical role in accelerating progress, towards achieving development goals through increasing the capital formation process with the help of increasing investment, creating employments and technological innovations which ultimately raise the standard of living.

low income group people are majorly contributing there labor in corporate sector but the percentage is very low, it is because of illiteracy, poverty ,unemployment , lack of basic resources , and lack of awareness and it

will lead to increase in more poverty and it will affect the growth of our country, if they will contribute their strength in corporate sector then it will give positive effect on our GDP and can help to develop our country.

Inclusive business approach is based on solving poverty and social problems and core business engagement, rather than Corporate Social Responsibility (CSR). The theme of inclusive business is to working with poor people as business partners, rather than recipients of aid and charity, which will ultimately lead to bring confidence and encourage low income group people to take initiatives to work for their livelihood.³

II. OBJECTIVES

This paper has been developed undertaking following objectives:

- (i) To study the role of inclusive business in meeting social values and opportunities that are existing in India,
- (ii) To study the status of inclusive business in various companies of India & how they are incorporating inclusive business approach in their operation.
- (iii) To study the challenges that are existing in the subject area of inclusive business in current business scenario.

III. RESEARCH METHODOLOGY

The present study is descriptive in nature with information, analysis and conclusion drawn from various secondary sources.

IV. OPPORTUNITIES FOR INCLUSIVE BUSINESS IN INDIA

According to Paul polman bata lecture, February 2013 “unemployment – and specially youth unemployment remains unacceptable high, with all the implications this has for social cohesion. In many countries between a third and a half of all young people cannot find jobs. no wonder people warn of a ‘lost generation’.”

India is moving on the path of development and it is trying hard to eradicate every obstacle which is coming in between in the form of poverty, unemployment, social regional imbalances but still much is to be done to achieve all round development. Current scenario could be traced from Reserve Bank of India (RBI) 2013 data, which states that 27.05% of total population is living in below poverty line. As per World Bank, 2013 India’s GDP per capita income is 1498.9 US \$ as compared to china whose GDP per capita income is 6807.4 us \$. In another data, as per World Bank, 4% of total female labor force was unemployed and 4% of total male labor force was unemployed in 2013, on other side youth situation is worse where 11% of total female labor force ages 15-24 was unemployed and 10% of total male labor force ages 15-24 was unemployed in 2013 .what to say about literate sector, here situation is alarming, in 2010 10% of total unemployment with primary education was unemployed, 42% of total unemployment with secondary education was unemployed and 23% of total unemployment with tertiary education was unemployed.

This data represents that in India there is a wider scope of inclusive business and business community may take advantage of this untapped market which is available in the form of poverty, low GDP per capita and high rate unemployment in the country. Inclusive Business also provide opportunity to government to meet its social objectives of eradicating poverty and society’s imbalances which are prevailing due to improper policy execution and fellow up. Current social scenario of our country demand that there should be collaboration

between government and Business community so that this untapped market could be served more efficiently with low cost and objectives of sustainable development may be achieved . There are four broad areas where opportunity of inclusive business can be incorporated.

- Supply chain — Big corporate have realized that associating themselves with small suppliers have enabled their supply chains to be more flexible and stable and at the same time be of reduced costs.
- Employment — employing the local people in the areas of business will firstly ensure a market for the product. Also local employees will have a better idea of the kind of products that might appeal to the market and can also provide essential local knowledge.
- Product/service — another way of looking at inclusivity in business is by producing goods or rendering services to the poor. Even though earlier it was considered that producing for the poor is ultimately a mere wastage of resources now the poor are target customers for many businesses corporate.
- Distribution channels — Poor localities have poor public infrastructure. Therefore it is essential that there is some amount of flexibility and reliability in its operations. This will be ensured to a certain extent with inclusion. (inclusive business)

V. EXAMPLES OF INCLUSIVE BUSINESS

5.1 Hindustan Unilever

According to Hindustan Unilever - We are living in a world where temperature is rising, water is scarce, energy expensive, food supplies are uncertain and the gap between rich and poor increasing. We cannot close our eyes to the problems the world faces. At Unilever we believe that business must be part of the solution. But to be so, business will have to change.

Sustainable, equitable growth is the only acceptable business model. Enhancing livelihoods is about the impact we can have as a business on people's lives. We can do this by widening opportunities, increasing skills and including more people in our business growth. It's about respecting and, where necessary, protecting their fundamental human and labor rights.

Unilever's Indian subsidiary developed an innovative way to add iodine to salt, and has partnered with the World Health Organization and local governments to promote the product to local communities. The distribution of the product is organized through Project Shakti, a program striving to create income-generating opportunities to underprivileged rural women. "Empowering women makes sense for our business because women's inclusion in the economic cycle has a magnifying impact on growth and the health and progress of their families and communities. The discrimination and disadvantage encountered by women hinder economic growth and represent a waste of talent and ability." "To accomplish our commitments, we will provide financial literacy and job skills training to women smallholder farmers and small-scale distributors. An example of the work we are doing is our public private partnership, which we signed in January 2013, with our supplier Symrise and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH to source vanilla from Madagascar.

The programme is set to benefit 4,000 farmers – many of whom are women - in 32 farming villages and 44 schools and colleges. Women will be involved in the entire programme and prioritized where appropriate. With the work on improving access to primary education, this programme has the potential to benefit 24,000 people."

HUL Contributed to the improvement of health and sanitation in rural India—by selling HINDUSTAN UNILEVER products (soaps, shampoo, water purifier, etc.) at affordable prices and small packages. And also Utilizing “Global Public-Private Partnership for Hand Washing with Soap,” in collaboration with USAID, World Bank, and UNICEF in awareness-raising campaign. HINDUSTAN UNILEVER donate to the betterment of health and sanitation in rural India by selling HINDUSTAN UNILEVER products at affordable prices.⁴

5.2 The Allianz Group

The Allianz group is a leading global provider of insurance, banking and asset management has been active in microfinance industry. When the south East Asian tsunami devastated communities and left many families homeless. They realize the pain of poor’s that the risks the poor face are much the same as those for others, but without insurance the financial impacts of disasters are obviously greater.

Allianz found that by working in partnership with local organization such as NGO’s trade unions and microfinance institutions it can reach out to clusters of villages across southern India, Indonesia, Egypt and soon West Africa. As an example, in 2006 Allianz’s subsidiary Bajaj Allianz joined forces with CARE International to launch a three year partnership aimed at providing micro insurance to people in Tamil Nadu. one of the areas hardest hit by the 2004 tsunami. The project was designed to deliver affordable life and nonlife insurance products catered specifically to farm workers and fishermen in the coastal communities of Tamil Nadu.

The premium for the micro-life insurance policies covering risks of accident, death, loss of household assets, natural disasters and fire is 1 euro per year, which provides families with €370 of coverage in the event of a natural or accidental death. Currently, this covers around 200,000 people.⁵

The Allianz group is working towards the development of poor people through providing them insurance and banking facility this will create an confidence for safety and betterment that will create big positive impact on low income group people.

5.3 Coca-Cola

Coca cola is a best example of inclusive business because of its distribution channel. The coca cola company is having advancing business solutions for economic development through its innovative approach in distribution. Coca-cola approach is to distribute its product in hard-to- reach urban and peri urban areas in India. Company identifies and engages independent enterprises that can distribute and sell its beverages in small specific geographical areas.

The company has, to date, created over 2,500 manual distribution centers (MDCs) in Africa, generating over 12,000 jobs and more than US\$ 500 million in annual revenues. MDCs are typically located in areas where a lack of stable roads and infrastructure makes it difficult for delivery trucks to travel, which helps the company secure hard-to-reach markets while creating wealth and job growth in that communities.⁵

Coca cola is now a popular cold drink in rural areas. People are aware about the product because of its affordable price and easy availability. A growing number of large corporations are proactively engaging in inclusive business approaches with the aim of achieving core business benefits - such as greater competitiveness, increased market share and improved risk management - while also contributing to the achievement of international development goals.

5.4 M Krishi

Delivering services to farmers via mobile technology. The mKRISHI business model involves Tata Consultancy Services (TCS) maintaining the software platform and inviting partners to use the platform to provide services and products to farmers. Revenue opportunities come from fees paid by farmers or by partners who use the platform to reach farmers; mKRISHI has already been piloted in four different villages, with a small number of farmers in order to test different models, and TCS aims to further develop distribution models to support the scale-up of the mKRISHI platform.

“The initiative aims to increase agricultural productivity stimulate local micro enterprises and in the long term support rural development in India”.

M Krishi is an innovative tool pioneering the application of information technologies in agricultural practice in remote rural areas. It aims to connect illiterate, semiliterate, and literate farmers from remote villages to an expert in their districts for seeking personalized advice. Through specialized and integrated IT solutions, the platform aims to enable farmers to access personalized agricultural advice and information anytime and anywhere. Better information and reduced uncertainty can lead to increased yields, reduced cost, improved market linkages and improved farming efficiency. A number of spin-off benefits are anticipated, depending on the uptake of different services. TCS is partnering with the various national and international agencies for providing services like procurement, rural banking, crop insurance, agriculture quality certification, access to international markets etc. Also, better soil management can be achieved with better information dissemination on pesticide, fertilizer and soil conservation. In addition to benefits to farmers, opportunities arise for micro-entrepreneurs to sell services at the village level.⁶

VI. CHALLENGES

Inclusive business opens up opportunities for businesses – and also the possibility of contributing to poverty reduction through specially tailored offerings. But anyone who invests in developing countries and emerging economies is also running risks.

Taking up inclusive business is a challenge by itself.

- Internal challenges — taking up an inclusive initiative in a corporate firm implies undergoing major internal changes that may be unwelcomed and opposed. It may be seen as too risky and also not too rewarding in the short run. In many cases it is also considered to be highly time consuming. Therefore it is important to keep in mind the internal structure of the firm as there needs to be internal commitment and initiative.
- External environment challenges — these are what are usually referred to as external diseconomies. As we are all very well aware the poor are the most ignored category in the society by the government. They lack basic infrastructural facilities like housing, electricity, water, sanitation etc. it is often seen that small suppliers do not have proper roads and communication systems. These can be major drawbacks for the firm.
- Social challenges — conventionally business firms are known to be profit motive. Therefore before taking up any such inclusive business ideas it is essential to gain the local population’s trust and respect. But this might result in a drastic change in the existing social patterns. Therefore building such relationships should be done with utmost care so that there are no social disturbances within the concerned localities. (wikipedia)

One of the greatest challenges facing inclusive business is attracting sufficient and appropriate capital to finance such activities, especially in countries with considerable business risk. To overcome this barrier, a mindset shift is required whereby companies embrace new ways of thinking about how business could be done. To make the most of available resources, companies need to redefine how, from whom and for whom they raise capital.

Some companies have begun to shift their thinking from a centralized capital strategy, whereby companies raise their own funds for their business to a distributed capital strategy, in which they also become capital conduits to existing local expertise and capacities. Development agencies are increasingly interested in working with business, and some private foundations are beginning to support for-profit ventures whose goals mesh with their own program objectives.

VII. CONCLUDING REMARKS

Inclusive business holds great promise but it is still limited and there is an urgent need to find ways to imitate, scale, and encourage other companies to take action. One way in which WBCSD is advancing the agenda is by developing resources and tools to support companies wishing to do business in a more inclusive way. As we discussed that India is a developing country which is also a labor surplus economy so there is lot of favorable opportunities for doing business with low income group people. In present scenario various MNC's and other companies are interested in inclusive business. According to a journal inclusive growth has become the economic development mantra for both Indian politicians and CEOs in recent months. Former Prime Minister Man Mohan Singh was championing this concept to ensure that even as the red-hot Indian economy keeps growing at 9%, this growth is equitable so that the 300 million Indians living with less than \$1 a day are not left out of the economic boom. He has challenged Indian companies to come up with inclusive business models that deliver more value at less cost for more citizens — be it in agriculture, healthcare, education, energy, or financial services.’

Our present Indian government is highly motivated to takes initiative to promote the inclusive business through “make in India” plan, which is also a plan to provide livelihood to low income group of people through providing opportunities in total business operation. But still there is a need to include other players also to fully utilize the potential of this unique business plan; corporate sector as well as the government has to take steps to promote the inclusive business approach by taking the low income group people's development in priority list because inclusive business model demand's integrated and inter-connected initiatives from all the sectors of the economy. Government and corporate businessmen can make specific norms for doing business to promote the skill through low cost training program to the low income group people that can help them to develop themselves. Awareness programs may also be conducted to spread the awareness among people so that they may avail benefits of inclusive business concept.

Having a clear long term vision is very important to develop the approach of inclusive business therefore companies should develop long term plan of inclusive business which may not only bring material benefits to the company but also raise the standard of living in low income group of people. Inclusive business is almost the same as business in established markets and is yet completely different. It is similar because it strives to gain competitive advantage through a clear and attractive value proposition & efficient processes. It is different because incorporation of low income group people in current competitive scenario is considered to be risky but still it's proper implementation generate extra revenue & extra social image, which others find it difficult due to

tough market conditions and lack of experience hindering business processes. Each country faces a different set of priorities; every Development strategy must be orchestrated in tune with the local context. Therefore, rather than pressing simply for better governance or better framework conditions, the WBCSD encourages governments to consider key priority areas which, if addressed, could maximize the impact of development efforts and the benefits of increased investment inflows.

In recent reports, WBCSD argues that it is in the enlightened self-interest of global business to invest in providing sustainable solutions to development challenges:

- First, business cannot succeed in countries that fail in delivering stable and prosperous societies make for better business opportunities.

- Secondly, by developing a better understanding of and proactively addressing socio-economic and environmental concerns, companies will be able to better manage their risks and thereby underpin their license to operate, innovate and grow.

- Thirdly, developing inclusive business models, i.e. sustainable business solutions that go beyond philanthropy and expand access to goods, services, and livelihood opportunities for low-income communities in commercially viable ways, will help companies build positions in growth markets. By incorporating low-income populations in the supply, production, distribution and/or marketing of goods and services, companies generate new jobs, income, technical skills and local capacity. Likewise, poorer consumers can benefit from products and services that meet their needs in affordable ways.

- Finally, the transition to a more sustainable world represents a significant business opportunity due to the corresponding investments in infrastructure and technology by both governments and private entities and the long-term demand for related products and services needed to sustainably meet the needs of growing populations in developing countries.⁶

After reviewing selected research papers and reports it could be concluded that the inclusive business is a powerful tool to achieve the proper balance between economic and social activity and establishing sustainable business in the market. But it should be seen that one shall not undertake these activities for image sake; because inclusive business approach demand's inclusion of low income group people at every stage of operation with proper consideration of cost & benefit analysis. Thus, to address the social issues effectively inclusive business should form part of the corporate DNA.

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CLLOUDSIM: A SOFTWARE FRAMEWORK FOR MODELLING CLOUD COMPUTING ENVIRONMENT

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ABSTRACT

Advances in computing have opened up many potential possibilities. Previously, the main concern of application developers was the consumption and hosting of applications, keeping in mind the acquisition of resources with a fixed capacity to handle the expected traffic due to the demand for the application, as well as the installation, configuration and maintenance of the whole sustaining stack. With the advent of the Cloud, application deployment and hosting has become highly flexible, easier and less expensive because of the pay-per-use chargeback model offered by cloud service providers through online mediums and portals [1]. Cloud computing is a best-fit for applications where users have heterogeneous, dynamic, and competing quality of service (QoS) requirements. Different applications have different performance levels, workloads and dynamic application scaling requirements, but these characteristics, service models and deployment models create a vague situation when we use the cloud to host applications. The cloud creates complex provisioning, deployment, and configuration requirements [1].

Keywords: IaaS, SaaS, PaaS, Pay-Per-Use, Quality of Service (QoS)

I. INTRODUCTION

Cloud computing dispenses infrastructure, platform, and software as services, which is made available on subscription basis, that is services in a pay-as-you-go model to consumers. These services in business are individually referred to as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Clouds aim to power the next generation datacenters by divulging them as a network of virtual services like hardware, database, user-interface and application logic. This allows the users to access and deploy applications from anywhere in the world on-demand at competitive costs depending on users QoS (Quality of Service) requirements. Developers with pioneering ideas for new Internet services are no longer required to make large capital expenditures on hardware and software infrastructures to deploy their services or human expense to operate it. Offer's substantial benefit to IT companies by freeing them from the low level task of setting up basic hardware and software infrastructures and thus enabling more focus on innovation and creation of business values.

As Cloud computing is a rapidly embryonic research area, there is a severe lack of defined standards, tools and methods that can resourcefully tackle the infrastructure and application level complexities. Hence in the near future there would be a number of research efforts both in academia and industry towards essential core algorithms, policies, application benchmarking based execution contexts. Bearing in mind, that none of the

current distributed (including Grid and Network) system simulators offer the environment that can be directly used for modelling Cloud computing environments, we present CloudSim: a new, comprehensive, and extensible simulation framework that allows seamless modelling, simulation, and experimentation of emerging Cloud computing infrastructures and application services. By using CloudSim, researchers and industry-based developers can test the performance of a newly developed application service in a controlled and easy to set-up environment. The main advantages of using CloudSim for initial performance testing include [1]:

(i) Time effectiveness: It requires very less effort and time to implement Cloud-based application provisioning test environment.

(ii) Flexibility and applicability: Developers can model and test the performance of their application services in heterogeneous Cloud environments (Amazon EC2, Microsoft Azure) with diminutive programming and deployment effort.

II. CLOUD SIMULATIONS

Cloud service providers charge their users depending upon the space or service provided. In R&D, it is not always possible to have the tangible cloud infrastructure for performing experiments. For any research scholar, academician or scientist, it is not feasible to hire cloud services every time and then execute their algorithms or implementations. For the purpose of research, development and testing, open source libraries are available, which give the sense of cloud services. Nowadays, in the research souk, cloud simulators are widely used by research scholars and practitioners, without the need to pay any amount to a cloud service provider.[3]

Tasks performed by cloud simulators are:

- Modelling and simulation of large scale cloud computing data centers.
- Modelling and simulation of virtualized server hosts with customizable policies for provisioning host resources to VM's.
- Modelling and simulation of energy-aware computational resources.
- Modelling and simulation of data center network topologies and message-passing applications.
- Modelling and simulation of federated clouds.
- Dynamic insertion of simulation elements.
- User-defined policies for allocation of hosts to VMs, and policies for allotting host resources to VMs [2].

2.1 Why simulation is important for the cloud environment?

Cloud service providers offer elastic, on-demand, measured infrastructure, platforms and software services. In the public cloud, tenants have control over the Operating system, storage and deployed applications. In the public cloud deployment model, the performance of an application deployed in multiple regions (considering the geographical locations) is a matter of concern for organizations. Proof of concepts in the public cloud environment gives a better understanding, but costs a lot in terms of capacity building and resource usage even in the pay-per-use model [1]. CloudSim, which is a toolkit for the modelling and simulation of Cloud computing environments, comes to the rescue. It provides system and behavioral modeling of the Cloud computing

components. Simulation of cloud environments and applications to evaluate performance can provide constructive insights to explore such dynamic, massively distributed, and scalable environments.

The principal advantages of simulation are:

- Flexibility of defining configurations
- Ease of use and customization

III. MAGNITUDE OF CLOUDSIM

The CloudSim framework aims to ease and speed-up the process of conducting tentative studies that use Cloud computing as the application provisioning environments. Conducting these kinds of tentative studies using real Cloud infrastructures can be extremely time-consuming due to their sheer scale and complexity. The primary objective of this tool is to provide a generalized and extensible simulation framework that enables seamless modelling, simulation, and experimentation of emerging Cloud computing infrastructures and application services. By using CloudSim, researchers and industry-based developers can focus on explicit system design issues that they want to investigate, without getting concerned about the low level details related to Cloud-based infrastructures and services. [6]

CloudSim is a library for the simulation of cloud scenarios. It provides essential classes for describing data centers, computational resources, virtual machines, applications, users, and policies for the management of various parts of the system such as scheduling and provisioning. Using these components, it is easy to assess new strategies governing the use of clouds, while considering policies, scheduling algorithms, load balancing policies, etc. It can also be used to assess the competence of strategies from various perspectives such as cost, application execution time, etc. It can be used as a building block for a simulated cloud environment and can add new policies for scheduling and load balancing. By using CloudSim, organizations, R&D centers and industry-based developers can test the performance of a newly developed application in a controlled and easy to set-up environment. [7]

3.1 Uses of CloudSim Toolkit

The two important and most acknowledged uses of CloudSim Toolkit are:

- Functionality Leveraged as IS
- New Extensions Introduced

Functionality Leveraged as IS

CloudSim toolkit covers most of the activities taking place within a Data Center in detail. This includes:

- Simulating Data Center hardware definition in terms of physical machines composed of processors, storage devices, memory and internal bandwidth.
- Simulating virtual machine specification, creation and destruction.
- The management of virtual machines, allocation of physical hardware resources for the operation of virtual machines based on different policies (e.g. time-shared and space-shared).
- Simulating the execution of user programs or requests (Cloudlet/Gridlet) on the virtual machines [4].

New Extensions Introduced

In addition to the Data Center operations provided by the CloudSim toolkit, following additional functionality is required for the CloudAnalyst and hence had to be built on top of CloudSim.

- Application users – Autonomous entities are required to act as traffic generators and their behaviour needs to be configurable.
- Internet – The data transmissions across the Internet needs to be realistically modelled with network delays and bandwidth restrictions.
- Simulation defined by time period – CloudSim as a toolkit is designed to process a pre-defined series of events (e.g. submission of n-number of cloudlets.) But for user's purpose we need to convert the simulation to a time-frame limited execution where events are continuously generated by users until a pre-defined time period expires.
- Service Brokers – CloudSim already has the concept of Data Center Brokers which performs a dual role in VM management in multiple data centers and routing traffic to appropriate data centers. But for CloudAnalyst these two main responsibilities were segregated and assigned to two different entities. The Data Center Controller (described below) extends Data Center Broker and is primarily responsible for the VM management within a single data center and load balancing of VM's etc within that single data center. The new entity CloudApp Service Broker were introduced to handle the responsibility of managing the routing of user requests between data centers based on different service brokerage policies[4].

IV. ARCHITECTURE OF CLOUDSIM

The CloudSim layer provides a support for modelling and simulation of cloud environments including dedicated supervision interfaces for memory, storage, bandwidth and VMs. It also provisions hosts to VMs, application execution management and dynamic system state monitoring. A cloud service provider can implement customized strategies at this layer to study the efficiency of different policies in VM provisioning [3].

Cloud Applications

This layer includes applications that are directly available to Cloud customers. These applications may be supplied by the Cloud providers (SaaS providers) and accessed by customers either via a subscription model or a pay-per-use basis. In this layer users deploy their own applications, applications such as Salesforce.com that supply business process models on Clouds (namely, customer relationship management software) and social networks.

User-Level Middleware

This layer includes the software frameworks such as Web 2.0 Interfaces (Ajax, IBM Workplace) that helps developers in creating rich, cost-effective user-interfaces for browser-based applications. The layer also provides the programming environments and composition tools that ease the creation, deployment, and execution of applications in Clouds [4].

Core Middleware

This layer implements the platform level services that provide runtime environment enabling Cloud computing capabilities to application services built using User-Level Middleware. Core services at this layer include

Dynamic SLA Management, Accounting, Billing, Execution monitoring and management, and Pricing. The well-known examples of services operating at this layer are Amazon EC2, Google App Engine, and Aneka [4].

System Level

The computing power in Cloud environments is supplied by a collection of data centers, which are typically installed with hundreds to thousands of hosts. At the System Level layer there exist massive physical resources (storage servers and application servers) that power the data centers. These servers are evidently managed by the higher level virtualization services and toolkits that allow sharing of their capacity among virtual instances of servers. These VM's are isolated from each other, which aid in achieving fault tolerant behaviour and isolated security context. [1]

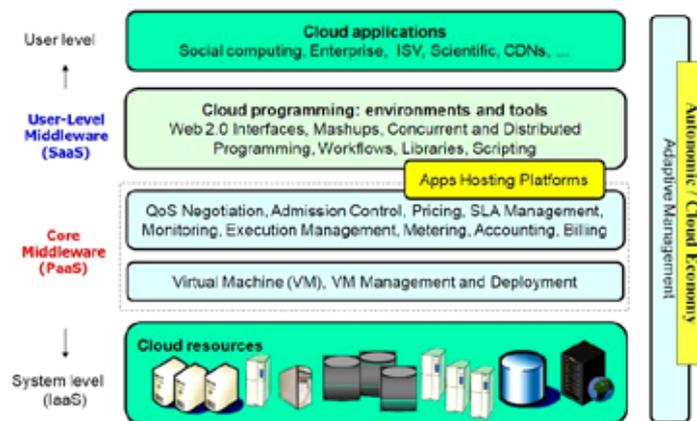


Fig 1: CloudSim Architecture

4.1 Implementing the Cloud with CloudSim

The CloudSim layer provides support for modelling and simulation of cloud environments including dedicated management interfaces for memory, storage, bandwidth and VMs. It also provisions hosts to VMs, application execution management and dynamic system state monitoring. A cloud service provider can implement customised strategies at this layer to study the efficiency of different policies in VM provisioning. The user code layer exposes basic entities such as the number of machines, their specifications, etc., as well as applications, VMs, number of users, application types and scheduling policies. The main components of the CloudSim framework are [9]:

- **Regions:** It models geographical regions in which cloud service providers distributes resources to their customers. In cloud analysis, there are six regions that correspond to six continents in the world.
- **Data centers:** It models the infrastructure services provided by various cloud service providers. It encapsulates a set of computing hosts or servers that are either heterogeneous or homogeneous in nature, based on their hardware configurations [9].
- **Data center characteristics:** It models information regarding data center resource configurations.
- **Hosts:** It models physical resources (compute or storage).
- **The user base:** It models a group of users considered as a single unit in the simulation, and its main responsibility is to generate traffic for the simulation.
- **Cloudlet:** It specifies the set of user requests. It contains the application ID, name of the user base that is the originator to which the responses have to be routed back, as well as the size of the request execution

commands, and input and output files. It models the cloud-based application services. CloudSim categorizes the complexity of an application in terms of its computational requirements. Each application service has a pre-assigned instruction length and data transfer overhead that it needs to carry out during its life cycle.

- **Service broker:** The service broker decides which data center should be selected to provide the services to the requests from the user base.
- **VMM allocation policy:** It models provisioning policies on how to allocate VMs to hosts.
- **VM scheduler:** It models the time or space shared, scheduling a policy to allocate processor cores to VMs [9].

V. POLICIES AND ALGORITHMS

CloudSim models scheduling of CPU resources at two levels: Host and VM. At Host level, the host shares fractions of each processor element (PE) to each VM running on it. Because resources are shared among VMs, this scheduler is called VmScheduler. The scheduler a host uses is a parameter of the Host constructor. In the VM level, each virtual machine divides the resources received from the host among Cloudlets running on it. Because in this level resources are shared among Cloudlets, this scheduler is called CloudletScheduler. The scheduler a VM uses is a parameter of its constructor. In both levels, there are two default policies available: the first policy, xSpaceShared (x stands for VmScheduler or Cloudlet Scheduler), required PEs by Cloudlets/VMs are exclusively allocated. It means that if there are more running elements (VMs or Cloudlets) than available PEs, the last elements to arrive wait on a queue until enough resources are free. In the second policy, xTime-Shared, fraction of available PEs are shared among running elements, and all the elements run simultaneously [8].

Policies for VM scheduling and Cloudlet scheduling can be used in any combination. For example, you can use VmScheduler Time-Shared and Cloudlet Scheduler Space-Shared, or you can use VmScheduler Time-Shared and Cloudlet Scheduler Time-Shared. It is possible even having a host running VMs with different Cloudlet scheduling policies, or a data center with hosts with different VM Scheduling policies. The VmScheduler models the behaviour of scheduling at virtual machine level like VMMs such as Xen and VMware. Therefore, if you want to model behaviour of this kind of software regarding distribution of resources among VMs running in the same host, this is the place where your new policy should be implemented [8].

Similarly, Cloudlet Scheduler models the behaviour of scheduling at operating system level: given a number of applications currently running in the system, how available CPU resources should be divided among them? If you want to model this behaviour, Cloudlet Scheduler is the class to be extended. There are several places in CloudSim where we can implement the algorithm depending on what the algorithm is intended to do. Here are several examples of classes that may need be modified or extend:

- Data center Broker -- modifying the way VM provisioning requests are submitted to data center and the way cloudlets are submitted and assigned to VMs.
- VmAllocaton Policy -- you need to extend this abstract class to implement your own algorithms for deciding which host a new VM should be placed on. You can also implement dynamic VM reallocation

algorithms by implementing the optimize Allocation method, which is called at every time frame and passed with the full set of current VMs in the data center.

- VmScheduler -- implementing algorithms for resource allocation to VMs within a single host.
- Cloudlet Scheduler -- implementing algorithms for scheduling cloudlets within a single VM.
- PowerVm Allocation Policy Migration Abstract -- a template class for implementing power-aware dynamic VM consolidation algorithms that use VM live migration to dynamically reallocate VMs at every time frame. The main method to be overridden is optimize Allocation [10].

VI. CONCLUSION

The recent efforts to design and develop Cloud technologies focus on defining novel methods, policies and mechanisms for efficiently managing Cloud infrastructures. To test these newly developed methods and policies, researchers need tools that allow them to evaluate the hypothesis prior to real deployment in an environment where one can reproduce tests. Simulation-based approaches in evaluating Cloud computing systems and application behaviours offer significant benefits, as they allow Cloud developers: (i) to test performance of their provisioning and service delivery policies in a repeatable and controllable environment free of cost; and (ii) to tune the performance bottlenecks on commercial Clouds. In order to offer a built-in support CloudSim simulates the currently available Clouds into the environment. Modelling and simulation of such environments that consist of providers encompassing multiple services and routing boundaries present unique challenges [1].

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SURVEY ON ANDROID SECURITY MODEL

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ABSTRACT

This paper presents the study of Android Security Model. . In this paper a study of various papers is done, and in the reviewed paper we explain the application of android system. Intents, Activities, Broadcast Receivers, Services, Content Providers and Binder. As android is open source we should also have this code available to us. Both the java and C code is critical for understanding how Android works, and is far more detailed than any of the platform documentation

Keywords: *Android Tool, Android, API, Access Permission, Security*

I. INTRODUCTION

In present days people carry mobile devices rather than desktops or mainframes computer. So the importance of data and services support the increasing vulnerability.

Android provide a platform for usable security infrastructure. Android has been developed by open Handset Alliance(led by Google).It provide a base operating system, application middleware layer, java software development kit(SDK) and collection system application. As we know Android SDK has been available since 2007. Traditional desktop and server operating systems have tried to securely integrate personal and business applications and services on a single platform. And when we did it on a mobile platform such as Android it remains nontrivial. Many researchers observe that it provides a clean slate devoid of the complications that legacy software can cause. Android doesn't officially support applications developed for other platforms: The applications execute on top of a Java middleware layer running on an embedded Linux kernel, so developers wishing to port their application to Android must use its custom user interface environment. Additionally, Android restricts application interaction to its special APIs by running each application as its own user. This article attempts to show the complexity of Android security and summary some possible development pitfalls which can be showed while defining an application 'security. We conclude by attempting to draw some aspects and identify opportunities for future scope that should be showed in clarity and correctness entity.

Android is a widely anticipated open source operating system for mobile devices which provides a base operating system, an application middleware layer, a Java software development kit (SDK), and a collection of system applications. Android has a unique security model that focuses the user work in control of the device. Android devices provide the open nature of the platform allows for proprietary extensions and changes.

II. BRIEF DESCRIPTION OF ANDROID SECURITY MODEL

Android is a program having Linux platform with java. It enhanced its own security. It combines OS features like multitasking, Unix User Identifier (UID) and file permission. It is familiar with class library and safe java language. This model is like multi-user server than sandbox found on J2ME or blackberry platform. The Android GUI environment has some novel security features that help support this isolation. Mobile platforms are rapidly increasing which results in having complex requirements including regulatory compliance [6].

Android supports building applications used by phone feature quality while protecting users by minimizing the consequences of bugs and software. Android's process isolation results the need for complicated policy configuration files for sandboxes. This gives flexibility to applications to its use native code without compromising Android's security or granting the application rights. Android permissions are necessary for the given applications which allow them to do things like take pictures, use the GPS or make phone calls. When installed applications having unique UID, and the application will always execute as that UID on that particular device. The UID of an application is used to secure its data and developers have needed to be explicit about sharing data with other application [7]. Applications can allow users to work or entertain with graphics, playing music, and launch other programs without special permissions. Malicious software is reality software on popular platforms, and with its features Android tries to minimize the impact of malware. However, even unprivileged malware which gets installed on an Android device pretending to be useful can still temporarily allows the user's experience [8]. Users in this unfortunate state will have to identify and remove the hostile application.

III. ANDROID APPLICATION CRITERIA

Application framework mainly enforces on structure to developers. It does not have main () function. Instead of using main () function developers design application in terms of components. For explaining this we can take example or described as the Friend Viewer application are used to retrieve the stored geographic coordinates and view friends on a map. Both applications contain multiple components for performing their respective tasks the components themselves are classified by their component types. An Android developer chooses from predefined component types depending on the component's purpose (such as interfacing with a user or storing data). An application developer defines one activity per "screen." Activities start each other, possibly passing and returning values. In this application only one process can be running like keyboard work and all other are suspended. In the working of Android application there are two functions performed i.e. component protection and component interaction. In Component Interaction there are two components there is System server which has two components system service and location manager. System service communicates with boot receiver and location manager communicate with friend tracker.

After that boot receiver get contacted with friend tracker then friend provider used to read or write the function and friend tracker control perform the functioning of start/stop with friend tracker.

In component protection, friend tracker, friend viewer and contact are three applications which get communicated with ICC reference monitor. Android protects application and data through enforcement mechanism on the System level as well as at ICC level. Generally, each application runs as unique user identity.

IV. ACCESS PERMISSION

For developing Android application developer have to assigns some permission access. The permission assigned via XML manifest file which accompanies every package application.

In this framework, developer assigns permission to define application security and write permission

This permission can be explained at various levels. The Access permission are as follows-

Protection Permission

Broadcast permission

Content Provider

V. SECURITY

In this phase main aspect is to make process secure. In this phase, developer focuses on how their code will keep user safe as well as how to get behave with constrained memory, processing and power of battery.

Developer has to secure input data into device with their application and did not allow malware to access application without special permission. The big trick in android development is that every application runs with different UID. In Android, the system has given its own UID rather than every person.

For example, an application wants the READ_CONTACTS permission to read the user's address book. A contact manager application wants the READ_CONTACTS permission, but a block stacking game should not keep the model simple. It is possible to secure the use of all the different Android inters- process communication (IPC) mechanisms with just a single kind of permission. Starting Activities, connecting to Services, accessing Content Providers, sending and receiving broadcast Intents, and invoking Binder interfaces can all require the same permission. Therefore users do not wants to understand more than —My new contact manager needs to read contacts.

VI. CONCLUSION

Android application can communicate with different ways. In this paper, we conclude that we can make our data and communication security by allowing special permission. Android applications have their own identity given or enforced by the system. Application can be communicated with the mechanism provided by the system like file, activities and content provider.

While communicating with other program makes sure that how much you can trust your input and validate the identity of services you used up.

VII. ACKNOWLEDGMENT

We express thanks to all the departments' personals and sponsors who give us an opportunity to present and express my paper on this level. We wish to place on my record my deep sense of gratitude to all reference papers authors for them valuable help through their papers, books, websites etc.

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SEM AND XRD STUDIES OF CDZNS THIN FILM WITH CAPPING AGENT

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ABSTRACT

In this paper, an investigation of CdZnS nanocrystalline films with capping agents CTAB deposited by chemical bath deposition (CBD) method has been made using X-ray diffraction (XRD), Scanning electron microscope (SEM). Structure of CdZnS nanocrystalline films with capping agent CTAB was observed by XRD technique was found to be both hexagonal and cubic. SEM micrographs shows the cabbage like structure of CdZnS: CdCl₂ nanocrystalline films when prepared in presence of capping agents.

Keywords: CdZnS, Chemical Bath Deposition, Thin films, Structural properties

I. INTRODUCTION

Group II-VI compounds can form ternary and quaternary alloys. Zn diffusion in CdS forms CdZnS ternary compound material, which has direct energy band gap transition type over a whole alloy composition with increasing absorption coefficients. These compositions can be used to fabricate the hetero-junction photovoltaic devices [1-6]. Consequently, experimental and theoretical studies on the material and device properties of group II-VI compounds have intensified [7-8]. Cadmium zinc sulphide CdZnS has been investigated as an important candidate for a wide band gap material. CdZnS ternary compounds can form a continuous series of solid solutions, allowing systematic variation in the band gap of CdZnS from 2.43 eV for CdS to 3.7 eV for ZnS by adjusting the composition. The replacement of CdS with a higher energy gap ternary CdZnS has led to a decrease in window absorption loss and lattice mismatching [8-14]. CdZnS thin films have been prepared using various techniques, such as electrodeposition [19], chemical bath deposition [20], successive ionic layer adsorption and reaction (SILAR) [23] and metal organic chemical vapor deposition [24]. Chemical bath deposition (CBD) is the most attractive because of its advantageous features over other deposition techniques because it is cheap and easily applicable techniques. This method gives high quality films at low temperatures, requires slow evaporation temperatures and easily coats very large surfaces. The only requirement for using this method is the knowledge of chemistry of the process [26]. CBD deposition of cadmium zinc sulphide is based on a controlled release of the metal ions of Cd²⁺, Zn²⁺ and sulphide ions (S²⁻) from thiourea in an aqueous alkaline bath. It is agreed that metal ions and sulphide ions are slowly released owing to the control of the complexing agent to form a thin film on the substrate. In this paper different CdZnS size-controlled CdZnS nanoparticles were prepared in the presence of capping material cetyl trimethyl ammonium bromide (CTAB) [15].

II. EXPERIMENTAL PROCEDURE

CdZnS thin films were deposited on glass substrates of dimensions 24mm X 75mm cleaned with H₂SO₄, acetone, double distilled water and ultrasonic cleaner. The total volume (47 ml) of the chemical bath, is an aqueous solution. All CBD films were deposited using the same concentration of reagents in the chemical bath. The chemical bath solution was contained in a glass beaker and controlled at 60°C. The dried glass slides were dipped vertically into the mixture of solutions. Film deposition starts when thiourea is added. The samples were retired from the bath after 60 minutes. The resulting transparent and pale yellow films presented high adherence on substrate and bright surfaces. Samples are prepared by using 0.01M Cetyl trimethyl ammonium bromide (CTAB) as capping agent.

X ray diffraction (XRD) measurements in the incidence mode with 0.5° of beam inclination were performed, using a monochromatic Cu K α radiation ($\lambda=1.5406 \text{ \AA}$) and an aperture diaphragm of 0.2°, in a Rigaku RUZHR X-Ray diffractometer. Films were carefully mounted so no misalignment was presented. The scanning step used on the goniometer was 0.01° with a counting time of 10 s. The scattered radiation passed through an arrangement of horizontal slits to the detector. Data were collected sequentially at 2 θ angle between 5 and 120°. An SEM study with EDAX was made by using a JEOL JSM 5600 scanning electron microscope.

III. EXPERIMENTAL RESULTS

The CdZnS films prepared by CBD method are uniform, layered, good adhesive with glass and yellow in color and their thickness \approx 658 nm. By using CTAB as capping agent particle size reduced. Thickness of film varies for films prepared by using different concentration of CTAB.

SEM is a promising technique for the topography study of samples, as it provides valuable information regarding the growth mechanism, shape and size of particles and/or grains. In this work, it appears to be a helpful technique to specify the growth mode via the surface roughness, and to determine the effect of the capping agent on the film morphology. The surface shows smooth and uniform spherical grains without creaks or pinholes and well covered to the glass substrate. By using different capping agents concerning the nucleation stage, film growth proceeds by nucleation of crystallites, then form a cabbage like structure as shown in the Fig 1. When CTAB is used as capping agent the leafy like structure changes into nanorods and forms a cabbage like structure due to a process of nucleation as reported in [18].

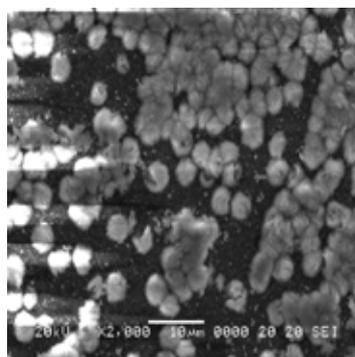


Figure 1 SEM Micrographs Of CdZns With CTAB

An II-VI chalcogenide semiconductor material shows the structural duality, and can be formed as either sphalerite (cubic, zinc blend type) or wurtzite (hexagonal type) [21]. The structural properties of all the films were studied by X-Ray automatic diffractometer using $\text{CuK}\alpha$ radiations ($\lambda_{\text{K}\alpha} = 1.540600\text{\AA}$). The scanning angle 2θ was varied in the range of 10° - 60° in steps of 2 min^{-1} for all the films. In the present work all the parameters like substrate temperature, deposition time, pH value of the solution are kept constant and films were prepared with capping agent. Table 1 shows the XRD results of CdZnS thin films.

Table 1 XRD results for CdZnS:CdCl₂ thin films

Sample	FWHM	2θ (Degree)	D(nm)	(hkl)	Grain size	I/I ₀
CdZnS	0.54	26.8348	3.31	(100) _c	2.757	100%
	0.39	29.3325	3.04	(111) _c , (002) _h	3.75	81.82%
	0.12	30.1318	2.96	(101) _h , (200) _c	12.094	69.61%
	0.55	44.4688	2.03	(110) _h , (220) _c	2.84	38.76%
	0.37	51.8621	1.76	(112) _h , (311) _c	4.3055	38.46%
CdZnS with CTAB	0.89	17.7430	4.99	(001) _c	1.65	83.1%
	0.17	20.9901	4.22	(100) _c	8.66	71%
	0.94	27.0346	3.29	(111) _c , (002) _h	1.58	72%
	0.69	29.3825	3.037	(101) _h , (200) _c	2.169	100%
	0.59	42.7703	2.11	(110) _h , (220) _c	2.59	
	0.49	51.8621	1.76	(112) _h , (311) _c	3.286	41.2%

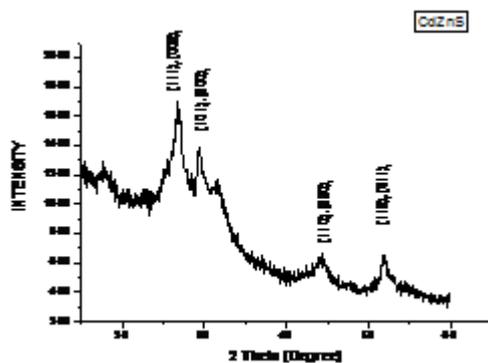


Figure 2(a) XRD spectra of CdZnS

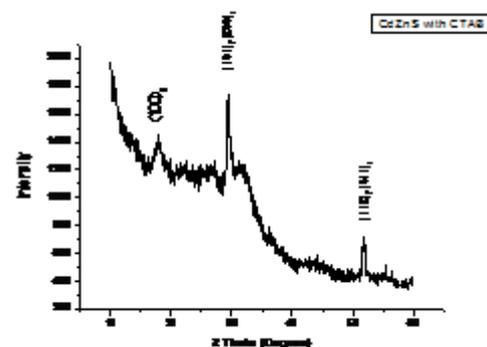


Figure 2(b) XRD spectra of CdZnS with CTAB

The assignments of peaks are made by comparing with JCPDS data [25] and calculation of lattice constants. Structural parameters like interplaner distances and lattice constants are listed in table-1. The different assigned peaks are also mentioned in figure 2(a), 2(b). The prominent peaks in the diffractographs are about (100), (101), (111), (002), (211), (220) of CdZnS which is in good agreement with JCPDS card 49-1302 [25]. Hexagonal and cubic both phases are equal. In these entire compositions, the (0 0 2) diffraction peak was present, indicating

that these thin film compositions have a hexagonal structure. The plane (0 0 2) gives lattice matching to the chalcogenide semiconductor, such as $\text{CuIn}_x\text{Ga}_{1-x}\text{Se}_2$ and $\text{CuIn}(\text{S}_{1-x}\text{Se}_x)_2$, which are used in photovoltaic devices. Hence, the presence of a (0 0 2) diffraction line suggests the fabrication of a suitable p-n junction within a device [22]. One more peak is observed at angle 17.7430 due to the effect of the capping agent CTAB.

IV. CONCLUSION

In this work we have shown that the CdZnS nanocrystalline films with two different capping agents CTAB and TSC can be chemically deposited on a glass substrate at bath temperature 60°C. Crystallography and SEM studies have been investigated on deposit CdZnS nanocrystalline films. X-ray diffraction technique shows that an extra diffraction peak is observed in CdZnS film with capping agent CTAB.

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A REVIEW: ENERGY EFFICIENT CLUSTERING PROTOCOLS FOR WIRELESS SENSOR NETWORK

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ABSTRACT

Now a day's Wireless sensor network (WSN) has various applications like disaster management, animal tracking and monitoring, volcano monitoring etc. Energy efficiency is a serious issue in wireless sensor network. Hierarchical routing or Clustering is the best solution for reducing energy consumption in WSN. LEACH (Low energy adaptive clustering hierarchy) is a good hierarchical protocol. There are many protocols introduced based on LEACH but still have issues of energy efficiency. Lots of research is going on CH (cluster head) election, data aggregation, different power levels, Quality of service and reducing number of transmissions. This paper introduces various clustering protocols; also their advantages and disadvantages.

Keywords: Clustering, Energy Efficiency, LEACH, Lifetime, Stability Period, WSN

I. INTRODUCTION

Wireless sensor networks consist of several nodes. Each node has computation capability like sensing, control function and transmission. Every node sends their sensed data to sink using wireless communication. Sink receives sensed data; aggregates that data and takes decision about action for particular application. So there are various applications based on WSN like disaster management, animal tracking and monitoring, volcano monitoring etc. In these kinds of applications, sensors require energy for various operations; but at such places battery cannot be recharged or replaced; so taking care of energy consumption is an issue now a days. Every node transmits same kind of data directly to sink (Single hop) it is not an efficient way because it consumes more energy; nodes far away from sink die earlier because they have required more energy to transmit their data directly to sink; so lifetime decreases. Later they introduce multi hop communication between nodes; in this approach most of the data transmit through nodes nearer to sink; so nodes nearer to sink die earlier and network fails.

To solve above problems of energy consumption hierarchical routing (clustering) is the best approach. In this approach clusters have been formed; each cluster has several nodes and one cluster head. Every node sends their sensed data to CH; CH aggregates that data and sends data to sink. This paper introduces various clustering protocols; also their advantages and disadvantages. Out of them some of the protocols for homogeneous network, some of the protocols for heterogeneous network, some of the protocols for proactive network and some of the protocols for reactive network.

II. PROTOCOLS BASED ON CLUSTERING

There were various protocols based on clustering that have been developed from 2001 to 2014. We introduce some of them including LEACH protocol. Some of the protocols based on clustering are as follows,

2.1 leach [1]

LEACH (Low Energy Adaptive Clustering Hierarchy) was proposed by [1] W. Heinzelman. It was first clustering approach introduced for WSN. It is for homogeneous and dense sensor network. It is TDMA based MAC protocol integrated with clustering and uses simple routing. It is working in 2 phase: 1) Set up phase: cluster has been formed, CHs selected and CH send TDMA schedule to nodes which want to join that particular cluster. 2) Steady state phase: nodes transmit sensed data to CH in their time slot; CH aggregates that data and transmit to sink. In every round this 2 phase are worked and new CHs are selected.

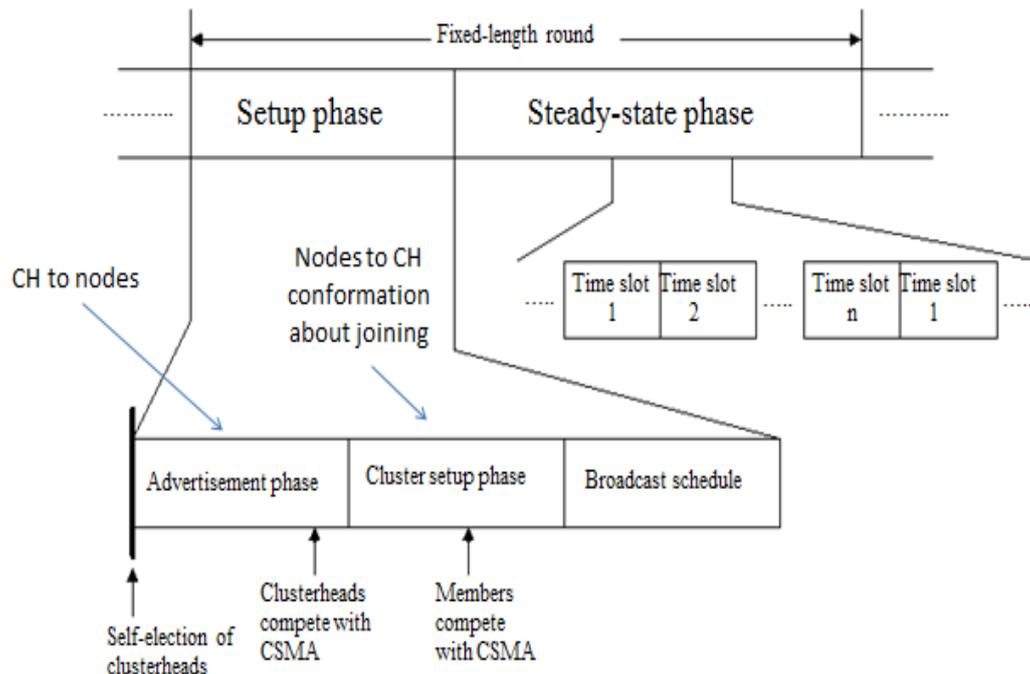


Fig.1: Organization of LEACH Rounds [2]

CHs are selected by below equation,

$$T(n) = p / (1 - p (r \bmod (1/p))) \quad n \text{ belongs to } G \quad (1)$$

P = probability to become CH r = number of round

n = total number of nodes G = number of node which not become CH for last $1/p$ round

If $T(n)$ is zero then node not became CH otherwise it became CH

2.1.1 Advantages of LEACH [3]

- (1) Each node has an equal chance to become a cluster head but cannot be selected as cluster head in a subsequent round so the load is shared between nodes.
- (2) Because LEACH uses Time Division Multiple Access (TDMA), it keeps cluster heads from unnecessary collisions.
- (3) LEACH can avoid a lot of energy dissipation by opening and closing members' communication interfaces in conformity with their allocated time slots.

2.1.2 Limitations of LEACH [3]

- (1) Because LEACH uses single-hop communication, it cannot be deployed in networks spread over large distances.
- (2) Because cluster heads are elected only on the basis of probability, not taking energy into consideration, LEACH cannot provide actual load balancing.
- (3) Because cluster heads are elected on the basis of probability, uniform distribution cannot be ensured. So, there is a chance that the elected cluster heads are concentrated in one part of the network and some nodes might not have any cluster heads in their vicinity.
- (4) The idea of dynamic clustering brings extra overhead.

2.2 Teen [4] [3]

Threshold-sensitive Energy Efficient sensor Network (TEEN) was proposed by Anjeshwar *et al.* and is a hierarchical scheme for reactive networks. Its main use is in time-critical applications. TEEN is a combination hierarchical and data-centric approach. TEEN has a two-tier clustering topology. TEEN operation uses two thresholds: hard threshold (HT) and soft threshold (ST). HT is used for the sensed attribute. ST is used to show small changes in the value of the sensed attribute. In TEEN, a cluster head sends its members its HT and ST values. The hard threshold and soft threshold try to reduce data communications.

2.2.1 Advantages of TEEN [3]

- (1) By varying the two thresholds, data transmission can be controlled.
- (2) TEEN is well suited to time-critical applications.

2.2.2 Limitations of TEEN [3]

- (1) The main drawback is that, whenever the thresholds are not met, the node will not communicate, and if the node dies, the network will not be able to sense it.
- (2) Data may be lost if cluster heads are not able to communicate with each other if they are out of range from one another.

2.3 Heed [5][3]

Hybrid Energy-Efficient Distributed (HEED) clustering was introduced by Younis and Fahmy. The main goal of HEED is to prolong network life. The main difference between HEED and LEACH is cluster head election; cluster head election in HEED is not random. The construction of clusters is based on residual energy of the node and intra-cluster communication cost. Cluster heads have higher average residual energy than the member nodes. The communication technique of HEED is the same as LEACH. CH elected by below equation,

$$CH_{prob} = C_{prob} * (E_r / E_m) \quad (2)$$

E_r is the estimated current energy of the node, and E_m is a reference maximum energy, C_{prob} is set to assume that an optimal percentage cannot be computed a prior.

2.3.1 Advantages of HEED [3]

- (1) HEED is a fully distributed cluster-based routing technique.

- (2) HEED achieves load balancing and uniform cluster head distribution due to lower power levels of clusters.
- (3) HEED achieves high energy efficiency and scalability by communicating in a multi-hop fashion.

2.3.2 Limitations of HEED [3]

- (1) Energy consumption is not balanced because more cluster heads are generated than the expected number.
- (2) As with LEACH, massive overhead is created due to multiple rounds.
- (3) HEED also has additional overhead owing to several iterations being done to form clusters.

2.4 Deec [6][7]

Distributed Energy Efficient Clustering Protocol (DEEC) protocol proposed by L. Qing. DEEC protocol is a cluster based method for multi-level and 2 level energy heterogeneous wireless sensor networks. In this scheme, the cluster heads are chosen using the probability based on the ratio between residual energy of every node and the average energy of the network. The era of being cluster-heads for nodes are entirely different according to their initial and residual energy. The nodes with more initial and remaining energy have greater chances of the becoming cluster heads compared to nodes with low energy.

2.4.1 Advantages of DEEC [6]

- (1) It avoid each node needs to know the global knowledge of the networks; DEEC estimates the ideal value of network life-time.
- (2) It controls the energy expenditure of nodes.

2.4.2 Limitations of DEEC [7]

- (1) Advanced nodes always punish in the DEEC, particularly when their residual energy reduced and when they come in the range of the normal nodes. During this position, the advanced nodes die rapidly than the others.

2.5 Mclb [8]

Multi-hop Clustering for Load Balancing Algorithm (MCLB) proposed by, N. Israr. It is a new cluster based routing algorithm that exploits the redundancy properties of the sensor networks in order to address the traditional problem of load balancing and energy efficiency in the WSNs. The algorithm makes use of the nodes in a sensor network of which area coverage is covered by the neighbors of the nodes and marks them as temporary cluster heads. The algorithm then forms two layers of multi hop communication. The bottom layer which involves intra cluster communication and the top layer which involves inter cluster communication involving the temporary cluster heads. Performance studies indicate that the proposed algorithm solves effectively the problem of load balancing and is also more efficient in terms of energy consumption from Leach and the enhanced version of Leach.

2.5.1 Advantages of MCLB

- (1) Selects best path with minimum hop-count between first cluster-head and base station.
- (2) Use full for longer distance.

2.5.2 Limitations of MCLB

- (1) Calculating distance from CH to sink and routing introduces more iteration so overhead increases.
- (2) Multiple transmission and reception consume more energy.

2.6 E-Horm [9][10]

Energy Efficient Hole Removing Mechanism (E-HORM) was proposed by M. B. Rasheed. In this technique, they use sleep and awake mechanism for sensor nodes to save energy. This approach finds the maximum distance node to calculate the maximum energy for data transmission. They considered it as a threshold energy E_{th} . Every node first checks its energy level for data transmission. If the energy level is less than E_{th} , it cannot transmit data. When numbers of sleep nodes are greater than 10 then put sleep node one by one into active mode. They also explain mathematically the energy consumption and average energy saving of sensor nodes in each round.

2.6.1 Advantages of E-HORM

- (1) Increase stability period and remove energy holes.
- (2) Significantly helps to extend the network lifetime.

2.6.2 Limitations of E-HORM

- (1) Continuous sleep and awakening of node puts complexity in algorithm.
- (2) Change in number of sleep node (10) for putting into active which change performance based on application.

2.7 A-Leach [11]

Assisted LEACH (A-LEACH) proposed by S. V. Kumar. It achieves lessened and uniform distribution of dissipated energy by separating the tasks of Routing and Data Aggregation; CH aggregates data and transferred to Helper node; Helper node sends aggregated data to sink. A new algorithm has been formulated to facilitate energy efficient Multi-hop Route Setup for helper nodes to reach base station. CH same as LEACH and Helper node selected by below Equation,

$$T(n) = 0.5 * (p / (1 - p(r \bmod (1/p)))) \quad n \text{ belongs to } H \quad (3)$$

H = set of node which not become helper node for last $1/p$ round

2.7.1 Advantages of A-LEACH

- (1) It extends the lifetime of the network, minimizes overall energy dissipation in the network
- (2) It distributes dissipation among Cluster Heads, Sensor Nodes and Helper Nodes.

2.7.2 Limitations of A-LEACH

- (1) They used same equation same as LEACH rather than HEED/DEEC.
- (2) They reduce overhead but significantly.

2.8 Modleach [12]

Modified LEACH (MODLEACH) proposed by D. Mahmood, N. Javaid. They introduce efficient cluster head replacement scheme and dual transmitting power levels. IT is for homogeneous network. They use different

power level for transmission from node to CH, CH to CH, CH to sink. They use CH selection method such that if CH has more energy than it remains as CH for next round. Also they introduce soft threshold and hard threshold; so energy consumption reduces.

2.8.1 Advantages of MODLEACH

- (1) It minimizing routing load of protocol and increase energy efficiency.
- (2) It distributes dissipation among Cluster Heads, Sensor Nodes.

2.8.2 Limitations of MODLEACH

- (1) If cluster head has less energy than required threshold, it will be replaced according to LEACH algorithm. They used same equation same as LEACH rather than HEED/DEEC.

2.9 O-Leach [13]

Optimize LEACH (O-LEACH) proposed by S. El Khediri and N. Nasri. In which Election of cluster-head in each round with energy value greater than ten percent of the residual value at each sensor. So node which has low energy not become CH; so it consumes less energy and remain alive for next few round for communication.

2.9.1 Advantages of O-LEACH

- (1) It achieves longer stability.
- (2) It was improve energy efficiency as well as lifetime.

2.9.2 Limitations of O-LEACH

- (1) If any nodes have not remaining energy greater than required then no CH selected network fails.
- (2) They used same equation same as LEACH rather than HEED/DEEC.

III. COMPARISON OF PROTOCOLS [1, 13]

We learned various protocols based on LEACH. We summarize these protocols using TABLE 1.

Protocol	Cluster Stability	Energy Efficiency	Delivery Delay	Algorithm Complexity
LEACH	Small	Very Poor	Very Small	Low
TEEN	Medium	Good	Small	Very High
HEED	High	Medium	Medium	High
DEEC	High	Medium	Medium	Medium
MCLB	Medium	Medium	Very High	High
E-HORM	High	Good	High	Very High
A-LEACH	Medium	Medium	Very High	Very High
MODLEACH	High	Very Good	High	High
O-LEACH	High	Good	High	High

Table 1: Comparison of Clustering Protocols

Each of these has an advantages and disadvantages, out of which E-HORM, MODLEACH and O-LEACH has good energy efficiency for proactive network and TEEN for reactive network and also MCLB for very large network.

IV. CONCLUSION

We see clustering reduces energy consumption in Wireless Sensor Network. LEACH was first clustering protocol. Also DEEC protocol for heterogeneous network. Sleep and awake schedule prolongs network lifetime. Also different power levels introduced for reduce energy consumption so energy efficiency and lifetime increases and also stability period increases. Different cluster head algorithm changes value of all parameters. Protocols based on LEACH introduces in this paper with their advantages and disadvantages. Mostly all protocols for homogeneous and proactive network. TEEN, MODLEACH with Hard Threshold and MODLEACH with Soft Threshold protocols for homogeneous and reactive network. Reactive network has long lifetime than proactive network. Also Heterogeneous network has long lifetime than Homogeneous network.

V. ACKNOWLEDGEMENTS

I would like to thank my parents, my guides Prof. H. J. Kathiriya and Prof. N. H. Kathiriya, all staff members of R.K. University for guidance throughout work period. Also I would like to thank Prof. A. D. Pandya, Prof. M. B. Raseed, and Prof. N. Javaid and to all for giving online support.

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