SURVEY ON COMMUNITY DETECTION IN SOCIAL NETWORKS

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ABSTRACT

Community detection is a growing field in the area of Social Network applications. Community in social network is peoples with common interests join anytime anywhere to freely share information, experiences, opinions, services, and other useful resources. Communities give us valuable data about relation between individuals and how data transfers between them. . Social network mainly have a graphical representation. Within the graph community is a group of vertices which probably share common properties and play similar roles. A few methods focus here to detect communities are by analysing the graphical structure of the network, and by applying clustering techniques on network. This will identify the disjoint communities in a network.

***Keywords**: Affinity Propagation, Clustering, Gibbs sampling, Hierarchical Agglomeration, Social Network.*

I. INTRODUCTION

Many systems of current interest can usefully be represented as networks. Examples include the Internet and the world-wide web, social networks [12] food webs and biochemical networks. A network community generally refers to a group of vertices within which the connecting links are dense. The links represent the data connections between computers, friendships between peoples and so forth. Interactions between nodes can be used to determine communities in a social network. Particularly, network communities in different contexts may be circles of a society within which people share common interests and keep more contacts, clusters of web pages related to common topics.

A community is formed by individuals such that those within a group interact with each other more frequently than with those outside the group. Therefore, communities are groups of entities that presumably share some common properties. Community detection is important for many reasons, including node classification which entails homogeneous groups, group leaders or crucial group connectors. Communities may correspond to groups of pages of the World Wide Web dealing with related topics to functional modules such as cycles and pathways in metabolic networks to groups of related individuals in social networks and so on. Community detection is discovering groups in a network where individuals' group memberships are not explicitly given.

Human beings are social. The Easy way of using social media allows people to extend their social life in unprecedented ways. Difficult to meet friends in the physical world, but it is much easier to find friend through online with similar interests.

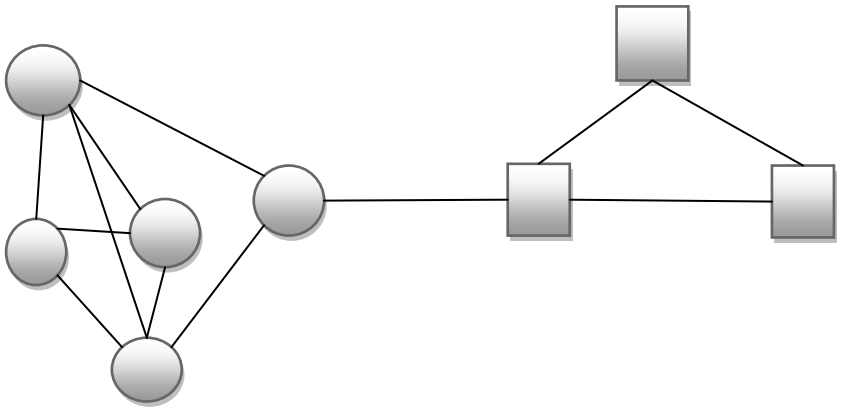

Fig1: A Social Network with Two Communities

II. FINDING COMMUNITIES IN A NETWORK

2.1 Semantic Community Discovery

A semantic [3] community includes users with similar communication interests and topics that are associated with their communications. The community structure of an SN is studied by modelling the communication documents exchange between the users. Communication documents include emails. Because email body contains valuable information regarding shared knowledge and the SN infrastructure. A Bayesian network is used to simulate the generation of emails in SNs. Differing in weighting the impact of a community on users and topics, two versions of Community models are proposed.

2.1.1 CUM: Modeling community with users

Initially consider a Social Network (SN) community as no more than a group of users. This is similar to the assumption in a topology-based method. For a specific topology-based graph partitioning algorithm such as Modularity, the connection between two users can be simply weighted by the frequency of their communications. In Community User Model (CUM) treat each community as a multinomial distribution over users. Each user u is associated with a conditional probability P (u/c) which measures the degree that u belongs to community c. The goal is therefore to find out the conditional probability of a user given each community. Then users can be tagged with a set of topics, each of which is a distribution over words. Community discovered by CUM is similar to the topology-based algorithm.

2.1.2 CTM: Modeling community with topics

In contrast to CUM, second model introduces the notion that an SN community consists of a set of topics, which are of concern to respective user groups. Analogously, the products of Community Topic Model (CTM) are a set of conditional probability P(z/c) that determines which of the topics are most likely to be discussed in community c. Given a topic group that c associates for each topic z, the users who refer to z can be discovered by measuring P(u/z).

CTM differs from CUM in strengthen the relation between community and topic. In CTM, semantics play a more important role in the discovery of communities. Similar to CUM, the side effect of advancing topic z in the generative process might lead to loose ties between community and users. An obvious phenomena of using CTM is that some users are grouped to the same community when they share common topics even if they

correspond rarely. For CUM, users often tend to be grouped to the same communities while CTM accentuate the topic similarities between users even if their communication seems less frequent.

2.1.3 The Algorithms

Gibbs sampling for Community-User-Topic model

```
/* Initialization */
for each email d
  for each word wi in d
    assign wi to random community, topic and user;
    /* user in the list observed from d */
/* Markov chain convergence */
i ← 0;
I ← desired number of iterations;
while i < I
for each email d
  for each wi € d
    estimate P(ci, ui, zi|wi), u € ad;
    (p; q; r) ← argmax (P (cp, uq, zr|wi));
    /*assign community p, user q, topic r to wi*/
     record assignment T (cp, uq, zr, wi);
  i + +;
```

2.2 Finding Community Structure in Very Large Networks

There are several methods to discover communities from social network. But most of the methods proposed so far are unsuitable for very large networks, because of their computational cost. Here consider a [4] hierarchical agglomeration algorithm for detecting community structure which is faster than many competing algorithms.

The algorithm modularity uses a greedy optimization in which, starting with each vertex being the sole member of a community of one, we repeatedly join together the two communities whose amalgamation produces the largest increase in members of community. For a network of n vertices, after n-1 such joins left with a single community and the algorithm stops.

The operation of the proposed algorithm involves finding the changes in Q that would result from the amalgamation of each pair of communities, choosing the largest of them, and performing the corresponding amalgamation. One way to implement this process is to think of network as a multigraph, in which a whole community is represented by a vertex, bundles of edges connect one vertex to another, and edges internal to communities are represented by self-edges. Rather than maintaining the adjacency matrix for calculating ΔQij, uses update a matrix. Since joining two communities with no edge between them can never produce an increase in Q. Only store ΔQij for those pairs i, j that are joined by one or more edges. Since this matrix has the same support as the adjacency matrix, it will be similarly sparse, so it can be represent with efficient data structures.

Maintain three data structures

- A sparse matrix containing ΔQij for each pair i,j of communities with at least one edge between them. We store each row of the matrix both as a balanced binary tree and max heap.
- A max-heap H containing the largest element of each row of the matrix ΔQij along with the labels i,j of the corresponding pair of communities.
- An ordinary vector array with elements a_i.

Where eij = 1/2m if i and j are connected and zero otherwise, and $a_i = k_i/2m$, m is the number of edges in the graph and degree k_i of a vertex i is the number of edges incident upon it. Thus we initially set

$$\Delta Qij = \begin{cases} 1/2m - k_i k_j /(2m)^2 & \text{if i, j are connected,} \quad (1) \\ 0 & \text{otherwise,} \end{cases}$$

and

$$a_i = k_i/2m \quad (2)$$

The Algorithm

1) Calculate the initial values of ΔQij and a_i according to (1) and (2), and populate the max-heap with the largest element of each row of the matrix ΔQ.
2) Select the largest ΔQij from H, join the corresponding communities, update the matrix ΔQ, the heap H and ai and increment Q by ΔQij.
3) Repeat step 2 until only one community remains.

The running time of the algorithm on a network with n vertices and m edges is O(mdlog n) where d is the depth of the dendrogram describing the community structure. Many real-world networks are sparse and hierarchical, with m ˜ n and d ˜ log n, in which case our algorithm runs in essentially linear time, O(n log2 n). This is considerably faster than most previous general algorithms, and allows us to extend community structure analysis to networks that had been considered too large to be tractable.

2.3 Community Detection Using Action of Users

The online social networks have a graph structures. It include effective information of users within networks. This information can lead to improve the quality of community discovery. Here [5] instead of using centrality measures in social networks analysis, use user actions to identify communities and leaders. First, based on Interests and activities of users in networks, discover some small communities of similar users, and then by using social relations, extend those communities. A Social graph is an undirected graph G = (V, E)

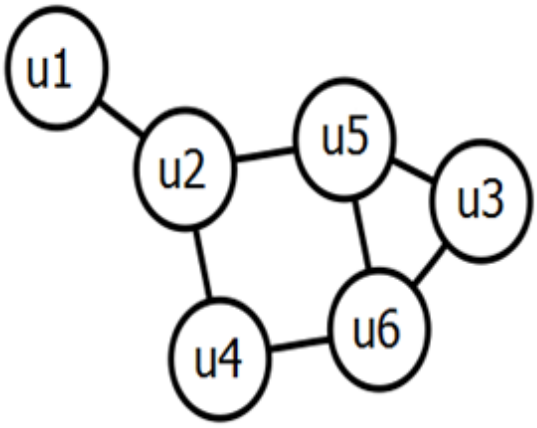

Fig.2: A Sample of Social Network

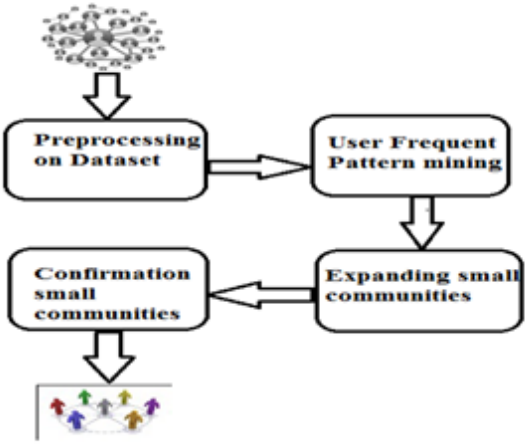

Fig.3: Steps of Community Detection

2.3.1 Pre-processing

The input of the algorithm includes user-action table and graphs. Two thresholds will be determined, β and ¥ that will be used in the algorithm.

Action	User
A1	U1,U3,U9,U2
A2	U1,U6,U7
A3	U2,U5,U8
A4	U2,U5
A5	U1,U6
A6	U4
A7	……..

TABLE I User-Action table

2.3.2 User Frequent Pattern mining

Find maximal patterns using frequent pattern mining algorithms and minimum support threshold ¥. For mining the patterns use Aprior pattern mining algorithm.

Frequent Pattern	Maximal Pattern
U1	U1,U6
U2	U2,U5
U5	
U1,U6	
U2,U5	

TABLE III If ¥=2, the maximal patterns include two tails

2.3.3 Confirmation Small Communities

Every small extracted group of previous step consists of few users. They are operationally similar to each other. To verify these are communities users of each group is connected to each other by a threshold. It is called β. In this step two or multiple groups are examined. If users within each group are connected according to a threshold they are refers to as a community. Otherwise group will be divided into small communities.

Steps involved in the confirmation of small communities

- Any node of each group stores its name or ID in its memory.
- All nodes which their memories are edited transmit their memories to neighbours.
- Neighbours integrate them to their memories.
- Variable called STEP which adds one unit of value to per sender node, maximum value is β.
- If all users of group were found in one memory, algorithm ends and return TRUE.
- Otherwise, value STEP is examined and if it is equivalent to value β, algorithm ends and return FALSE

2.3.4 Expanding Small Communities

Each extracted community in the previous step consists of two or more nodes with similar action which are to some extent related, that build a small community. Since users let their network friends see their actions, and seeing actions performed by their friends may sometimes tempt some fraction of the users to perform those

actions themselves. So users who are in neighbourhood probably are more similar. It is sensible, due to threshold β, these communities to be expanded. For achieving this goal, an algorithm similar to k-nearest neighbour, was used. Voting among neighbours is done to specify the node to communities.

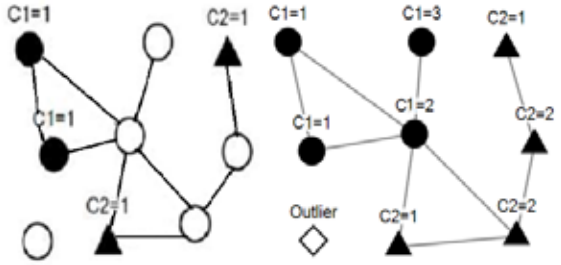

Fig.4: Triangle Community Scoring 6 and Circle Community Scoring 7

Compared with other methods, extracted nodes in the communities may not have the best density. But each community is expanded around the larger core of similar and related nodes. So in applications like predicting the users actions in marketing and recommender systems, the method will be more effective.

2.4 Community Discovering using Clustering Technique

A method is proposed [6] to derive communities of social networks. In addition to finding topics of network, this method also parses and analysis amount of communication between users. The method focus on text based information of social networks.

Various step involved are Social network Dataset Preparation module, Text Pre-processing and Data Modeling module, Social Object Clustering module, Social Network Members Partitioning module and Link Analysis module. Data set Pre-processing module prepares and cleans data input from social activities like email. Text pre-processing module involve processing of the enormous amount of information stored in unstructured texts cannot simply used for further. The computer handles the text as simple sequences of character strings. Therefore, specific pre-processing methods and algorithms are required for extracting useful patterns. Text mining refers to the process of extracting interesting information and knowledge from unstructured text. Text mining can be used in many areas such as information retrieval, machine learning, statistics, computational linguistics and especially data mining. The TF/IDF count the number of times each term occurs in each document and sum them all together.

The next step is clustering. Here an innovative clustering technique that purports to combine the advantages of affinity-based clustering [2] and model-based clustering. It is Similar to k-medoid clustering in that representative data points called exemplars used as centers to clusters. It is more efficient than k-medoid in the sense that the exemplars are not chosen randomly and the initial choice is close to a good solution. Here all data points are simultaneously considers as potential exemplars.

Each data point is considered as a node in a network. It recursively transmits real-valued messages along edges of the network until a good set of exemplars and corresponding clusters emerges. The magnitude of each message at any point in time reflects the current affinity that one data point has for choosing another data point as its exemplar. So we call this method as affinity propagation. It takes as input real valued similarities between data points. Similarity s(i,k) shows how well the data point with index k is suited to be the exemplar for data point i. Negative Euclidean distance used to measure similarity. One of the advantage of this method is number of original clusters do not have to be specified. It also takes an input a real number s(k,k) for each data point k

so that data points with larger values of s(k,k) are more likely to be chosen as exemplars. This value is also referred to as preferences.

Two kinds of messages exchanged between data points. One is responsibility r(i,k) is sent from data point i to candidate exemplar point k. It indicates that how strongly each data point favors the candidate exemplar over other candidate exemplars. Second is availability a(i,k) is sent from candidate exemplar point k to data point i. It indicates to what degree each candidate exemplar is available as a cluster center for the data point.

$$a(i,k) \leftarrow \min\left\{0, r(k,k) + \sum_{i\text{ s.t. } i' \notin \{i,k\}} \max\{0, r(i',k)\}\right\}$$

The availability a(i,k) is set to the self-responsibility(k,k) plus the sum of the positive responsibilities candidate exemplar k receives from other points. Only the positive portions of incoming responsibilities are added, because it is only necessary for a good exemplar to explain some data points well, regardless of how poorly it explains other data points .

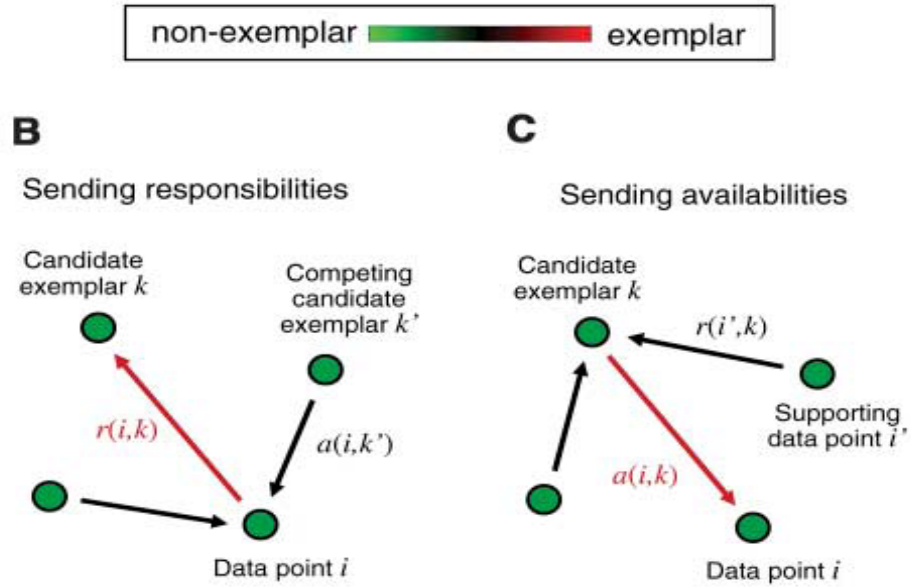

Fig.5: Affinity Propagation Is Illustrated For Two-Dimensional Data Points

Finally achieves communities by examining communication structure between users and communication between each two member user.

III. CONCLUSIONS

The study of networked communities is the expanding field of social network. The present survey has provided a state-of-the-art on existing methods. Graphs analysis will help to find a community in a larger network. Semantic community method successfully detects the communities of individuals and it provides semantic topic descriptions of these communities.

Community detection based on the action of uses will help to predicting the users actions in marketing and recommender systems. Most efficient method of detecting community is by using clustering algorithm. Affinity propagation method can efficiently determine the community than any other clustering methods. These communities have an important role in finding problems solution, managing organization and determining degree of success for people.

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ANTS-CLUSTERING ALGORITHM FOR BEST MEMORY UTILIZATION

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ABSTRACT

The Artificial Intelligence is playing vital role in the area of Swarm Intelligence, which is a study of bio inspired behaviour of insects, with the help of SI we are trying to make the implementation biological behaviour in computational area, such as Swarm intelligence in optimization, swarm robotics, routing protocols for next generation network, evolution of self organization, dynamic optimization problem. An agent based approach to self organized production and organic computing. This paper is mainly concentrating on one of the features of organic computing that is ants clustering techniques. This organic computing systems should possess self – x properties have a decentralized control and adaptive to changing requirements to their user. This clustering technique is implemented based on random selection or initialization of basic objects and fixing their threshold values and clustering will be worked with the help of similarities and dissimilarity behaviour of an item.

Keywords: Ants Colony, Clustering, Swarm Intelligence.

I. INTRODUCTION

Swarm Intelligence is an interesting area of research which has interlinked with Artificial Intelligence discipline. The Artificial Intelligence is nothing but requiring human intelligence, to implant knowledge to machine, so that work/problem to be solved. Swarm Intelligence emerged out social insect collective behaviour shows many interesting properties such as flexibility, robustness, decentralization and self organization. This is implemented based on natural support or by inspiration from natural insects such as ants, bees and swarm, the life style or living behaviour of these insects made the researchers to implement this technique in the area of computation. The functions performed by these insects are based on team or group work. The representation of group is technically termed as “Clustering”. This clustering aims at representing large datasets by fever number of prototypes or clusters. This technique is one of the key tasks of data mining. It is also a current area of research. Clustering can be defined as the act of partitioning an unlabeled data set into groups of similar objects/items. This similar property of group is known as cluster. The dissimilarity of object is represented as different group. Hence dissimilarity is usually represented between the clusters. This cluster analysis has played a central role in the field of engineering, computer science, life and medical science, earth science and social science.

II. SWARM INTELLIGENCE

This Swarm intelligence is a relatively new interdisciplinary field of research, which has gained huge population in today’s research area. The implementation of Swarm Intelligence is as same as Artificial Intelligence that

means through the design of algorithm. This improves several computational requirements on the relevant clustering techniques. A family of bio inspired algorithm has recently emerged that meets these requirements and has successfully been applied to a real world clustering problem. The behaviour of the natural swarms has influenced the design of algorithms and systems in computer science as following features:

1. Collective transport of ants has inspired the design of controllers of robot for performing work coordination
2. Brood sorting behaviour of ants motivated several clustering and sorting algorithm.
3. The path finding and orientation skills of the ants are mainly used for implementation of ant colonial optimization.

The swarm intelligence algorithm mainly focuses on particle swarm optimization (PSO), Artificial Bees Colony (ABC) and Ants Colony System (ACS).

In this paper we are mainly focusing on swarm controlled emergence based on ant base clustering technique and this can be implemented with the help of Ants Colonial Optimization.

III. ANT COLONICAL OPTIMIZATION FOR CLUSTERING

Ant clustering refers to the behaviour of ants to cluster their brood (producing new ant) within the nest centre, or to cluster dead corpses (dead body) so that they transform so called cemeteries [1]. Both the phenomena can be seen as emergent behaviour which has been inspired biological insects. This living behaviour can be implemented in the area of computation based on ant clustering technique; this can be done with the help of distribution of items in two dimensional or n dimensional arrays.

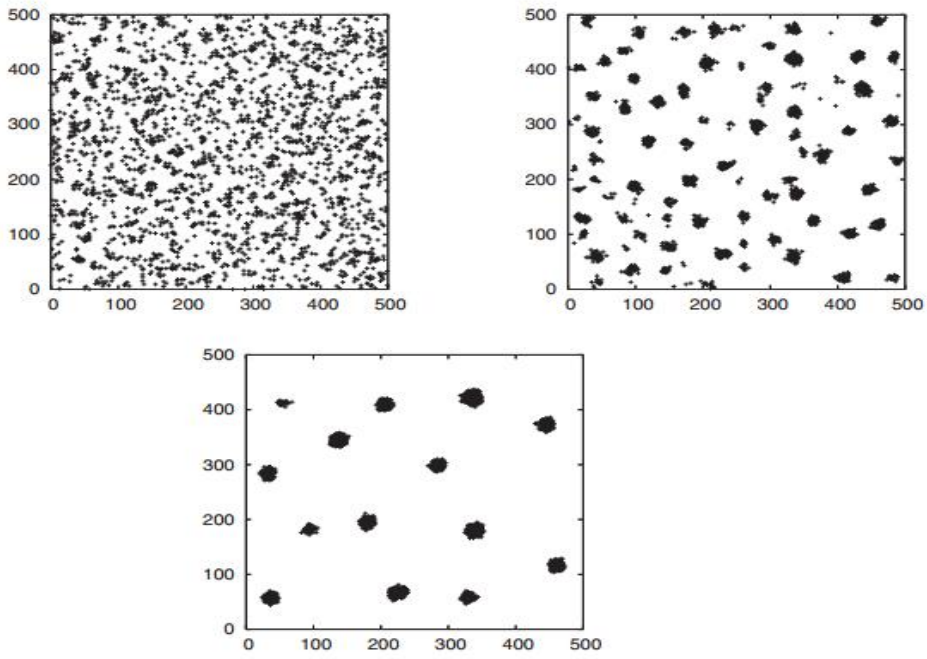

Fig. 1. Cell array with clustering agents: distribution of items after 100,000 (upper left), 1,000,000 (upper right), and 50,000,000 (lower) simulation steps

It can be seen that many small clusters have been formed after 100000 simulation type steps with growing number of clusters becomes smaller and the size of the cluster increases [2]. The top left group represents less ants but more groups, right top group represents little bit less number of groups but number of ants in each group is more compare to left group. Down group represents number of clustering group is very small but

number of ants in each cluster group is more compare to both the above groups Considering an ant as an agent walk randomly within the cell array/memory location and picks up an item that it finds with certain probability, carries it around, and drops it with a certain probability [3]. The mathematical implementation of picking up of an item can be represented as

Pp = (k1/ (k1 + f)) 2

The dropping of an item is represented as Pd = (f/ (k1 + f)) ^{2}.

Where f- is a fraction of cells in the neighbourhood of the agent and it can be compute the fraction of time stamp where agent moved across cells that are occupied by an item.

K1 & K2 – The threshold value of probability of picking up & dropping of an item.

The process of ant based clustering kind of algorithm can be generalized in different steps:

1. Projection plane: All objects and ants are randomly projected, that means selected randomly and projected onto two dimensional planes which includes the speed of an ant, projected area or space and accuracy of the ants colony optimization.
2. The randomly selected ants are clustered based on calculating the similarities of ant's behaviour or items.
3. The dissimilarity of ant cluster is usually happens with neighbouring cluster ants where has dissimilarity will occur only between two different groups.
4. Calculating the object picking up and dropping value based on number of time required to move across the cells 'f' and with threshold value of probability.
5. The direction of ant's movements along two dimensional representations, which represents the speed of an ant which can be chosen uniformly. It affects the likelihood of picking up and dropping objects.
6. Repeat the steps from 2 to 5.

These steps mainly help in the creation of cluster and fixing values in memory position.

IV. ALGORITHM FOR ANT BASED CLUSTERING TECHNIQUE

Step1: Initialization of ant's population size, ant's movement speed, radius of projection plane and memory capacity.

Step2: Randomly place the object or items on the area/space and item will be fixed in one of the cells of the space.

Step3: The object is dropped along their location that is memory. The number of object/item is placing in the memory will check the size of memory.

Step4: Whenever the ant picks up a new item, it checks its memory to make comparison of items based on the similarity of an object, if any item is already present in memory with same property then it jumps to that particular location, & this prevent dropping object in unvisited place, this forms cluster. This cluster reduces the number of memory usage.

Step 5: The pickup of item will be separated until all the items are completely fixed in the location.

Step6: For dropping an item first we need to generate random Maximum dropping number G.

Step7: If the probability value of dropping is more compare to G. (Pg >G) then drop (I, 0) this represents 'I' item will be dropping at 0 positions.

Step8: Once items are dropped then memory will be allocated and it will be represented with object name, location and maximum memory size.

Step 9: Once memory is allocated, before placing an object it will compare present object with already existed

object in the memory if it finds any item which is similar as present object then it will jump to that location and fixes the object in that location only.

Step 10: If any items present in memory is not similar with the current object then it moves to a new site or location where this location is not occupied by any other ants.

This algorithm represents the best utilization of memory by implementing clustering technique, where data which is stored through this technique is very huge compare to data which is stored individual at every memory location.

IV. ANTS SLEEPING MODEL

An artificial Ants Sleeping Model (ASM) and adaptive artificial ants clustering algorithm are presented to resolve the clustering problem in data mining by simulating the behaviour of gregarious ant colonies. This paper reports a study of light/dark periods on workers activity as well as sleep locations, posture and wake/sleep cycle of fire ant workers and queens located in an artificial nest chamber. Workers slept in one of three locations: on the ceiling against the chamber wall or in the centre of the chamber floor, workers on the ceiling or against the chamber wall slept for longer periods than those at the center of the chamber floor where most grooming and feeding activity occurred. Sleep posture of an ant is distinctly different that wake posture. During deep sleep, queens and workers fold their antenna and were non- responsive to contact by other ants. Another indicator of deep sleep was Rapid Antennal Movement (RAM) sleep. The sleep episodes were polyphasic for queens averaged approximately 92 sleep episodes/day, each episodes has approximately 6min/episodes, for 92 episodes X 6 min/episode = 552 min/day that is 9.4 hrs/day[4]. For worker average sleep is 4.8 hrs/day. The worker were hypervigilant with an average of 80% of the labour force completing grooming, feeding or excavation tasks at any given time.

Research into the neural mechanisms of sleep in one species can enlighten us on the neural mechanisms of sleep in other species; studies of sleep among caste members in the social insects can extend our understanding of intra and inter specific variability of sleep/wake cycle day to day and over evolutionary time. This paper reports a study of the affect of light on worker activity level. The success of ants worldwide is largely a result of the ability of workers to quickly switch back and forth from individual to group tasks based on need. Since fire ants are subterranean dwellers and thus irregularly exposed to photoperiods, we hypothesized that inactivity in individuals would be polyphasic and asynchronous. Sampling for our study on sleep cycle of fire ant workers and queens, a single colony was selected from laboratory maintained colonies. This colony contained a large ratio of brood relative to workers, indicating the presence of healthy queens. To simulate the small grouping of fire ants found in field nest changers, 3 queens, 30 workers, 30 large larvae were placed in one artificial chamber. A glass cover slip was placed over the chamber and tunnel. Queen sleep data on the activity/inactivity of the three queens was collected from video record for the computation purpose a single queen is selected one at a time, for its behavioural analysis, active and inactive duration were recorded in seconds along with the time of change in behaviour, from this analysis data, frequency duration and synchrony of each queens active and inactive periods were analyzed with this posture and location of queens was noted every hour over this observation periods.

The queen activity/inactivity indicators of wake active episodes in queens took three forms: antennal movement, head movement or body movement in the form of walking. When walking or moving their heads, queen extended their antenna with the scape forward of the eyes, scape and funicular at an obtuse angle to each other

(ant a). The mandibles and glossae (tongue) were partially extended [5]. Queens that ingested fluids from a worker or from a larva's and slit held their antennae with the scape and funiculate at acute angle and with the scape extended in front of the eyes, the tips of the antennae packed and folded, the mandibles teeth tips are touching but not overlapping and the glossae were partially extended(ant b). Queen that regurgitates food to a worker or another queen extended their antennae with the scape in front of the eyes, forming a right angle with the funiculate, mandibles were open and glossae fully extended (ant c).

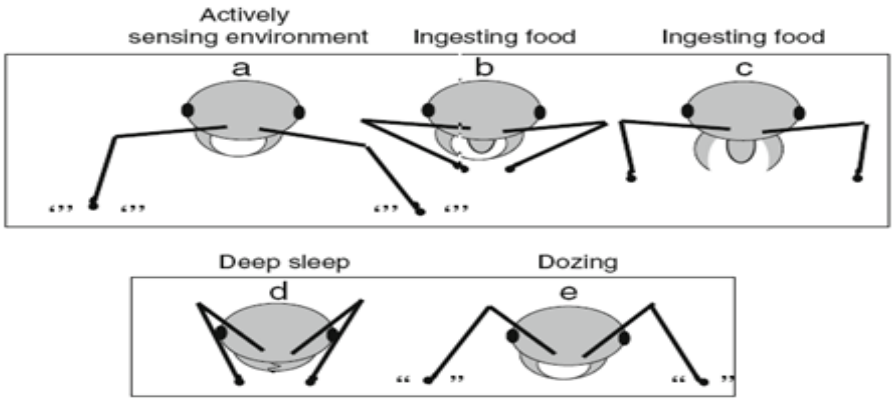

Fig 2: Ants active/inactive representation

The sleep mode episodes took two forms: deep-sleep and dozing. During deep-sleep, antennae where completely retracted as were glossae and mandibles, queens were unresponsive to contact by workers, during periods of deep-sleep, the folded antennae of queens quivered in a rapid antennal movement (ant d). Where as in dozing is different from deep-sleep, in that antennal were partially extended, with the scape and funicular at right angle to each other in this mandibles were partially open such that the tips of the teeth were touching but not overlapping. Dozing queens were more likely to respond to contact by worker with antennal movements.

V. CONCLUSIONS

This paper provides the way to best utilization of Memory by Clustering Technique, As we know that Homogenous Cluster will save Memory with same attributers it is implemented with the help of ant colonial optimization technique which represents less number of clustering group of ant will have more ants compare to individual present in the projection. where clustering produce best utilization of memory with similar attributes.

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UTILIZATION OF MECHANICAL ENERGY FROM ROTATION OF CEILING FAN TO GENERATE ELECTRICITY
(Mini Generator Using Conventional Machine)

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ABSTRACT

The non-renewable sources are going to be exhausted very soon in future and hence different technologies are being demonstrated to use alternate sources instead of conventional energy sources. This project leads a step forward towards the ***conservation of energy*** *i.e. THE MECHANICAL ENERGY OF THE ROTATING CEILING FAN IS USED TO GENERATE POWER. This has been designed as a generator set on the ceiling fan i.e. the magnets (neodymium) are placed with alternate poles on the stator. By using the principle of Faraday's law of electromagnetic induction the emf is being induced in the coil which further depends on the magnetic field strength and the relative motion between the magnetic field and the coil. Design process is simple, effective, reliable, economical and efficient. The main benefit is that generation of power is possible without affecting the normal operation and parameters of the ceiling fan. Till now the generation of the voltage up to 18 volts AC after rectifying 15volt DC has been obtained by placing 8 magnets and 8 coils with specified turns and gauge. Generated voltage can be stored in a battery, LED Bulbs can be glown as required or it can be stepped up using step up transformer and it can be further used for various applications. It regenerates nearly 40% of the total energy consumed by fan. It consumed nearly 2months for designing of the generator and total cost is Rs 2000.*

Keywords: Electro-Magnetism, Fossil Fuels, Generator, Global Warming, Renewable.

I. INTRODUCTION

Electricity is a peculiar characteristic that cannot be stored in large amounts. As the demands are high the electric utilities have realized that consumer demands cannot be met satisfactorily. Due to increasing fuel prices and energy cost, it has made us think alternate methods which will be a contribution to existing utilities. The increasing humidity level due to global warming. It has become difficult to get 'Natural cool air' from the environment, so it has become necessity of fan at domestic and commercial places. So thought why can't use that rotations of the fan for the generation and "**conserve**" the energy.

What is conversation?

It is defined as "Reduction in amount of energy consumed in a process or system or by an organization or society through economy, elimination of waste, and rational use". Energy conservation is a process of saving of energy without affecting to the actual work with or without investment.

In this model we are using the actual ceiling fan (prime mover) to generate electricity. “When this idea was given everybody starts thinking that just an alternator is connected to the fan which is worthless”, because with above method no new energy can be created. Just the input which is given to fan will be transformed two times and will be getting as output. The output should be such that normal operation of the ceiling fan should not be disturbed but also extra energy should be extracted from it without any losses. Simply saying the main and original purpose of fan is to “give cool air”, so without disturbing it we should get extra energy which can be stored in to the battery and can be used for further purpose.

II. REVIEW OF LITERATURE

2.1 Reviews on Generators

Electric generators first started being built in the 1830's by Michael Faraday who utilized rotary mechanical power. Different versions based off of Faraday's technique evolved all using permanent magnets. Not until 1866 when Werner Siemens perfected the process did generators on longer need a permanent usage of magnets.

Electric generators work by converting mechanical energy into electrical energy. Common generators used today use a wide variety of fuels from gasoline, diesel, water, natural gas, wind, and more. Abiding by a basic law of physics, the generator doesn't actually create energy but merely transfers the type of energy from some sort of mechanical to electric. [1]

2.2 Reviews on Axial Flux Alternator

A paper being published by Steven Fahey on the construction homemade Axial Flux Alternator using the principle of Faradays Law of Electromotive force in the year 2006.

The magnetic field is manipulated to the advantage, when making permanent magnet alternators. By concentrating the magnetic flux between two opposite magnet poles, and capturing the flux in iron plates that would otherwise be wasted, direct as much energy can through the gap between the faces.

Construction consists coils of wire held steady, while the magnets spin past on the rotors.

Because the magnets were arranged N-S-N-S, the direction of the field flips each time a magnet goes by. Each coil sees a flipped magnetic field, and pulse of electricity is produced. When the field flips back, a pulse of opposite voltage is created. This coil is now producing Alternating voltage. Here is a set of 9 coils that were wound for a Permanent Magnet Alternator. They are all the same size, and have the same number of turns each. Wire comes in a variety of sizes. The diameter (or “gauge”) of the wire determines the maximum amount of current it can carry. Heavier wire can carry more current than thinner wire. The builder selects a wire size that allows the current required for his design, but no bigger.

III. EXPERIMENTAL SETUP

Setup consists of rotor on which magnets are being placed directly or on a disc which rotates when the rotor starts rotating, and a shaft which is stationary on which the windings are placed with the help of a disc as shown in figure 4.1. The distance between the magnets and windings maintained is optimal.

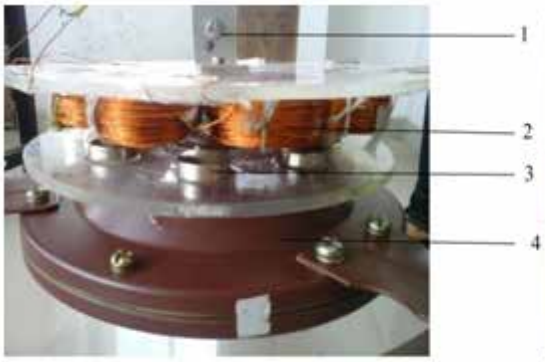

Fig. 3.1: Complete set up of project

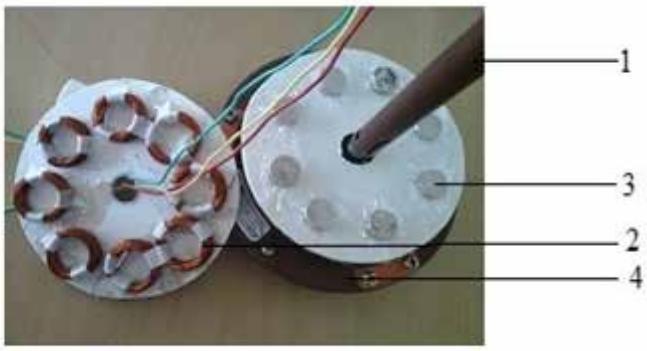

Fig. 3.2: Placement of coils and magnets

3.1.1 Down Rod

The down rod is a component which gives support to the rotor and supply lines are passed through it. In the present model the stator is fixed on the down rod.

3.1.2 Coils

The coils are placed as shown in figure 4.2 placed on a stator disc. Coils are made with optimal no of turns with certain thickness (gauge).

3.1.3 Magnets

The magnets used here are permanent type i.e. neodymium iron clad with higher amount of magnetic field density.

3.1.4 Rotor

The motor house of the ceiling fan is used as a rotor on which magnets are being placed as shown in figure 4.2.

IV. METHODOLOGY

For normal operation of the fan we noted down speed (N1) for different settings of regulator. After making the modifications in the construction of the fan again the speed (N2) is noted for different settings of the regulator. Difference between N1 and N2 are tabulated so that we get to know the modification effect on normal operation of fan.

The generated voltage and current for different speed is being noted and also can be varied to different values with the help of the regulator which is not possible in wind turbines which is depends on velocity of the wind. The voltage generated can be utilized directly or it can be stored in battery for further use.

V. PROCEDURE

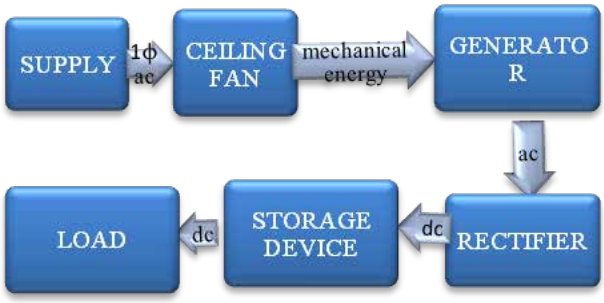

Fig. 5.1 Block Diagram Representing the Working Procedure

Many trials have being conducted taking various no of magnets, number of coils, with different no of turns, we have noted down the emf induced, resistance of the coils, current and speed. Finally by keeping number of magnets constant and by varying number of coils and turns, induced emf is noted down and for corresponding emf, LEDs with particular range of wattages have been glown. Till now the LEDs up to 20 watts have glown and further improvements are in process. The further step of this is to store the generated energy in battery so that it can be used whenever needed.

TABLE 5.1: Comparison of Various No. Of Turns and No. Of Coils for 35gauge Wire

No. of turns	No. of coils	Emf induced in volts	The range of LEDs which can be glow in watts
60	1	0.12 to 0.13	0.048 to 0.062
	4	0.48 to 0.52	0.192 to 0.208
	8	0.96 to 1.05	0.384 to 0.42
125	1	0.32 to 0.35	0.128 to 0.14
	4	1.28 to 1.4	0.512 to 0.56
	8	2.56 to 2.8	1.024 to 1.12
250	1	0.7 to 0.8	0.28 to 0.32
	4	2.8 to 3.2	1.12 to 1.28
	8	5.6 to 6.4	2.24 to 2.56
500	1	1.5 to 1.8	0.6 to 0.72
	4	6 to 6.8	2.4 to 2.72
	8	12 to 14.5	4.8 to 5.8
1000	1	3.2 to 3.5	1.28 to 1.4
	4	12.8 to 14	5.12 to 5.6
	8	25.6 to 28	10.24 to 11.2
1500	1	3.8 to 4	1.52 to 1.6
	4	15 to 16	6 to 6.4
	8	30 to 32	12 to 12.8

In order to increase the power generated copper wire of 27 gauge was being considered

No. of coils=8

No. Of turns=900

No. of magnets=8

Generated voltage=15.2volts (DC), 18.6volts (AC)

Total resistance=72Ω

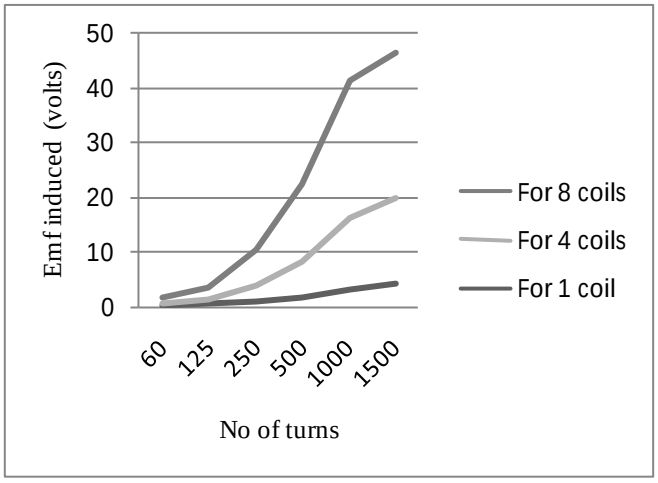

Fig. 5.2: Graphical Representation Taking No of Turns versus EMF Induced For Different Sets of Coils

VI. CALCULATION PARAMETERS

6.1. Frequency Calculation

Definition: The frequency is defined as the number of cycle per second or it can also be defined as the number of cycles per unit time. The frequency is inversely proportional to the time and it can be expressed as follows

f=1/T…….(1)

Where T=time in seconds

5.1.1 Theoretical calculation:

f= (N*p)/120……(2)

Where

N= Speed of the fan=420

P= number of poles=8

F=frequency in Hz

By substituting above parameters in eqn (2) we get

f= (420*8)/120

=28 Hz

6.1.2 Practically Obtained

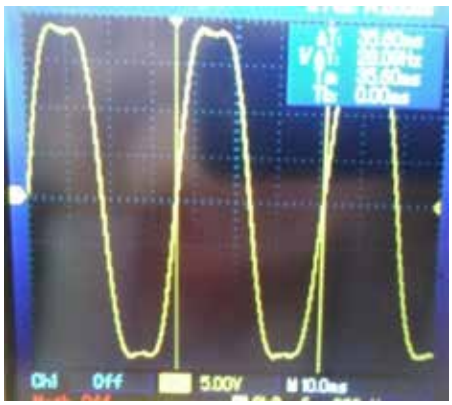

Fig. 6.1 Sinusoidal Wave Form Representing Frequency of Output

Frequency= 28.064 Hz

Peak to peak voltage=36.6volts

VII. MATERIALS REQUIRED

6.1. Ceiling fan

6.2. Acrylic sheet

6.3. Magnets [2][3][4][5][6][7][8][9]

6.4. Copper

6.5. Rectifier [10][11]

6.6. Rechargeable Battery [12][13]

6.7. LEDs

7.1 Materials and their Specifications

7.1.1 Neodymium Magnet

Fig. 7.1 Neodymium magnet

Dimensions

Diameter=20mm

Thickness=4mm

Magnetic Flux Density=1.35tesla

7.2 Coils

Fig. 7.2 Copper coil

Dimensions

Gauge=27SWG

No. of turns=900

Resistance of each coil=9Ω

7.3 Stator

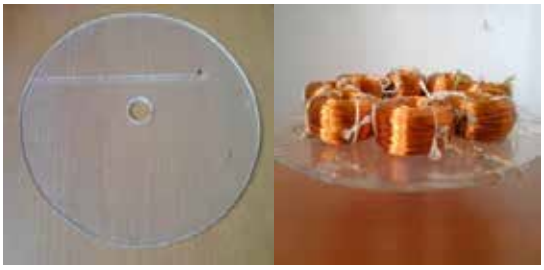

Fig. 7.3 Stator

Dimensions

Inner Diameter: 18mm

Outer Diameter: 20cm

Thickness: 4mm

7.4 Rotor

Fig. 7.4 Rotor

Dimensions

Inner Diameter: 50mm

Outer Diameter: 18cm

Thickness: 4mm

VIII. ANALYSIS OF PROJECT AND ITS PAYBACK PERIOD

8.1 Total Project Cost

·	Copper	400
·	Magnets	1400
·	Rectifier	20
·	Acrylic sheet	60
·	Miscellaneous	100
·	Total	Rs. 1980
·	Approximate	Rs. 2000

8.2 Units Calculation

No. of Units = watt*hours/1000

Considering 15W LED Bulb,

No. of units per day = 15*24/1000

= 0.36 unit

No. of units per year = 0.36*365

=131.4 units

Charge per unit = 6.5 Rs

Savings per year = 131.4*6.5

= 854.1Rs

Approximate = 855 Rs

Payback period = Total project cost/Savings per year

= 2000/855

= 2 year 5 months

TABLE 8.1 A Tabular Column Representing General Calculation For Payback Period.

Sl. No	Time (hours)	Units/Day	Units/ Year	Savings in Rs	Payback period
1	24	0.36	131.6	855	2 years & 5 months
2	12	0.18	65.7	420.5	4 years &10 months
3	8	0.12	43.8	285	7 years
4	6	0.09	32.85	214	9 years & 3 months

8.3 Example 1

Considering our college premises,

Total working hours (9AM to 5PM) = 8 hours

Total working days of college = 290 days

Considering fan is running for 6 hours,

Then

No.of units = 15*6/1000

= .09 units/day

No. of units/year = 0.09*290

= 26.1 units/year

Savings per year for a single fan =6.5*26.1

= 170Rs/year

Sl.No	Time (hours)	Units/Day	Units/year	Savings (Rs/fan) before payback	After pay back	Total savings by 2 fans after payback
1	24	0.36	131.6	855	1708	3415
2	12	0.18	65.7	421	840	1680

3	8	0.12	43.8	285	570	1140
4	6	0.09	32.85	214	425	850

Payback period = 2000/170

= 11years 7 months

Total number of fans in our college including hostels = 290

Total savings after payback period for 290 fan= 170*290

= 49,300 Rs/year

Approximately = 50,000 Rs/year

8.4 Example 2

Considering residential,

By comparing luminous intensity of 15W LED bulb which is equivalent to 30W fluorescent bulb[13]

By Considering,

No. of fans = 2

No. of working hours = 24

By replacing 30W fluorescent by 15W LED bulb then in general 15W is being saved before payback and the savings for which is as shown in table no 9.1

That is 855 Rs/year.

After payback period,

30W will be freely available, so one can save 1700 Rs/year/fan.

Similarly for 2 fans it will be = 3400 Rs/year.

TABLE 8.2 A Tabular Column Representation for Payback Period of Residential House

Sl.No	Time (hours)	Units/Day	Units/year	Savings (Rs/fan) before payback	After pay back	Total savings by 2 fans after payback
1	24	0.36	131.6	855	1708	3415
2	12	0.18	65.7	421	840	1680
3	8	0.12	43.8	285	570	1140
4	6	0.09	32.85	214	425	850

IX. CONCLUSICONCLUSION OF ABOVE EXAMPLES

The calculations which have shown above are variable and are depending upon the usage of fan, humidity of particular regions and also on design of the generator. By observing above values one can conclude that this project will be more use full for more humid regions.

X. APPLICATIONS

1. Battery storage is the one of the universal application of this project.
2. It is applicable for almost all 12 volt (dc) appliances like LED bulbs, 12 volt rechargeable batteries, cooling fan (CPU).

XI. ADVANTAGES

1. Simple in construction.
2. Light in weight.
3. Reliable.
4. Less maintenance.
5. Easy installation.
6. Usage of freely available mechanical energy for generation.

XII. DISADVANTAGES

Usage of the fan will be depending on the humidity of the region, if utilization of the fan is less then payback period will be more or vice versa

XIII. CONCLUSION

Renewable energy is being encouraged so this is, been designed to generate and contribute some amount of energy.

This design can reduce the domestic load up to some extent and is economic. Charge can be stored in battery and used whenever needed.

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A RELIABLE ZIGBEE BASED WIRELESS AUTOMOTIVE SPEED CONTROL SYSTEM

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ABSTRACT

Road safety is an issue of national concern. Road safety is a multi-sector and multi-dimensional subject. It includes orderly development and management of roads, provisions of safer vehicles and comprehensive response to accidents. It relies on modern traffic management systems and practices, improved safety standards in design, construction, operation and maintenance of roads. Inspite of all these production and maintenance of safer automotive vehicles is a prime factor. In the years to come, driver assistance systems will be required safety features rather than options. Through this paper we propose a complete ZigBee based driver assistance system solution that provides the cost-effective, low-power and secure wireless networking features of the ZigBee protocol. This can be used to prevent over speeding and to control road accidents in accident prone zones. The solution seeks to reduce the speed of the vehicle as it approaches the accident prone zones. A zigbee based unit is installed at necessary waypoints, transmitting relevant information to the corresponding zigbee units installed in approaching vehicles. Such a system automatically controls the speed of the vehicle which results in the deceleration of the vehicle and thus in the reduction of road accidents.

Keyword: Intelligent Transport Systems (ITS), Medium Access Control (MAC), Adaptive Cruise Control (ACC), Zigbee Adds Network (NWK)

I. INTRODUCTION

To make roads safer, cleaner and smarter, sensor and communication technologies are increasingly considered in research, standardization and development. While today's vehicles are already able to sense the surrounding environment, we expect that future cars will communicate with a roadside communication infrastructure and with each other. Connected vehicles create a fundamental building block of intelligent transport systems(ITS) and can provide numerous application services to improve safety and comfort of driving. Current driver assistance systems are based on a number of technologies such as radar, computer vision and sensors. Integrating all of these technologies into a single system is normally a costly and complex solution. Here we thought of introducing zigbee. ZigBee based driver assistance system solution leverages the cost-effective, low power and secure wireless networking features of the ZigBee protocol. ZigBee-based driver assistance system provides a very cost-effective alternative to more expensive commercially adopted systems like GPS, which provide navigation but do not have any fore-warning capabilities. Zigbee is specifically designed to support sensing, monitoring and control applications with lowest poor consumption. It also supports mesh networking a feature not found in most wireless networking standards. ZigBee is the only standards-based wireless

technology designed to address the unique needs of low-cost, low-power wireless sensor and control networks in just about any market. Since ZigBee can be used almost anywhere, is easy to implement and needs little power to operate, the opportunity for growth into new markets, as well as innovation in existing markets, is limitless.

II. MOTIVATION FOR ZIGBEE

The ZigBee standard was developed to address the following needs:-

- Low cost
- Secure
- Reliable
- Flexible and extendable
- Low power consumption
- Easy and inexpensive to deploy
- Global with use of unlicensed radio bands
- Integrated intelligence for network set-up and message routing.

FEATURE	WIFI	BLUETOOTH	ZIGBEE
Battery life	Several hours	Several days	Several years
Complexity	High complexity	complex	Simple
Node numbers	32	7	65000
Time for network communication	3 seconds	10 seconds	30 milliseconds
Coverage	100m	10m	10m – several kms
Extension	Roaming enable	no	Yes
Data rate	11Mbps	1Mbps	250Kbps
Security	SSID	64bit,128bit	128bit AES

Fig 1: Comparison Chart

This highly flexible concept can also perform the following functions:-

1) Alert the driver to approaching traffic, streaches of road under maintenance, school and hospital zones, vehicles approaching around a blind corner and many other hazardous

2) Serve as milestones, road signs and simple advertisement such as the menu of a near-by restaurant.

3) Be used as waypoint nodes to record and transmit traffic statistics, such as the number of vehicles passing through an intersection. These nodes can be linked to sensors measuring air quality, temperature or humidity at important locations in the city, and all readings can then be broadcast through a mesh network of various waypoint nodes to in-car units and a central gateway node for further processing.

4) Be used for automated, unmanned toll collection for parking lots and toll roads where a secure ZigBee link can help carry out toll transactions before the vehicle reaches the entry point.

5) In summary, any application that requires car-to-road communication, with a moderate amount of data involved, would benefit from the solution.

In this paper, we propose and analyze a hybrid architecture that combines vehicle to roadside sensor communication. From the wide range of possible use cases we have chosen accident prevention which we regard as important future services.

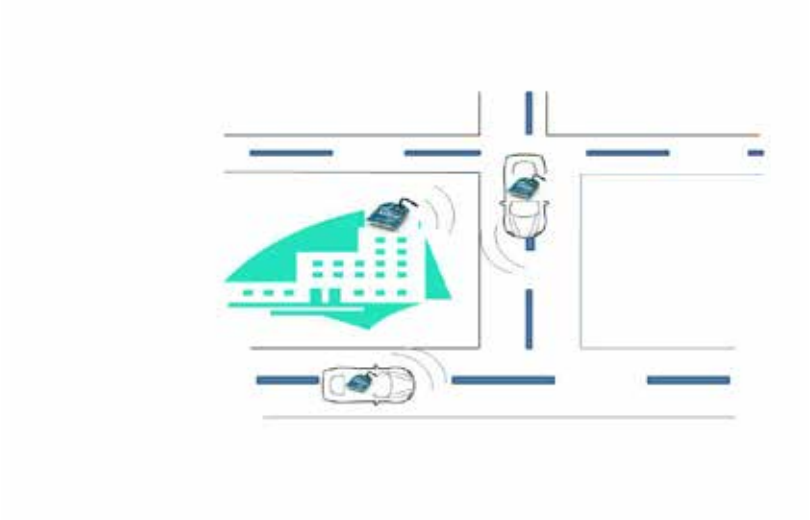

Fig 2:Schematic Representation Of Zigbee Pairing

II. THE ZIGBEE NETWORK

The ZigBee networking stack is built upon the IEEE 802.15.4 standard that defines the physical (PHY) and medium access control (MAC) layers for a low-data-rate, low-power network. ZigBee adds network (NWK) and application (APL) layer specifications on top of 802.15.4 to complete the full ZigBee stack.

III. SYSTEM DETAILS

We introduce the terms ―mobile unit‖ and ―static unit‖ here. The ZigBee unit installed in the vehicle is called the mobile unit, while a waypoint unit on the road is the static unit. In a mobile unit, an LCD screen and an array of LEDs on a vehicle's dashboard serve to display the messages and alert the driver along with audio warnings. The kind of LCD used (segmented or color) depends on the kind of MCU used and the cost of the unit. LEDs can be applied through GPIOs or RGPIOs and can be used in a low-cost solution in place of an LCD. Also, waypoint nodes and gateway nodes do not require LCDs, as a technician can connect the node to a laptop to view its information during debug and maintenance. Audio alerts are a must for all mobile nodes.

To conserve power, the static unit is in sleep mode most of the time, waking up when it detects an zigbee. Solar energy can also be used to power the waypoint and recharge its batteries for enhanced 24-hour energy efficiency.

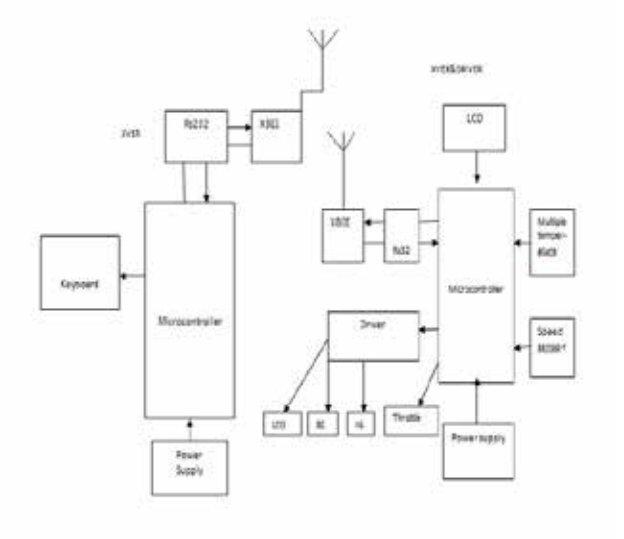

Fig. 3: Receiver Block Diagram

Fig 4: Flowchart of Speed Control System

Figure Shows the block diagram of the car unit that is the receiver unit which is embedded in the car. It is clear from the figure that the zigbee is interfaced with the microcontroller to receive the data sent from the zigbee nodes situated in specialized zones.

IV. SPEED CONTROL SYSTEM

It is known that road accidents are increasing day by day. Most of these road accidents are caused because the automobiles are driven at high speeds even in the places where sharp turnings and junctions exist. Running the automobiles even at those places is the main cause for the accidents. Reduction of number of such accidents is the prime step needed to be taken. Many systems have been developed to prevent these road accidents. One of them is Cruise control system (CC) that is capable of maintaining speed defined by the driver and its later evolution version Adaptive Cruise Control (ACC) that keeps the automobile at safer distance from the preceding vehicle. But these systems have no capability to detect the actual speed limit of the road which is required for safer transportation. So we are proposing a system in which the zigbee node placed on the roadside broadcasts the speed limit of the road. The receiver in the car gets the speed limit and gives the control to the speed check circuit. If it is found that the car is over speeding; the speed control is taken by the controller and the car runs with the specified speed limit as broadcasted by the zigbee node.

In our proposed design automobile is always in either Normal mode or Active mode. An automobile operates in normal mode until wireless module receives any data packet from the transmitter. In Active mode of operation microcontroller unit continuously studies the speed of the car. To control the speed of the car according to the limits we have developed the fuzzy logic. If the speed of the car is above the Maximum speed limit, then it sends the digital signal to the ECU such that speed of the automobile will be decreased. When the accelerator pedal is moved to increment the speed, microcontroller calculates the speed that would be reached on the new pedal position. If the speed is greater than the maximum speed limit then it denies excess speed and gives appropriate signal to the ECU.

V. STATISTICS

According to the WHO statistics for 2002,out of about 11.8 lakh road accident deaths across the world, 84,647 deaths were reported from India alone. In the year 2004, the number of road accident deaths in India increased to 92,618. The social cost of road accidents in India at about 3 percent of GDP. Considering the gravity of this situation, there is consensus that concerted measures are necessary for reducing this high level of accident deaths and injuries through safety measures and traffic management. In India with the expansion in road network, motorization and urbanization in the country, the number of road accidents have surged. Road accident injuries(RTIs) and fatalities have emerged as a major public health concern , with RTIs having become one of the leading causes of deaths, disabilities and hospitalization which impose severe socio economic cause across the world. According to the ministry of road transport & highways, the costs imposed due to the accidents are listed below

Accidents impose significant costs

- 3% GDP for India (1999-2000)
- 1% GNP for low income countries
- 1.5 % GNP for middle income countries
- 2% GNP for high income countries

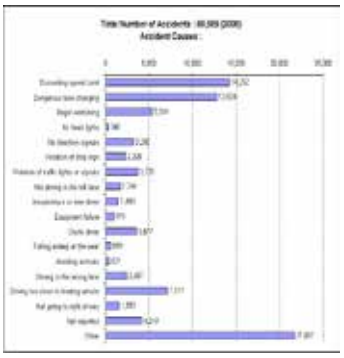

Fig 5: survey of accident cause analysis

The emergence of RTIs have become a leading cause of deaths and disabilities. RTIs are the 9th leading cause of death in 2004 and expected to be 5th leading cause of death by 2030 world wide. RTIs are one of the major causes of deaths, disabilities and hospitalizations, with severe socio economic cause across the world. The United Nations has rightly proclaimed 2011-20 as the decade of action on road safety and have called upon all the member countries to prepare a decadal action plan for implementation in their respective countries so that the present rising trend of road accident stabilizes and is reversed by the year 2020.

The above graph chart presents the total number of deaths in the year 2008and the list of causes. According to this graph chart, the exceeding speed limit is the major cause of accidents. Thus, there is an urgent need to recognize the worsening road safety situation inorder to take appropriate action. Driver assistance systems and vehicle safety systems should also be given same attention. The scale of resources that are currently being channeled towards other predominant health issues, if increasing human loss and injury on roads, with their devastating human impact and large economic loss to the society are to be avoided.

VI. FUTURE SCOPE

For future scope we propose and analyze a hybrid architecture that combines vehicle-to vehicle communication and vehicle-to-roadside sensor communication. From the wide range of possible use cases, we have chosen accident prevention which we regard as important future service. For accident prevention, roadside sensor nodes measure the road condition at several positions on the surface, aggregate the measured values and communicate

their aggregated value to an approaching vehicle. The vehicle generates a warning message and distributes it to all vehicles in a certain geographical region.

VII. CONCLUSION

In this paper we discussed the importance of an efficient driver assistance system and how it can help us improve safety standards on the road. The solution can significantly reduce the risk to drivers and enable better traffic management. Our ZigBee-based driver assistance system provides a very cost-effective alternative to more expensive commercially adopted systems like GPS, which provide navigation but do not have any forewarning capabilities. We showcased a number of ZigBee-enabled application scenarios related to automotive and road safety, such as data logging, information broadcasting and driver alerts.

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STUDIES OF PRODUCTIVITY IMPROVEMENT IN INDIAN AUTOMOBILE INDUSTRIES PLANT LAYOUT

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ABSTRACT

Cellular layout is having a good recognition and acceptability in Automobile industries of Europe and other developed countries due to space and operator problems. Most of automobile industries are working under for cellular concept. The work related with rearrangement of existing plant layout for specific production assembly line. Like TVS, very few companies in India have implemented this layout. Some of the automobile industries have not implemented this type of layout for any line, so preparatory work is going on for implementation and restructuring of Plant. Sharda Motors Industries Ltd., Nasik is planning to rearrange existing layout to new suitable layout. This study indicates Cost Saving in two major factors like manpower reduction and productivity of cell. Results show that a) No. of operator required is reduced by 03 and b) Job target / Shift is increases by 31.

Keyword- Automobile Firm, Cell Development, Plant Layout, Parametric Studies.

I. INTRODUCTION

Cellular Manufacturing System design is a complex creative decision activity which applies scientific knowledge, engineering theories and technologies to process a large quantity of information about products, machines, human resources and markets. Optimising the system is much more complicated, not only for human designers, but also for computers. This research concentrated on the layout design and its related problems.

1.1 Research Work Areas

1. Research type: addressing design issues, operational issues, or study based on empirical research
2. Resources consideration: machines, handling equipment, and people resources and related issues
3. Virtual Implementation level
4. Layout consideration
5. Use of Group Technology
6. Automation or non-automation issues of the manufacturing system.

1.2 The Need For Re-Layout Decision

Why do layout problems arise? Ordinarily when one thinks of plant layout, one links it with planning an entirely new plant starting from scratch. Although such occasions undoubtedly do arise, this usually is not the reason all the time. More frequently, layout work consists of making minor changes in the existing layouts, locating new

machines, revising a small section of the plant, or making occasional changes in material handling systems or so. The most common reasons for redesigning of plant are the result of one or more than one of the following:

1. Inefficient operations i.e. high cost of production, bottlenecks etc.
2. Changes in the design of production/services.
3. Introduction of new product services.
4. Changes in mix of outputs.
5. Changes in volume of output.
6. Obsolescence or failure of existing equipment.
7. High percentage of rejection.
8. Congestion in plant, lack of storage space etc.
9. Workers complaint regarding working conditions, (noise, light, temperature etc)
10. High rate of accident or safety hazard.
11. Changes in the location of market for existing products.
12. Environmental changes.
13. Changes in factory legislation.
14. Redesign of material handling system.

1.3 Space Requirement

Once the flow pattern is designed and some thought is given to the service and auxiliary activities, it is necessary to make preliminary estimates of the total space required for production centres, space for storage of material and for each activity in the faculty. A first estimate of the total space required may be arrived at by estimating an appropriate number of square feet(with the aid of a production space requirement sheet), for each piece of machine or equipment, including the area for workers, maintenance services, material get down, access to aisle and general or supporting areas. After estimating space needed for each activity or function the Total Space Requirement is worked out for all activity areas.

It should be emphasized that space determination made at this stage are estimates. They should very likely be optimistic enough to be sure that there is sufficient area.

In making the space calculations, space must be included for:

a) Raw material storage
b) In- process inventory storage
c) Finished good storage
d) Aisles, cross aisles and main aisles
e) Receiving and shipping
f) Material-handling equipment storage
g) Tool rooms and tool cribs
h) Maintenance
i) Packaging
j) Supervision
k) Quality control and inspection
l) Health and medical facilities
m) Food service
n) Offices

o) Employee and visitors parking

p) Receiving and shipping parking.

II. LITERATURE REVIEW

In CM part families are formed based on their similar processing requirements and the grouping of machines into manufacturing cells to produce the formed part families investigated by Barve [1]. In order to handle new product designs and product demand general- purpose machines and equipment are use in CM which reduces efforts in term of time and cost. Thus it gives great great flexibility in producing a variety of products as explained in recent reviews by [2]. Pasupuleti investigated the performance measures like the make span, mean flow time, mean lateness and mean tardiness are used to evaluate the considered dispatching rules. The method gives the sequence of parts to process on each machine and the total schedules for all the operations of the parts [3]. Elmaraghy et al. developed model for assessing the layout structural complexity of manufacturing systems. Guidelines such as reducing number of cycles, density and decision points are recommended to reduce manufacturing systems layout complexity. Author focused on two important planning objects the planning of capacities and orders [4]. To bridge the gap between conceptual works on the one hand and quantitative contributions on the other, they provided a framework for the structuring of planning tasks. In showing similarities and differences between existing works and planning tasks, the review aims at contributing towards a common understanding of production management in the automotive industry [5]. Thottungall and Sijo suggested that the optimal layout strategy for the company which is a combination of product line layout and process layout [6].

Dombrowskia and Ernsta studied a scenario based simulation approach to find out factory layout variants that are adequate for future requirements which is verified by a case study. Results showed that a scenario-based simulation approach is feasible for developing, analyzing and evaluation various variants of the production [7]. Yinhua examined perceptual error in the monitoring mode and cognitive error in fault diagnosis during malfunctions. The simulation results coincide well qualitatively with observations of actual plant operations and simulator training. This operator model can be used to analyze the generation mechanism of various types of human errors from the viewpoint of cognitive information processing [8].

Andrew developed A discrete event simulation model was developed and used to estimate the storage area required for a proposed overseas textile manufacturing facility. Discrete event simulation is concerned with the modeling of systems that can be represented by a series of events. The process of undertaking the simulation project initiated useful discussions regarding the operation of the facility covering areas such as the management of the departments and their interrelationships, the accuracy of data held on machine capacity, working practices such as shift patterns and examination of production rules that had evolved over time without any formal assessment of their appropriateness [9].

III. METHODOLOGY

3.1 Plan Possible New Layouts

When the team has an idea of what to change, it plans a new layout. The team follows several guidelines:

1. Layout in the process sequence is the basic principle.
2. Machines are placed close together, with room for only a minimum quantity of WIP.
3. The layout curves in a U or C shape, with the last machine near the first to reduce walking between cycles.

4. The process flow is often counter clockwise. As people walk around to operate the cell, the right hand, which has more control in most people, is then next to the machine; this allows efficient handling of tools and parts, with less turning and reaching over.

3.2 Methodology Adopted To Achieve the Objectives Is As Follows

1. Experiments to eliminate waste, to improve the division of processes and balancing of labour.
2. Approach starts by coordinating the timing of production with customer needs.
3. Studying the existing layout
4. Identifying operation sequence & elemental Operation time details for each machine.
5. Calculation of machine capacity for each machine.
6. Developing proposed layout for each production line in cellular layout.
7. Calculation of manpower utilization for each production line in new layout.
8. Determination of material handling route for each production line in new cellular layout..
9. Determination of WIP inventory and trolleys requirement for each production line in new cellular layout.
10. Cost analysis.

IV. EXISTING LAYOUT

Case considered for study is from Sharda Motors Industries Ltd., Nasik, one of the major automobile manufacturers for various MNC like Mahindra & Mahindra Ltd., Maruti Udyog Ltd., TELCO and many more. Name of Component: Scorpio W105 Front Pipe for Mahindra & Mahindra Ltd. Nasik.
Fig. 1 shows present layout of Scorpio W105 Front Pipe Assembly Layout in Sharda Motors Industries Ltd.
Problems identified in existing layout are-

- ü Manpower utilization is less than required capacity.
- ü Material handling route are not properly defined, so handling time required for components is more in existing
- ü layout.
- ü High Work in Process (WIP) inventory.
- ü Space Utilization
- ü Capacity utilization of machines are low.
- ü Machine changeover time is more.
- ü The wide entry and exit points between lines have the operator empty-handed too much of the time.
- ü Extra operator makes line crowed.

Fig.1 shows layout is used for production of two different front pipe assembly i.e. one for New Launch MHAWK Scorpio Model and second for old LCCR Scorpio model.

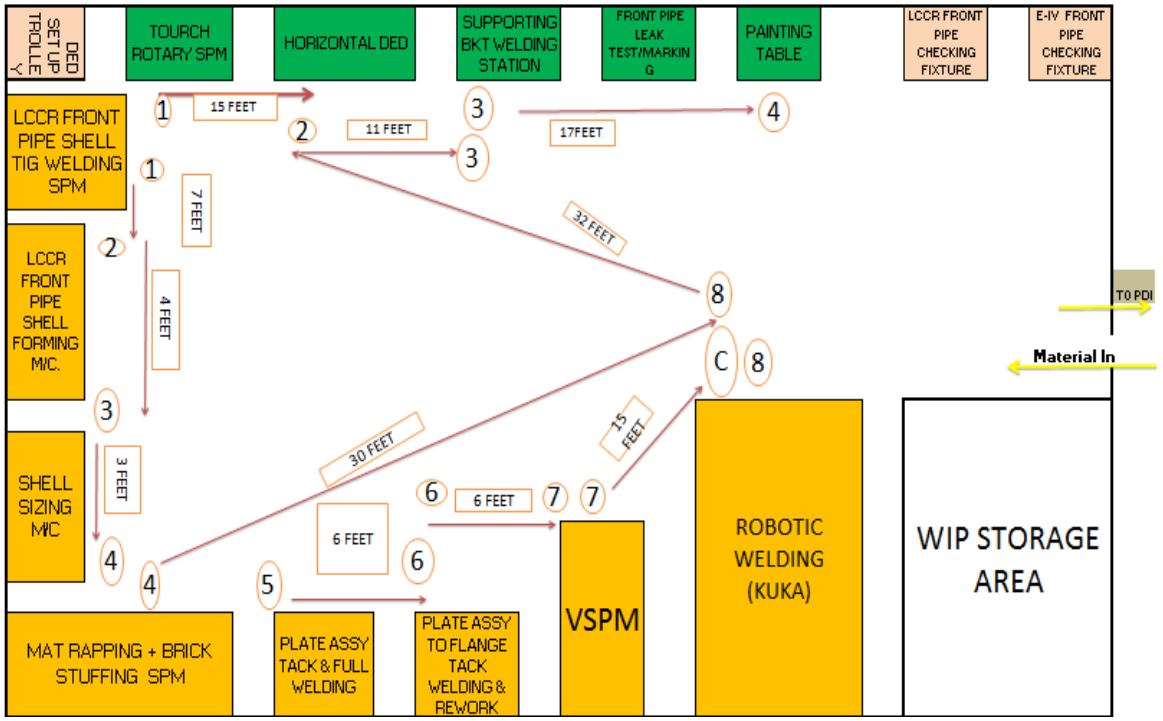

Fig.1 Scorpio W105 Front Pipe Assembly Layout

1. Layout No. 01

Scorpio W105 MHAWK Front Pipe Assembly Layout

Operation sequence in current layout is as shown in Fig.1 by arrows.

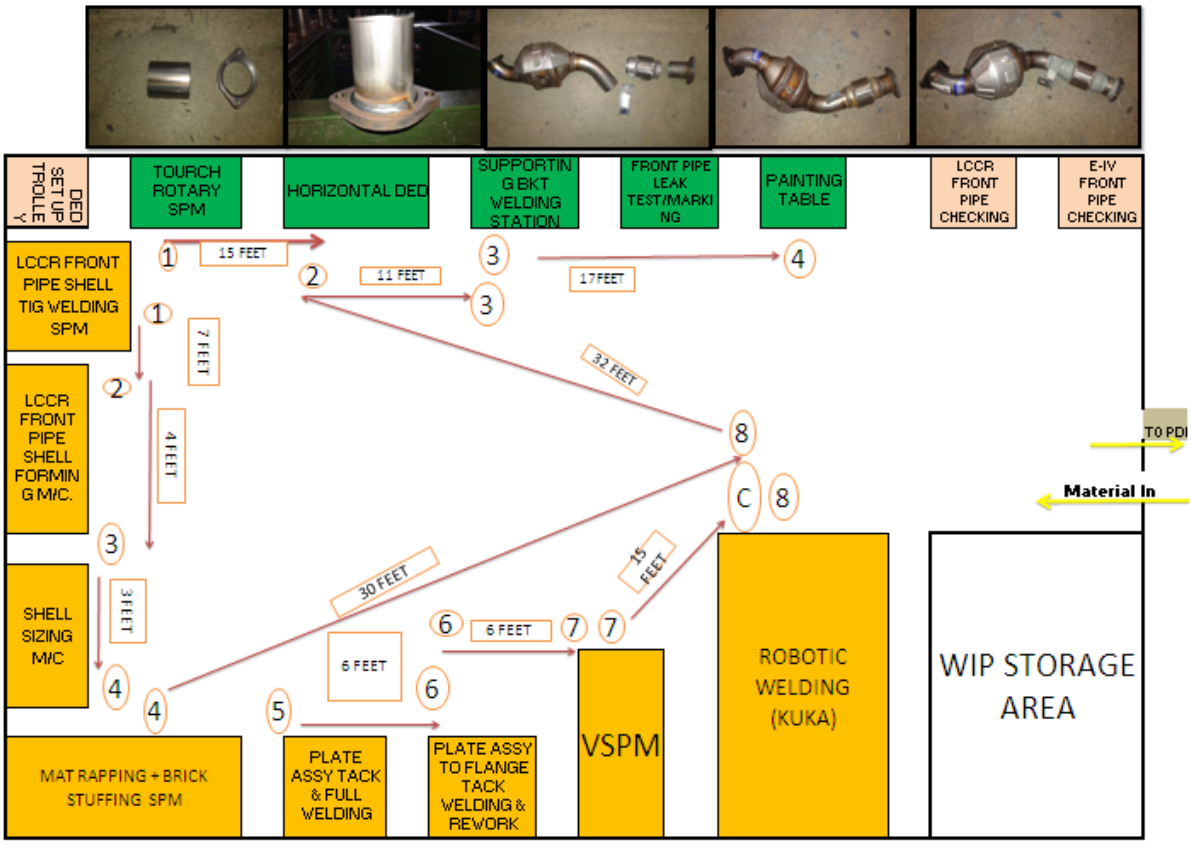

Fig.2 Scorpio W105 MHAWK Front Pipe Assembly Layout

Table 1 Operations Time Details of MHAWK Front Pipe Assembly Line

CYCLE TIME for FRONT PIPE ASSY MHAWK										
TOTAL OPERATORS 5	ST. NO.	DESCRIPTION	TIME IN SECOND						AVAILABLE TIME IN MIN	JOB PER SHIFT
			1ST	2ND	3RD	4TH	5TH	FINAL		
OPERATOR NO. 1	1	STRAIGHT PIPE+FLANGE SPM	88	84	85	96	88	88.2	27000	306.12
OPERATOR NO. 2	2	BELLOW+CATCON+BELLOW OUT PIPE SPM	112	129	129	132	125	125.4	27000	215.31
OPERATOR NO. 3	3	FRONT PIPE BKT WELD	133	130	131	128	140	132.4	27000	203.92
OPERATOR NO. 4	4	LEAK TEST/TAPPING/MARKING	155	152	142	143	155	149.4	27000	180.72
OPERATOR NO. 5	5	CHEAPING & PAINTING	182	190	185	187	188	186.4	27000	144.84
OPERATOR NO. 5	6	HEAT SHIELD AASY								
OUTPUT PER OPERATOR PER SHIFT	33	TOTAL TRAVELING LENGTH IN FEET		63				681.8	THROUGHPUT TIME	

In present MHAWK layout –

1. Total travelling distance = 63 feet
2. Throughput time = 681.8 seconds

Layout No. 2 -

Scorpio W105 LCCR Front Pipe Assembly Layout

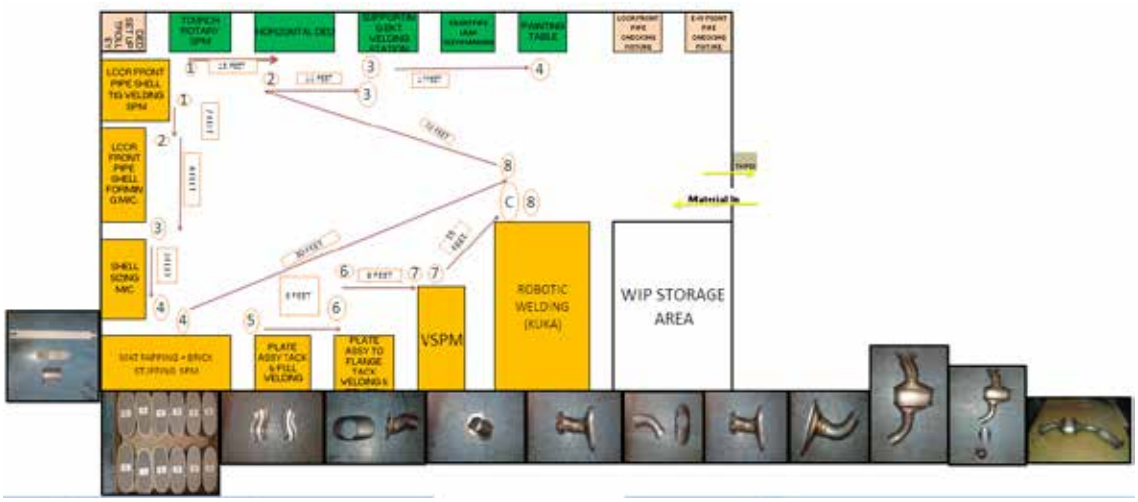

Fig.3 Scorpio W105 LCCR Front Pipe Assembly Layout

Table 2 Operations Time Details of LCCR Front Pipe Assembly Line

CYCLE TIME for FRONT PIPE ASSY LCCR										
TOTAL OPERATORS	ST NO	DESCRIPTION	TIME IN SECOND						AVAILABLE TIME IN MIN	JOB PER SHIFT
			1ST	2ND	3RD	4TH	5TH	Average		
OPERATOR NO. 1	A	LCCR FP Shell TIG Welding	53.6	51	49.8	52	51	51.5	27000	524
	B	Shell Forming	41.3	41	41.8	42	41.2	41.5	27000	650
	C	Shell Sizing	18.7	18.2	18.9	19	18.5	18.7	27000	1443
	D	Mat Rapping+Brick Stuffing+Stamping	78.6 +60	78.2+ 59	78+6 1	77.2+ 62	77.8+ 60	78+6 1	27000	194
OPERATOR NO. 2	E	Plate Ass. TACK & Full welding	110	115	108	119	116	114	27000	236
	F	Plate Ass. To Flange TACK welding & Rework	45	47	45.2	48.1	45.6	46	27000	586
OPERATOR NO. 3	G	SPM Welding	61	60	60	69	70	64	27000	421
OPERATOR NO. 4	H	Mat welding robot	145	145	144	146	145	145	27000	186
OPERATOR NO. 5	1	STRAIGHT PIPE+FLANGE SPM	49	50	48.8	49.5	50.2	49.5	27000	545
	2	BELLOW+CATCON+BELLOW OUT PIPE SPM DED	122	120	124	126	122	123	27000	219

OPERATOR NO. 6	4	LEAK TEST/TAPPING/MARKING	105	76	90	101	84	91	27000	296
OPERATOR NO. 7	5	CHEAPING & PAINTING	71	70	72	71	71	71	27000	380
	6	HEAT SHIELD AASY								
162.2 Ft	TOTAL TRAVELING LENGTH IN FEET							955	THROUGHPUT TIME	

In present LCCR layout –

1. Total travelling distance = 162.2 feet
2. Throughput time = 955 seconds

V. PROPOSED LAYOUT FOR SCORPIO W105 MHAWK/LCCR FRONT PIPE ASSEMBLY LAYOUT

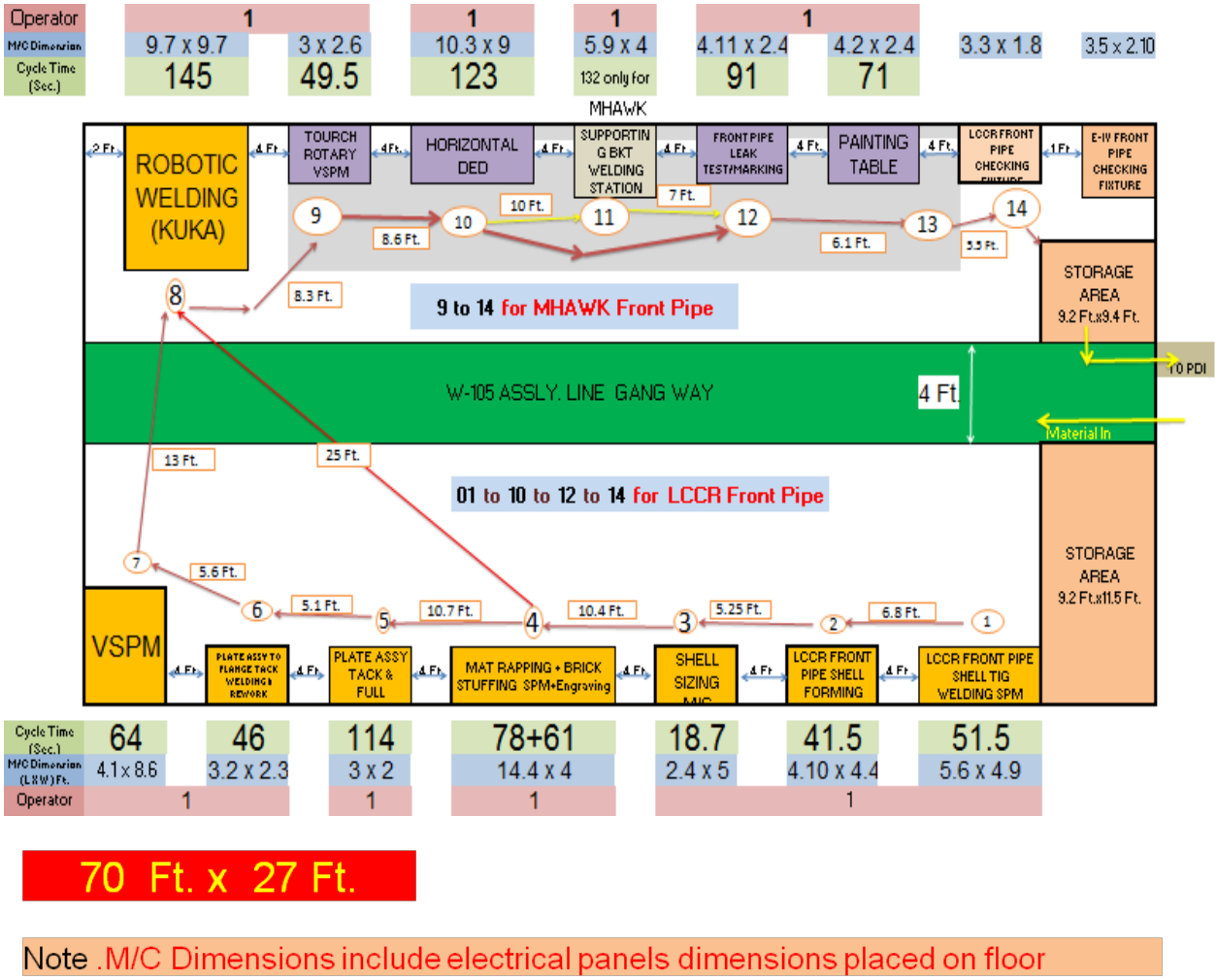

Fig. 4 Proposed Layout for W105 MHAWL/LCCR Front Pipe Assembly Line

In proposed layout, machines are rearranged as per operation sequence which avoids backtracking of component within cell while processing.

VI. COMPARISON OF EXISTING & PROPOSED LAYOUT FOR FRONT PIPE ASSEMBLY LINE

Table 3 Capacity Utilization of Cell

Shift Time	7.5 Hours	27000 Seconds		Proposed Job / Shift
Total Cycle Time for LCCR FP		955 Sec / Job	28 Job / Shift/Operator	28 x 7 = 196 Job / Shift
Total Cycle Time for MHAWK FP		466.5 Sec /Job	57 Job / Shift/Operator	57 x 3 = 171 Job / Shift
Job	**Operator**			Existing Job / Shift
	Existing	Proposed		
LCCR FP	8	7		140 Job / Shift
MHAWK FP	5	3		140 Job / Shift
Job	**Material Travel**			
	Existing	Proposed		
LCCR FP	162.2 Ft.	126 Ft.		
MHAWK FP	43 Ft.	37.2 Ft.		

Tabe 4 Manpower Requirement

Operator Required (LCCR)
Time /Operator=27000 Sec./ (28 Job x 7 M/c Combined) = 137.75 Sec.
Operator Required = Available Time/ (Total Job/Shift* No. of M/C) = 955 / 137.75 = 6.93
Operator Required (MHAWK)
Time /Operator=27000 Sec./ (57 Job x 3 M/c Combined) = 157.89 Sec.
Operator Required = Available Time/ (Total Job/Shift* No. of M/C) =466.5 / 157.89 = 2.95

VII. CONCLUSION

7.1 Evaluation for Effective Layout

1. Plant layout is a plan of, or the act of planning, an optimum arrangement of industrial facilities, including personnel, operating equipment, storage space, materials handling equipment, and all other supporting services, along with the design of the best structure to contain these facilities.

2. Because plant layout covers a wide range of activities, the criteria used to evaluate plant layout must necessarily vary from one problem to another. Thus, the term “optimum” in the definition refers to planning the best layout by whatever criteria may be chosen to evaluate it. In one problem the criterion may be the amount of materials handling; thus, the optimum arrangement should have a minimum number of handlings. In another problem the criterion may be the overall costs of processing through a particular department; thus, the optimum arrangement should minimize this overall cost.

3. It is quite possible that an optimum solution to a layout problem might maximize the output of a given set of facilities with little regard to overall costs. Of course, it was the urgent demand for war materials that brought about this rather unusual situation.

4. The most difficult part of the plant layout procedure is evaluation of the various alternative proposals. To date, no procedure for evaluating layout alternatives has achieved general acceptance. It may well be that each layout problem is so unique that a general evaluation procedure cannot be found.

5. Recently mathematicians have become interested in the problem of plant layout and location. This interest has led to the development of a number of techniques which can be most helpful to the layout analyst in evaluating alternatives. More research is needed to prove whether or not general procedure for evaluating layouts can be evolved.

7.2 Advantages of Proposed cell Layout

1. Manpower utilization greater than 90%
2. Through put product
3. Flexible layout
4. Low cycle time
5. Low inventory and synchronous material handling.

7.3 Cost Saving

1. No. of operator required is reduced by 03.
2. Job target / Shift are increases by 31.

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SECURE DATA HIDING AND DATA EXTRACTION INTO VIDEO

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ABSTRACT

This paper proposes a novel scheme to hide a data in video. Today's world is known as world of Internet, but exchanging data over internet is not secure. Many times problem arise related to data security. So to secure data (message) the concept of Steganography is used. In this system sender encode the data in video and saves the data encoded video. Sender sends the video to receiver using exiting mail system. Receiver now decodes the data encoded in video. Data encoding and decoding into video can be done by using LSB Replacement or Substitution Techniques. There is no difference in a video and video encoded with data.

Index Terms: Data Abstraction, Data Hiding, Data Extraction, Video Encryption, Steganograohy

I. INTRODUCTION

Now days the security of data or information is indispensable factor for security of the data. Because of getting more popularity to internet as well as digital media, requirement of transmission of data securely is increased. In present there are many systems available in market which uses concept of Steganography. Such as ImageHide2.0, Steganography1.50, etc. But the drawback of these systems is they can hide message in only Image and audio file format. The size of the image and audio file is comparatively small to hide long message or data.

So we are designing the system which can hide the message inside the video file and that message will be encrypted.

Steganography is the art and science of hiding Secret message. Steganography is a term coming from the Greek words **stegos** which means that "roof or covered" and **graphia** means that "writing". That is Steganography is covered writing.Using Steganography, you can embed a secret message inside a video and send or store it without anyone knowing of the existence of the secret message.

The goal of this system is to hide data (message) in video and retrieve that message whenever needed. This system is data (message) hiding system, which encodes the secret data into video file and decodes video file to get original message back. This system allows user to store message more securely. Hence user can send secure information over unsecure network. As encrypted data is hided in to video so generally hacker is not able to identify that the file which he has hacked, contains some message.

This system allows authorized user to encode text message into video file format and decode it using same system to get original text message. It is necessary to have this system with both sender and receiver.

II. PROPOSED SCHEME

We are proposing the system "Implementation of Steganography using video" which is very simple to interface and providing useful utilities for security of data. This system will allow user to encode video with hidden message and decode video to get back original message. This system will hide the data in video file and for that purpose we will use the LSB Replacement Technique or Substitution Technique.

The system will be basically divided into two parts. That is embedding and retrieving of message. The basic part for embedding the message will be hiding message into video and second module that will be used for retrieving the message which will be hidden into these video.

A sketch of proposed scheme is given in below Fig. 1. At the sender side, the owner of the image first selects the video and then he types the message which he wants to encode into the video. Then the data hider, without any knowledge of original video content, hides the data (message) using data hiding key. The data (message) encoded video is then stored. When we see the original video and data (message) encoded video then there is no difference between this original video and data encoded video.

The data (message) encoded video is mail to the receiver. At receiver side, data accessor can extract the data from video using same data hiding key and data accessor will separate out the video and message. Now receiver will get the original message send by the sender.

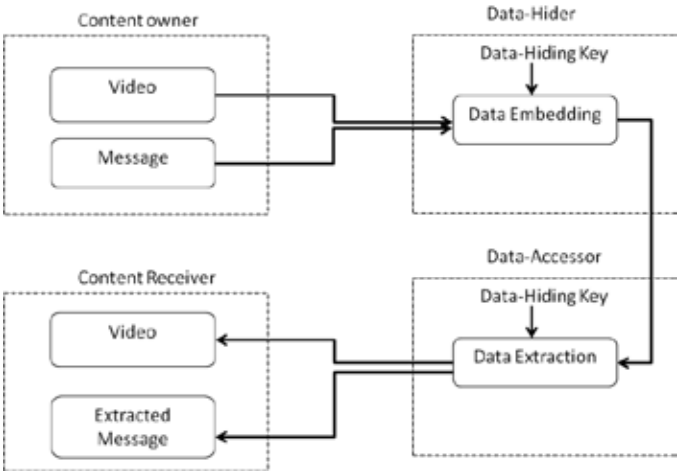

Fig.1. Sketch of the Scheme

There are two basic operation or process are used

2.1 Encoding Process

This system performs Encode process. User selects input video file (i.e. Source video), from where information of video is collected. User also provides output video file where encoded video is going to be stored with message to be hidden. For encoding purpose LSB Replacement or Substitution Technique is used.

In data embedding phase, some parameters are embedded into a small number of pixels. LSB of the other pixels are compressed to create a space for accommodating the additional data and the original data at the positions occupied by the parameters. According to a data-hiding key, the data-hider pseudo-randomly selects encrypted pixels that will be used to carry the parameters for data hiding.

The other pixels are pseudo-randomly permuted and divided into a number of groups. For each pixel-group, the data hider collects the least significant bits of the pixels.

The data-hider generates a matrix which is having two parts; the left part is an identity matrix, the right part is a pseudo-random binary matrix. This pseudo-random binary matrix is derived from the data-hiding key. Then, embed the values of the parameters into the LSB of selected encrypted pixels. At the same time the most significant bits (MSB) of all pixels are kept unchanged.

When the video files are created, there are usually some bytes in video file that are not required or not important. These areas of a given video file can be replaced with data (message) that is to be hidden without damaging the original video. Such type of method is called as LSB replacement Method. Generally this method is used for Image and video files. The value 11111111 can be replaced by 11111110. This Least significant bit change is unpredictable by Human Eye.

Example

Videos are made up of number of frames and each frame consists of thousands of pixels. We are dividing given video into number of frames. Each pixel is made up of RGB (Red, Green and Blue) color. Each color of RGB is represented by 8-bits of data. Consider a given example that represents three pixels of a one of the frame of given video. Here each pixel is represented with RGB color.

	R	G	B
1st Pixel	(10101111	11101011	11011001)
2nd Pixel	(11011011	11001001	00001001)
3rd Pixel	(11001010	00100100	11011111)

So we use three pixels to store one byte of message. Suppose we want to store or encode character A.

Let Character A=10000001, is inserted, the following result occurs-

	R	G	B
1st Pixel	(10101111	11101010	11011000)
2nd Pixel	(11011010	11001000	00001000)
3rd Pixel	(11001010	00100101	11011111)

So resulting pixel of video have slightly changed values which is undetectable by Human Eye.

2.2 Decoding Process

Decoding process is exactly opposite to encoding. Here we simply read only LSB (least significant bit) of pixels. And then combine these bits into bytes. Each byte will represent a character. These characters in turn form a message. In this way we get the original message.

Example

As we already encoded message into video. We will consider encoded pixel of above example,

	R	G	B
1st Pixel	(10101111	11101010	11011000)
2nd Pixel	(11011010	11001000	00001000)
3rd Pixel	(11001010	00100101	11011111)

This produces bit sequence 10000001, where 10000001 presents A. So message retrieved is A.

III. SYSTEM INFORMATION

Below Fig.2 shows the system flow diagram. These diagram shows sender side as well as receiver side operations. Here sender first login the system. Sender enters user name and password and authenticates himself. After successful registration sender selects the video that he want to send and also the message that he want embed into that video. Data hider uses the data hiding key to embed the data into video. After that sender saves the data (message) embedded video. Later on sender send the video through current mailing system. And sender sign out the system. At receiver side, receiver first select the video that he wants to access the message. Data accessor displays the message using data hiding key to receiver. After getting the embedded message receiver sign outs the system.

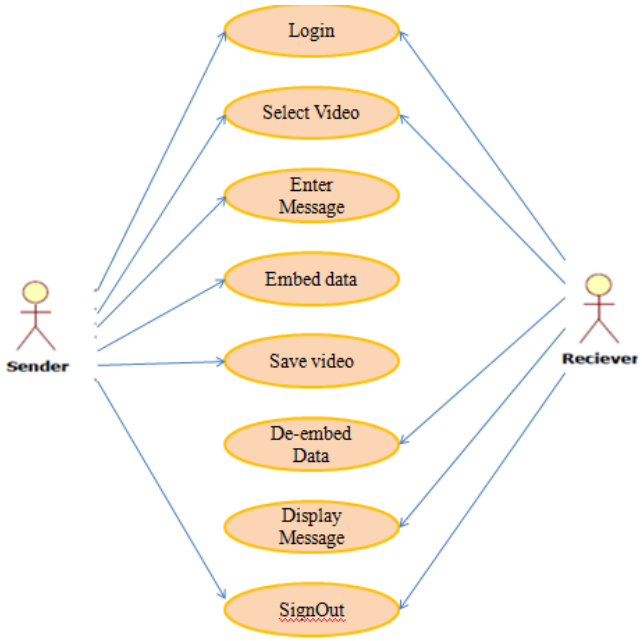

Fig. 2 System Flow Diagram

3.1 Hardware Requirement

Computer processor:		Pentium IV onwards
Clock speed	:	1.2 GHz Processor
Hard Disk	:	10 GB minimum
RAM	:	128 MB minimum

3.2 Software Requirement

Operating System:		Windows family O.S.
Language	:	Java
Tools	:	jdk 1.6.0, Net Beans 7.2.1
Server	:	Mongo DB

IV. TESTING

Testing is one of the important step to be performed to ensure successful implementation of the system .The basic idea of carrying out testing is to ensure no error exits in the functionality and operability of the program. Therefore the most useful and practical approach is with intension of finding errors .This is the phase where the system is intentionally made to fail so as to make the system full proof and error free up to the limit possible.

Initially Test data is prepared to check the software. During this phase the system is used experimentally to ensure that the software does not fail. Special test data are inputs for processing and the result is examined. It is very essential for increasing its effectiveness and accuracy.

The testing of system is necessary to ensure the following issues: Completeness, Correctness and Reliability.

In general the system was thoroughly checked at each level, right from the beginning. System was checked at different levels.

- Ø Testing of data entry procedures is done.
- Ø Testing of data validation id done.
- Ø Entering data via different screens (forms) is done.
- Ø Testing for data insertion and updation is done.
- Ø Record saving procedure is done.
- Ø Error routines were checked.

Again here time complexity also checked. Video with larger size require more time to embed the data (message). And video having less size require less time to embed the data (message) into video. For video testing, run both the video on separate machine simultaneously. And see the difference between two video that is before and after data (message) embedded to video.

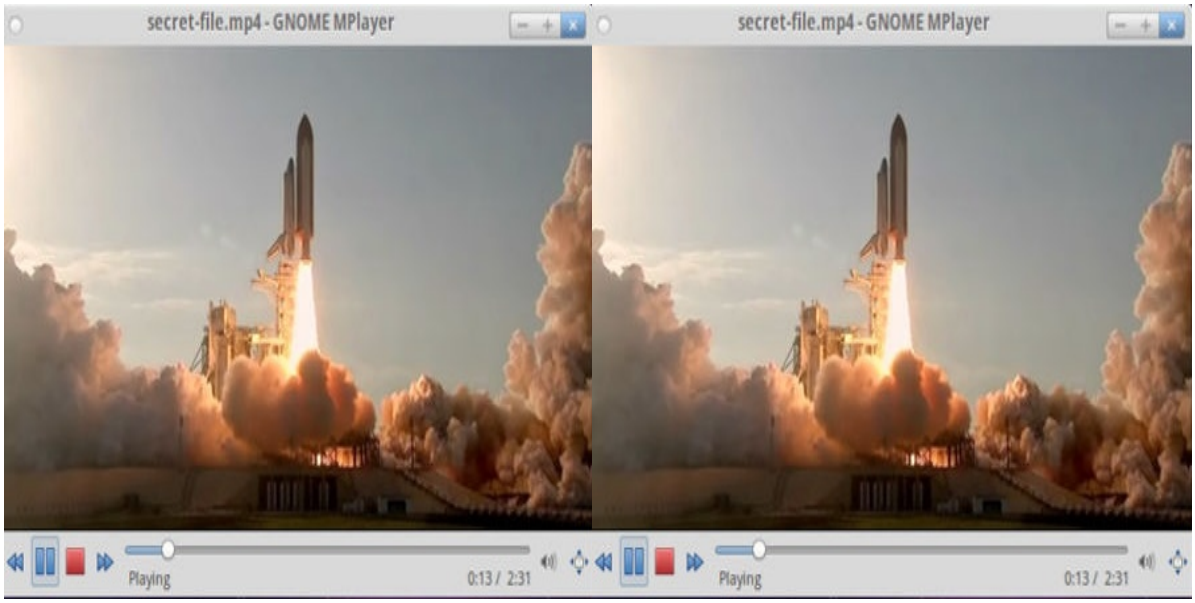

Fig 3 Video before embedding the data (message) **Fig.4 Video after embedding the data (message)**

After seeing both Fig 3.and Fig 4., we found that there is no any difference between video before embedding and after embedding the data (message) into video. Because of LSB replacement techniques, Human eye cannot be able to predict this small LSB change in pixels of different frames of a given video. As frames moves very fast and continuously it is unpredictable to fine such small change in video.

V. CONCLUSION

In this paper, data hiding in video using Stegnography is proposed. This system mainly consists of data hiding and data extraction process. Data hider hides the data (message) into video using data hiding key. The data acessor access the data from video by using same data hiding key. The sender or receiver who's having this system only knows the user name and password. By using this username and password sender as well as

receiver authenticate himself. First sender can select his video and enter the message that he want to send and click on encode button to embed the data (message) into video. After successful data embedding process sender saves the data embedded video. When we run the video before and after data (message) embedding, there is no difference between both the videos. Sender sends the video to receiver. Receiver again login the system and authenticate himself. Receiver use these video and press the decode button. Data accessor displays the embedded data (message) to receiver. In this manner receiver get the data. Thus, the event of embedding data (message) into video and extracting data (message) from video is achieved successfully with the proposed system.

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DESIGN AND IMPLEMENTATION OF ANTI-COLLISION RAILWAY SYSTEM USING HYBRID OF ZIGBEE NETWORK AND INTERNET OF THINGS

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ABSTRACT

To avoid accidents of railways and save life's of many people it is very important to have a robust, automatic and scalable solution which would improve signaling system and reduce the chance of accidents due to human errorsand old railway signaling methods. This paper discusses the architecture and implementation of Anti-Collision railway system using ZigBee and RFID network and Azure cloud service as a backend system. The proposed system leverages the scalability of ZigBee network and its self-healing property with Azure stream service as its backend. Each rail track would be uniquely identified by maintaining a RFID tag to it. The train will have a small embedded device which would communicate with Azure cloud service, read the RFID tag of the track on which train is running and make important decisions based on the information it gathers from cloud service. The train network could consist of ZigBee coordinator residing at railway control station, ZigBee router residing on train and ZigBee end device residing at signal posts. All railway control stations would be connected to each other via Azure cloud service thus forming dense centralized intelligent railway system.

Keywords: Asynchronous Message Queuing Protocol (AMQP), Azure Event Hub, Internet of Things (IOT), Personal Area Network (PAN), Radio Frequency Identification (RFID), Zigbee Coordinator

I. INTRODUCTION

The train accident generally happens because of human errors and machine failures. The Indian railway losses huge amount of money due to cancellation of trains during winter every year. Also it is quite difficult to run trains in the winter every year. The main reason behind this problem is fog. Indian railways has worked on many technologies to overcome the hindrances. The ACD (Anti-Collision device) [1, 2] is developed by konkan railways which uses the GPS technology for tracking the position updates of the train. The drawback of ACD is that it could not detect the rail tracks separated by a distance of 10-15 feet because of limitations of accuracy of GPS in our country. The ACD does not take into account factors based on environment. As a result accident due to other factors like collapsing of bridge or derailment cannot be overcome. All these above limitations are taken into consideration and a new architecture of the system is proposed in this paper and its prototype is implemented.ZigBee technology [3,4] was selected as a last mile communication device because of its highly scalable, self-healing, low power and its unique radio properties. Thus ZigBee is a perfect candidate suitable in wireless communication for embedded system design point of view. Also ZigBee supports large number of nodes, easy to deploy, have a very long battery life, secure, low cost and can be globally used. To

support, monitor and control such a large infrastructure which consists of train inventories, monitoring weather conditions, do intelligent rerouting of rails based on traffic and environmental conditions we will leverage Internet of Things technology which would connect to Azure cloud service. All the ZigBee devices connected on trains, bridges, signal post etc. will connect to Azure event hub via ZigBee gateway located at railway control station.

II. LITERATURE SURVEY

The existing conventional signaling system most of the times relay on the oral communication through telephonic and telegraphic conversations as input for the decision making in track allocation for trains. There is large scope for miscommunication of the information or communication gap due to the higher human interference in the system. This miscommunication may lead to wrong allocation of the track for trains, which ultimately leads to the train collision. The statistics in the developing countries showing that 80% of worst collisions occurred so far is due to either human error or incorrect decision making through miscommunication in signaling and its implementation. IR sensors are also used to identify the cracks in the railway. IR sensors have limitations due to the geographic nature of the tracks. The Anti-collision device system also is found to be ineffective as it is not considering any active inputs from existing Railway signaling system, and also lacks two ways communication capability between the trains and the control centers or stations. Later geographical sensors have also been used which makes use of satellites for communication. But the system is costly and complicated to implement. At present laser proximity detector is used for collision avoidance, IR sensors identifies the cracks in the railway track and gate control is done by manual switch controlled gate. But there is no combined solution for collision between trains, train derailment in curves and bends and the automatic control of railway gate.

2.2 History of Anti-Collision Device for Train

The ACD Network is a Train Collision prevention system invented by RajaramBojji and patented by Konkan Railway Corporation Limited (a public-sector undertaking of the Ministry of Railways, Government of India). ACDs have knowledge embedded intelligence. They take inputs from GPS satellite system for position updates and network among themselves for exchanging information using their data radio modems to take decisions for timely auto-application of brakes to prevent dangerous 'collisions', thus forming a 'RakshaKavach' (meaning a '(Train) Safety shield').ACDs fitted (both in locomotive and guard's van of a train) act as a watchdog in the dark as they constantly remain in lookout for other train bound ACDs, within the braking distance required for their relative speeds. They communicate through their radios and identify each other. If they happen to find themselves on the same track and coming closer to each other, they automatically restrain and stop each other, thereby preventing dangerous head-on and rear-end collisions. Loco ACD of a train also applies brakes to reduce the train speed either to 15 km/h if on approach it receives a message from other train bound ACD that has stopped in a block section on adjacent track (and driver of that train has yet not communicated that things are 'Normal') or to bring the train to a stop if train bound ACDs of other train are radiating 'train parted' message thereby preventing dangerous side collision that may occur due to infringement of adjacent track by a stopped or a 'parted' train, respectively. ACD trials have recently been concluded successfully in Southern Railway. Further implementation on Indian Railway is awaited.

Level crossing: Loco ACD on receipt of 'Gate Open' input from Gate ACD (provided at non-interlocked level crossing), applies brake to regulate its train speed to 30 kmph or as per requirement previously set. Gate ACDs fitted at manned and un-manned level crossings also give audio-visual 'Train Approach' warning to road users if an ACD fitted train approaches them. Also if a Loco ACD receives manual 'SOS' message from other Train bound ACD or a Station ACD that is within three kilometers of its radial range; it applies brakes automatically to bring the train to a stop. The application of this Anti-Collision Device has been refined to not only prevent 'midsection' collisions but also to prevent their occurrences in 'station yards'. The newly engineered solution is integrated with the signaling systems and interlocking to react appropriately in case collision like conditions are perceived at the time of reception and dispatch of trains from a station, for e.g. while approaching a Station, Loco ACD also gives 'Station Approach' alert to the driver and regulates its train speed when it receives information from Station ACD to this effect, namely, either main-line is occupied by a train OR a load stabled on it and not fitted with ACD OR if route for train reception is not set for main line. Loco shed ACDs, Track-ID Assigning ACDs and Repeater ACDs further to strengthen the working of ACD Network.

ACD deficiencies: The ACD system is based on GPS based positioning and track detection. This had its inherent problems as with the GPS- Standard Positioning GPS service or Coarse acquisition (Precision positioning is only available in US for military use) the best possible horizontal accuracy is 10 m. This is inadequate for detection of rail tracks separated by a distance of 10–15 feet. ACD does not even have DGPS (Differential GPS that gives an accuracy close to 2.5m) and hence had errors in track detection using their patented Deviation Count Theory that worked in block sections but failed in station sections. The result was erratic braking that disrupted train movements and proved to be ineffective. Another design different to ACD was patented in 2001, named "Railway Collision Avoidance System" by an Indian inventor, IndranilMajumdar from Calcutta who was awarded the Texas Instruments Analog Design Challenge 2001 for this design and the patent granted in 2007.The design ruled out GPS as it was a 3rd party system (US based) and suggested track based sensors similar to RFID (Radio Frequency Identification Device) or Balise (similar to the EuroBalise). The design didn't receive much attention as the inventor had no railway background. However, the design concepts were eventually reflected in the TCAS design first released in 2008.After 7–8 years of problems with the ACD system, RDSO, Lucknow drafted the Train Collision Avoidance System (TCAS) specs. With amendments that followed and finally in 2012, the Ver3.1.1 spec. has been released (after joint consultation with companies manufacturing signaling equipment for the Indian Railways). The ACD system though in use with the Indian Railways, has its inherent problems in Station Sections due to its design concept of using GPS for track detection that is not viable.

The High Level Safety Review Committee at Mumbai on 12/13 January 2012 at the Western Railway HQ were sceptic of the ACD effectivity and were unanimous of having TCAS developed, as an open architecture system that shall offer multi-vendor operability without attracting any royalty unlike the ACD which is proprietary. TCAS being developed by qualified companies (RDSO approved and manufacturing railway safety systems that includes, Kernex Microsystems, Medha Servo Drives Hyderabad, Invensys Bangalore, Siemens, HBL Power Systems Ltd Hyderabad and others) in India selected by RDSO through an Expression of Interest (EOI), shall be an Indian Train Protection System offering collision avoidance and also offer many functionalities of the European Train Control System that includes prevention of Signal Passing at Danger (SPAD), Movement Authority and Control, Critical Train Data Recorder, advance in cab display of signals, advance alerts and warnings from Station sections, uploading of running train data to a Central Train Management System over

GSM-GPRS, etc.TCAS has been selected for implementation and it is going to cost very heavy to Govt as per this news report there would be a cost of 10 L INR per kilometer

III.PROPOSED SYSTEM

The architecture is divided into two parts.

1. Front End Architecture
2. Backend Architecture

3.1. Front End Architecture

Following components are the part of Front End Architecture:-

1. ZigBee networks
2. RFID tags
3. Environment sensors enable for IoT technology[8]

3.1.1 Zig Bee networks

Each railway control station will have one ZigBee coordinator which will form ZigBee networks with unique PAN ID.

Each train will have ZigBee routers which would join the ZigBee networks. ZigBee networks are formed with mesh topology. In mesh topology network coordinator is responsible for the network initialization and maintenance. Routers are used to extend the network. Thus a mesh network is called a self-healing network where the different devices performs the routing in the network and if one node fails another node can be used for delivery. Thus as shown each railway station may have their own ZigBee network. Each railway station will connect to Azure cloud service for intelligence railway management, real time event monitoring, machine learning and generating insights and reports. Each train will communicate to Azure via ZigBee router i.e. railway control station.

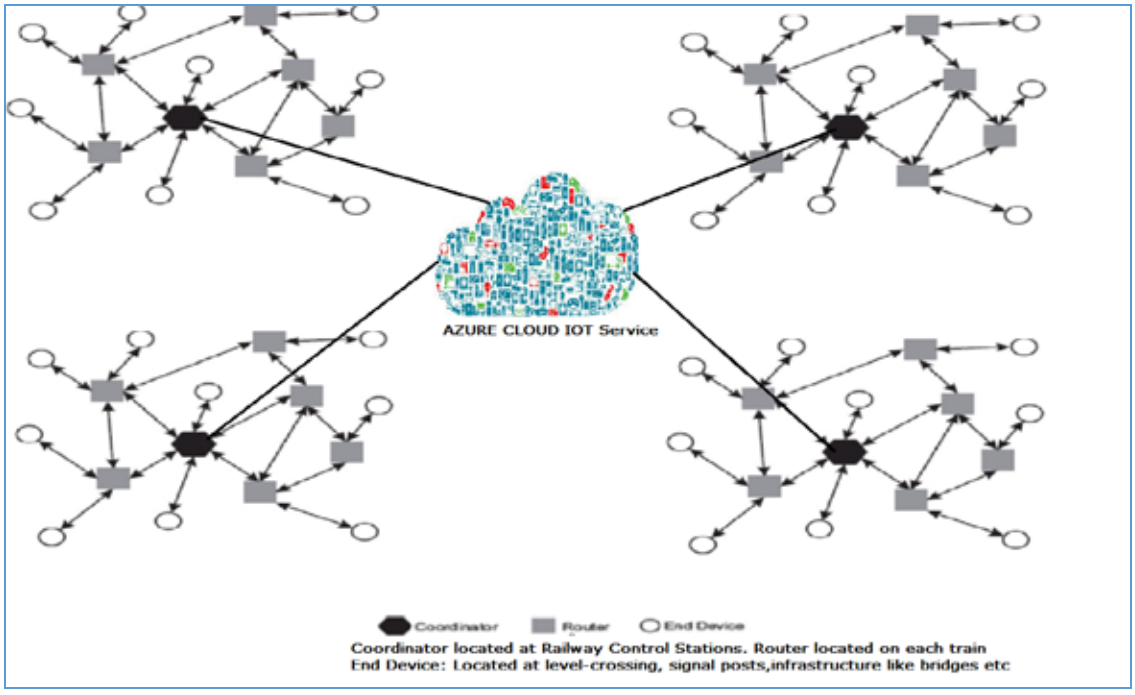

Fig 1: High Level Architecture of Proposed System

3.1.2 RFID Tags

The train detects the correct train track using radio frequency identity technology. Each rail track has a unique RFID tag attached to it. Fig 2 shows the fitment of RFID tags, ZigBee router, and ZigBee coordinator in the proposed system

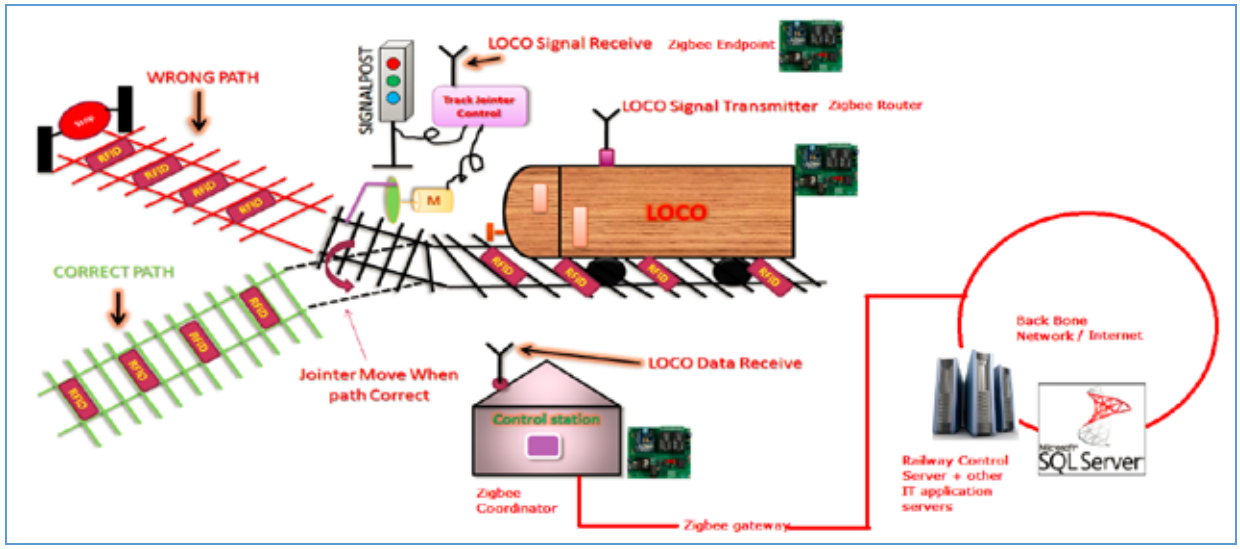

Fig 2: High Level Architecture of Proposed System

In this architecture control stations lookup the Azure backend database to get the correct track ID and transmits it to the all trains within its network. If the train is not on the correct track ID on which the train is supposed to run, the embedded system in the train would invoke automatic braking and provide audio-video alerts. The cloud service would not allow to run two trains on the same track in opposite direction within the same time frame as all intelligence of the system is built centrally at cloud service. The decisions are taken at the cloud side and are propagated down to the train via ZigBee networks. The train first discovers the ZigBee network and registers itself to ZigBee coordinator via nearby ZigBee devices located on another train or signal post. After network discovery, the train would read the track ID via RFID. The train would get all necessary information from cloud services and cloud service can respond on real time bases to the response it receives from all the control stations simultaneously.

3.1.3 Environment Sensors Enable for IOT Technology Connecting To Azure

All the end devices like temperature sensors, humidity sensors, wind sensors, fire-sensor,and ZigBee coordinator can communicate to the Azure via a gateway. The gateway converts the propriety protocol to IP protocol. So every device is assigned an IPv6 public IP. Thus device can communicate directly with each other and also with Azure calling this as a machine to machine networking terminology [9].

3.2 Backend Architecture

The ZigBee coordinator located at railway stations, and other devices like sensors connect to Azure event hub. Event hub of Azure comes under Azure stream line analytics. Heart of the proposed system is Azure NRT where the intelligence is stored. All the real time events are collected from the devices and stored in Azure SQL [5]. Transforms of the data are done using simple SQL queries and the necessary events are transmitted back to the end devices via Azure Event hub. Fig 3 shows the high level architecture of backend

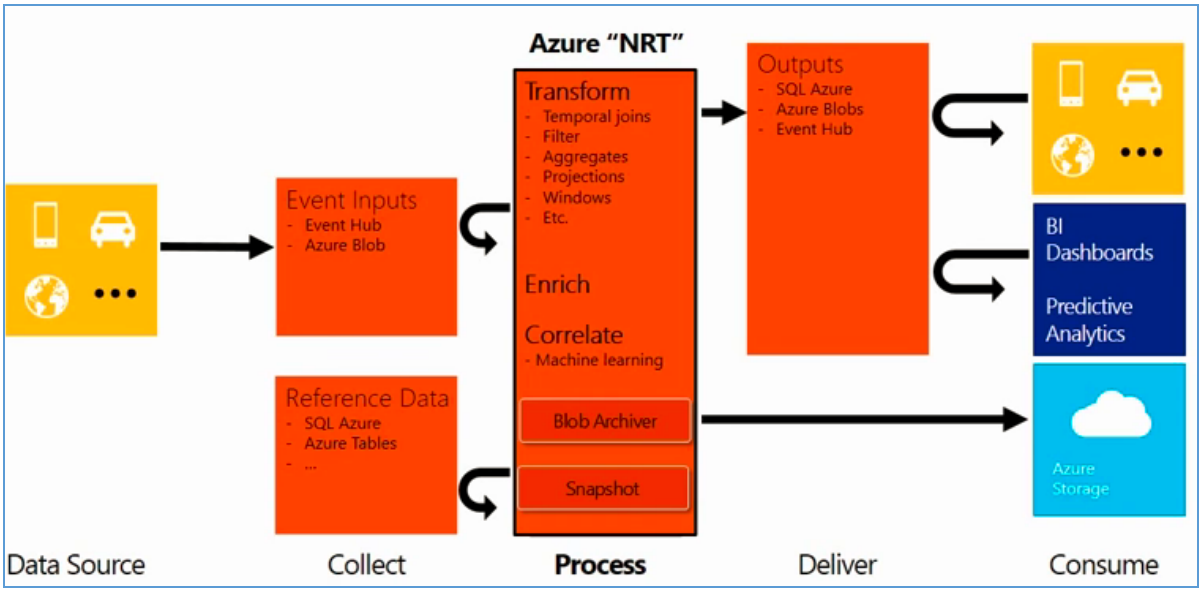

Fig. 3: High level architecture of backend system in Azure

ZigBee coordinator can connect to Azure via field gateways like Arduino Ethernet shield. Sensors can connect to the Azure event hub via various protocols like HTTP and Asynchronous Messaging Queue protocol. HTTP protocol is very insufficient as a messaging protocol, hence Microsoft's AMQP protocol [6] is used to transfer the data from end devices to cloud.

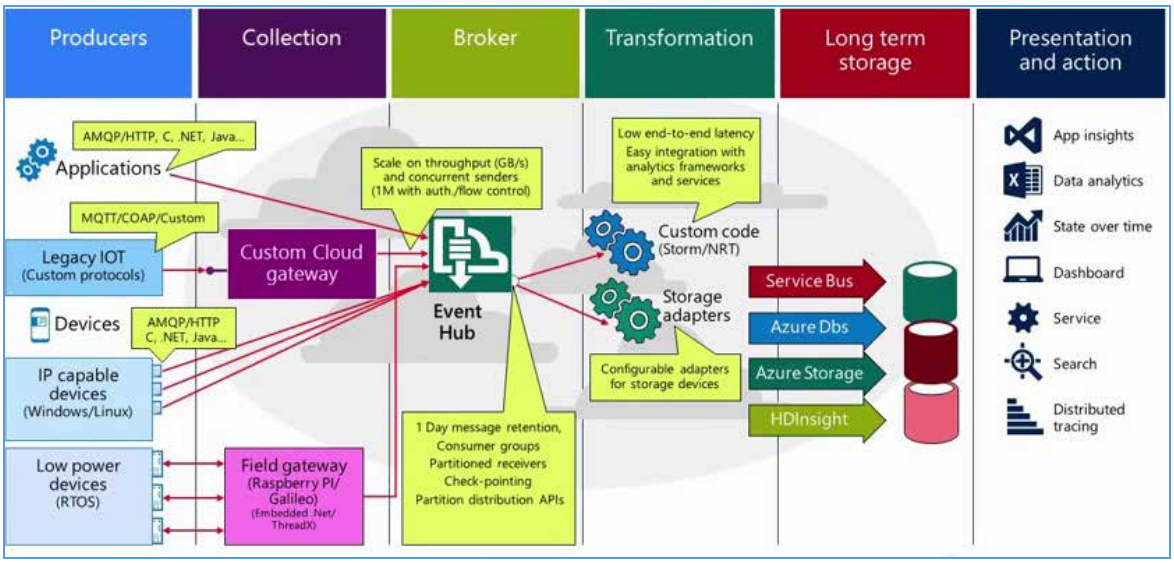

Fig. 4: Detail architecture of Azure event hub

IV. IMPLEMENTATION OF FRONTEND

We have implemented train module which consists of ARM controller LPC2148, LCD to display events and alerts/warnings, DC motor acting as train engine, power supply unit and a ZigBee router. The main work done by the microcontroller is to discover nearby ZigBee network and register to it, continuously monitor strength of the received signal by reading the RSS (Received Signal Strength) value and register to the ZigBee network having maximum RSS.

Microcontroller also processes the information received from Azure and the trains within its network. Fig 5 shows the high level block diagram of the implemented module for the train.

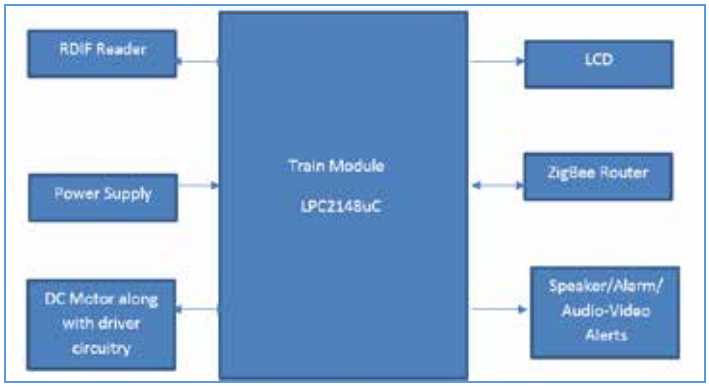

Fig. 5: Block diagram of module attached to trains

The module present at railway control stations have Arduino microcontroller and a ZigBee router connected to Arduino Ethernet shield acting as a gateway to Azure. Main purpose of this module is to initiate and form ZigBee network with unique PAN and is to interface with Azure cloud.

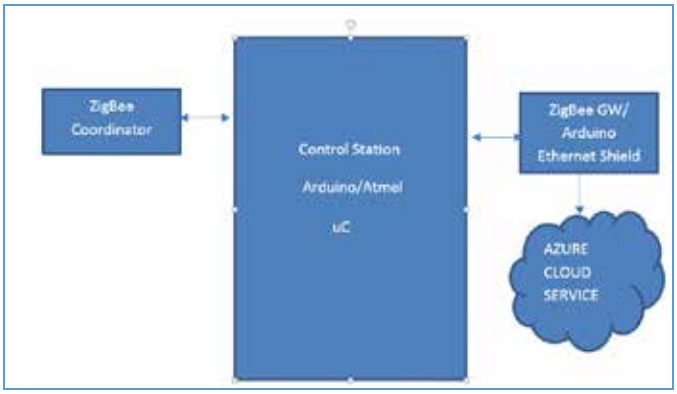

Fig. 6: Block diagram of module present at railway control stations

4.1 Workflow of the Train Module

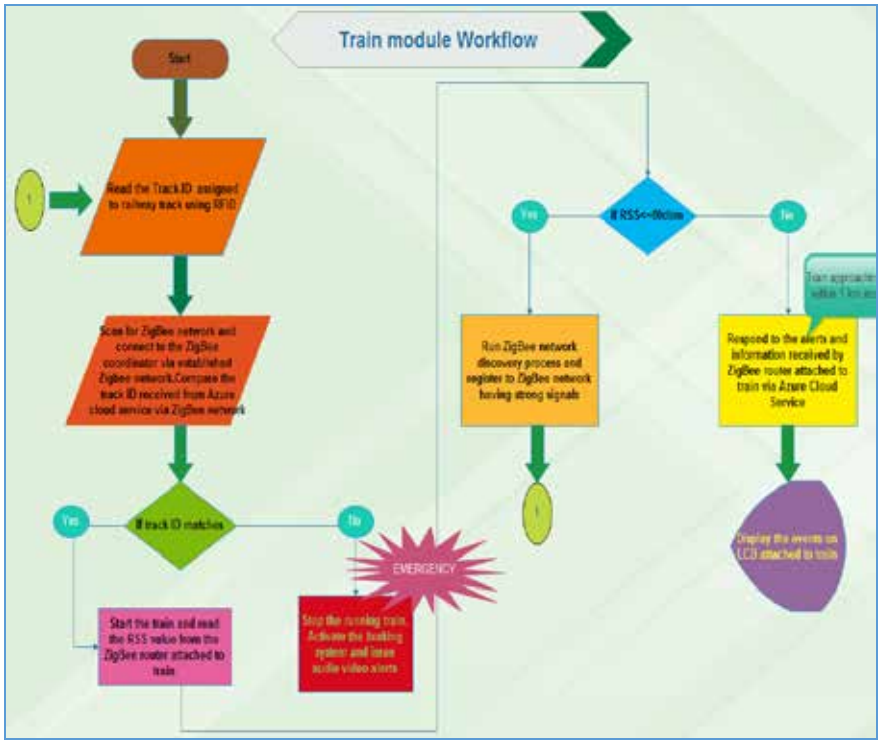

Fig. 7: Workflow for implemented train module

Workflow for train:-

1. Each train has a ZigBee router connected to it as shown in Fig 6 block diagram. The router will connect to ZigBee coordinator located at railway control station by scanning though the available ZigBee network.
2. Each railway control station is connected to Azure service bus using internet/MPLS or E-route provided by AT&T network.
3. ZigBee network would be set by ZigBee coordinator with some personal ID number. Trains falling under the given railway control station would join that particular ZigBee network.
4. When train modules star it would first read the underlying RFID tags attached to the railway track. Each railway track has unique identify identified by its RDIF tag.
5. Train will then query its current configuration i.e. destination it has to reach, path needed to be taken by it to reach destination etc. from railway control station. Railway control station will turn query the necessary train configuration from Azure cloud services.
6. The train module will then compare these two values received from control station and RFID. If the values are equal the train would start and check the quality of signal received for ZigBee network. If the signal value falls below -80dbm ZigBee router would rescan the ZigBee network and connect to the ZigBee network having stronger receive signal strength. Stronger signal strength is preferred to reduce bit errors and retransmission.
7. If the ZigBee signal strength is good then the train would listen to the events received to it and respond to it. Example if there collision like situation, the train would issue audio-video alerts, will invoke automatic braking system etc.

4.2 Workflow of the Signal Post and Level Crossing Module

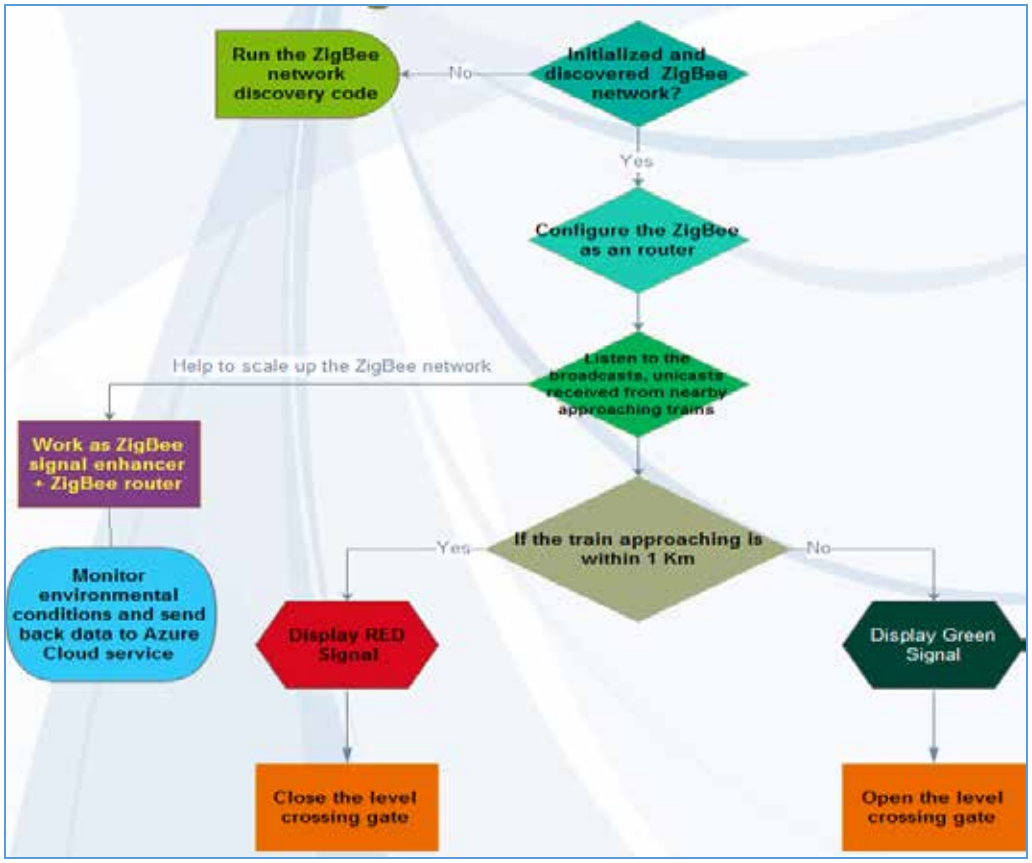

Fig. 8: Workflow for simulated train module

Workflow for Signal Post and level crossing module

1. Each signal post will be connected by a ZigBee router. Initially the ZigBee router would connected to the predefined ZigBee network having predefined PAN ID of the nearby railway station.
2. This module will be in turn connected to the level crossing gate control system
3. This module will monitor all the environmental conditions and send data to Azure cloud via railway station controller.
4. It will also take part in ZigBee routing to form a mesh network as discussed in previous section.
5. The signal post module and the level crossing gateway are placed 1 KM apart from each other. If the train approaching the signal module, the level crossing gate would be closed with all necessary audio-visual alerts.
6. The gate would remain close until the train has departure and is 1 KM away from the signal module.
7. After that the signal post would display green signal.

```
Train on wrong Track!!!
Train with ID: 40B7A183 is not allowed to run on track ID 1000696FFFFF.
 Alerted  the train driver regarding wrong track by blinking RED LED
Train on wrong Track!!!
Train with ID: 40B7A183 is not allowed to run on track ID 1000696FFFFF.
 Alerted  the train driver regarding wrong track by blinking RED LED
********************************************************************************
----------MESSAGE FROM TRAIN 40B7A183----------
1. Communication Link established ... Train is entered into zigbee network and is configured as Zigbee router
 2. Data is sent from train ID 40B7A183
----------END OFMESSAGE FROM TRAIN 40B7A183----------
********************************************************************************
********************************************************************************
----------MESSAGE FROM TRAIN 40B7A183----------
1. Train with ID: 40B7A183 is allowed to run on track ID 100069697F6F
2. HAPPY JORNEY!!!!!!!!!!!!
----------END OFMESSAGE FROM TRAIN 40B7A183----------
********************************************************************************
********************************************************************************
```

Fig. 9: Output received from microcontroller after reading RFID Tag

Fig. 10: Train module along with RFID reader and Tags images

V. IMPLEMENTATION OF BACKEND

We are leveraging Azure cloud service as the backend for our system. We have inventory of all the assets deployed in our system. Below figure shows the schema of the database holding information of track IDs. Below is the schema of the RFID card and its events stored in Azure SQL table.

CREATE TABLE `cardevents` (`deptcode` tinytext NULL, `cardid` varchar(16) NULL DEFAULT NULL, `event` int(32) NOT NULL AUTO_INCREMENT, `servertime` timestamp NULL DEFAULT CURRENT_TIMESTAMP, PRIMARY KEY (`event`) , INDEX `fk_accessevent_card_1` (`cardid`)) ENGINE=InnoDB AUTO_INCREMENT=2416 ;

CREATE TABLE `cards` (`cardid` varchar(8) NOT NULL, `allocated` tinyint(4) NOT NULL DEFAULT 0, `start` datetime NULL DEFAULT NULL, `end` datetime NULL DEFAULT NULL, PRIMARY KEY (`cardid`) , UNIQUE INDEX `carddex` (`cardid`)) ENGINE=InnoDB ;

All the railway control station uploads the information to Azure cloud bus [7] regarding sensors data and real time data. Azure in the backend analysis the data in real time and sends back data to the relevant control station if collision like situation is arises.

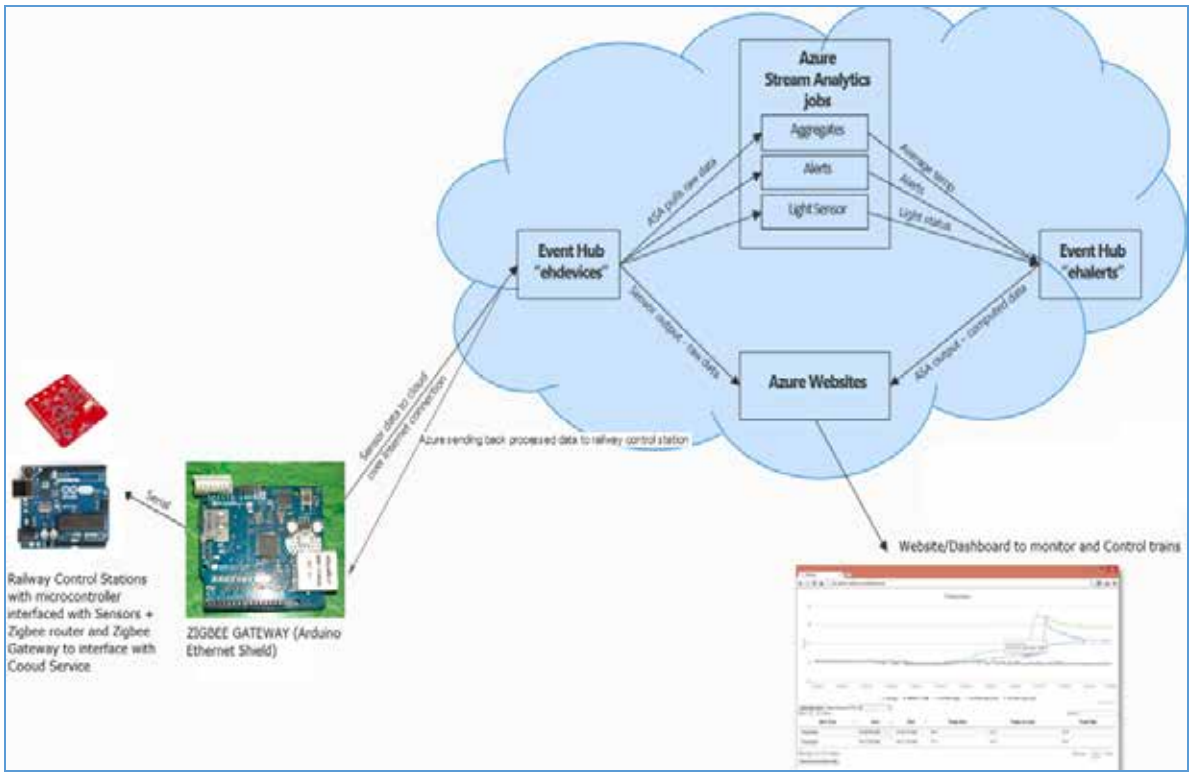

Fig. 11: ZigBee coordinator interface with Azure Cloud

Fig 8 shows the interface of ZigBee gateway (Arduino Ethernet Shield) with Azure event hub. Azure stream line analytics jobs processes all the real time data received to it via Event hub from railway control stations and environmental sensors. After analysis the Azure stream line analytics jobs necessary events back to event hubs which are sent to railway control stations and then propagated to individual trains via ZigBee network. All the real time data streams can be viewed with HTML5 capable browser.

5.1.1 Simulation of the Events and Azure Event Bus to Test Latency to Process Real Time Events

We have registered one endpoint (railway control station) on Azure service bus. We are inserting data into Azure queue using Windows phone. Windows phone is connected to Arduino on Pin 8 serial RX. Arduino is connected to Ethernet Shield having one static IP and a default gateway to internet router. Thus Windows phone sends event to Azure event bus and azure analytics in turns processes the queue and sends processed event back to event hub to the led. This setup was done to test the latency. In this setup we used Asynchronous Messaging Queue protocol to transfer messages to event hubs rather than HTTP as HTTP is very inefficient to carry messages as a payload. Figure 9 shows the simulation setup along with the dashboard to monitor real time events.

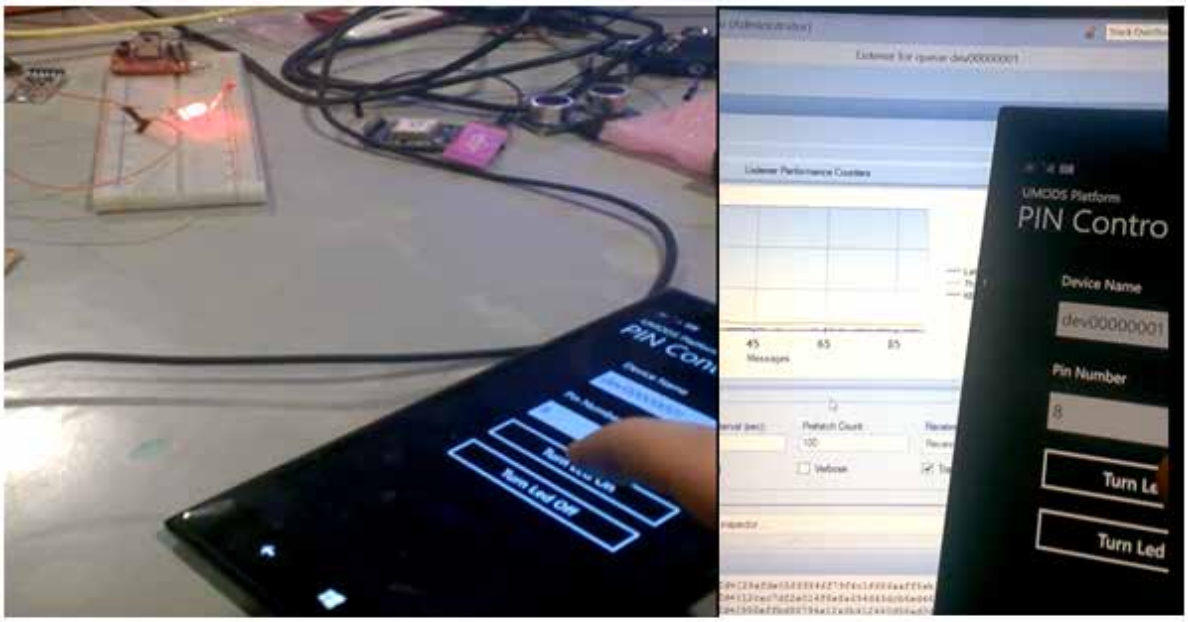

Fig. 12: Simulation of Signal Post module using Azure services

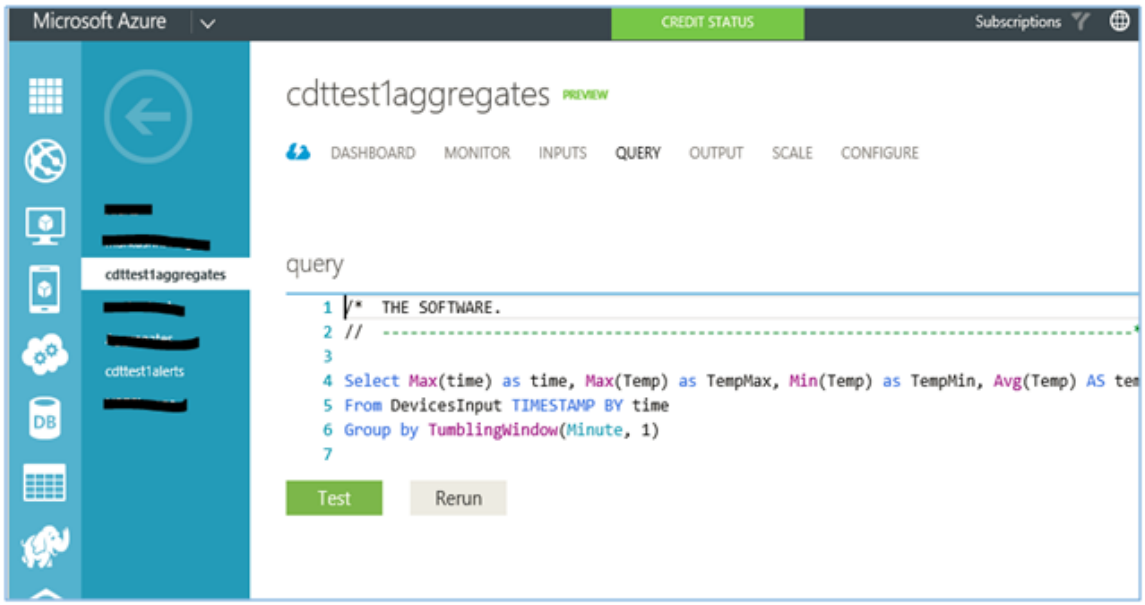

Fig. 13: Query run at Azure streamline Analytics to get real time data of temperature from Signal post module

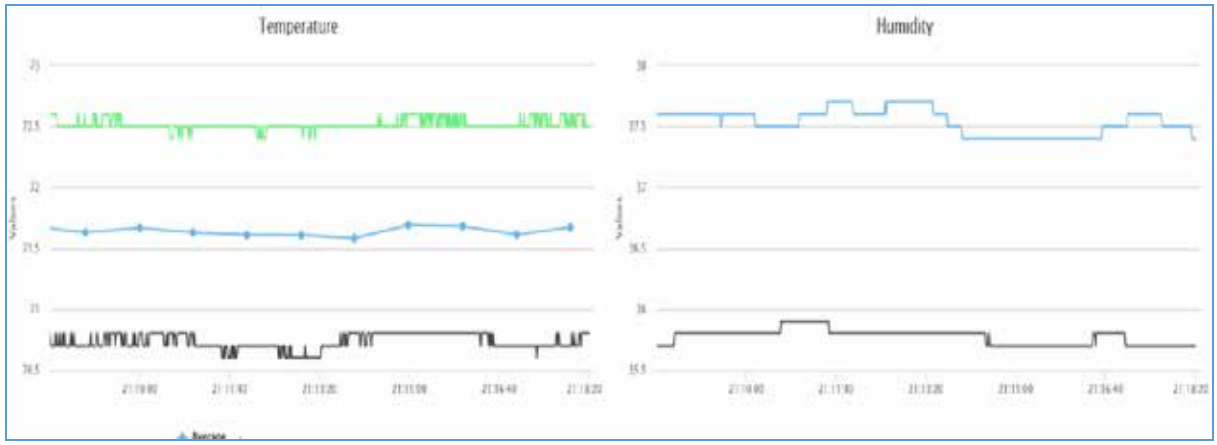

Fig. 14: Dashboard output for monitoring climatic conditions at train signal post

VI. EXPERIMENTAL RESULTS

6.1 Signal Strength Vs Distance

This set of measurement were carried out using the ZigBee module used in the implementation of this system. Approximately 150 measurements were done iterating for every selected distance.

Distance	1m	2m	3m	4m	5m	7.5m	10m	15m	20m
RSSI	-58.889	-60.732	-66.086	-66.577	-69.6	-69.474	-76.439	-77.685	-93.141
St.Deviat.	2.233	1.407	1.313	0.632	1.035	1.621	2.024	1.453	1.408

Table1: Distance, average RSSI [dBm] and standard deviation forZigBee module

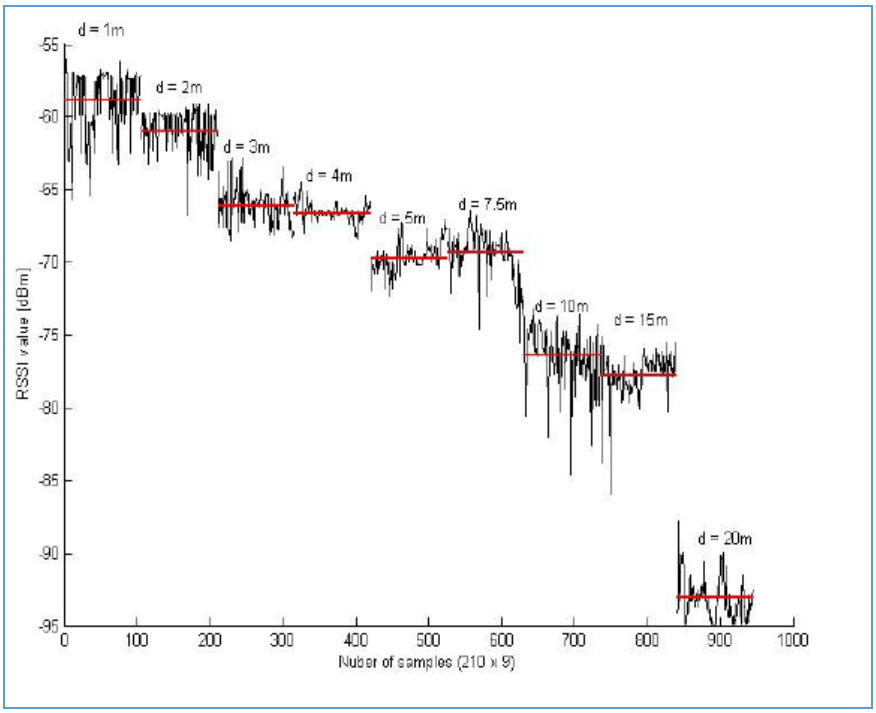

Fig. 15: Dashboard Output for Monitoring Climatic Conditions at Train Signal Post

Measurements were done in a real environment, not in a noise-free laboratory. This is because we wanted to place the modules within real working environment in which they would be normally be operating when deployed.

6.2 Zigbee Network Self-Healing Analysis

One of the most important characteristics of ZigBee is its self-healing capacity through mesh routing. So we tested the time cost of mesh routing by measuring the elapsed time between the elimination of one path and the search and creation of another. The test set up uses a diamond topology network as the one shown in Fig. 13.To perform the test we first start sending messages from ZR3 to ZC through ZR1, after some time we turn off ZR1 so that ZR3 needs to find another path to deliver the messages to ZC. The path must be found through ZR2, and we measure the time between the last message sent through ZR1 and the first sent through ZR2, this is what we called mesh routing recovery time.The results of this test are shown in Fig. 14 and there we can notice a maximum delay of 126 ms to find the new path when using a 20 ms transmission period. We can also notice the delay gets smaller when the transmit period between the messages is bigger than 20 ms; probably the bigger period permits the node to focus its resources such as memory and processing, to find the new path. The minimum delay we found was 85 ms. When we used maximum payload messages for the tests, with transmit periods under 20 ms it was not possible for the node to find the new path probably for the lack of memory to perform the search. Though for the 20, 40 and 50 ms tests, the node found the new path in less than 90 ms.

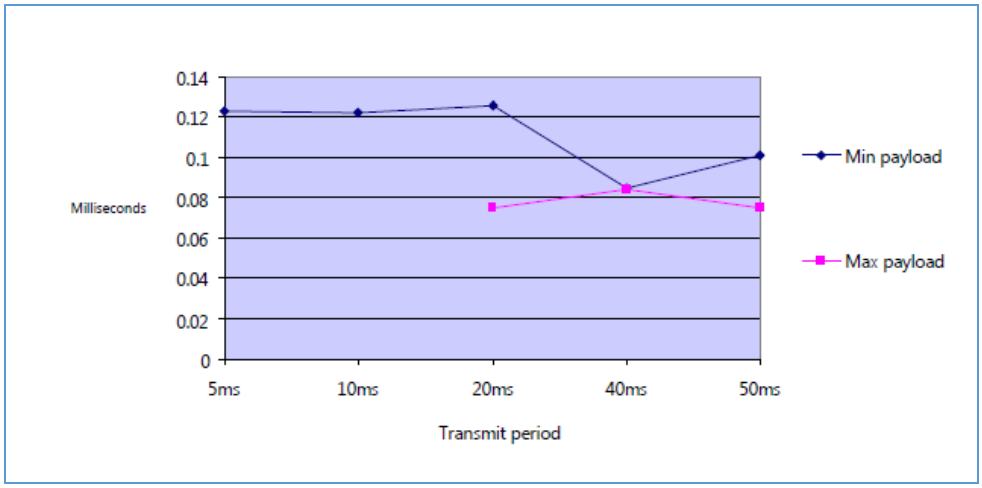

Fig. 16: ZigBee Mesh network throughput

6.3 Summary of the Results

Sr No	Parameter	Network	Theoretical	Practical
1	Data rate	ZigBee network	250Kbps	8.3Kbps
2	Nodes	ZigBee network	65000	1650
3	Retransmission time	ZigBee network	1msec	17.2msec
4	Power consumption		NA	0.035706 W when transferring 24 bytes of data
5	Latency	ZigBee network	NA	20msec
6	Battery life	ZigBee network	NA	1000 hrs at 34 bytes/second
7	Azure latency	Internet	NA	1 second
8	Time to join	ZigBee network	2 sec	8 seconds
9	Time to detect collision like situation	ZigBee network + Azure Analytics latency + Internet latency	3 sec	7 to 9 seconds

Table 2: Experiment Results Summary

VII. CONCLUSION

Collision avoidance systems are especially useful in bad weather conditions. In this project a design for automatically alerting train collisions and accidents at level crossing gate have been designed, simulated and tested.

It uses the advanced features of ARM and Arduino micro controller with RFID and ZigBee communication technique along with scalable Azure backend infrastructure, proves to be very cost effective, scalable, practically feasible without requirement of doing major infrastructure changes. From results we can see that ZigBee consumes very less power hence perfect candidate in embedded systems.Saving human life, protection against accidents and the communicable electronic systems are the salient features and the added advantage of this research.

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BPING – A MULTIPLE PING SOFTWARE

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ABSTRACT

B Ping provides unique value for monitoring a network and troubleshooting. Most of the times network has fluctuating nature which leads to hindered service .BPing allows monitoring numerous routers simultaneously. This enables selection between multiple possible hosts to monitor uptime and performance, or for the purpose of keeping track of general connectivity .The report generation which this software aims to implement allows the user to understand performance metrics on a daily basis through reports. These reports will be generated automatically using the data extracted from the simultaneous multiple pinging of the TCP/IP hosts. This proposed technology will drastically reduce the manual labor of report generation, thus allowing user to make better use of resources and time.

Keywords: Connectivity, ICMP (Internet Control Message Protocol), Latency, Ping (Packet Internet or Inter-Network Groper), Report, TCP/IP.

I. INTRODUCTION

Network monitoring is the process of using a system which constantly monitors a computer network for lagging or straggling elements and notifies the network administrator (through email, SMS or warning devices) if necessary, in case of outages. It is an essential activity in network management.

The basic intrusion detection system monitors a network for attacks or threats from the exterior environment whereas a network monitoring system monitors the network for problems caused by overburdened and/or slow servers, network connections or other elements in a network.

For example, to check the status of a web server, the software may periodically send an HTTP request to fetch a page. For email servers, a test message might be sent through SMTP and retrieved by IMAP or POP3.

Commonly used metrics in network monitoring are response time, availability and uptime. Nowadays consistency and reliability metrics are also starting to gain popularity. The ubiquitous use of WAN optimization devices is having an unfavorable effect on most network monitoring tools -- especially when it comes to measuring accurate end-to-end response time because they limit round trip visibility.

Status request failures - such as when a connection cannot be established, it times-out, or the document or message cannot be retrieved - usually produce an action from the monitoring system. The various actions could be -- an alarm may be sent (via SMS, email, etc.) to the resident system admin, automatic failover systems may be activated to remove the troubled server from duty until the problem is rectified.

Observing the performance of a network uplink is commonly known as network traffic measurement. When monitoring an internet server, its owner should always know if one or all of his services go down. Server

monitoring can be of two types, internal and external. In internal the web server software checks its status and notifies the owner if some services go down whereas in external the web server monitoring companies check the services status with a certain frequency. Server monitoring has various other activities involved like examining system metrics, for example CPU usage, memory usage, disk space and network performance. It could include application monitoring feature like checking the processes of programs. These programs could be the basic ones like MySQL, Apache, Postgres or Nginx.

External monitoring can be considered more reliable, as it keeps on working even when the server completely goes down. A good server monitoring tool should also have additional features like alerting tools, performance benchmarking and a way to link certain thresholds with automated server jobs like performing a backup or providing more memory.

1.1 Services Worldwide

Network monitoring services usually have a number of servers across various countries spread around the globe. It could be Europe, America, Australia, Asia or any other locations. When a monitoring service has multiple servers in different geographical locations, it can easily check the status and diagnose a Web server if it is available across different networks worldwide. With more widespread locations we get a more complete picture on network availability.

1.2 Web Server Monitoring Process [1]

When a web server is being monitored for the likely threats or network problems, an external web monitoring service checks a number of parameters. First, it monitors for a proper HTTP return code. By HTTP specifications RFC 2616, any web server returns several HTTP codes. Analysis of the HTTP codes is by far the fastest way to determine the current status of the monitored web server. Market available third-party application performance monitoring tools have capabilities like alerting, additional web server monitoring, and reporting capabilities.

II. WHAT IS PING?

Ping is a basic Internet program that allows a user to verify that a particular IP address exists and can accept requests [2]. Ping is used to ensure that a host computer the user is trying to reach is actually operating. Ping works by sending an ICMP Echo Request to a specified interface on the network and waiting for a reply.

Ping can be used for troubleshooting to test connectivity and determine response time. As a verb, ping means "to get the attention of" or "to check for the presence of" another party if it is up or down. The acronym for PING is Packet Internet or Inter-Network Groper which was contrived to match the submariners' term for the sound of a returned sonar pulse.

III. POTENTIAL USES OF PINGING IN SOFTWARE

Ping is a crucial security tool for any network administrator .This TCP/IP diagnostic utility gives us an insight into how ping works, and what it means when a ping request times out or reaches a network host. Various uses of ping could be as follows [3]:

- Monitoring many IP addresses simultaneously.

- The software allows users to keep track of which of IP cameras are responding, and can alert you if one (or more) goes down - so that the user can get it fixed before it becomes an issue.
- It can monitor key servers/routers/machines to check their status, if they are responding. If yes, then how quickly they're responding. If there is a large network with a lot of connected devices the network monitoring software makes it more convenient to record and observe the whole network.
- The software can help pick the best server to make sure that the user gets the best performance that can be achieved. It is also possible to keep a list of potential servers that the users might use, and sort them by packet loss, latency or other factors.

IV. REPORT GENERATION

A report generator is a computer program whose task is to take the data from a source such as a database, XML stream or a spreadsheet, and use it to produce a documents or reports in format which makes deciphering and extracting information easier for humans [4].

Report generation facility is always provided with the well known database systems. Here the source of the data is the database itself. Sometimes it is said that report generation is part of the purpose of a Spreadsheet. Standalone report generators have capabilities of working with multiple data sources and distribute reports in different document formats.

It is said in Information Systems theory that the information which is provided to a user or human reader should be Timely, Accurate and Relevant. Report generation utility satisfies the requirement of target users who desire to reduce the manual labor of preparing reports which involves wasting human resources dedicated to this work alone. These human resources can be better used elsewhere when the reports are generated automatically by the software.

V. DESCRIPTION OF THE PROPOSED DESIGN OF BPING

5.1 Sequence Diagram

Explanation of sequence diagram in Fig. 3:

- The sequence diagram shows the flow of the software in a proper sequence.
- First the User provides the IP address to the software for checking its status.
- Then software pings the IP address/host, and receives reply data from the particular IP address.
- Software sends the ping status to the user (up or down) and stores the latency details (in milliseconds) in the database.
- When the user requests to generate reports, the software provides it by searching the database.

5.2 Report Generation Technique Proposed

Through our software we plan to implement a report generation technique to help professionals at the management level in organizations who could use this software by utilizing human resources more efficiently and also to keep a check on the internet service providers at the organization's various outlets.

Various other proposed features are:

- Monitors the performance of the desired targets, allowing easy comparison of the performance of the targets simultaneously.
- Minimize system tray functionality.

- Can save lists of IP targets to monitor for later use.
- A graph of packet loss is visible.

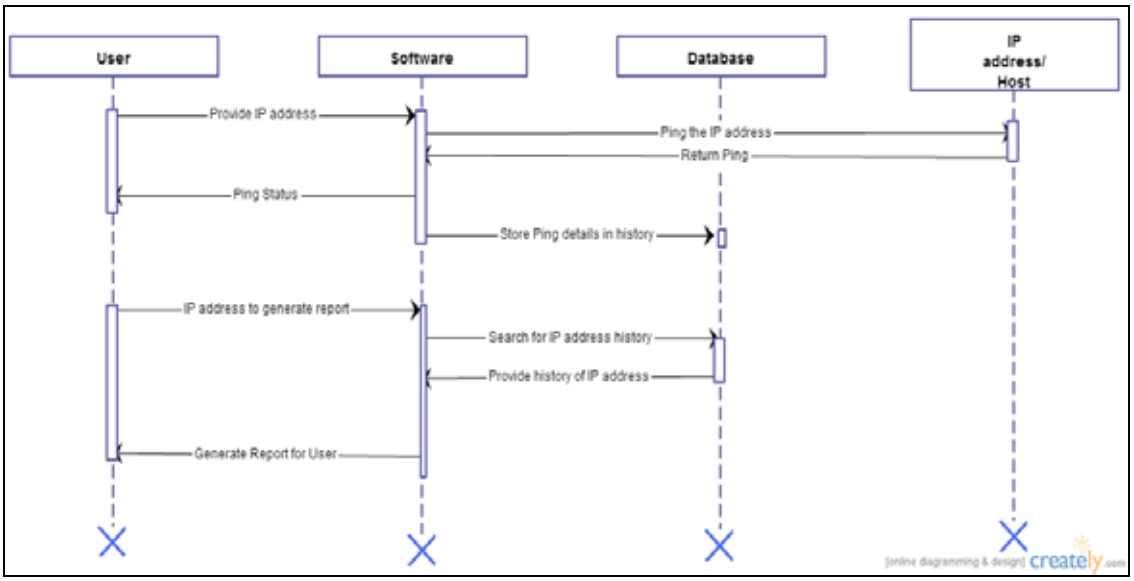

Fig. 3 Sequence Diagram of the proposed design of BPing

5.3 Platform Description

The network monitoring utility software was tested on x86 architecture machine. The application is built using Java programming language making it easily available across most heterogeneous environments and configurations.

VI. CONCLUSION

When we measure the time taken by a packet to reach a target and return back to the origin it is called as the latency or ping time. In the most broad understanding, every user wants this ping time to be as low as possible to ensure a good connection to that pinging target. This ping time is displayed in BPing as the response time in milliseconds (also called "Round Trip Time" - the time it takes for the packet to travel towards the destination and back to the origin). Thus the feature is ultimately used in monitoring the IPs and alert the user if the target fails to respond (which will show up as a lost packet, red, in BPing), or is responding slowly.

BPing's guarantees high performance since it consumes minimal resources and is built using Java technology. Its lightweight code and user friendly GUI allows the user to send multiple ping requests to multiple targets simultaneously at a periodic interval of his/her choosing. All of this ping information is further stored in backend database which can also be depicted in graph format for better information interpretation. The built in report generation utility reduces the manual labor required at any organization thus making it an essential and efficient software.

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THERMAL PERFORMANCE EVALUATION OFHEAT SINKFOR VARIOUS PROFILES

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ABSTRACT

In the present scenario of electronic systems must be self-indulge to improve its reliability and from its premature failure .So efficient cooling of the electronic devices becomes a challenging task in thermal area .Innovation in technology has made a large leap towards compact, so equipment size variation has changed to miniature size .For optimum working condition of electronic systems energy-efficient heat sink is needed. This paper has considered a heat sink with thermal aspect of existing-fin circumstance concocted an effort to produce an optimum design for the heat sink by assorting its correlated parameters through modeling and analyzing the redesign through simulation software. Additionally mathematical computation work is done by technical programming to acquire efficiency and effectiveness of heat sink

Keywords*: *Efficiency, Fin Profile, Heat Sink Simulation, Thermal Analysis.

I. INTRODUCTION

The world has adapted the emerging trend of technology which has the best performance in its environment. We can see the electronic applications such as integrated circuits such as graphic card, audio area, chip sets, CPUs and hard disk drives are making an high effort to give the best outcome but as high working conditions lead to heat dissipation which must be reduced to an extent within less span of time and without increasing other difficulties for the system. Heat sink is an excellent element for heat exchange that cools a device by its extended surfaces, which are popularly known as fins used in air-cooled heat exchangers and electronic cooling arenas. Fins with maximum surface area, increase the frictional resistance resulting low air flow rate[1].

This paper deals with optimum design of heat sink so the various comparisons have been done for evaluating the performance of extended surface by considering geometric parameters of heat sink such as fin height, fin length, fin thickness, number of fins, fin shape or profile, material etc.[2].The hydraulic and thermal characteristics of various impinging heat sinks have extensively studied, due to its favorable price, reliability and weight by many researchers .Sansoucy et al.[3].The accurate analysis of heat transfer in extended surface has become crucial with growing demand of high performance with taking account of smaller weights, volumes, initial and running cost of the system.[4]. Over the years contrasting fin profiles have been transformed upon the application and geometry of the primary surface. It has been identified three main fin geometries. These are longitudinal fins, radial or circumferential fins and pin fins or spines.[5]. Fins with straight profile and constant thickness can be manufactured easily. Numerous investigations have proposed high performance heat removal characteristics .Among that numerical optimization used to estimate the shape of pin-fins for a heat sink to improve the cooling efficiency [6]. Therefore constructive heat sink design algorithm enhances the efficiency of heat sink modules and reduces the duration along with cost of the design process.

In specific, in fin the temperature difference reduces from primary base i.e., fin base to fin tip. Economizing of fin material can be obtained by attaining narrow fin profiles. this validation made to determine the optimum fin profile so that fin volume becomes lower limit for a given rate of heat dissipation or the rate of heat dissipation is maximum for a given fin volume the criteria for optimum fin profile under convective condition was first proposed by Schmidt[7].by neglecting profile curvature of fin surface area has made further investigations to update fin optimization and (LAI) length of arc idealization was taken in account for optimizing fin shapes under convecting, radiating, convecting-radiating condition[8], for fins with heat generation [9] .the majority of the analytical works on fin optimization and its effective design until now are based on the presumption of constant convective heat transfer coefficient along the fin length. Nevertheless, existence of a non- uniform heat transfer coefficient has been prevailing theoretically and perceived experimentally. Kraus has thoroughly discussed the results of the explorations, which have taken in account of non – uniform heat transfer coefficient along the fin surface. He culminated that non uniformities have an impact on the rate of heat dissipation by the fins.[10].

II. OBJECTIVE

The heat sink has been immensely consumed for effective cooling function for all possible heat dissipating components in view of fact that circuit density and heat generation of integrated circuit chips are expeditiously increasing in order to accrue the heat flux levels within these chips. Simultaneously large amount of heat flux can create significant quantities of heat stress on components and its package .Consequently beneficial heat sink module necessary to maintain the operating temperature of electronic integrants at a competent level. The cost effective and energy efficient heat sink design will certainly influence on reliability and working condition of the electronic equipment. Explorations on optimum design parameters and selection of heat sink with a high-performance heat removal aspect are discussed [11-17]. Implementation of heat sinks presented along with details of fundamentals of heat transfer and hydrodynamics characteristic of heat sinks including the fin efficiency and forced convection [11-12]. The aim of the paper is to put forth appropriate design for heat sink with optimum profile with its peculiarity along with number of fin, fin height, fin thickness and spacing also taken in account. The contrast work is done by comparing features of heat sink with incompatible models and consequence is discussed through graphical plotting and simulation works.

III. MATLAB

Numerical computing is done in multi-paradigm numerical computing environment i.e. matrix laboratory. In matlab software the required mathematical formulation for free convection is technically computed by high performance language. The computation algorithm consist object oriented programme features as they help evaluate the mathematical expression. Free convection conditions are programmed and also an algorithm created for variance fin profiles i.e. straight rectangular, tapered fins, cylindrical pin fins filled and in-line array for computing the overall efficiency of heat sink and effectiveness of fins. The four algorithms consisted detailing of parameters involved in computation of efficiency. The attributes used in numerical computing heat sink's length and breadth, fin's height, thickness, length, diameter and spacing. Material consideration is also taken for effectual outcome i.e. thermal conductivity of material, heat transfer coefficient and its film coefficient. The heat sink operating conditions are taking from real scenario which helped to obtain the optimum heat sink.

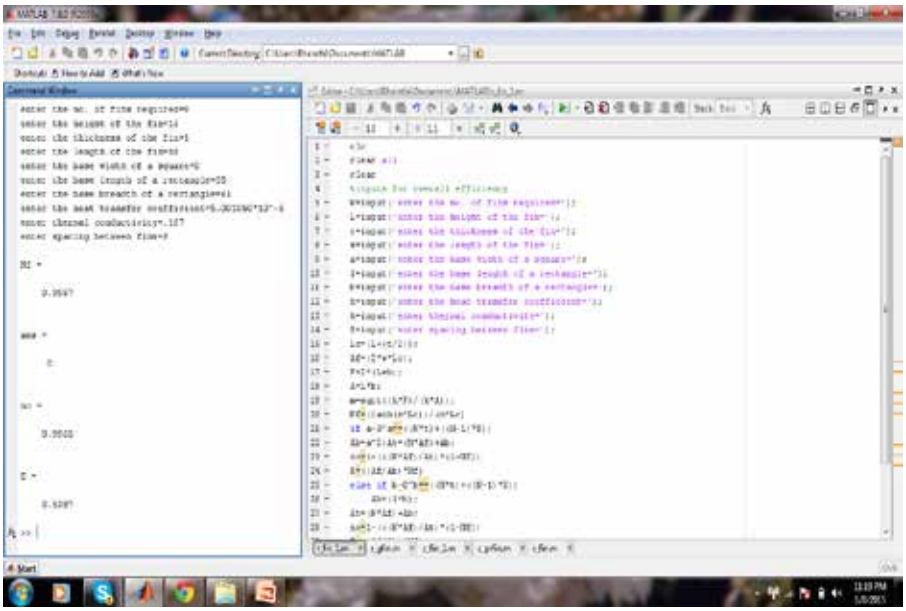

Fig 1: The Executed Matlab Program for Base Model

TABLE: DESIGN AND MODELLING

TYPE OF MODEL	BASE MODEL	CORRUGATED MODEL	TAPERED MODEL	CYLINDRICAL INLINE MODEL	CYLINDRICAL FILLED MODEL
EFFICIENCY	99.95	99.56	95.45	94.90	94.90
EFFECTIVENESS	5	5	5	4	4

Heat sinks are widely used in most of industrial applications such as electronic, refrigeration, conditioning and chemical processing systems [18]. Fins deploy to enhance air-cooling is the easiest , simplest and effective heat sink structure beneath the constraints consideration i.e. cost ,space and weight of the heat sink.[19].consequently design of heat sink faces circumstances of satisfying the current prerequisite and successfully removing elevated heat of high–ranking electronic integrants in the future. In spite of fact that, lot of exploration research works done in the area of free convection however a handful of discrete information is accessible in technical literatures regarding optimization and design of heat sinks .optimization is necessity for enhancing the thermal characteristics of heat sinks. Analytical work is covered with details [20].

Heat sink is modeled in parametric feature based architecture modeling approach. It illustrate parameter, dimensions , feature and strived to capture intended product behavior to create a layout which enables design automation as well as optimum design with product development process. This epitomizes the product with all accessories and the outcome is featured in complete digital representation. This parametric modeling approach enables concurrent engineering –design, analysis includes manufacturing working in parallel along with streamline product development processes.

A replica of existing heat sinks is taken in account for redesign to enhance its heat dissipation factor by varying influencing factors which subsequently show the incremental in efficiency of heat sink.re-design of heat sink involved improvisation and optimization of extended surface .The peculiarity of heat sink criterion involved considerable amount of analysis for ultimate fin profile, fin thickness, reduced spacing along with number of fins increased and their fin height reduced. Consequently area of base plate and heat flux are unchanged due to consideration of existing heat sink in electronic integrant. For further comparison is made to meet the challenges

of current high performance electronic gadgets i.e. material of heat sink ,two material is taken in account AL6061 and Cu .Fin profiles involved in analysis and comparison work are straight rectangular, tappers and new profile is presented for enhancing thermal heat dissipation i.e. straight corrugated profile. The comparison work made to take cylindrical pin fins profile also for additional analysis.

IV. ANALYSIS

The analysis work is comprehensive approach to guide and optimize complete product design. Simulation work determines robustness and performance of component along with their assemblies. It helps designing team to make decision making and changes can be updated .This effort provides piece of information to automotive , aviation ,space and shipping industries to extend their product variation and product development cost. ANSYS 15 is a productive tool for design verification through simulation results it circumvent prototype testing, manufacturing and cost in engineering field. The emerging trend of products are tending towards complexity with advanced functionality and features which in result thermal issues have become sensitive to compensate other factors to obtain optimization. It delivers major advancement to complete multiphysics workflow for complex environment. This paper has done simulation work for 26 models of heat sink and obtained optimized and best fin profile in comparison.

V. RESULTS AND DISCUSSION

The work presented in the paper has considered the heat input and heat sink from existing electronic system. Analysis is explored by taking the influencing factors affecting the efficiency of extended surface. The thermal parameters are taken by present scenario working condition i.e. Q=50Watts and dimensions of the heat sink. The area of heat sink 55*61 mm^2, length, height, thickness of fin is 55mm, 16mm, 1mm respectively. The graph results shows the temperature variation when heat sink material is taken in account

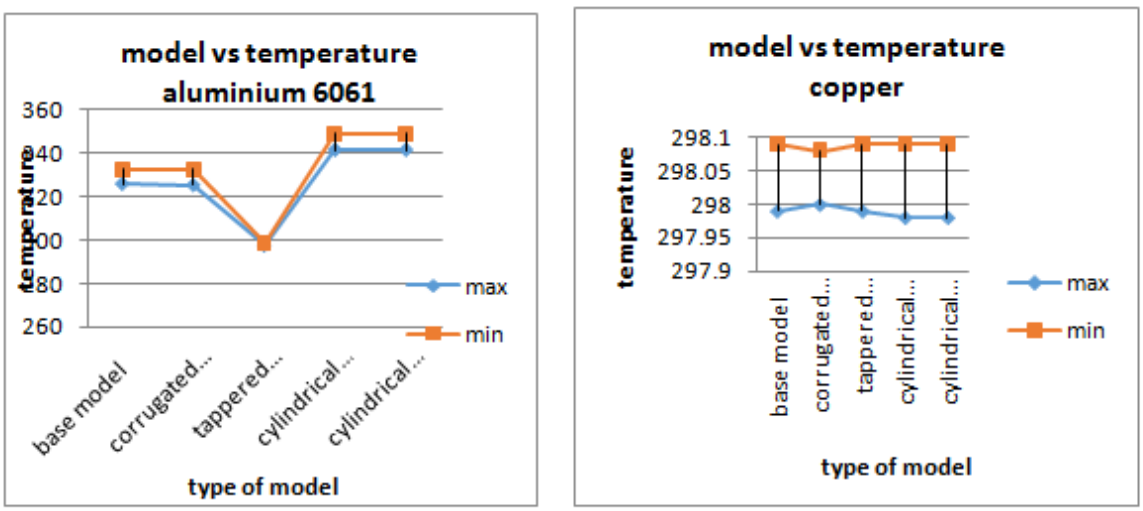

Fig.2: The Temperature Graph of Various Fin Profiles of Aluminum and Copper Material Considering Existing Heat Sink Condition

The figure 3 and figure 4 are the base model and new proposed model i.e. corrugated heat sink has been applied convection and analyzed. Thermal analysis results of base model and corrugated mode shown below.

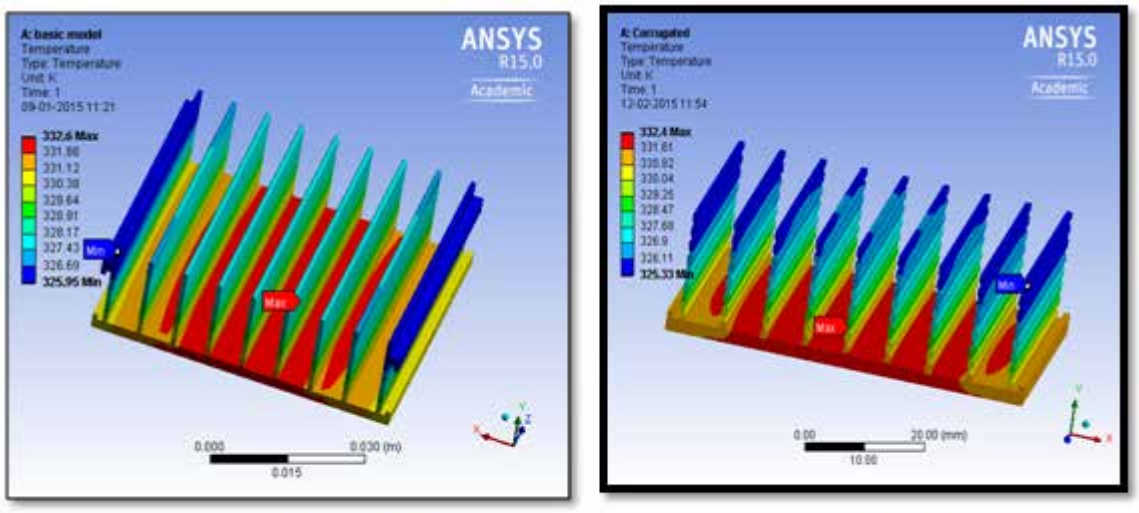

Fig.3 and Fig.4: Analysis of base model and corrugated model

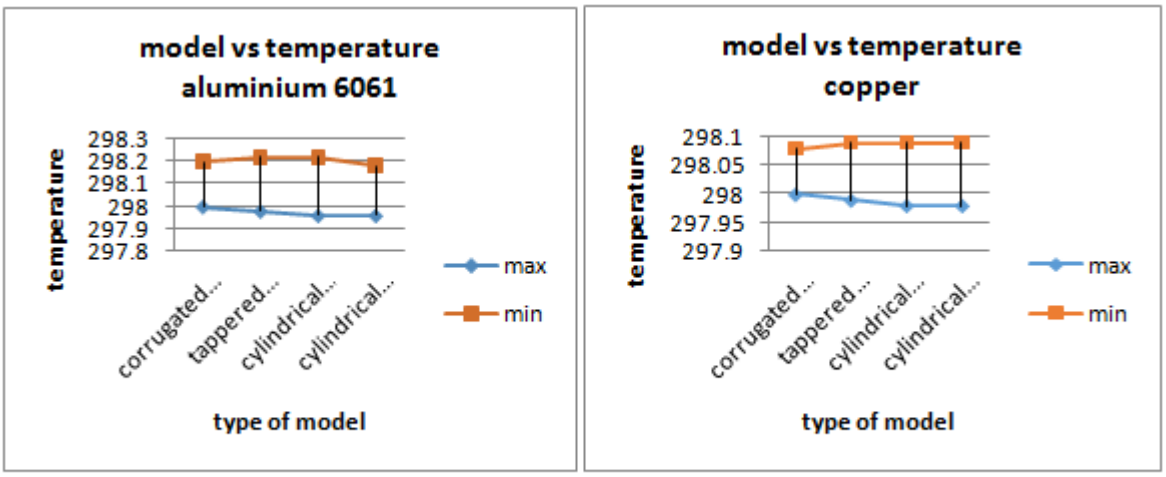

Fig.5: Results of heat sink for reduced height through graph

From the figure 5 the results plotted above graphs are for varying parameters in the heat sink. The height of the fin is reduced than base model to examine the thermal characteristics and comparison has been shown by changing material and applying the free convection condition

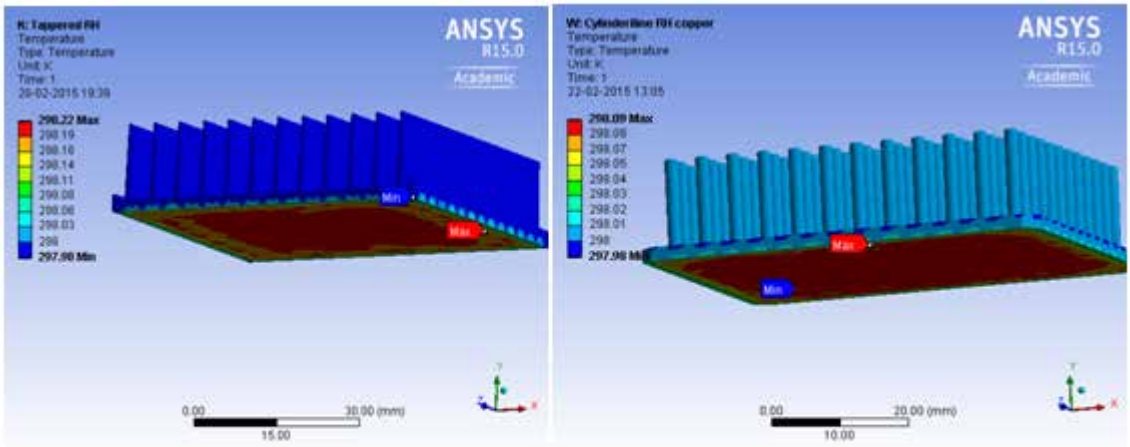

Fig.6: Analysis of reduced height of fins for tapered and cylindrical inline fins

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Simulation results shown from figure 6 represent tapered and cylindrical pin fin heat sink, the reduction of height of fin by 2.5mm by maintaining same heat flux and free convection boundary condition

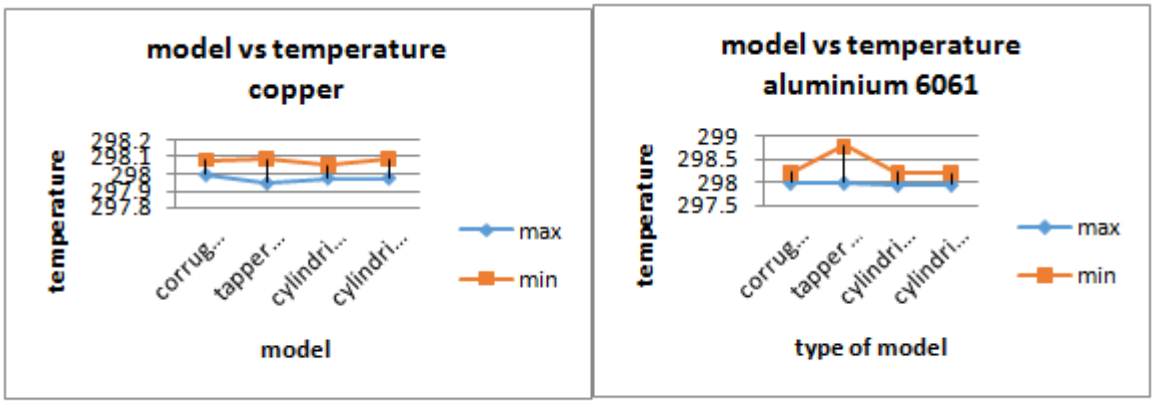

Fig.7: Results of heat sink by minimizing the spacing and maximizing the no. of fins.

In the figure 7, graph presents temperature variation of heat sink by varying the spacing between fins and increasing the number of fins, compared on both materials Cu and Al6061.

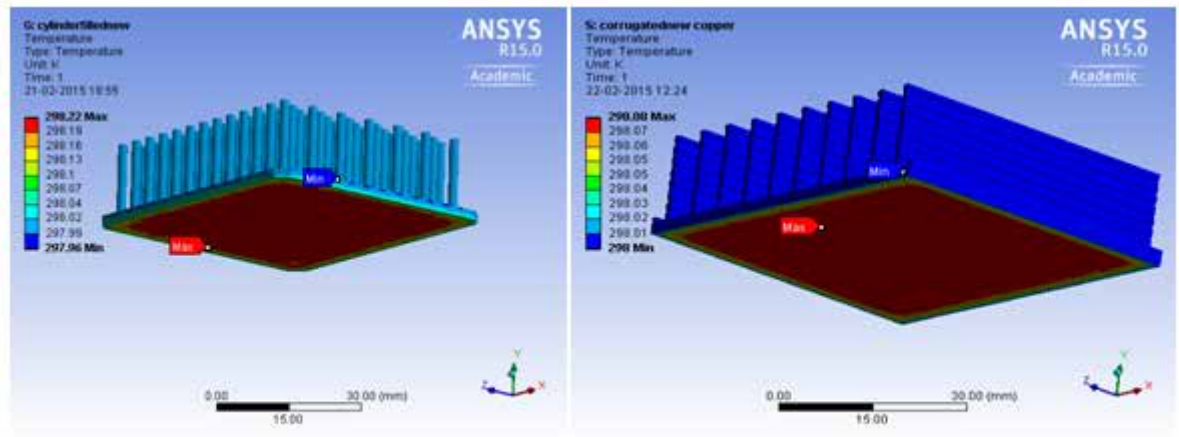

Fig.8: Analysis of heat sink for various parameters line spacing and fin maximization

The ANSYS 15 simulation works are represented in figure 8, graph explains the condition in which spacing and fin number have been increased as a result. As the surface increased the efficiency has increased by applying thermal boundary conditions.

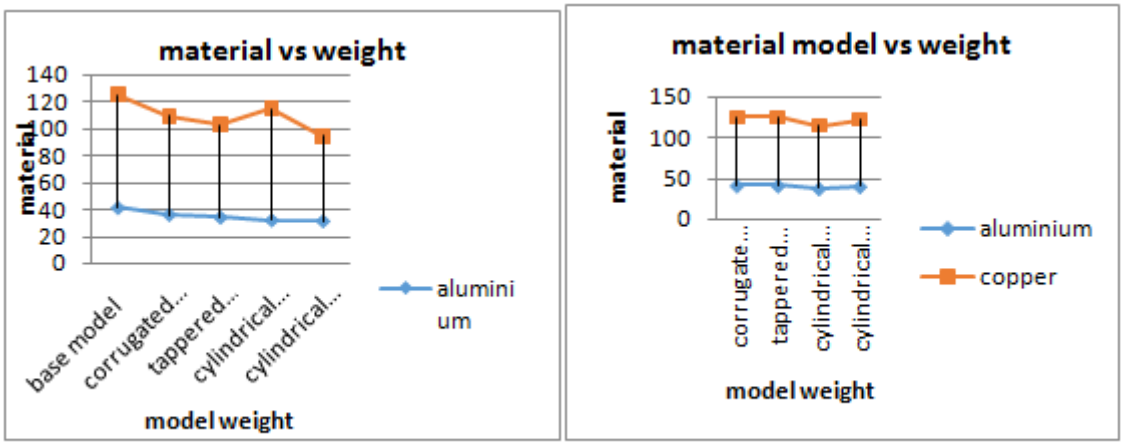

Fig.9: Weight comparison of heat sink for aluminium and copper

The figure 9 graph illustrates weight comparison of analysed models as Cu has more density so the copper heat sink is heavier but still they are effective by fin profile.

The existing heat sink is taken from an electronic system and analysed the thermal effects to re-design the heat sink was the objective of paper which is successfully completed by creating various fin profiles and comparison is made through varying factors related to heat sink as well as material consideration is also taken in account.

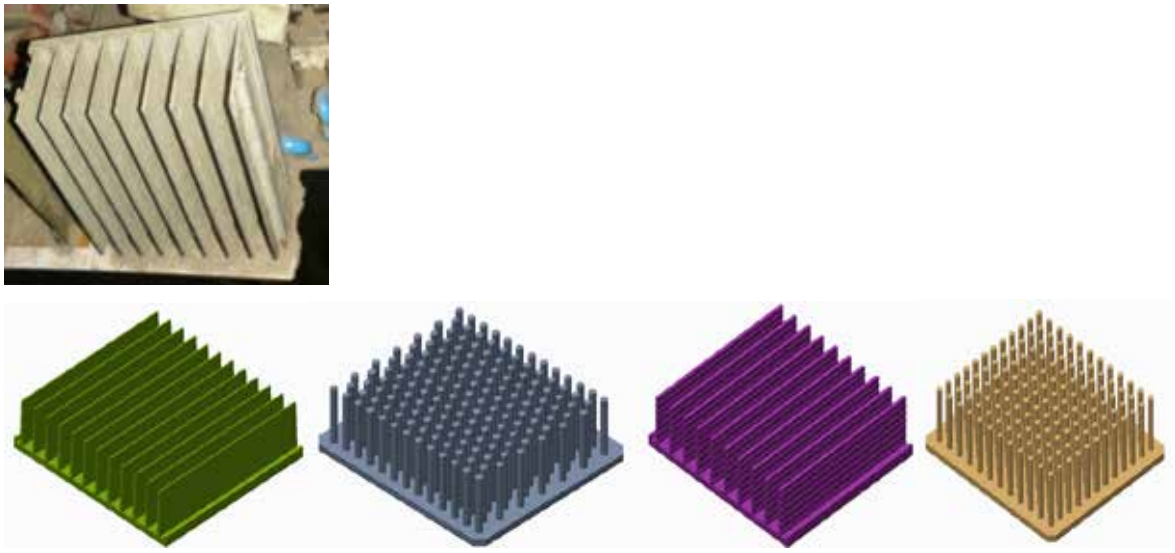

Fig.10: Different heat sink models used for analysis along with existing base model

In the figure10 models used for analysis i.e. straight tapered heat sink, cylindrical pin heat sink filled, straight corrugated heat sink and cylindrical inline heat sink respectively.

VI. CONCLUSION AND FUTURE WORK

This paper presents a new fin profile i.e. straight corrugated heat sink, which is modelled as well as thermal analysis have been done. The performance of the heat sink under same working conditions of existing heat sink operating conditions has been analysed and compared .The outcome was better than the existing model and with a reduced weight is an advantage as the cost can be minimized. Through simulation works best effect is seen in tapered heat sink with much better rate of heat dissipation. Fin efficiency and fin effectiveness of corrugated and tapered heat sink are high compared to base model .Further additional research work can be done by varying heat flux and taking other thermal parameters in account for analysis.

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RESEARCH STUDY ON INNOVATIVE LEARNING ENVIRONMENT FOR GRADUATES STUDENTS OF PROGRAMMING LANGUAGE

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ABSTRACT

In this paper explored the impact of trustworthy learning exercises, as an instructional plan, on services teachers' technology incorporation self-efficacy and purposes to join in technology. And discussion the foreign countries strategy and goal of the learning for the student and also teacher's provides study material of the student regarding learning Computer programming Language. Some Circumstances have been used in education concluded a variation of methods, Such as case written analysis, case discussion, and case development. Education is recycled a chronological set-up to examine the following effects of timing of sympathetic information presentation (information before vs. information during the learning task clusters) in communicating digital learning materials (IDLMs) and type of collaboration (personal discussion vs. online discussion) in computer-supported collaborative learning (CSCL) on student knowledge construction.SCY learning environments centre the entire learning process on creating, sharing, discussing, and re-using these learning objects. And new skill and pedagogy for the 21st Century in the United States and other countries.

Keywords: IDLMs, CSCL, SCY, Education, learning

I INTRODUCTION

A software development concept use in software engineering is a framework that use to structure, plan, and control the process of developing an information system [11]. "In the face of a fixed trend of how-to workshops and approximately longer-duration seminars, pervading technology into programme and teaching practices leftovers indescribable for many teachers" [8].Students are thought to be involved in learning when they dynamically contribute in interesting learning activities, mostly those that develop higher order sophisticated skills including interface and partnership with peers. Active and problem-based learning are two such methods. Active learning is amethodology to enlighteningplan that is based on happenings in which students work collaboratively on responsibilities that contribute to their learning [6].Launched in 2012, the U.S. Department of Education's Race to the Top-District (RTT-D)grant program stresses modified learning environments—a new methodology to sympathetic how and where education is distributed, how students learn, and the roles of teachers, parents, and the broader community in supporting students' academic success [1].The Dutch Ministry of Education, Culture, and Science (MoECS) has introduced the preparation of national emergent literacy

accomplishment targets. In recent years, many Dutch kindergartens have devoted in technology to provision the curriculum. Severaleducations have exposed positive belongings of knowledge in supportive learning in emergent literacy development [3].

II CONCEPTUAL FRAMEWORK

2.1 Technical, pedagogical, and content knowledge

Exploration has exposed computer and software expertise helps teachers to define how technology might be positive to student learning. Highlights the connections among technologies, curriculum content, and specific pedagogical approaches, demonstrating how teachers' understandings of technology, pedagogy, and content can interact with one another to produce effective discipline-based teaching.The skill of programming contains knowledge of programming tools and languages, problem-solving expertise, and in effectapproaches for program strategy and operation. A mutual approach in programming teaching is to first teach the fundamentals of a programming language and then guidestudents towards operative strategies for the whole programming process [2].The United States has always had compartments of revolution in schooling, and the first decade of the 21st century is no exception.Three themes emerge from a review of research and literature on school facilities design. First, facilities designs have been shown to have an impact on learning. Second, these designs have been shown to have an impact on students and others who work in the schools. Third, there have been few innovations in school facilities design [10].The separate effects of interactive digital learning materials (IDLMs) and computersupported collaborative learning (CSCL) on student learning are well researched, up till now no experiential study has lectured the sequential effects of these two learning arrangements on knowledge construction.

2.2 Difficulties in learning programming

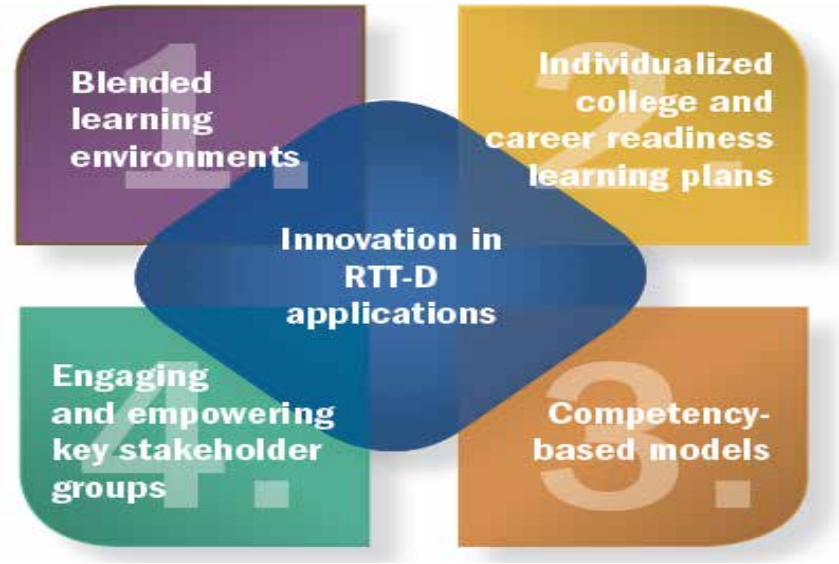

Figure 1. American Institutes for Research

Learning to program is generally considered hard, and programming courses often have high dropout rates.Educational research has been accepted out to distinguish the appearances of novice programmers and to

study the learning process and its influences to the different aspects of programming. Lately also differences between procedural and object-oriented education approaches have been studied, as Java and C++ have become common educational languages [2].AIR's analysis of opportunities, promises, and pitfalls in the design and development of personalized learning environments is structured around four main activities that emerged as central components of the 16 RTT-D grant applications [1].

- Creating and implementing blended learningenvironments.
- Developing and using individualized collegeand career readiness learning plans.
- Implementing competency-based modelsto support and accelerate students' progressthrough their learning plans.
- Engaging and empowering key stakeholdergroups, including teachers, parents, and thebroader community in the process of ensuringstudent success.

2.3 Designing New Learning Environments

As a programmer, it's very important to keep up with what's latest in the programming world. By trying new techniques and by solving the same problems in new ways, you'll improve your skills and become a better programmer [12]. New Tech teachers are able to embed all the learner outcomes (content and 21st century skills) and assess against them. Learner outcomes are the same across all subjects and interdisciplinary courses. Projects have associated rubrics for content, collaboration, written communication, oral communication, critical thinking, and so on, and are all posted online for students so they can decide on their own whether to achieve basic, proficient, or advanced work [10].Designing 21st century schools and new learning environments starts with defining the outcomes. We must ask, "What knowledge and skills do students need for the 21st century?" But real design needs to go much further and address the following questions as well.

- What pedagogy, curricula, activities, and experiences foster 21st century learning?Self-assessment is a critical element of assessment for learning.
- What assessments for learning, both school-based and national, foster student learning of the outcomes, student engagement, and self-direction?
- How can technology support the pedagogy, curricula, and assessments of a 21st century collaborative learning environment?
- What physical learning environments (classroom, school, and real world) foster 21st century student learning?

  After defining these outcomes, the key design issues might be illustrated as depicted in Figure2 [10].

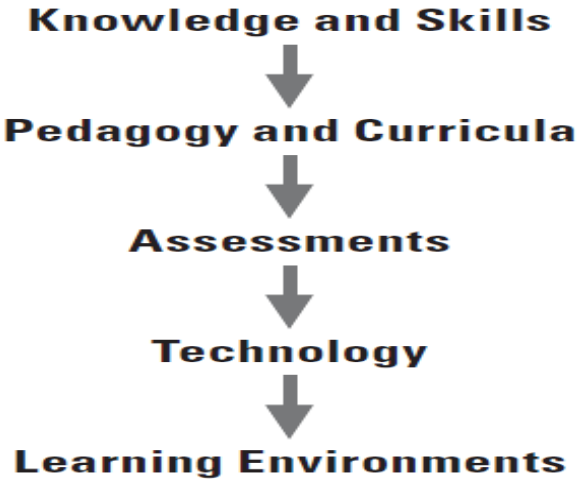

Figure 2. Design criteria for 21st century collaborative learning environments

2.4 Effective learning Methods

Effective schools are schools that produce learning outcomes for all students that are above typical expectations.The following learning methods are used to signpost areas for reflection and action [15]:

- School Values, beliefs and expectations
- Teaching and learning arrangements
- Teaching practices
- Learning Environments
- Learning Communities
- Leadership

III CONCLUSION

Learning to program is a complex task and teachers should design their teaching approachescarefully. The traditional approach of concepts first is common and found to be effective, althoughalso different approaches exist.This paper emphasizes on development Structure fordeveloping in Java programing language and provide a smallsurvey of students under this structure point or model part.All studies have limitations. One is particularly notable in this study: testing emergent literacy. From the pre- and post-testing data, it appeared that a ceiling effect might have impaired the measurement of emergent literacy learning gains for the senior kindergarteners

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