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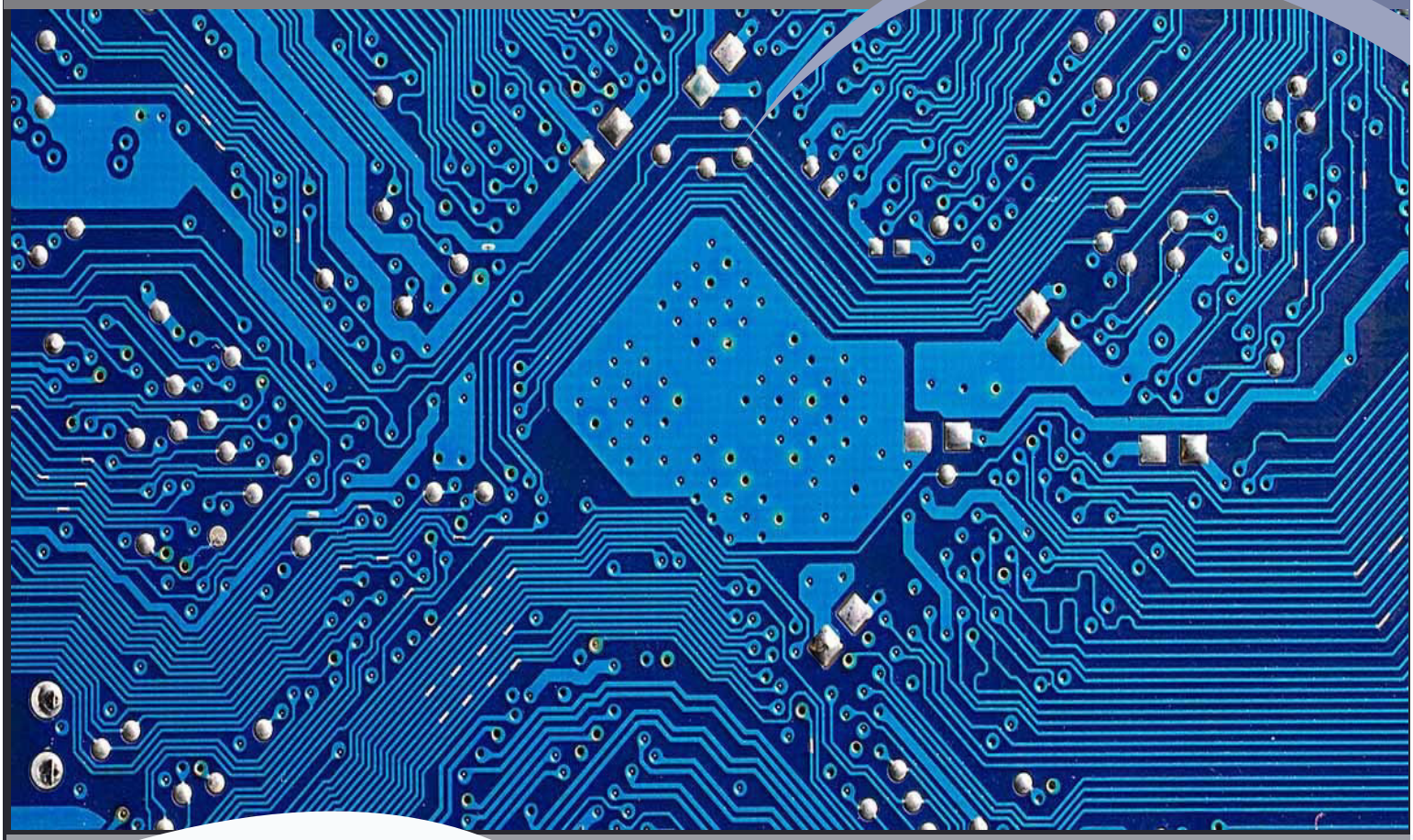

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NOVEL DEFENCE MECHANISM AGAINST ON DEMAND ADHOC ROUTING PROTOCOL FOR MOBILE ADHOC NETWORKS

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Abstract:To access multimedia data mobile users like to use their own consumer electronic devices anywhere and at anytime . Hence, we expect that wireless ad hoc networks will be widely used in the near future since these networks form the topology with low cost on the fly. However, consumer electronic devices generally operate on limited battery power and therefore are vulnerable to security threats like data flooding attacks. The data flooding attack causes Denial of Service (DoS) attacks by flooding many data packets. However, there are a few existing defense systems against data flooding attacks. Moreover, the existing schemes may not guarantee the Quality of Service (QoS) of burst traffic since multimedia data are usually burst. Therefore, we propose a novel defense mechanism against data flooding attacks with the aim of enhancing the throughput. The simulation results show that the proposed scheme enhances the throughput of burst traffic.

Keywords *— Data flooding attack, throughput, burst traffic, wireless ad hoc network.*

INTRODUCTION:

Consumer electronic devices have evolved depending on user needs. Users want to use compact and portable devices such as cellular phones, laptop computers, Personal Digital Assistants (PDAs), etc. anywhere and at anytime [1]. They like to use those devices to download multimedia data or to access real-time traffic. Those devices are used as mobile nodes in wireless ad hoc networks; hence, wireless ad hoc networks on the basis of consumer electronics are expected to be widely used in the near future. In wireless ad hoc networks, the communications take place between mobile nodes, operating under limited energy of battery power rather than through base stations [2]. Hence, it becomes extremely hazardous to wireless ad hoc networks when mobile nodes are clogged. Meanwhile, wireless ad hoc networks are vulnerable to security threats since all signals go through bandwidth constrained wireless links and the routing decision are taken in a decentralized manner [3].

Therefore, it is important to provide a path with secure robustness in wireless ad hoc networks. Wireless ad hoc networks can be victimized to various kinds of attacks [4]-[7]. Among them, the ad hoc flooding attack can easily cause Denial-of-Service (DoS) attacks by flooding many Route Request (RREQ) or data packets [7]. Since a mobile node has limited resource capacities such as memory space, computational ability, battery power, bandwidth capacity, and so on, it cannot provide services when it receives a lot of packets. Hence, the whole network as well as the victim node can get easily paralyzed.

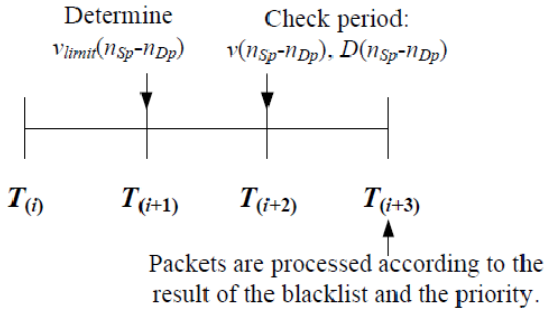
Even though attackers are able to conduct ad hoc flooding attacks by flooding either RREQ packets or data packets, most researches in this field have focused their study on RREQ flooding attacks much more than data flooding attacks [8]-[9]. Contrary to other networks, the path construction from the source node to the destination node is important in wireless ad hoc networks because the communication is performed via multiple hops without any infrastructure. Besides, the data flooding attack can be performed only after constructing a path. Therefore, an attacker sets up a path to the victim node so as to conduct data flooding attacks and then forwards tremendous useless data packets to the victim node along the path. However, the size of data packets is usually much larger than that of RREQ packets; i.e., 24 bytes for RREQ packets and 1 Kbytes or 512 bytes for data packets [10]. Hence, resource consumption and bandwidth congestion of a node or the entire network can be easily occurred by data flooding attacks.

The flooding attack prevention (FAP) [7] suggested a defense system against either RREQ or data flooding attacks. The path cut off mechanism is used as defense against data flooding attacks [7]. When the victim node realizes that it has been subjected to the data flooding attack, it may cut off the path. However, the procedure of the path cut off mechanism is not explained in detail, and FAP cuts off the path when many data packets are transmitted to the victim node. Current users like to download or access multimedia data using the consumer electronic devices so that the packets may be transferred as burst traffic [11]. However, FAP cannot distinguish burst traffic from attack traffic since FAP distinguishes an attack by comparing the incoming packets with a threshold. Hence, the throughput of burst traffic may degrade if a simple threshold-based defense system is used in FAP.

PERIOD-BASED DEFENSE MECHANISM AGAINST DATA FLOODING ATTACKS

To defend the data flooding attack, the proposed PDM scheme sets up *w* periods for the data transmission. The PDM scheme checks data packet floods at the end of each period in order to enhance the throughput of burst traffic. Therefore, it can guarantee the Quality of Service (QoS) of burst traffic.

We denote $v(n_{Sp}\text{-}n_{Dp})$ as the variance of the number of received data packets for the source node (n_{Sp}) to the destination node (n_{Dp}) during the period $T_{(i+1)}\text{-}T_{(i+2)}$. Here, *p* denotes the number of sessions taken for data transfer.



SYSTEM ANALYSIS

Existing system:

Ranging and positioning techniques are highly vulnerable to attacks from dishonest nodes and external attackers; dishonest nodes can report false position and distance information in order to cheat on their locations; external attackers can spoof measured positions of honest nodes. An attacker can generally influence all thesemeasurements by jamming and delaying signals, and by modifying their signal strengths.

Proposed system:

We propose a different approach to secure data's while transferring, that relies on a set of covert base stations used for secure positioning to find the attack particularly. A novel period-based defense mechanism (PDM) against data flooding attacks taking enhancing the throughput of burst traffic into account.

PROBLEM FORMULATION

4.1 Objective:

Mobile users like to use their own consumer electronic devices anywhere and at anytime to access multimedia data. Hence, we expect that wireless ad hoc networks will be widely used in the near future since these networks form the topology with low cost on the fly. However, consumer electronic devices generally operate on limited battery power and therefore are vulnerable to security threats like data flooding attacks. The data flooding attack causes Denial of Service (DoS) attacks by flooding many data packets. However, there are a few existing defense systems against data flooding attacks. Moreover, the existing schemes may not guarantee the Quality of Service (QoS) of burst traffic since multimediadata are usually burst. Therefore, we propose a novel defense mechanism against data flooding attacks with the aim of enhancing the throughput.

4.2 Hardware Specification

- SYSTEM : Pentium IV 2.4 GHz
- HARD DISK : 40 GB
- FLOPPY DRIVE : 1.44 MB
- MONITOR : 15 VGA colour
- MOUSE : Logitech.
- RAM : 256 MB
- KEYBOARD : 110 keys enhanced

4.3 Software Specification

- Operating system :-Windows XP Professional
- Front End :-Java Technology
- Tool : Eclipse

4.4 Software Description

Java Technology

Java technology is both a programming language and a platform.

THEJAVAPROGRAMMING LANGUAGE

The Java programming language is a high-level language that can be characterized by all of the following buzzwords:

- Simple
- Architecture neutral
- Object oriented
- Portable
- Distributed
- High performance
- Interpreted
- Multithreaded
- Robust

- With most programming languages, you either compile or interpret a program so that you can run it on your computer. The Java programming language is unusual in that a program is both compiled and interpreted. With the compiler, first you translate a program into an intermediate language called *Java byte codes* —the platform-independent codes interpreted by the interpreter on the Java platform. The interpreter parses and runs each Java byte code instruction on the computer.

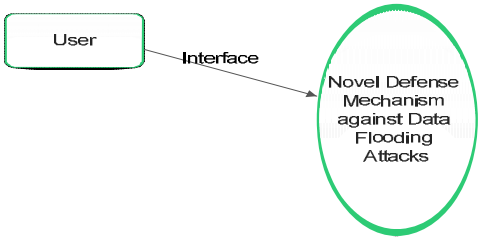
Compilationhappens just once; interpretation occurs each time the program is executed. The following figure illustrates how this works

SYSTEM DESIGN:

DESIGN OVERVIEW:

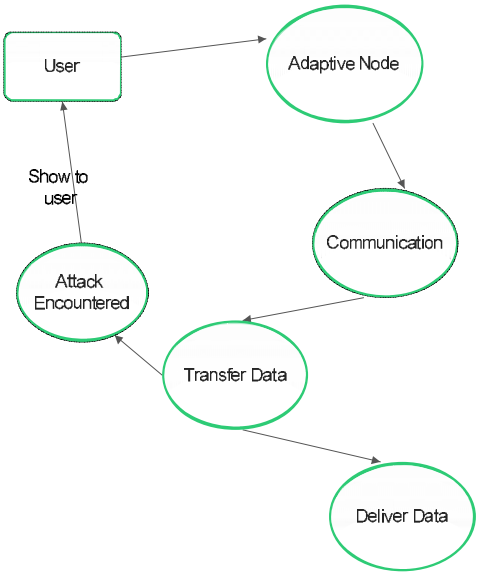
Design involves identification of classes, their relationships as well as their collaboration. In objectory, classes were divided into Entity classes, interface classes and the control classes. The Computer Aided Software Engineering tools that are available commercially do not provide any assistance in this transition. Even research CASE tools take advantage of meta modeling are helpful only after the construction of class diagram is completed. In the Fusion method ,it used some object-oriented approaches like Object Modeling.

Contextanalysis diagram:

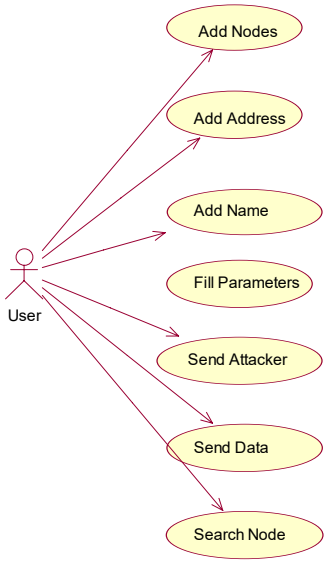


DATA FLOW DIAGRAM:

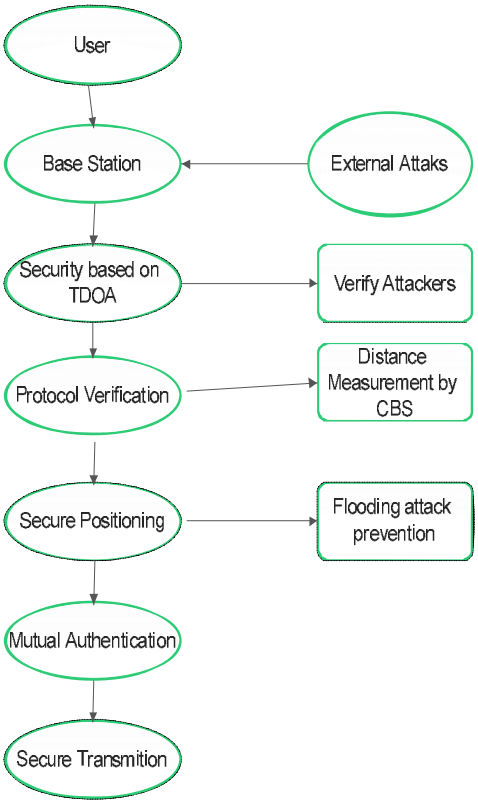
Level1 DFD:



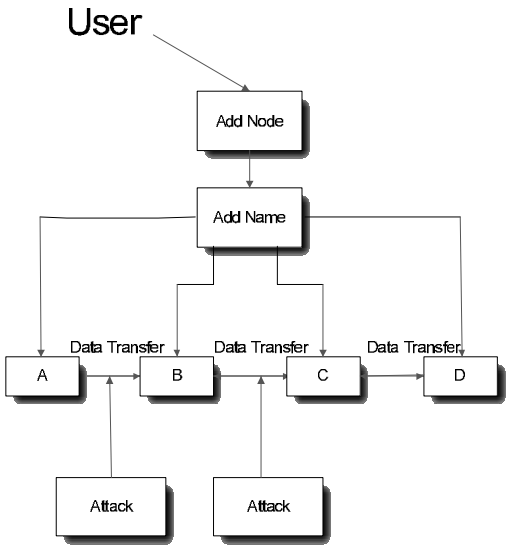
Use case diagram:



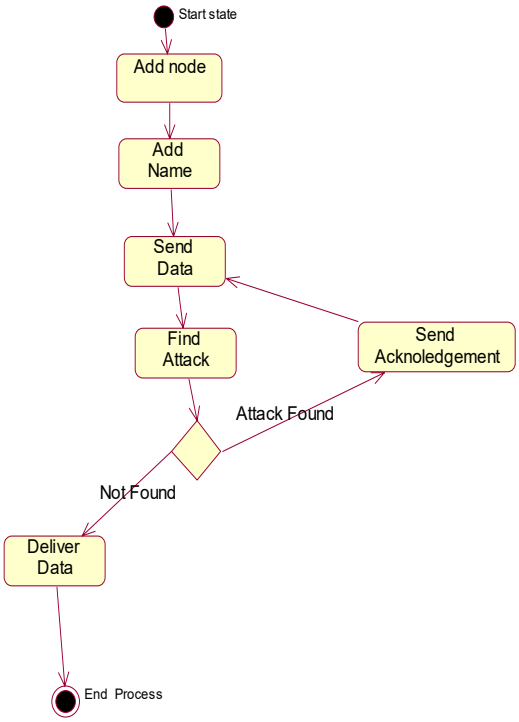
Level2 DFD:



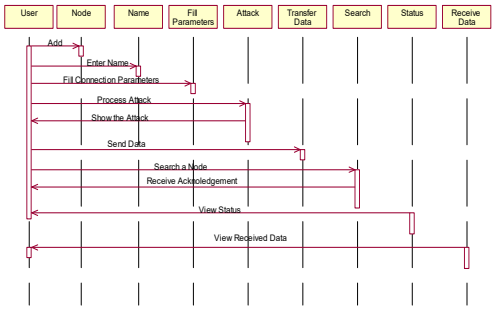
SYSTEM ARCHITECTURE:



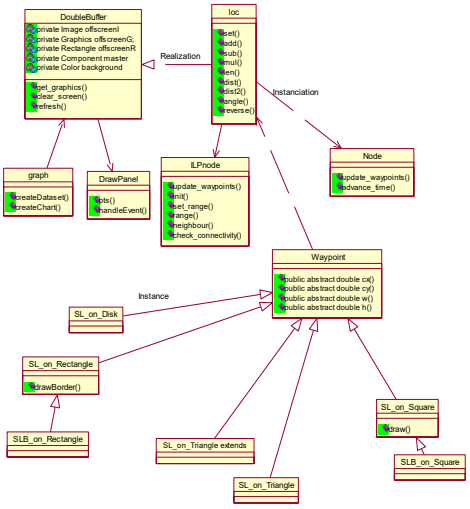
ACTIVITY DIAGRAM:



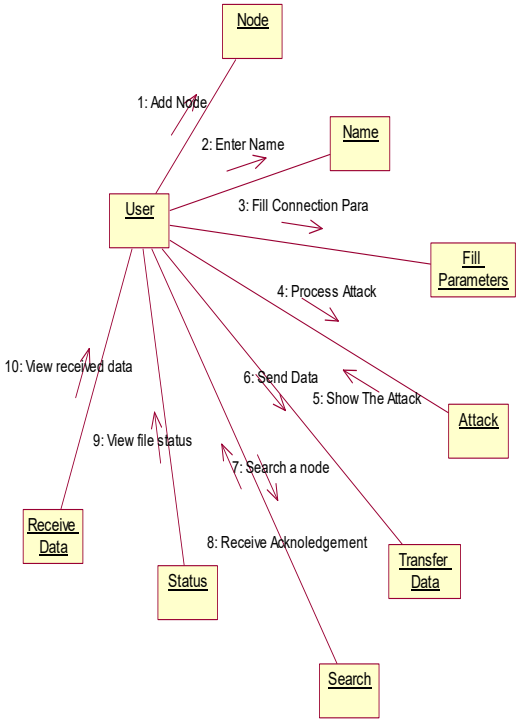
SYSTEM CASE DIAGRAM:



CLASS DIAGRAM:



COLLABRATION DIAGRAM:



CONCLUSION:

We have proposed the period-based defense mechanism against data flooding attacks. The data flooding attack paralyzes a victim node by consuming its resources. Hence, the throughput of the victim node is significantly reduced. However, the current defense systems focus on RREQ flooding attacks rather than the data flooding attack. They easilyattack paralyzes a victim node by consuming its resources.

Hence, the throughput of the victim node is significantly reduced. However, the current defense systems focus on RREQ flooding attacks rather than the data flooding attack. They easily reduce the throughput of burst traffic by comparing with the simple threshold. Hence, we scheme uses a blacklist, considers the data type, and processes packets according to the priority aim to enhance the throughput of burst traffic under the data flooding attack. The proposed so as to defend against data flooding attacks; since the attacker forwards many data packets at a high rate for the whole session. Recently, many users like to download and share multimedia data, so we expect that the proposed scheme is useful to networks where burst traffic are transferrable.

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ENERGY EFFICIENT REACTIVE ROUTING IN MANET UNDER CBR AND EXPONENTIAL TRAFFIC MODELS

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Abstract— A Mobile Ad hoc Networks (MANET) represents a system of wireless mobile nodes that can freely and dynamically self-organize in to arbitrary and temporary network topologies, allowing people and devices to seamlessly communicate without any pre-existing communication architecture. One of the main issues in MANET routing protocols is development of energy efficient protocols due to limited bandwidth and battery life. There are various such protocols developed and analyzed under Constant Bit Rate (CBR) traffic by many authors. In the present communication the energy consumption in traffic models (CBR and Exponential) is measured using routing protocols namely AODV and DSR. Simulation and computation of energy consumed, received and transmitted energy were done with ns-2 simulator (2.35 version) with parameter variation: number of nodes, pause time, average speed.

Keywords- *MANET, CBR Traffic, Exponential traffic, AODV, DSR, NS-2.35.*

1. INTRODUCTION

A mobile ad hoc network (MANET) is a collection of wireless mobile nodes dynamically forming a network Topology without the use of any existing network infrastructure or centralized administration. Such infrastructure less networks are usually needed in battlefields, disaster areas, and meetings, because of their capability of handling node failures and fast topology changes. One important aspect of ad-hoc networks is energy efficiency since only a simple battery provides nodes autonomy. Thus, minimizing energy consumption is a major challenge in these networks.

Jaun Carlos Cano et. al. [1] have developed number of such protocols and analyzed them under Constant Bit Rate (CBR) traffic. J Hoong et. al. [2] have compared two reactive protocols under ON/OFF source traffic. They have selected packet delivery ratio, normalized routing overhead and average delay as the performance parameters. Maashri et. al. [3] have compared the energy consumption of various protocols under CBR traffic. D. Nitnawale et. al. [4] have presented a paper on comparison of various protocols under Pareto traffic. Dubey and Shrivastava [5] have identified the packets responsible for increasing energy consumption with routing protocols using different traffic models. In the present paper, we have compared the energy consumption of two routing protocols (AODV and DSR) under CBR and Exponential traffic. Total energy consumed by each node during transmission and reception process has been evaluated as the function of number of nodes, pause time, average speed.

This paper is organized in five sections. Section 2 gives brief description of studied routing protocols. Section 3 describes simulation environment, traffic models and energy evaluation model. Simulation results are discussed in section 4. Section 5 describes our conclusion and future scope.

2. DESCRIPTION OF MANET ROUTING PROTOCOLS

Description of routing protocols AODV and DSR in brief are as follows:

2.1. AODV (Ad-hoc on demand Distance Vector)

This is a reactive protocol, which performs Route Discovery using control messages route request (RREQ) and route reply (RREP) whenever a node wishes to send packets to destination. To control network wide broadcasts of RREQs, the source node uses an expanding ring search technique. The forward path sets up an intermediate node in its route table with a lifetime association RREP. When either destination or intermediate node using moves, a route error (RERR) is sent to the affected source node. When source node receives the (RERR), it can reinitiate route if the route is still needed. Neighborhood information is obtained from broadcast Hello packet. As AODV protocol is a flat routing protocol it does not need any central administrative system to handle the routing process. AODV tends to reduce the control traffic messages overhead at the cost of increased latency in finding new routes. The AODV has great advantage in having less overhead over simple protocols which need to keep the entire route from the source host to the destination host in their messages. The RREQ and RREP messages, which are responsible for the route discovery, do not increase significantly the overhead from these control

messages. AODV reacts relatively quickly to the topological changes in the network and updating only the hosts that may be affected by the change, using the RRER message. The Hello messages, which are responsible for the route maintenance, are also limited so that they do not create unnecessary overhead in the network. The AODV protocol is a loop free and avoids the counting to infinity problem, which were typical to the classical distance vector routing protocols, by the usage of the sequence numbers. [6].

2.2. DSR (Dynamic Source Routing Protocol)

The Dynamic Source Routing Protocol (DSR) is a reactive protocol [7]. This protocol generates less overhead and provides more reliable routing than proactive routing, but at the cost of finding the optimal route. Mobile hosts do not utilize periodic messages, with a consequently energetic advantage in battery consumption. DSR updates automatically only when it needs to react to changes in the routes currently in use. This protocol is simple and efficient. The protocol is composed of the two main mechanisms of "Route Discovery" and "Route Maintenance", which work together to allow nodes to discover and maintain routes to arbitrary destinations in the ad hoc network. Other advantages of the DSR protocol include easily guaranteed loop-free routing and very rapid recovery when routes in the network change. The DSR protocol is designed mainly for mobile ad hoc networks of up to about two hundred nodes, and is designed to work well with even very high rates of mobility.

3. SIMULATION ENVIRONMENT

The simulation is done with the help of NS-2 simulator version 2.34 [8]. The network contains 10, 30 and 50 nodes randomly distributed in a 500m X 500m area, pause time of 10s, 20s and 50s and average speed of 17.10m/s, 10.33m/s and 4.72m/s as basic scenario.

Parameter	Value
No. of nodes	10, 20, 40
Simulation Time	120s
Pause Time	10s, 20s, 50s
Average Speed	17.10m/s, 10.33m/s,4.72m/s
Traffic Type	CBR, Exponential
Packet Size	512byte

Table 1: Basic Simulation Scenario

The selected parameters are varied using setdest command .

3.1. Traffic Model

Traffic model used are CBR and Exponential, which are generated using cbrgen.tcl [9].

3.1.1. CBR Traffic Model

CBR generates traffic at a deterministic rate. It is not an ON/OFF traffic.

3.1.2. Exponential Traffic Model

It is an ON/OFF traffic with exponential distribution. It generates traffic during ON period (burst time). Average ON and OFF (idle time) times are 1.5s and 0.5s respectively.

Parameter	Value
Burst Time	1.5s
Idle Time	0.5s

Table 2: Parameter for Exponential Traffic

3.2. Energy Evaluation Model

We have used energy model as given in the following table:

Parameter	Value
Network Interface	WirelessPhy
MAC Type	802.11
Channel	WirelessChannel
Propogation	TwoRayGround
Antenna	OmniAntenna
Radio Frequency	281.8mW (≈250m)
Initial Energy	100 Joule
Idle Power	1.0w
Receiving Power	1.1w
Transmission Power	1.65w
Transition Power	0.6w
Sleep Power	0.001w
Transition Time	0.005s

Table 3: Parameter for Energy Model

Energy is converted in joules by multiplying power with time. Total energy consumed by each node is calculated as sum of transmitted and received energy for all control packets.

4. RESULTS

We have made following evaluation with pause time 10s:

1. Energy consumption percentage due to packet type (routing/ MAC/ CBR or Expo) during transmission and reception with 10 nodes (Figure 1) and with 40 nodes (Figure 2).

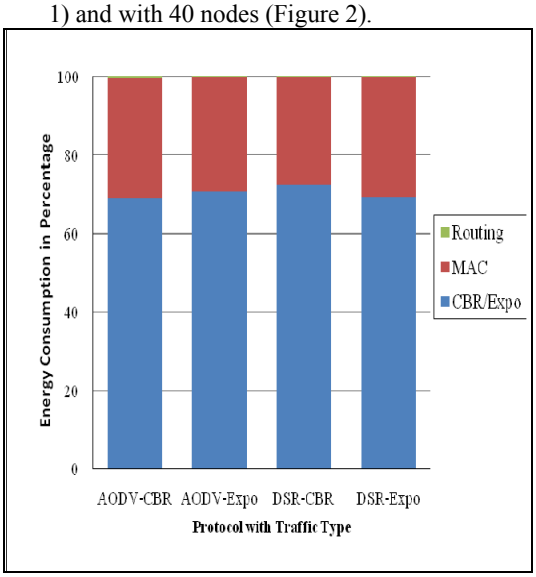

Figure 1: Energy consumption percentage due to packet type during transmission and reception with 10 nodes

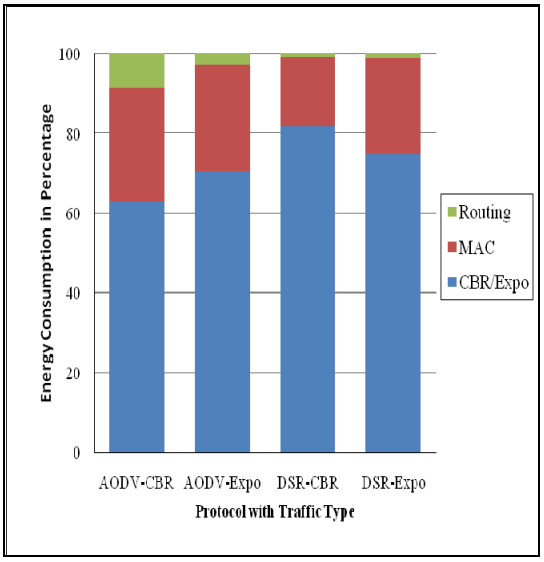

Figure 2: Energy consumption percentage due to packet type during transmission and reception with 40 nodes

Figure 1 and 2 shows the energy consumed due to traffic type CBR or Expo control packet significantly affects the total energy consumption for AODV and DSR protocols. The protocol type REQUEST, REPLY and ERROR packets are routing control packets. Request to Send (RTS), Clear to Send (CTS) and Acknowledgment (ACK) are the MAC control packets. Energy consumed by routing control packets is increased with increasing the number of nodes while energy consumed by MAC control packets is decreased with increasing the number of nodes.

2. Energy consumption percentage of Total transmission and receiving energy due to control packets with 10 nodes (Figure 3) and with 40 nodes (Figure 4).

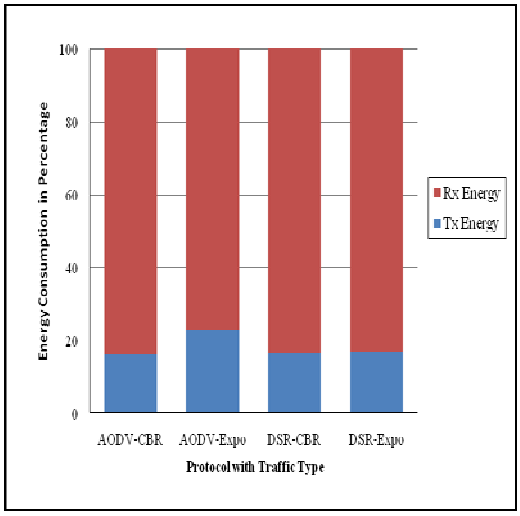

Figure 3: Energy consumption percentage of total transmission and receiving energy due to control packets with 10 nodes

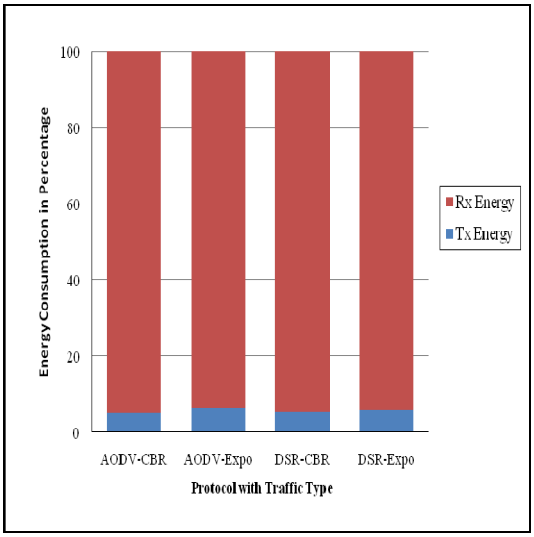

Figure 4: Energy consumption percentage of total transmission and receiving energy due to control packets with 40 nodes

Figure 3 and 4 shows the total transmission and receiving energy. The energy consumed mainly due to receiving process. When number of nodes is low, the transmitting energy is more with Expo traffic in comparison of CBR traffic for AODV and DSR. This is due to burst nature of Exponential traffic. When number of nodes is high, transmission energy in AODV and DSR with CBR Traffic type is less than Exponential Traffic type and when number of nodes is low, the receiving energy is more with CBR traffic in comparison of Expo traffic for both AODV and DSR Routing Potocol. When number of nodes is

high, recieving energy in AODV and DSR with CBR Traffic type is more than Exponential Traffic type.

4.1. Varying Selected Parameters

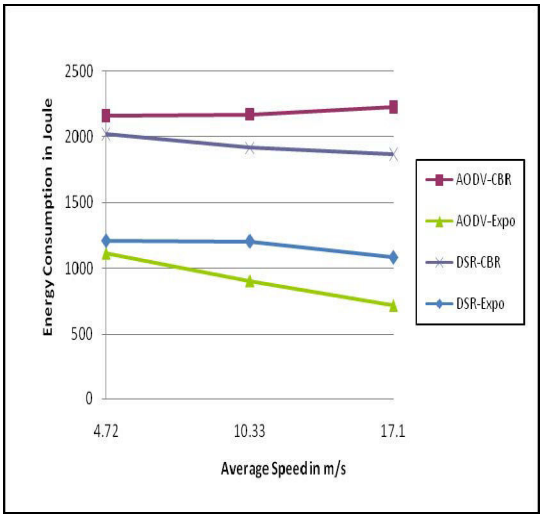

Figure 5: Energy consumption Versus Average Speed

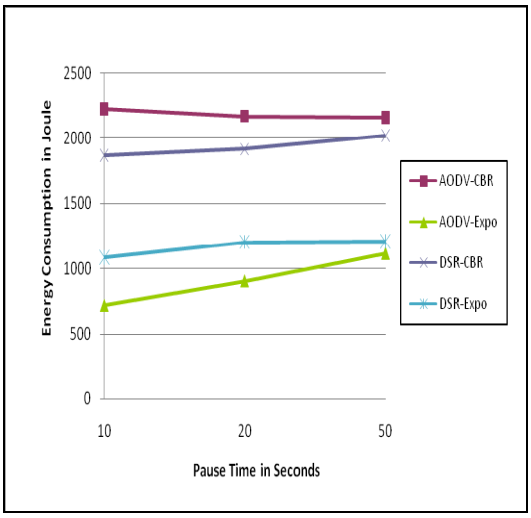

Figure 6: Energy consumption Versus Pause Time

Figure 5 shows total energy consumed in joule by all 40 nodes involved in transmitting and receiving the control packets with increasing average speed 4.72m/s, 10.33m/s and 17.10m/s. Energy consumption is more with CBR traffic than Exponential traffic. In CBR traffic AODV consumes more energy due to more route discovery process than DSR. In CBR traffic, AODV energy consumption is slighty increases, while in Exponential traffic energy consumption is decreases with increasing speed. In both CBR and Exponential traffic, energy consumed with DSR is decreased with increasing speed. Overall AODV with Exponential traffic consumes less energy than AODV with CBR traffic and DSR with both traffic.

Figure 6 shows total energy consumed in joule by all 40 nodes involved in transmitting and receiving the control packets with increasing pause time 10s, 20s and 50s. Energy consumption is more with CBR traffic and less with Exponential traffic. In CBR traffic with AODV energy consumption is slightly decreases, while in Exponential traffic energy consumption is increases with increasing pause time. In both CBR and Exponenttial traffic, energy consumed with DSR is increased with increasing pause time. Overall AODV with Exponential traffic consumes less Energy than AODV with CBR and DSR with both traffic.

The speed and pause time defines mobility of nodes, both are inversely proportional to each other. We obtain the results, which verify the same.

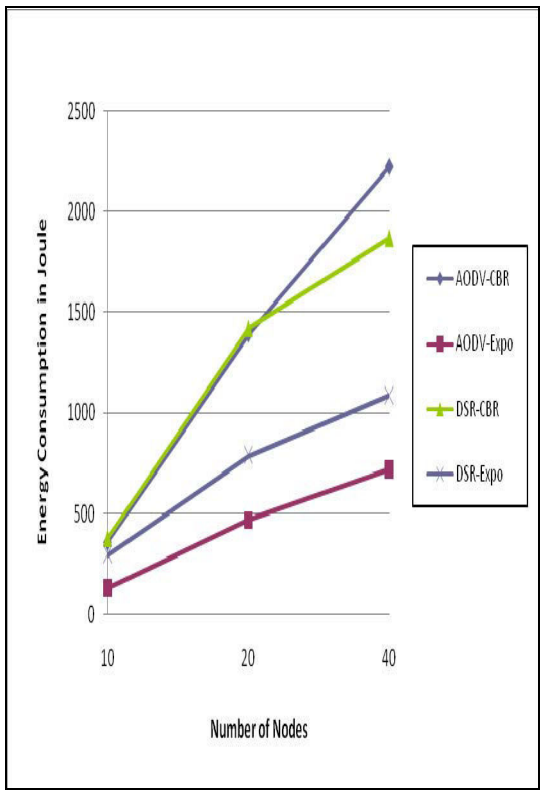

Figure 7: Energy consumption Versus Number of nodes

Figure 7 shows total energy consumed in joule involved in transmitting and receiving the control packets with increasing number of nodes 10, 20 and 40. All traffic models show the increment in energy consumption with increasing number of nodes due to the requirement of more maintenance process. At low number of node all consume nearly same amount of energy but AODV with Expo traffic consumes less energy than others. AODV consume less energy compare to DSR with Exponential traffic. And AODV consume more energy compare to DSR with

CBR traffic. The energy consumption in CBR traffic is more than the Exponential traffic with both the protocols. Energy consumption increases with increment the number of nodes.

5. CONCLUSION AND FUTURE SCOPE

From the above study and obtained simulation results, we observe that AODV consume less energy than DSR with increasing number of nodes, average speed and pause time with Exponential traffic, while AODV consume more energy than DSR with increasing number of nodes, average speed and pause time with CBR traffic.

We observed that increasing number of nodes also increases energy consumption due to routing control packets. We can reduce energy consumption by reducing the number of routing control packets to increase the lifetime of network. In future we will try to evaluate and measure performance of other routing protocols under these scenarios and develop an algorithm for reducing the number of routing packets.

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A SECURITY ARCHITECTURE FOR REAL- WORLD APPLICATIONS OF WIRELESS SENSOR NETWORK

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Abstract: With the recent capability of being applicable in enormous fields, the Wireless Sensor Networks (WSN) have drawn attention of researchers and industries in diverse areas. Being deployed in areas that are hostile, WSN pose lots of difficulties and challenges to the research fraternity.

In this paper, we discuss a generalized security framework for real world application of WSN. In particular we have considered the scenario of civil engineering field, a road tunnel. The proposed work mainly focus on security model for self adaptive lighting Model for road tunnel in WSN, and hence called Smart tunnel which provide the safety of the tunnels.

Keywords:

INTRODUCTION

Security is of a paramount importance for the deployment of WSN applications in a real environment. Due to the limited computation and communication capabilities offered by sensors, introducing security means to further reduce those resources for the application level. Therefore, the use of security primitives in WSNs requires to balance the needs for an adequate level of security while limiting the impact on resources. However, most of the security approaches for WSNs presented in literature are developed as stand-alone mechanisms that do not take into account the stringent requirements of realworld applications and deployments. For instance, TinySec [1] was one of the first work that addresses the security concern in WSNs. TinySec provides a fully implemented architecture for link-layer security in WSNs based on well-known cryptographic primitives. Another important aspect of TinySec is that its security properties exploit the limitations that are intrinsic of WSNs. For instance, WSNs have limited bandwidth. Therefore, it becomes possible to relax certain security properties and still guarantee adequate protection to specific attacks. Although TinySec provides a usable approach for WSN applications, pragmatic aspects that need to be addressed before a real deployment are left undefined. One of such aspects is key management. The authors state that several options are available but not a single one is integrated with their architecture. Basically, it is left to the application developers to implement which key distribution mechanism is the best match for the characteristics of their applications. We believe that key distribution is an important aspect of a security architecture that constrains the integration with the application level. Therefore, key management must be concretely addressed before a seamless integration can be achieved.

Considering one of the real world scenario, a road Tunnel, an underground passageway completely

enclosed except openings for ingress and egress. The operation of the tunnels is critical as it affects the safety of the drivers and also it involves the expenditure of energy for proper lighting. Studies have revealed some of the worst accidents that occurred in tunnels due to the lack of proper lighting and safety measures. Major accidents include especially from vehicle fires when combustion gases can asphyxiate users, as happened at the Gotthard Road Tunnel in Switzerland in 2001. One of the worst railway disasters ever, the Balvano train disaster, was caused by a train stalling in the Armi tunnel in Italy in 1944, killing 426 passengers.

Hence to avoid such accidents a self-adaptive lighting model inside the tunnel is required, which should be secure from attacks that are both physical and logical.

In section 1, we discuss with the deployment of the sensor nodes in the real world application, a road tunnel. Section 2, describes the security threats and the security requirements with respect to the tunnel application. The proposed generic Security architecture for a real world application using Self Adaptive Lighting Model to overcome these threats to provide security is discussed in section 3. Summary and conclusions are briefed in section 4.

1. Deployment of Sensor in Real world Application Scenario: Smart Tunnel

WSN is a collection of nodes with sensing capabilities and they have the ability to self organize. The deployment of the sensor nodes can be manual so that can get precise location information also is flexible and convenient. In this work we have considered a real world scenario a road tunnel as shown in figure 1, manual deployment of the sensor

nodes is best suited, as the sensor nodes are to be placed along the sides of the inner tunnel.

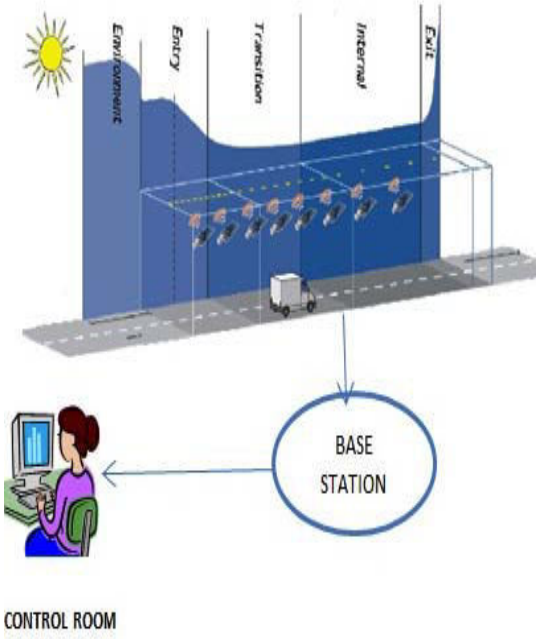

Figure 1: Smart Tunnel Scenario

In fact, each application based on WSN sensing technology has its own specific requirements which are derived from both the WSN setting specific to the application itself (nodes hardware, placement, access, just to mention a few) as well
as from the overall requirements of the application where the information gathered through the nodes are collected. In this tunnel scenario the deployed sensors senses the light in the tunnel and gather the sensed information from all the nodes and forward it to the Base station, based on the light inside the tunnel the Base Station tunes the lighting system through the control room to reduce the energy consumption hence called as SELF-ADAPTIVE or SMART TUNNEL.

2. Security Threats And Security Requirements

By envisaging the tunnel scenario threats/attacks are possible, hence protecting the system from such threats is very important. The threats could be passive or active. Passive threats include listening to the communication and traffic analysis whereas, Active threats include reply attack and node compromise. To overcome these threats/attacks data integrity, confidentiality and authentication is required and to cater to these requirements a key management.

3. Proposed Generic Security Architecture for a Real World Application using Self Adaptive Lighting Model

The generic system Architecture for real world applications in WSN for providing security to road tunnels is as shown in as shown in the figure 2.

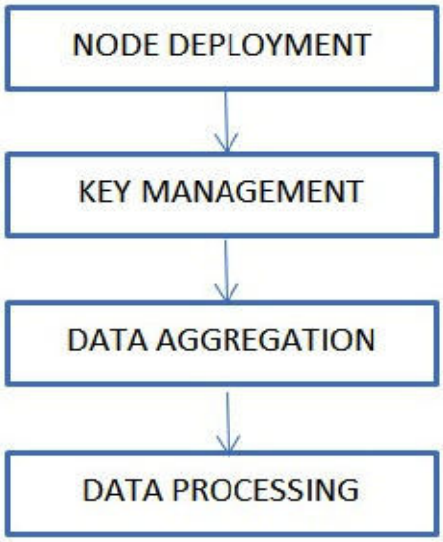

Figure 2. Proposed Security Architecture, Self Adaptive Lighting for Smart Tunnel

The different modules of the self-adaptive model are i: Node Deployment ii: Key Management iii: Data Aggregation iv: Data Processing. The function of the Node Deployment module is to manually deploy the sensor nodes along the inner perimeter of the tunnel. The second module is the key management module, the function is to generate and exchange the keys among the nodes so that the system could be secured which is discussed in detail in the next section. The third module of the system design is Data Aggregation Module which is responsible for the exchange of the sensed data between the nodes and the base station. The last module is the data processing that is received at the Base station and forwarded to the control room.

3.1 Key Management for Smart Tunnels

For existing attacks, many wireless sensor network key management scheme and authentication methods have been proposed. Schnauzer L. et al[2] proposed random key pre- distribution management scheme, and many scholars put forward a number of programs and protocols on this basis, such as the q-Composite Random Key Pre-distribution scheme and symmetric polynomial random key pre-distribution management scheme. For cluster-type network, some scholars have proposed a low-power key management scheme [5], lightweight key management scheme, key pre-distribution scheme based on cluster and key pre-distribution scheme based on ECC. Aiming at the limitations of existing scheme, the paper provides a key management scheme based on one-way Hash function and the symmetric key scheme. The analysis show that the proposed scheme can effectively weaken the threat of node capture, be resilience against node replication or node forgery. Besides of good security properties, the

scheme promises good node addition or network extension ability.

Security in WSN can be achieved by proper Key management techniques. In general Key management has various phases such as i: key generation ii: pre-deployment iii: registration iv: post –deployment as discussed below.

3.2 Key Generation Phase: In this phase the different keys require are identified, the nodes use symmetric keys to communicate with the base station. Base station has pair of keys (public key and the private key)

At first keys are generated using one-way hash functions. One-way hash function takes a binary string of arbitrary length as input, and outputs a binary string of fixed length. It is considered to have the following prerequisite properties: (1)Pre-image resistant: Given the output y, it should be hard to find any x, such that y=Hash(x). (2)Collision resistant: It should be hard to find any x1 and x2, such that Hash(x1)=Hash(x2). The base station selects a random seed value say Xo, the key for can be obtained by hashing this seed value as Hash(Xo)-> X1 key. Then using this X1 as the nest seed we get the second key as Hash(X1)-> X2 and so on for N keys where N is the number of Sensor nodes in the network. The keys generated by the station are stored in a key table, each of the key generated is unique and each node will be assigned a key from this table.

Pre-Deployment Phase:

In this phase the node placed with a secret key and the public key of the base station is deployed manually around the inner perimeter of the tunnel.

Registration Phase:

Each of the nodes deployed , will register themselves with the base station by sending an message which consists of NodeID,SecretKey encrypted using the Base Station Public key Message1=EpubBS(NodeID,SecretKey) , the base station receives this message and decrypts it with its public key to obtain the identity of the node registering to the network. The base station forms a table that contains the nodeID and the Secretkey which will be used for further communication. All the nodes deployed register in the same manner with the base station.

POST-DEPLOYMENT PHASE:

Once the keys are deployed and the nodes registered the data sensing exchange begins.

3.3. Data Aggregation Phase:

The third module of the system design is Data Aggregation Module which is responsible for the exchange of the sensed data between the nodes and the base station. The exchange takes place as follows,

1: Data is sensed by the sensor(ie the intensity of the light in the tunnel)

2: The data then encrypted with the secret key possessed by the node
Message2=EsecretKey(data)
Message3= EpubBS(Message2, NodeID)

3: The message3 is then sent to the Base station
4: Base Station on receiving this Message will perform the decryption to obtain the message2 and the NodeID

5: The base station then uses the NodeID and checks the table to obtain the key corresponding to the node and decrypts to obtain the data . In this way data is received from the sensors and the value of the data is aggregated based on the number of messages received

3.4. Data Processing Phase:

In this module the data obtained by the base station is given to the control room, where the data is inferred and based on the inference the lighting of the tunnel is controlled.

4. RESULTS AND CONCLUSIONS

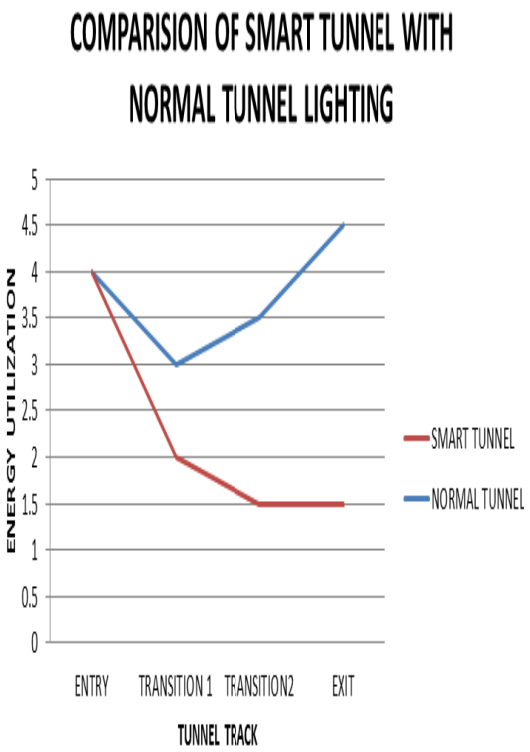

Figure 3: Comparisons of Smart Tunnel with Normal Tunnel

The key management scheme discussed provides security among the nodes and also between the nodes and base station. All nodes authenticate by registration process with the base station. By using encryption we provide confidentiality .

The above graph shows that the smart tunnel is energy efficient and also secure.

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THE HUMAN ACTIVITY DETECTION FROM VIDEO SURVEILLANCE BASED ON HMM FOR FUTURE DEVELOPMENT IN COMPUTER ENVIRONMENT

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Abstract: Visual investigation of human activities related to the detection, tracking and recognition of people, and, more generally, the perceptive of human activities, from image sequences. Recognizing human activities from image sequences is an active area of research in computer vision. Human activity recognition (HAR) research has been on the rise because of the rapid technological development of the image-capturing software and hardware. In this paper, we propose a new approach for human action recognition from video. Here we use the HMM algorithm for recognition of activity from video. The result of this method is good as compare to other method. It consume less time as compare with other method. This result can be useful in future development as an automatic human machine interaction.

Keywords*: Human activity recognition; HMM thresholding,; Gaussian filtering; Content Based Video Analysis ; Interactive Applications and Environments*

SECTION1
INTRODUCTION

As an active research topic in computer visions are the dynamic scenes detection, classifying object, tracking and recognizing activity and description of behavior. Visual surveillance strategies have long been in use together information and to monitor people, events and activities. Video surveillance works as to detect moving object [1], [2], [3], [4], classify [5], [6] the detected object track [7], them through the sequence of images and analysis the behaviors. Visual surveillance technologies [8], CCD cameras, thermal cameras and night vision device are the three most widely used devices in the visual surveillance market. The main goal of visual surveillance is not only to monitor, but also to automate the entire surveillance task. The goal of visual surveillance is to develop intelligent visual surveillance to replace the traditional passive video surveillance that is proving in effective as the numbers of cameras exceed the capability of human operators to monitor them. The automated surveillance systems can be implemented for both offline like storing the video sequence and to analyses the information in that sequence. But now days online surveillance system is very much needful in all public and private sectors due to predict and avoid unwanted movements, terrorist activities in those areas. It is helpful for traffic monitoring, transport networks, traffic flow analysis, understanding of human activity [11], [10], [9], home nursing, monitoring of endangered species, and observation of people and vehicles within a busy environment along many others to prevent theft and robbery. Some of the areas where video surveillance system place a major role in many application are 1) for military security 2)patrolling of country borders 3)extracting statistics for sport activities 4)surveillance of forests for fire detection 5) patrolling of highways and railway for accident detection.

The Proposed system gives human activity detection from online video surveillance and detects single human activity from video sequence. It is useful in many other applications. The paper is arranged as section1 is including introduction. The review of methods are include in section 2.The proposed system is describe in section 3. Advantages of proposed system are in section 4. The conclusion in section 5 and references are in section 6.

SECTION 2
REVIEW OF METHODOLOGIES FOR IMAGE SEGMENTATION

Surrounding modeling is also known as Background modeling. It is currently used to

detect moving objects in video acquired from static cameras. Numerous statistical methods have been developed over the recent years. The aim of this paper is to provide an extended and updated survey of the recent [12], [13], [14] researches which concern statistical background modeling. Murshed, M was proposed an edge segment based statistical background modeling [1] algorithm and a moving edge detection framework for the detection of moving objects. This paper actually focused about various methods of background modeling like traditional pixel based, edge pixel based and edge segment based approaches. He proposed this background modeling for natural image sequence with presence of illumination variation and noise. Yun Chu Zhang was analyses the background mechanism using GMM [3] model. Here this model updates new strategy which weighs the model adaptability and motion segmentation accuracy. But these works not focus dynamic moves in frame sequence. Wei Zhou [5] was proposed the dynamic background subtraction using spatial colour binary patterns. In addition to a refined model is designed to refine contour of moving objects. This method improves the accuracy of subtracting and detecting moving objects in dynamic scenes with presence of data driven model. Richard J.Radke [14] has written survey about image change detection algorithm with several challenge issues with solved by Stauffer and Grimson's background modeling with real times image. ViBe: A Universal Background Subtraction Algorithm [6] for Video Sequences paper presence a technique for motion detection which stores a set of value taken in the past in the same location or in the neighborhood. It then compares this set to current pixel value in order to determine whether the pixel belongs to the background and to adopt the model which substitutes from the background model.

SECTION 3
HUMAN ACTIVITY RECOGNITION FROM VIDEO

In the proposed system live video is taking as input and then image segmentation is done by using Gaussian mixture model. The Gaussian mixture model has different methods for subtraction of background from image frame. Here we used the frame differencing method for selection of foreground image from sequences of frames. Further we used the Noise and shadow immune features of Gaussian mixture model. As shown in block diagram of proposed system as follows

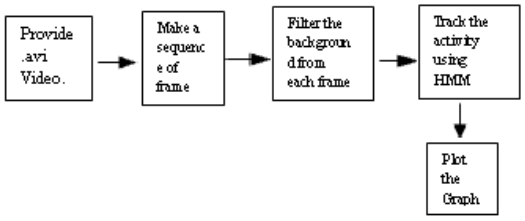

Figure 1. Shows the block diagram for human activity recognition.

This technique reduces the number of iteration for selecting human features from Sequences of frames. It means that we start by extracting the area that contains the person performing the activity, i.e., region of interest (ROI). Figure 2 shows an example result of background subtraction. A rectangular ROI is obtained from the result of background subtraction after noise and shadow removal as shown in Figure 2.b.

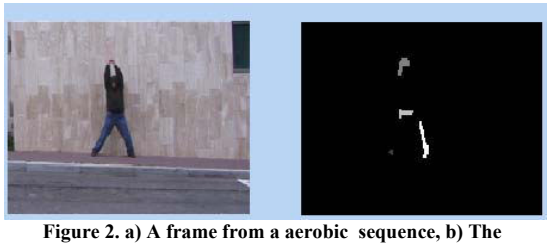

Figure 2. a) A frame from a aerobic sequence, b) The ROI obtained after background subtraction.

The background subtraction equation becomes

$$B(x; y; t) = I(x; y; t - 1)$$
$$|I(x; y; t) - (x; y; t - 1)| > Th \qquad (1)$$

$$K = argmin\{-\sum_{i=0}^{n} \ln f\left(xi\middle|\theta(K)\right) + \frac{K-1}{2}\ln(n) + \frac{d^2+3d}{4} K \ln(n)\} \qquad (2)$$

After we get the estimated model order, we can model each type of activity by Gaussian Mixture in the feature space. Then, the ROI is partitioned into 64 blocks, B(k) , with equal sizes, where k = 1, …, 64. The average optical flow vector for every block is then computed by:

$$\overline{O}_k = \begin{bmatrix} \overline{O}_{kx} \\ \overline{O}_{ky} \end{bmatrix} = \frac{1}{n} \sum_{i,j \in B(k)} \begin{bmatrix} \overline{o}_x(i,j) \\ \overline{o}_y(i,j) \end{bmatrix} \qquad (3)$$

where n is the number of pixels in a single block. Then, we compose the vector $O = [\overline{O}_1, \overline{O}_2, \ldots, \overline{O}_{64}]^T$

every frame to represent its motion feature vector, where each element contains two components for the x and the y directions.

As we get the foreground image now the selection of features like position and speed of object. The selection of position object is done by using the simple Average Theorem and combining velocity estimate over different time interval algorithm is used for selecting the speed of object.

Once the ROI (Region of Interest) is get then human activity is tracking from video using HMM thresholding algorithm. In this algorithm the maximum value of distance between frame sequences is considered as motion of object. We used both X and Y to denote video clips, and in the conditional probability expressions they represent the corresponding feature vector sequences. Based on this idea, the recognition result can be obtained as follows:

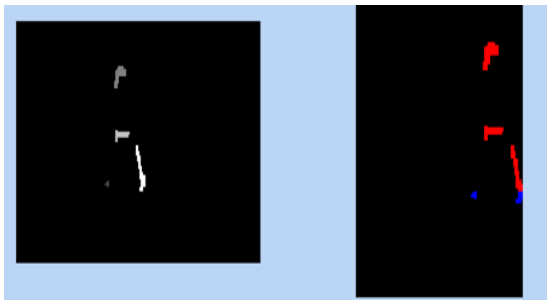

Figure 3.Tracking of activity from Region of Interest.

For recognition of activity we calculate the deviation. It is calculated for each matrix. In mat lab code The deviation is calculated as:

Deviation = sum (hsvCompare (pixels (:,:,:,f),motionMean,shadowLevel)./motionDeviation,3);

It considers the maximum distance between two frames as HSVCompare. Using the deviation the Sigma values is calculated in matlab as

sigma(:,:,1) = sigma(:,:,1)/(2*pi);

It is unique value for each activity the sigma value is calculated for each group of matrix and calculated sigma is get compare with the trained HMM for activity detection. The recognized activity is plot using graph by change of position of with different speed of human as

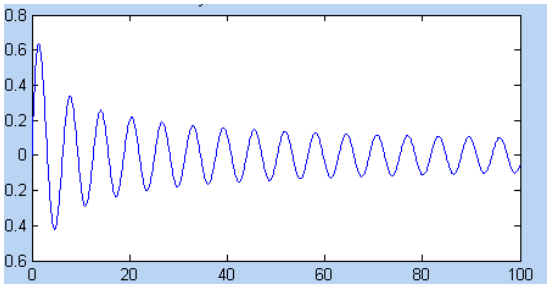

Figure 4. Graph of recognized activity position by speed of human activity.

SECTION 4
APPLICATION OF HAR

In this section, we are focusing on a few application areas that will highly the potential impact of vision-based activity recognition systems.

1) Behavioral Biometrics: It is based on physical or behavioral cues of Human. The conventional approaches are based on fingerprint, face or iris. In recent times, 'Behavioral Biometrics' have been raises fast popularity, The advantage of this approach is that subject assistance is not necessary and it can carry on without interrupting or interfering with the subject's activity. Since observing performance implies longer term observation of the subject, approaches for action-recognition extend naturally to this task. Currently, the recent example of behavioral biometric is human gait [15].

2) Content Based Video Analysis: Now a day's video has become a part of our everyday life. With video sharing websites experiencing persistent growth, it has become necessary to develop professional indexing and storage schemes to develop user experience. This requires knowledge of patterns from raw video and summarizing a video based on its content. Content-based video summarization has been getting improved interest with corresponding advances in content-based image retrieval (CBIR) [16]. Summarization and retrieval of consumer content such as sports videos is one of the most commercially workable applications of this technology [17].

3) Security and Surveillance: Security and surveillance systems have usually depend on a network of video cameras monitored by a human operator who needs to be conscious of the activity in the camera's field of view. As recent growth in the number of cameras and deployments, the effectiveness and correctness

of human operators has been increase. Hence, more security agencies are looking for vision-based solutions for security tasks which can replace by human worker. Automatic detection of anomalies in a camera's field of view is one such problem that has attracted attention from vision researchers [18]. Such more application involves searching for an activity of interest in a huge database by learning patterns of activity from long videos [19], [20].

4) Interactive Applications and Environments: To know the interface between a computer and a human remains one of the continuing challenges in designing human computer interfaces. Visual cues are the most key mode of nonverbal contact. Effective utilization of this mode such as gestures and activity holds the assure of helping in creating computers that can better interact with humans. Similarly, interactive environments such as smart rooms [21] that can react to a user's gestures can benefit from vision based methods.

5) Animation and Synthesis: The entertainment, gaming and animation industry depend on synthesizing sensible humans and human motion. The glamorous industry on the other hand has conventionally dependent more on human animators to provide best quality animation. However, this trend is rapid altering [22]. The new development in algorithms and hardware, much more realistic motion synthesis is now possible. A associated application is learning in replicated environments. Examples of such applications are training of military soldiers, fire-fighters and other rescue personnel in hazardous situations with simulated subjects.

SECTION 5
CONCLUSION AND ANALYSIS OF RESULT

In this paper we use Gaussian mixture model for subtracting background from image frame sequence to get the area where the motion of human is present. This is the selection of foreground image from frame. The feature selection of image is done by simple Average Theorem, combining velocity estimate over different time interval algorithm. Then using HMM we track and recognizes the motion of human from image sequence frame.

The proposed method gives best result because; it uses the special feature of Gaussian mixture model to immune the noise and shadow from the image frame. It minimizes the no of iteration for selecting the foreground image and most promising features of object. The trained HMM track and recognized the activity of human. The proposed method uses the frames of video as shown in following figure

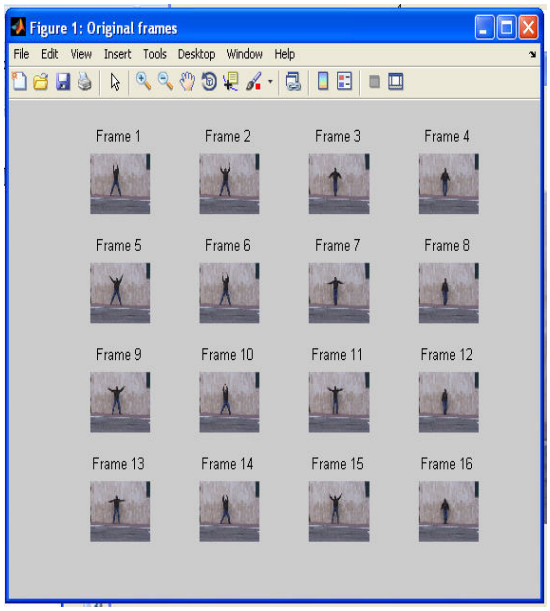

Figure 5. Shows the frames of video.

The confusion matrix of this method is as follows:

Actions	Walking	Running	Gymnasium work	Standing
walking	98	1	-	1
Running	1	98	-	1
Gymnasium Work	1	1	97	1
Standing	1	1	-	98

Table1. Confusion matrix for activity recognition in(%)

The recognition rate of this method is good as compare with the other methods. This method require the less time for the recognition of activity of human. The error rate is reduces to 1.2%. The recognition rate of activity is increases and within less time. But this method is useful for the system which requires only the signals of recognized activity like instruction for robots. The comparison is shows as in Table 2.

Sr.no	Method	Recognition Rate	Features considered
01	Human Activity Recognition Based on Spatial Transform in Video Surveillance	Walking- 88% Kick- 94% Sit down- 98%	Area, angle, centroid
02	HMM-based Human Action Recognition Using Multi view Image	Accuracy rate is 87%	silhouette, optical flow, and combined features
03	A Comparison of HMMs and Dynamic Bayesian Networks for Recognizing Office Activities	Using DBN 96.7% and using hmm 94.2%	Audio, Video, Keyboard and Mouse
04	Recognition of human activities using layered hidden markov models	Recognition rate 80%	Left and right hand movement
05	Proposed System	Walking 98% Running 98% Gymnasium work out 97% Standing 98% Over all recognition rate 98%	Position and Speed of object

Table 2. Comparison between proposed method with other methods.

The problem faced by the proposed system is the angel of view. It get trouble to detection of activity from video which having front view.

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PROPER NOUN CLASSIFICATION IN INDIAN LANGUAGES

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Abstract— Named-entity recognition (NER) is the task to identify the proper nouns in a given document and then to allot these proper nouns some Named Entity (NE) tags such as name of person, organization, location, quantities etc. There has already been huge work done in NER in English. But, not much work has yet been accomplished in NER in different Indian languages. In this paper we have given a brief overview of NER and the various issues in NER in the Indian languages. We have explained different approaches of NER. We have also drawn contrast among these different approaches according to their accuracies achieved for different Indian languages. HMM (Hidden Markov Model) is the simplest approach in NER. So, in the following paper we have also given the work done in NER in Indian languages using HMM. Lastly we have also presented the Performance Measure that is conducive to distinguish between various NER based systems.

Keywords- *NER, Performance Metrics, Accuracy, Precision, HMM*

I. INTRODUCTION

NER is one of the key tasks in NLP that involves recognizing and classifying named entities in a given document. NER is considered to be a significant task in the following fields of NLP: Question Answering, Information Retrieval, Information Extraction, Automatic Summarization, Machine Translation etc.[11][8] India is known to be a multilingual country and it has 22 official languages (8^{th} schedule).NER in Indian languages is a current topic of research and it is considered to be a very difficult task.

Example of NER in Hindi is given as follows:

"Ashok/PER Ne/O Baag/O Mein/O Ashok/PLANT Lagaya/O |/O"

In this sentence, we identify the proper nouns and then classify them into different classes of named entities. Here, first Ashok is the name of person, so it is given a 'PER' tag and the second Ashok is the name of plant, so it is given a 'PLANT' tag. Here 'O' means not a Named Entity tag. Selection of various Named Entity tags for a given document is an individual choice and is very crucial task as this selection of named entity tags affects the performance of a Named Entity Recognition System. TABLE I lists some of the Named Entity Tags.

TABLE I
Various Named Entity Tags. NE Tags: Named Entity Tags PER: Name of Person, LOC-Name of location, ORG-Name of Organization.

NE TAG	EXAMPLE
PER	Sheetal, Geeta, Ashok
LOC	Jaipur, Pune, MI Road
ORG	HCL, Infosys, IBM
RIVER	Yamuna, Ganga
DATE	31-01-1989,03/09/2012
TIME	15:23
PERCENT	99.9%

II. PROBLEMS FACED IN NER IN INDIAN LANGUAGES

In Indian languages, Named Entity Recognition is still a great topic of research. Not much work is done in NER in the Indian Languages. This is because of the lack of lexical resources and annotated corpora which came in to existence very recently. There are many other issues pertaining to Named Entity Recognition in the Indian languages .Some of them are listed below: [20][6]

1. In English and in various European languages, the word beginning with a capital alphabet is a proper noun. But, the concept of capitalization is not found in the Indian languages. So, NER based system already build for English and European languages cannot be used directly for the purpose of NER in Indian languages .This calls for a need to develop a more efficient NER based system for the Indian languages.[15]

2. Indian languages are inflectional, free word order and morphologically rich.

3. Indian languages mainly lack in resources .This is because of the fact that web mostly contains collection of list of Named Entities in English but are not in the Indian languages.[17].

4. In Indian languages, there are lots of proper nouns especially the name of persons which exist in the dictionary as common nouns. E.g. Name of persons like Aakash, Suraj, Chanda, Tara etc are common

nouns as well. So, resolving ambiguities and identifying and classifying Proper Nouns is the most challenging task in the Indian Languages.

III. APPROACHES FOR NER

Two methodologies are mainly used in Named Entity Recognition. [5] [1] [18] They include: Rule Based Approach and Statistics based Approach (Machine Learning Technique) [11][6][16].Machine Learning Techniques are more frequently used as compared to the Rule based Approaches.

A . The Rule based / Handcrafted Approach

1). List Lookup Approach:
In List Lookup Approach, we use collection of lists of different Named Entity classes. In this approach, the words occurring in a document are searched in the collection of lists of Named Entities. If a word is found in a particular list, then it is a Named Entity and an appropriate Named Entity Tag is assigned to it, corresponding to the list in which it is found.
This approach is easy and fast .But the disadvantage of this approach is that it is unable to overcome ambiguities.
e.g In a sentence :-
""Ashok/PER Ne/O Baag/O Mein/O Ashok/PLANT Lagaya/O |/O""
Ashok is a Named Entity .It can be a name of person or name of a plant .To classify Ashok into a particular class i.e. Name of a person or Name of a plant at a given instance cannot be resolved by this approach.

2). Linguistic Approach:
In this approach, a linguist, who has an in-depth knowledge about the grammar of a particular language frames certain set of rules, in order to identify Named Entities in a document and assign them proper Named Entity Tags. e.g. Name of Location in Hindi can be identified by the occurrence of certain suffixes in location name such as nagar, pur, vihar etc.[3][20][19]
The drawback of this approach is that it is highly language dependent. So, a NER based system developed using this approach for a particular language cannot be used to identify Named Entities in some other language. [11]

B. Machine Learning Based Approach /Automated Approach

1). Hidden Markov Models (HMMs):
Hmm is a machine learning based approach that consists of hidden states and the output which depends on the state is visible .It makes use of Markov Chain Property i.e. the probability of occurrence of next state depends only on the previous state. This model can be implemented very easily. The drawback of this approach is that it requires very large amount of training in order to obtain better results and it cannot be used to represent large dependencies.[12]

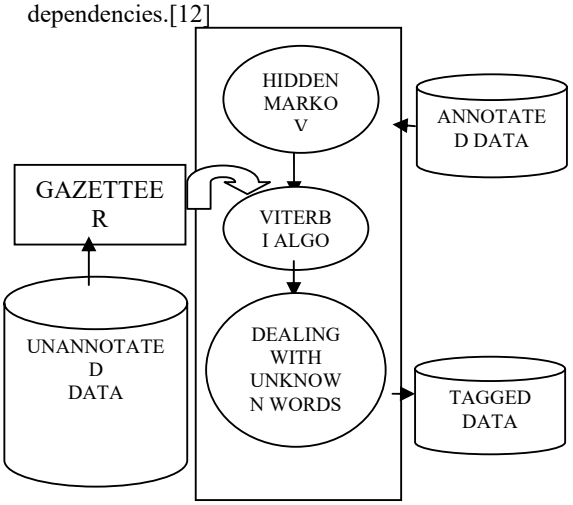

Fig. 1: Architecture of HMM used for NER

2) Maximum Entropy Markov Models:
This model makes use of maximum entropy concept, according to which the entropy is maximized by the least biased model that makes use of all the available facts.
It overcomes the large dependency problem of HMM .It has higher precision and recall as compared to HMM. This model suffers with the label bias problem. The sum of probabilities of transition from a given state must be one. So, MEMM is biased for those states through which lesser number of transitions takes place. To deal with this problem, we can alter the state transitions.[16][19]

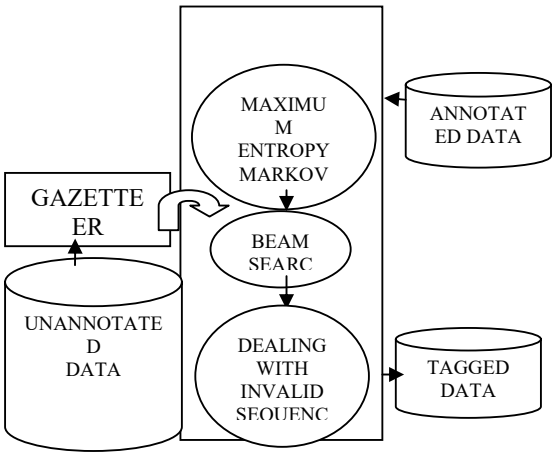

Fig. 2: Architecture of MEMM used for NER

3). Conditional Random Field (CRF)
It is graphical model which is undirected in nature. It is also referred to as Random field that allows

computing the conditional probability on the next node given the current node values.
This approach has same advantages as MEMM. & it overcomes the label bias problem of MEMM.[3]

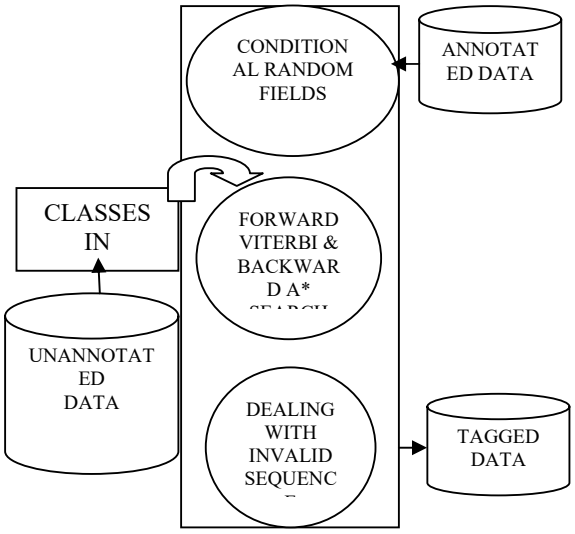

Fig. 3: Architecture of CRF used for NER

4) Support Vector Machine (SVM):
This approach was given by Vapnik and is one of the latest approaches. SVM is a supervised machine learning approach that is used to detect whether a given vector belongs to a given target class or not. [2]The training and testing data in SVM are

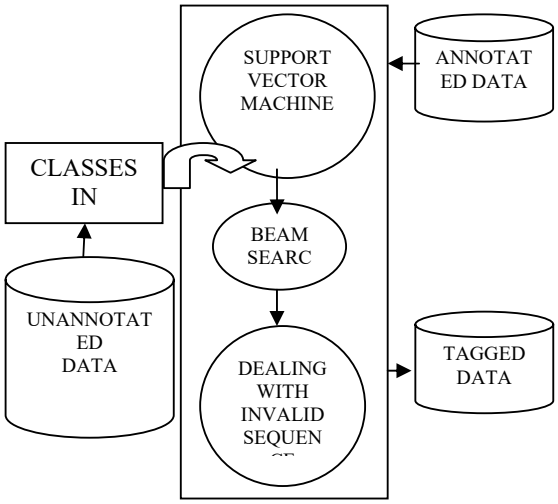

Fig. 4: Architecture of SVM used for NER

in a single dimension vector space. While performing training in SVM, we create a hyper plane to classify the members into positive class and negative class that lie on opposite sides of a hyperplane.SVM also generates distance of each vector from the hyper plane which is known as margin. SVM provides high accuracy for text categorization problem. [10][4]

5). Decision Tree (DT):
It is one of the famous approach that helps to predict and classify Named Entities in a given document .In Decision Tree approach, we apply certain recognition rules to the unannotated training document and Named Entities are obtained. We then compare these Named Entities with the actual answers of a given training set and Named Entities are classified into positive and negative examples for a given recognition rule. [7]Then, a decision tree is constructed that is used to classify the Named Entities in the testing document.[9] The resultant value of test can be shown by the leaf node of decision tree.[13]

IV. WORK IN NER IN INDIAN LANGUAGES

NER in Indian languages is still a topic of great research. But, some of the work has been done in NER in Indian languages like Telugu, Tamil, Hindi, Bengali, Punjabi, Oriya etc.
Fig 5.[13] depicts that we have achieved 70-90% accuracy in NER in Indian languages. This table helps us to compare different approaches of NER on the basis of the accuracy obtained by them for different Indian languages.

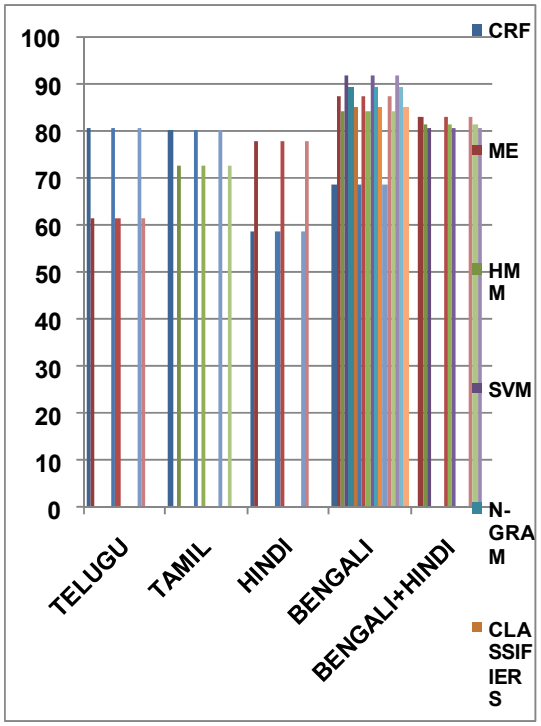

Fig5: Comparison of Different Approaches According to Their Accuracies.

HMM is simplest of all the approaches .It is extremely easy to implement it for NER in Indian languages. [2][15]

The Fig 6 shows the work done in NER using HMM. [13] in BENGALI, HINDI, ORIYA, TELUGU and URDU. Fig 6 depicts that we have achieved Precision and Recall of more than 75% in NER in Bengali and Hindi using HMM.[2][14]

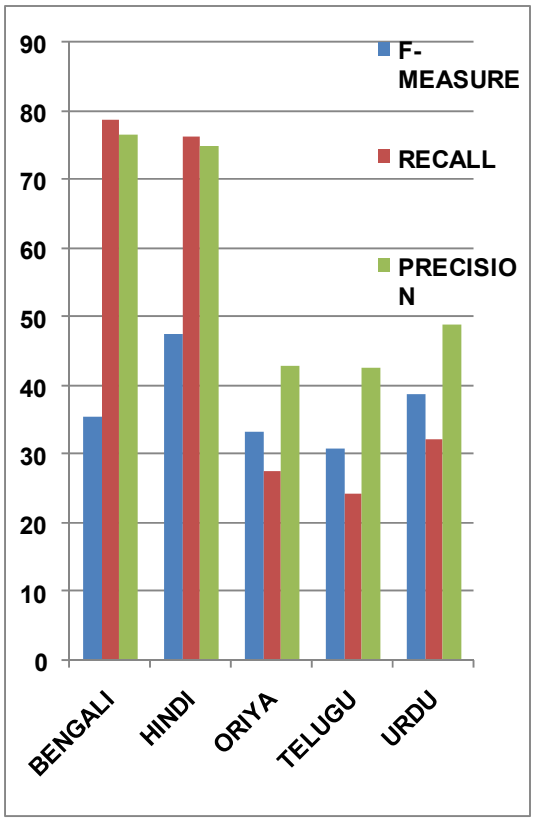

Fig 6 NER in different Indian Languages Using HMM.

V. PERFORMANCE METRICS

Performance Metrics is conducive to know about the performance of a NER system. The outcome of a NER tagger may be defined as "response" and interpretation of human beings as "answer key". So, we provide the following definitions:

1. Correct-If response is exactly same as answer key.
2. Incorrect-If response is not same as answer key.
3. Missing-If answer key is found tagged but response is not tagged.
4. Spurious-If response is found tagged but answer key is not tagged.

Performance of a NER based system can be judged by using the following parameters:[16][6]

Precision (P): It is defined as follows:
P=Correct/ (Correct+Incorrect+Missing)

Recall (R): It is defined as follows:
R=Correct/ (Correct+Incorrect+Spurious)

F-Measure: It is defined as follows: [5][8]
F-Measure = (2*P*R)/(P+R)

VI. CONCLUSION

India has 22 official languages (8th schedule).In our survfdey, we have seen that NER is not yet accomplished in all the Indian languages. Thus, there is a scope to develop NER based system in the rest of Indian languages.

A language independent approach based system can be used to identify and classify Named Entities for different Indian languages on a single NER system. But, not much satisfactory work has been done to develop a language independent approach based system for all the Indian languages.

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AUTOMATIC EYE TEMPLATE GENERATION AND TRACKING

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Abstract- Eye blinking is a physiological necessity for humans. This method automatically locates the user's eye by detecting eye blinks. A system is the improvement of driver carefulness and accident reduction. The driver's face is tracked while he is driving and he is warned if there seems to be an alerting fact that can result in an accident such as sleepy eyes, or looking out of the road. Furthermore, with a facial feature tracker, it becomes possible to play a synthesized avatar so that it imitates the expressions of the performer. For a user who is incapable of using her hands, a facial expression controller may be a solution to send limited commands to a computer. Eye blinking is one of the prominent areas to solve many real world problems. The process of blink detection consists of two phases. These are eye tracking followed by detection of blink. The work that has been carried out for eye tracking only is not suitable for eye blink detection. Therefore some approaches had been proposed for eye tracking along with eyes blink detection. In this thesis, real time implementation is done to count number of eye blinks in an image sequence. At last after analyzing all these approaches some of the parameters we obtained on which better performance of eye blink detection algorithm depend. This project focuses on automatic eye blink detection in real time. The aim of this thesis is to count the number of eye blinks in a video. This project will be performed on a video database of the facial expressions.

Keywords-*Eye Tracking; Blink Detection; Eye template.*

I. INTRODUCTION

There has been a growing interest in the field of facial expression recognition especially in the last two decades. The primary contribution of this research is automatically initializing the eye blink tracking and detection in an image sequence for real time eye blinking and tracking applications. Tracking and blinking the eye parameters and detecting eye states is more difficult than just tracking and blinking the eye locations because the eyes occupy a small region of the face. Most eye trackers work well for open eyes. However, blinking is a physiological necessity for humans. Moreover, for applications such as facial expression analysis and driver awareness systems, we need to do more than tracking the locations of the person's eyes but obtain their detailed description. We need to recover the state of the eyes (whether they are open or closed), and the parameters of an eye model (e.g. the location and radius of the iris, and the corners and height of the eye opening. we develop a model based system of tracking eye features that uses convergent tracking techniques and show how it can be used detect whether the eyes are open or closed, and to recover the parameters of the eye model. Eye tracking has received a great deal of attention. As blinking is a physiological necessity for humans. An example of such a system is the improvement of driver carefulness and accident reduction. The driver's face is tracked while he is driving and he is warned if there seems to be an alerting fact that can result in an accident such as sleepy eyes, or looking out of the road. Furthermore, with a facial feature tracker, it becomes possible to play a synthesized avatar so that it imitates the expressions of the performer. Human-Computer Interaction (HCI) systems may also be enriched by a facial feature tracker. For a user who is incapable of using her/his hands, a facial expression controller may be a solution to send limited commands to a computer. For many people with physical disabilities, computers form an essential tool for communication, environmental control, Security, education and entertainment. However access to the computer may be made more difficult by a person's disability. A number of users employ head-operated mice or joysticks in order to interact with a computer and to type with the aid of an on-screen keyboard. Head-operated mice can be expensive. The implementation of a system such as the proposed one presents several areas of difficulty:

1. Automatic Frame generation in video image sequence
2. Identifying and tracking the location of the eyes.
3. Eye Template generation in image sequence.
4. Being able to process the information in real- time using a moderately priced processor that will be running other applications in the foreground (e.g., Microsoft Word).

II. LITERATURE REVIEW

Much of the eye-detection literature is associated with face detection and face recognition. Direct eye-detection methods Search for eyes without prior information about face location, and can further be classified into passive and active methods.

Most eye trackers require manual initialization of the eye location before they can accurately track eye-features for real-time applications. A method for locating the eyes in static images was developed by Kanade in 1973 and has been improved by other people over the years. Most of these researchers have based their methods on Yuille's deformable templates to locate and track eye-features .This method looks for the valleys and peaks in the image intensity to

search for the eyes. Once the location of the eyes is determined, its position information is used as a priori knowledge to track the eyes in succeeding frames. But it requires the eye template to be initialized manually at or below the eye otherwise it detects the eyebrow instead of the eye. Hallinan has tried to build an automated model for deformable templates the best candidates for the eye pair, but in order to make his method invariant to scaling, the template is initialized at different sizes at various places and the best candidates for the eyes are selected. Chow et al. make use of the Hough transform in combination with the deformable templates to extract eye-feature points, but this approach is also time consuming as the Hough Transform for various scales had to be applied prior to detecting the iris, unless the approximate radius of the iris is known in advance. Deng and Lai presented the concept of regional forces and regional torque to accurately locate and resize the template on the iris even when the iris is in an extreme position, and for the correct orientation of the template. But their method also requires hand initialization to the position of the eye window before it can successfully locate and track the eyelids. All these methods track the eyes from frame to frame by readjusting the template of both the iris and the eye contour. Tian et al . have shown that such an approach is prone to error if the eyes blink in the image sequence.

A. Eye Authentication Processing

An image may be defined as a two-dimensional function, f(x, y) where *x* and *y* are spatial coordinates, and the amplitude off at any pair of coordinates (x, y) is called the intensity or gray level of the image at that point. When *x*, *y*, and the amplitude values of f are all finite, discrete quantities, we call the image a digital image. The field of digital image processing refers to processing digital images by means of a digital computer. Note that a digital image is composed of a finite number of elements, each of which has a particular location and value. These elements are referred to as picture elements, image elements and pixels. Pixel is the term most widely used to denote the elements of a digital image Vision is the most advanced of our senses, so it is not surprising that images play the single most important role in human perception. However, unlike humans, who are limited to the visual band of the electromagnetic (EM) spectrum, imaging machines cover almost the entire EM spectrum, ranging from gamma to radio waves. There is no general agreement among authors regarding where image processing stops and other related areas, such as image analysis and computer vision, start. Sometimes a distinction is made by defining image processing as a discipline in which both the input and output of a process are images. We believe this to be a limiting and somewhat artificial boundary. [9]

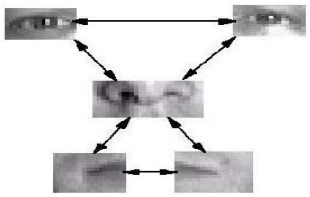

Fig. 1: Image acquisition

Eye Authentication Processing- Two broad categories can be defined methods whose input and output are images, and methods whose inputs may be images, but whose outputs are attributes extracted from those images. This organization is summarised in Fig. 1. The diagram does not imply that every process is applied to an image. Rather, the intention is to convey an idea of all the methodologies that can be applied to images for different purposes and possibly with different objectives. [10] Image Acquisition *is* the first process shown in figure 1. Acquisition could be as simple as being given an image that is already in digital form. Generally, the image acquisition stage involves pre-processing, such as scaling. Image enhancement is among the simplest and most appealing areas of digital image processing. Basically, the idea behind enhancement techniques is to bring out detail that is obscured, or simply to highlight certain features of interest in an image.

B. Eye Tracking and Detection

Video-based eye tracking has become one of the most popular and successful eye-tracking techniques. A multi-stage eye tracker with similar constraints to the multi-stage lip tracker. For the first stage, the eye centre in the previous frame and find the centre of mass of the eye region pixels. Then we search a 5 x 5 window around the centre of mass and look for the darkest pixel, which corresponds to the pupil. If this estimate produces a new eye centre close to the previous eye centre then we take this measurement [1]. If this stage fails, we run the second stage, where we search a window around the eyes and analyze the likelihood of each non-skin connected region being an eye. We limit the 69 search space to a 7 x 20 window around the eye. We find the slant of the line between the lip comers. The eye centres we select are the centroids that have the closest slant to that of the lip comers. Still, this method by itself can get lost after occlusion. For simplicity in our description, we refer to these two stages together as the eye black hole tracker. The third stage, which we call the affine tracker, runs in parallel with the first two stages. Since automatic initialization yields the eye centers, we construct windows around them, and then in subsequent frames, consider a second window cantered on the same point. We compute the affine transformation between the windowed sub-images and then, since we know the eye centre in the

previous frame, we warp the sub image of the current frame to find the new eye centre. Thus, we have two estimates for the eye centres, one from the eye black hole tracker and one from the affine tracker. When there is rotation or occlusion or when the eye black hole tracker produces an estimate that is too far away from the previous frame, we use the affine tracker slowly. In all other cases we take an average of the two trackers to be the eye centre. Later, we discuss how we detect rotation.

1) Eye position initialization

We assume the initial location of the eye is given in the first frame. The purpose of this stage is to get the initial eye position in the first frame of the image sequence. Some literature about eye locating has been published.

2) Eye Region intensity Normalization

For some image sequences, the eye region is very dark because of eye makeup or poor illumination. We therefore normalize the intensity of the image sequence. After the eye positions are initialized, a fixed size window is taken around the eye region. The intensities in this region are linearly stretched to fill the 0 - 255 range. For color image sequences, the R, G, B channels are stretched separately.

3) Eye Corner Tracking

It is assumed the initial location of the eye is given in the first frame. The purpose of this stage is to get the initial eye position in the first frame of the image sequence. It is found that eye inner corners are the most stable features in a face and relatively insensitive to facial expressions. Using an edge based corner detector, the inner corners can be detected easily. However, due to the low intensity contrast at the eye boundary and the wrinkles around the eye, some false corners will be detected as well as the true corners. Instead of using the corner matching method, we therefore use a feature point tracking method to track the eye inner corners for the remaining images of the sequence.

(a)

(b)

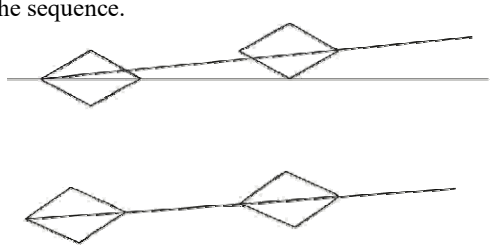

Fig 2: (a) Detected corners in the eye-blink pair; (b) Corners adjusted according to the slope between the outer corners.

C. Eye Blink Detection

Eye detection, the task of finding and locating eyes in images, is used in a great number of applications. Blink Detection, Blinking is defined as the rapid closing and opening of the eye lid [2]. The average duration of an eye-blink is 0.5 to 0.6 seconds, with a frequency varying from once every two seconds up to several tenths of a second. The blinking rate can also be affected by external stimulus such as fatigue, eye Injury, medication or disease. Much of the eye-detection literature is associated with face detection and face recognition see, e.g. [3, 4]. Direct eye-detection methods search for eyes without prior information about face location, and can further be classified into passive and active methods.

Passive eye detectors work on images taken in natural scenes, without any special illumination and therefore can be applied to movies, broadcast news, etc. One such example exploits gradient field and temporal analysis to detect eyes in gray-level video [5]. Active eye-detection methods use special illumination and thus are applicable to real-time situations in controlled environments, such as eye-gaze tracking, iris recognition, and video conferencing. They take advantage of the retro-reflection property of the eye, a property that is rarely seen in any other natural objects. When light falls on the eye, part of it is reflected back, through the pupil, in a very narrow beam pointing directly towards the light source. When a light source is located very close to a camera focal axis (on-axis light), the captured image shows a very bright pupil [6, 7]. This is often seen as the red-eye effect when using a flashlight in stills photography. When a light source is located away from the camera focal axis (off-axis light), the image shows a dark pupil. This is the reason for making the flashlight units pop up in many camera models. However, neither of these lights allow for good discrimination of pupils from other objects, as there are also other bright and dark objects in that would generate pupil-like regions in the image.

D.Face Resolution

Most systems proposed in the literature attempt to recognize facial expressions from high resolution faces (face regions are always greater than 200x200 pixels). However, for real-life applications, face resolutions can be affected by the quality of camera or the distance of user to camera, high resolution input cannot be guaranteed. Since facial images with coarse resolution can provide less information about facial features, algorithms that work well for high resolution face images can be expected to perform poorly when the resolution of input degrades.

E. Environment Variation

The variations of recording environment such as complex background pattern, presence of other people and uncontrolled lighting conditions have a potentially negative effect on expression recognition. As discussed above, in most of the training data sets, background of the images is neutral or has a consistent pattern and only a single person is present in the scene. When input images are captured in a clustered scene, face detector trained by data set without corresponding variations are difficult to perform reliably [8]. Similar to low resolution input,

images acquired in low lighting conditions may also provide less information about facial features.

III. METHODOLOGY

To make an automatic eye blink tracking and detection system for a video, we require extracting and tracking the eyes movements in an image sequence. For making such type of system, we have included three distinct phases: First, eyes are detected in each frame of a video. Motion analysis techniques are used in this stage, followed by online creation of a template of the open eye to be used for the subsequent tracking and template matching that is carried out at each frame. A flow chart depicting the main stages of the system is shown in Figure 3.

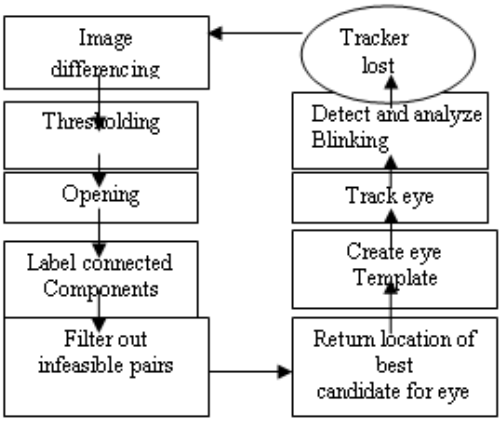

Fig 3 : Overview of the main stages in the system

The analyzing the blinking of the user is to locate the eyes. To accomplish this, the difference image of each frame and the previous frame is created and then threshold, resulting in a binary image showing the regions of movement that occurred between the two frames. Next, a 3x3 star-shaped convolution kernel is passed over the binary difference image in an Opening morphological operation. This functions to eliminate a great deal of noise and naturally-occurring jitter that is present around the user in the frame due to the lighting conditions and the camera resolution, as well as the possibility of background movement. In addition, this Opening operation also produces fewer and larger connected components in the vicinity of the eyes (when a blink happens to occur), which is crucial for the efficiency and accuracy of the next phase.

A recursive labelling procedure is applied next to recover the number of connected components in the resultant binary image. Under the circumstances in which this system was optimally designed to function, in which the users are for the most part paralyzed, this procedure yields only a few connected components, with the ideal number being two (the left eye and the right eye). In the case that other movement has occurred, producing a much larger number of components, the system discards the current binary image and waits to process the next involuntary blink in order to maintain efficiency and accuracy in locating the eyes. Given an image with a small number of connected components output from the previous processing steps, the system is able to proceed efficiently by considering each pair of components as a possible match for the user's left and right eyes. The filtering of unlikely eye pair matches is based on the computation of six parameters for each component pair: the width and height of each of the two components and the horizontal and vertical distance between the centroids of the two components.

A number of experimentally-derived heuristics are applied to these statistics to pinpoint the exact pair that most likely represents the user's eyes. For example, if there is a large difference in either the width or height of each of the two components, then they likely are not the user's eyes. As an additional example of one of these many filters, if there is a large vertical distance between the centroids of the two components, then they are also not likely to be the user's eyes, since such a property would not be humanly possible. Such observations not only lead to accurate detection of the user's eyes, but also speed up the search greatly by eliminating unlikely components immediately.

IV. RESULTS

A large volume of data was collected in order to assess the system accuracy. For experiment, total 30 videos are used in different lightning condition using inbuilt USB camera of Dell N5050 laptop. The size of each frame is 480 x 640. The result may be tested for more number of videos. The overall theme of our experiment was to capture the original blinks with the help of web cam, then converting these original blinks into automatic blinks with the help of Matlab code and thus calculated the missed blinks by comparing the original blinks with that of automatic. This experiment has various applications which can be used for security and up gradation of various technical sectors. From each person different states of the eyes were chosen, i.e. closed, open, half open, gazing and diverse head poses.

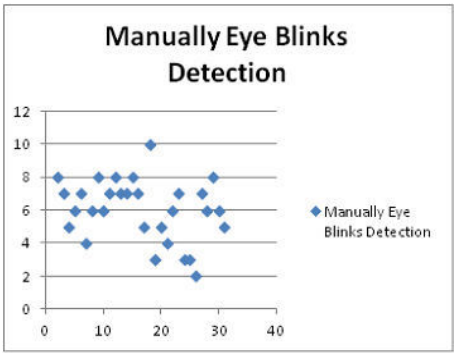

Fig: 4.1 Manually Eye Blink Detection

A. Manually Eye Blink Detection : Here the doted line represent the orignal eye blinking which were taken in the different videos with different values, the time taken in the video was about 6 to 8 second, through the blue dots shows the value of orignal eye blink tracking. In Fig. 4.1 the graph represents two dimentions ie; X and Y, In which X co-ordinate shows the total number of records and y- co-ordinates shows the number of eye blinks in each video. The blinks are detected manually through wab cam,the videos used here are all based on real time. Thus the graph is plotted here is for keeping a record to compare the blinks with that of the automatic blink, thus we can say that this graph is basically plotted to keep a record of natural blinks.

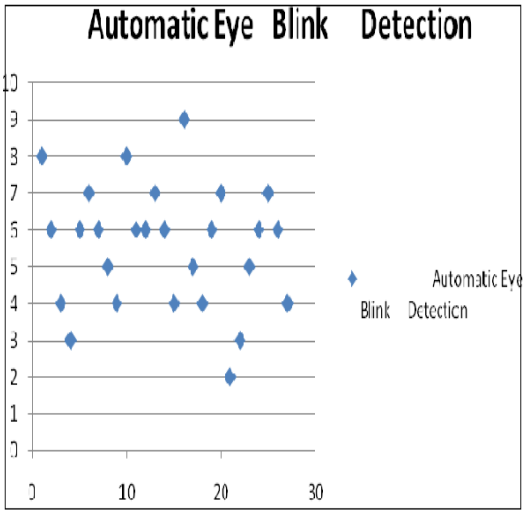

Figure: 4.2 Automatic Eye Blink Detection

B. Automatic Eye Blink Detection: Doted line represent the autometic eye blink detection taken in the different values,video timing is 6 to 8 second, through the blue doted line shows the value of autometic eye blink tracking .In Fig. 4.2 the graph represents two dimentions ie; X and Y, In which X co-ordinate shows the total number of records and y-co-ordinates shows the number of eye blinks in each video. The blinks are detected automatically through matlab coding.In some video the natural blinks are same as that of the automatic blink in the video, while in some the count was less and more then the naturl blink.Thus in this graph we are able to compare the blinks wih regard to automatic and natural.

VI. CONCLUSION

The system proposed in this thesis provides an automatic eye blink tracking and detection for people with disabilities similar to the one presented by Grauman et al. [9]. However, some significant improvements and contributions were made Over such predecessor systems. The automatic initialization phase (involving the motion analysis work) is greatly simplified in this system, with no loss of accuracy in locating the user's eyes and choosing a suitable open eye template. Given the reasonable assumption that the user is positioned anywhere from about 1 to 2 feet away from the camera, the eyes are detected within moments. As the distance increases beyond this amount, the eyes can still be detected in some cases, but it may take a longer time to occur since the candidate pairs are much smaller and start to fail the tests designed to pick out the likely components that represent the user's eyes. In all of the experiments in which the subjects were seated between 1 and 2 feet from the camera, it never took more than three involuntary blinks by the user before the eyes were located successfully.

After studying and analyzing results of above technique following points is concluded:

1. A good accuracy is achieved in different illumination conditions.
2. The initialization technique is efficient and gives good results.
3. The system responds slowly and requires more work for real time implementation.
4. Testing must be done on large database of videos.

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INCREASING THE LIFETIME OF HETEROGENEOUS SENSOR NETWORK BY USING GENETIC-FUZZY CLUSTERING

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Abstract—Wireless sensor network is composed of hundreds or thousands of sensor nodes which have computational, energy and memory limitation. Its duty is to receive information from its surrounding environment, analyze and process data and to send the received data to other nodes or base station. In these networks, sensor nodes are dependent on low power batteries to provide their energy. As energy is a challenging issue in these networks, clustering models are used to overcome this problem. In this paper, fuzzy logic and genetic algorithm are combined to increase the lifetime of the wireless sensor network. In other words, fuzzy logic is used to introduce the best nodes, those that in comparison to other nodes have more energy, density and centrality, to base station as cluster head candidate. Then, the number and place of cluster heads are determined in base station by using genetic algorithm. Also, the network acts heterogeneously and includes several nodes with different parameters.

Keywords-*genetic algorithm;clustering;wireless sensor network;fuzzy logic;lifetime;*

I. INTRODUCTION

Wireless sensor networks are a new generation of recent networks with computational, energy and memory limitation [1]. The wireless sensor network includes hundreds or thousands of sensors that usually are scattered in an inaccessible environment. The main duty of these sensors is to collect information from surrounding environment and send it to base station [2].Each sensor node is composed of sensor, computational, memory and wireless communication unit with a limited board. Wireless sensor networks are used in army, hygiene, education, industry, agriculture and etc. [3]. In these networks, sensor nodes are dependent on low power batteries to provide their energy. Because these networks are used in dangerous and inaccessible environments, it is hard or even impossible to charge or change their energy source. Therefore, one of the main challenges of these wireless sensor networks is the sensors' low energy [4]. These networks efficiency depends on the lifetime of sensor nodes and network coverage. Therefore, it's important to optimize energy consumption and manage the consumption power of sensor nodes. Most of energy consumption in these networks is due to information transference inside the network .clustering is one of the common solutions to decrease the number of network's internal transference [5]. In clustering sensor nodes are divided into some clusters and in each cluster one node is chosen as cluster head to receive data from other nodes and send them to base station. Selecting a suitable cluster head decreases energy consumption to a great extent and as a result increases networks' lifetime [1, 2]. In recent years, due attention has been paid to powerful methods such as: fuzzy logic, genetic algorithm and neural networks [6, 7, 8,9].

In LEACH protocol [10], cluster heads are chosen first and then the members of each cluster head are determined. Cluster members send the received data to cluster head according to TDMA scheduler. Cluster head combines the received data and sends it to base station. As this algorithm just uses local information, the number of cluster heads in each round is not fixed and it may be less or more than the optimized amount in one round. Also, each node should produce and compute a random number and a threshold level in every round.

ECS algorithm has improved LEACH method by changing probability. In probability function, energy parameter has been considered to choose cluster heads. Also reduction in search space has increased clustering speed [11].

In [13], in order to choose cluster heads, a two level fuzzy method is used that includes local level and global level. In local level, node's capability for being cluster head has been evaluated based on two parameters: energy and the number of neighbors. In global level three parameters have been considered: Centrality, closeness to base station and the distance between cluster heads.

This paper is organized in 4 sections. In section 2 the proposed algorithm to increase the lifetime of wireless sensor network is mentioned. Simulation and evaluation of the aforementioned algorithm are presented in section 3.section 4 is allocated to conclusion.

II. THE PROPOSED ALGORITHM

As in this paper a new idea is mentioned to increase the lifetime of wireless sensor network and combination of various algorithms are used to achieve our purposes, therefore, the Existing network is examined through fuzzy logic and genetic algorithms from these aspects:

- The lifetime of network.
- The selection of cluster head in each round.
- The number of dead sensors after each round.

In this section, the hypotheses, the problem and the suggested algorithm are explained. The paper's hypotheses are:

- Sensors are fixed in their place.
- In any round, each sensor can just send or receive data.
- Sensing the environment and preparing the data of each sensor node in order to send it, is done independently.
- Each node sends its position and remaining energy to its cluster head in the form of control packets.
- Base station has enough knowledge about the position of network nodes.
- Each node is equipped to a GPS system and finds its place and geographical position.

Heinzelman's energy model [10] is used for sensor network. Consumed energy to send a message with k bits length in d distance is computed through the (1).

$$E_{TX}(k,d) = \begin{cases} k \times E_{elec} + k \times \varepsilon_{fs} \times d^2, if\ d \le d_0 \\ k \times E_{elec} + k \times \varepsilon_{mp} \times d^4, if\ d \ge d_0 \end{cases} \quad (1)$$

Where E_{elec} the energy dissipated per bit to run the transmitter or the receiver circuit, ε_{fs} and ε_{mp} depend on the transmitter amplifier model we use, and d the distance between the sender and the receiver. By equating the two expressions at $d = d_0$, we have: $d_0 = \sqrt{\frac{\varepsilon_{fs}}{\varepsilon_{mp}}}$.

Each node's consumed energy to receive a k bit message is computed through the (2). $E_{TR} = k \times E_{elec}$ (2)

In the proposed method, the same as LEACH algorithm, the period of network's activity is divided into some rounds and each round includes two phases: setup phase and steady state phase.

A. *Setup Phase*

In the first phase, cluster heads are selected and then the clusters ' members are determined. In this phase, each node calculates its chance parameter based there main characteristics through fuzzy logic: its energy, density and centrality in comparison with neighbors. Nodes with higher capability introduce themselves to base station as cluster head' candidate, so they prevent those nodes which are not capable of being cluster head from sending their information. The network uses nodes with different factor after being launched. Nodes that remaining energy in comparison with network's total energy is less than threshold level are recognized as dead nodes and can't participate in competition. In base station, cluster heads are determined among cluster head candidates using genetic algorithm. Also, the number of times in which a node is selected as cluster head is considered. Then, base station sends a message including cluster head's ID to each node. If a node's cluster head ID conforms to the node's ID, that node is a head a cluster. Base station creates a Time division multiple access table and this table is sent to cluster heads. TDMA table is used to time the data transfer of sensor nodes and also enables sensor nodes to turn off their radio antenna and save their energy until it's time for them.

B. *Steady State Phase*

In the second phase, cluster members send the received data to cluster head according to TDMA table and after receiving data, cluster heads compress and send them to base station.

C. *Fuzzy Logic Control*

In the proposed method, we have used the most commonly used fuzzy inference technique called Mamdani Method. Input parameters of fuzzy logic controller in the proposed method are:

- Node's energy: energy variable shows the remaining energy in proportion to the network's total energy.
- Node's density: density variable shows the number of a node's neighbors that their distance to the controlled sensor is less than n.
- Node's centrality: centrality variable shows how close a node is to a cluster.

In order to compute the number of neighbor's sensors in the beginning of network's activity, each sensor sends its ADV message to neighbor nodes in a definite radius; thus, each sensor calculates the number of its neighbors based on the energy of the received signal. ADV message is a message to introduce sensor in the network. In order to calculate the amount of centrality, each node computes its distance to those neighbors which exist in n radius and their sum shows the amount of centrality variable. Language variables for each of the inputs are: Energy = (low, med, high) , Density = (low, med, high) and Centrality = (close, adeq, far). Figure 1 shows fuzzy rule base which are used in this structure.

1.(density== Low) &(Energy== low) &(Centrality== close)=>(Output== Small)
2.(density== Low) &(Energy== low) &(Centrality== adeq)=>(Output== Small)
3.(density== Low) &(Energy== low) &(Centrality== far) =>(Output== Vsmall)
4.(density== Med) &(Energy== low) &(Centrality== close)=>(Output== Small)
5.(density== Med) &(Energy== low) &(Centrality== adeq)=>(Output== Small)
6.(density== Med) &(Energy== low) &(Centrality== far) =>(Output== Small)
7.(density== High) &(Energy== low) &(Centrality== close)=>(Output== Rsmall)
8.(density== High) &(Energy== low) &(Centrality== adeq)=>(Output== Small)
9.(density== High) &(Energy== low) &(Centrality== far) =>(Output== Vsmall)
10.(density== Low) &(Energy== med) &(Centrality== close)=>(Output== Rlarg)
11.(density== Low) &(Energy== med) &(Centrality== adeq)=>(Output== Med)
12.(density== Low) &(Energy== med) &(Centrality== far) =>(Output== Small)
13.(density== Med) &(Energy== med) &(Centrality== close)=>(Output== Large)
14.(density== Med) &(Energy== med) &(Centrality== adeq)=>(Output== Med)
15.(density== Med) &(Energy== med) &(Centrality== far) =>(Output== Rsmall)
16.(density== High) &(Energy== med) &(Centrality== close)=>(Output== Large)
17.(density== High) &(Energy== med) &(Centrality== adeq)=>(Output== Rlarge)
18.(density== High) &(Energy== med) &(Centrality== far) =>(Output== Rsmall)
19.(density== Low) &(Energy== high) &(Centrality== close)=>(Output== Rlarge)
20.(density== Low) &(Energy== high) &(Centrality== adeq)=>(Output== Med)
21.(density== Low) &(Energy== high) &(Centrality== far) =>(Output== Rsmall)
22.(density== Med) &(Energy== high) &(Centrality== close)=>(Output== Large)
23.(density== Med) &(Energy== high) &(Centrality== adeq)=>(Output== Rlarge)
24.(density== Med) &(Energy== high) &(Centrality== far) =>(Output== Med)
25.(density== High) &(Energy== high) &(Centrality== close)=>(Output== Vlarge)
26.(density== High) &(Energy== high) &(Centrality== adeq)=>(Output== Rlarge)
27.(density== High) &(Energy== high) &(Centrality== far) =>(Output== Med)

Figure 1. Fuzzy Rule base

The second parameter is the number of received messages

D. *Using genetic algorithm*

Determining the number and place of cluster heads has always been a challenge. The dynamic nature of issue, due to the frequent changes in cluster heads in each round of network's activity, makes the issue more complex and as result modeling is not possible through math classic methods. Common clustering algorithms in other studies have benefited from heuristic methods. On the other hand, genetic algorithm is so flexible in solving dynamic issues. In this paper, genetic algorithm is used to determine the place of cluster heads in a way that the minimal amount of energy is consumed. Fitness Criterion is based on the minimal consumed energy from network nodes in each generation. In base station, the number of nodes that have introduced themselves as cluster head candidates determines the chromosome's length in genetic optimizing method. Each of this chromosome's genes recognizes some of the sensor network nodes. Chromosome's structure is defined as: $chrom = \{g_i \mid i = 1,2,3,...,l\}$, where l is the chromosome's length and g_i is the *i-th* gene.

After crossover operator, mutation happens in a way that a mutation may be created in a bit of one or some chromosomes. Finally, after crossover and mutation, base station selects the chromosome which has the networks least energy difference in proportion to the previous round and introduces the available nodes to network as cluster head and other nodes join to the nearest cluster head. If we show the network's current energy in *k-th* round with $E^k_{Network}$, fitness function is computed through the (3) that should become minimum and in this equation, | | sign indicates absolute value.

$$fitness = \left| E^k_{Network} - E^{k-1}_{Network} \right| \quad (3)$$

III. SIMULATION AND RESULT

As the most important part of each paper is allocated to its results, this section examines this paper's results. Ns2 simulator is used to simulate the proposed algorithm. 100 sensor nodes are used in the simulation. The parameter values used in the simulation are same as Table I.

TABLE I. THE VALUES OF THE SIMULATION PARAMETERS

parameters	Values
Network dimensions	100*100 m^2
ε_{fs}	10 pJ/bit/m^2
ε_{mp}	0.0013 pJ/bit/m^4
d_0 (distance threshold)	87 m
E_{DA} (Energy aggregation Data)	5 nJ/bit/signal
Average of normal data packet size	4000 bits

As most of the presented methods are random ones, each of the methods are executed for five times and the average of achieved amounts in each simulation is used to examine the function of each method. In order to decrease the complexity and have a simpler comparison among the presented methods, one base station is used. In this section, the proposed algorithm is compared to the GFS algorithm [13] which works based on fuzzy logic and genetic algorithm from two aspects:

- The time of first sensor node's death.
- The time of whole network's death (the time in which sensor node's energy is finished completely).

In this paper three scenarios are used to compare the efficiency of the suggested algorithm. Finally, the proposed algorithm leads to the lightest lifetime in sensor's network.

- First scenario: In this scenario, the proposed algorithm is evaluated in the form of a heterogeneous network with three different nodes: An advanced node, a normal node and a node which is in a critical condition and has the lowest energy level.
- Second scenario: In this scenario, the proposed algorithm which is a heterogeneous network with clustering routing is considered in a fuzzy state in which each node determines its capability for being a cluster head based on fuzzy logic.
- Third scenario: In this scenario, in addition to a network with heterogeneous nodes and fuzzy logic, genetic algorithm is used to select the cluster head in base station. In this section, the number of generations is 100, the crossover probability is 0.6 and mutation probability is 0.05.

As the suggested algorithm works based on clustering, the most efficient route which has the highest energy and the least distance to base station is chosen and network's stability increases too. Figure 2 shows the comparison of the proposed algorithm to the GFS algorithm in each of the three scenarios based on the time of first sensor node's death.

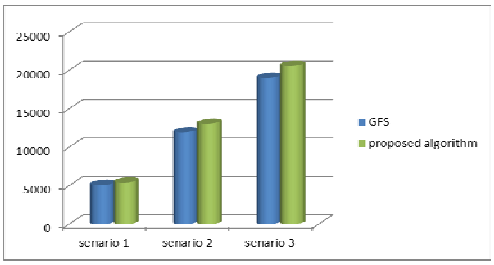

Figure 2. The death time of the first node.

Figure 3 shows the time in which all nodes' energy is finished. As the proposed algorithm uses

clustering, fuzzy logic and genetic algorithm, sensor nodes use a lot of time to lose their energy.

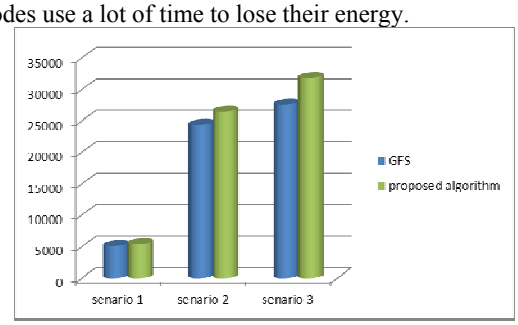

Figure 3. The death time of total network.

In this paper, network's lifetime was compared to LEACH and DEEC [14] clustering algorithms and the results show that by using fuzzy logic and genetic algorithm, the proposed algorithm works better than LEACH and DEEC. Network's lifetime parameter shows the time in which the first sensor node consumes its energy and dies. When the sensor node spends more time to consume its total energy, the network's stability is more. Figure 4 shows network's lifetime of proposed algorithm with comparison other algorithm.

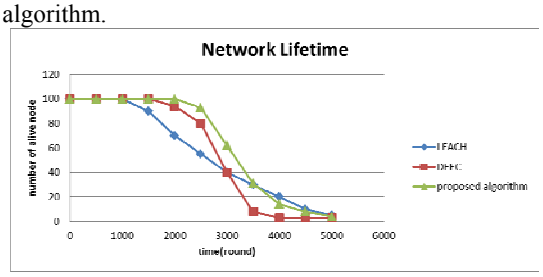

Figure 4. comparison of network lifetime

Figure 5 shows the number of received messages in base.

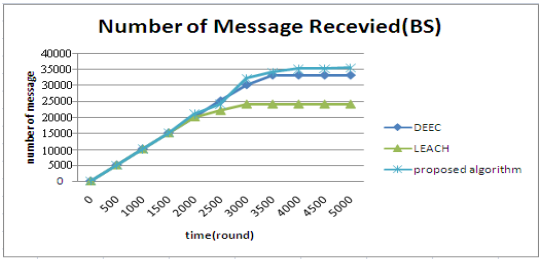

Figure 5. Number of received messages in base station

III.CONCLUSION

Optimum energy consumption in wireless sensor networks is important in such a way that optimum energy consumption will lead to an increase in the network lifetime. In this paper, a new method which is based on fuzzy logic and genetic algorithm is represented to select a cluster head in wireless sensor networks. Therefore, it is quicker and also more accurate to detect the node with higher energy and to select the cluster head. Moreover, this network has used nodes with heterogeneous characteristics. Some of the advantageous of heterogeneous nodes are: the long lifetime of networks, increase in network's reliability and decrease in data transference delay. In simulation, the proposed algorithm is compared to LEACH, EEC and GFS algorithms.

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ROLE OF REMOTE SENSING AND GIS IN FORESTRY

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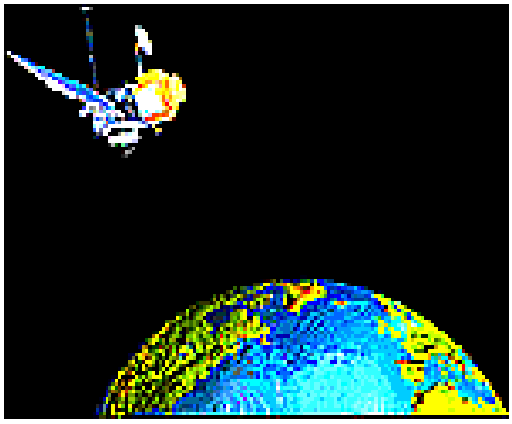
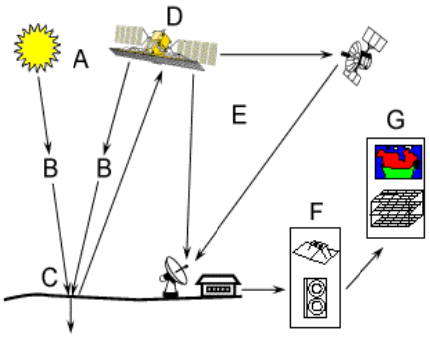
Abstract:- The Earth is constantly under observation from dozens of satellites orbiting the planet and collecting data. They are engaged in something called "remote sensing": the act of obtaining information about something without being in direct contact with it. Now-a-days the field of Remote Sensing and GIS has become exciting and glamorous with rapidly expanding opportunities. Many organizations spend large amounts of money on these fields. Here the question arises why these fields are so important in recent years. Two main reasons are there behind this. Now-a-days scientists, researchers, students, and even common people are showing great interest for better understanding of our environment. Development in complicated space technology which can provide large volume of spatial data, along with declining costs of computer hardware and software has made Remote Sensing and G.I.S. affordable to not only complex environmental/spatial situation but also affordable to an increasingly wider audience.



INTRODUCTION

Remote sensing is the examination or the gathering of information about a place from a distance. Such examination can occur with devices (e.g. - cameras) based on the ground, and/or sensors or cameras based on ships, aircraft, satellites, or other spacecraft.
Today, the data obtained is usually stored and manipulated using computers. The most common software used in remote sensing is ERDAS Imagine, ESRI, MapInfo, and ERMapper.



1.Energy Source or Illumination (A)
2. Radiation and the Atmosphere (B)
3. Interaction with the Target (C)
4. Recording of Energy by the Sensor (D)
5. Transmission, Reception, and Processing (E)
6. Interpretation and Analysis (F)
7. Application (G)

GEOGRAPHICAL INFORMATION SYSTEM

The expansion of GIS is Geographic Information System which consists of three words, viz. Geographic, Information and System. Here the word 'Geographic' deals with spatial objects or features which can be referenced or related to a specific location on the earth surface. The object may be physical/natural or may be cultural / man made. Likewise the word 'Information' deals with the large quantity of data about a particular object on the earth surface. The data includes a set of qualitative and quantitative aspects which the real world objects acquire. The term 'System' is used to represent systems approach where the environment consists of a large number of objects / features on the earth surface and their complex characteristics are broken down into their component parts for easy understanding and handling.
Over the past eight years, GIS technology has been widely accepted by public as well as private forestry agencies. In large part this has been a result of the benefit of using GIS technology over current forest maps. The primary management tool for timber production in America is the forest inventory. It is used to access the existing forest resource and develop harvest schedules and treatment programs to project future timber supplies and for other operational planning activities. Forest inventory data is collected using remote sensing techniques.
With GIS technology, the average age of the information in the forest data base could be reduced from 20 years to only a few weeks. The time factor alone has led to a wide acceptance and large demand for GIS applications in forestry.

VARIOUS APPLICATIONS OF GIS AND REMOTE SENSING:

FOREST MANAGEMENT

Forestry involves the management of a broad range of natural resources within a forested area. In addition to timber, forests provide such resources as grazing land for animals, wildlife habitat, water resources and recreation areas. The U.S. Forest Service is responsible for the management of forest harvesting, grazing leases, recreational areas, wildlife habitat, mining activities as well as protecting endangered species. To balance the competing resource conservation and resource use, activities must be accommodated. Accessing the feasibility of these multiple uses is greatly enhanced by the use of GIS techniques.

For example, the GIS for Flathead National Forest in Montana includes digital terrain data, vegetation associations from Landsat satellite data, timber compartments, land types, precipitation, land ownership, administrative districts and the drainage network. The GIS has been utilized for such analyses as timber harvesting, habitat protection and planning the location of scenic roads.

U.S. Forest Service and GIS Implementation

Virtually as government forest management agencies in North America have acquired or are acquiring a GIS. GISes have been widely used by the U.S. Forest Service. In the mid-1980's three national forests were selected as GIS evaluation sites. They were George Washington National Forest in Virginia, the Tongass National Forest in Alaska and the Siuslaw National Forest in Oregon. At each of these sites, a GIS was installed and comprehensive data bases for these national forests were implemented. A cost/benefit analysis was kept on the GIS systems for a three year period. The U.S. Forest Service has decided, after the three year period, to implement a standardized GIS data base for the entire forest service. A $150 million procurement has been initiated for GIS hardware and software to be installed in 600 locations beginning in 1991.

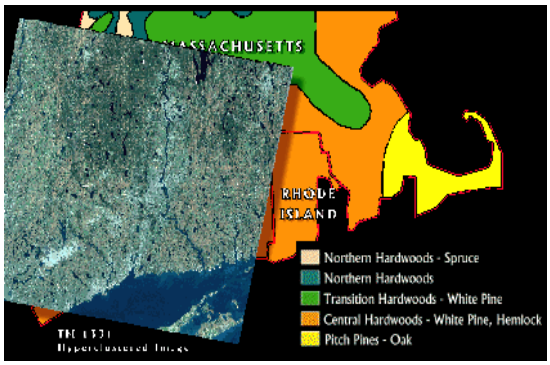
How Canada is Using GIS in Forestry

In Canada, almost every forestry agency has either implemented GIS or is in the process of implementing GIS technology. Forestry is a huge industry in the provinces. British Columbia's forest cover is 50 million hectares which is about 40% of the Canadian timber supply. (Aronoff, p.9) Before GIS, the forest databases were updated by aerial photography, field sampling methods and manual drafting. Under the GIS program, the forest maps were digitized and a forestry inventory can be updated constantly. GIS provides a way for forestry agencies to manage and manipulate their databases. Landsat satellite is used to update the individual maps that need current information due to forest harvesting and forest fires.

TIMBER MANAGEMENT

Timber management focuses on efforts to provide a continuous supply of trees for economically optimal wood production. In the recent past, foresters have relied on wood supply models to guide planning for optimal harvests that usually ignore specific geographic locations. These simulations describe the problem as follows:

While today's models are sufficient for defining and developing a spatial management design
strategies for wood supply, they lack consideration of the geographic structure of forests and are insufficient for design of wildlife sensitive and operationally, i.e., economically, acceptable management.



GIS has now made it possible to incorporate spatial components into harvest planning and simulation models. In some cases, the modeling capabilities of a particular GIS may be used directly to aid decisions about timber harvesting; in other cases, an external model is linked to a GIS database. These models are typically called Decision Support Systems (DSS) or Spatial Decision Support Systems (SDSS).
Moore and Lockwood (1990) developed a planning system known as the HSG Wood Supply Model that directly incorporates a GIS to assist in the design and evaluation of long-range timber harvest schedules. In the HSG system, the fundamental GIS data layer is a forest stand inventory in which each stand is assigned attributes of the year of stand origin, productivity of the site, area, relative stocking factor.

GIS, FOREST FIRE AND FIRE MANAGEMENT

Forest fires have an important influence on the vegetation cover, animals, plants, soil, stream flow,

air quality, microclimate, and even general climate. The loss of timber is obvious and so is the damage to life and property. The loss of recreation value of the forest and the destruction of wildlife habitat are also consequences of forest fires.

Researchers and scientists have long been trying to predict the behavior of a forest fire. Computer modeling has been the effort of many scientists using high resolution remote-sensing satellite imagery, powerful software, and GIS. In order to model a forest fire, the techniques for obtaining , analyzing and displaying spatial information in a timely and cost-effective manner are needed. As forest fires are spatial, GIS is used as a tool for modeling. A fire simulation program called FIRE! has been developed using ARC/Info. "The model puts the power of comprehensive fire behavior prediction into the hands of qualified ground resource managers where it can be most effectively applied."

Forests are often at risk of being destroyed by forest fires. So remote sensing can be used in efforts to reduce the risk and minimize damage if a fire occurs. Weather information allows foresters to calculate risk assessments and isolate the areas most susceptible to fire. Those areas can be closely monitored by satellites, such as high resolution Advanced Very High Resolution Radiometer (AVHRR) and Satellite Pour l'Observation de la Terra (SPOT). Images from these satellites are readily available and small fires show up on them almost immediately.

The effect of fire on forest resources is another important management concern. Management activities include fire prevention, wildlife control, prescribed burning, and post-fire recovery actions. The modeling capabilities of GIS have been quite effective in this context. Forest fire managers have used GIS for fuel mapping, weather condition mapping, and fire danger rating

There are various Fire behavior models that have been developed from fuel models to predict the fire intensity based on factors such as slope, elevation, site exposure, wind speed, relative humidity, cloud cover, temperature, and live and dead fuel moisture. Remote sensing contributes to fire-fighting efforts, as well. Data on wind direction and speed, and the dryness of surrounding areas can help predict the directions and speed at which a fire spreads. With this information, firefighters can be dispatched with maximum effectiveness and safety, and fires can be put out before they cause much damage.

Radar and thermal sensing allow for constant observation of fires, unaffected by clouds, smoke, or other conditions that hinder aerial observation.

After a fire, damage can be quickly and inexpensively assessed by using AVHRR or Landsat Thematic Mapper data. With accurate information on the area of the burn scar, amount of biomass destroyed and the amount of smoke and air pollution, forest managers can efficiently proceed with recovery and planning.

During every stage of forest management, foresters can use remote sensing data to estimate future urban spread and population growth. Then, forest management can be planned taking into account the future needs of settlements. Urban planning data can also be applied to the management of urban forestry, to create inventories of trees in parks and on streets.

SAVING WILDLIFE AND OTHER PLANT SPECIES

The logical extension of commercial forestry is logging, and the nature of the industry requires long-term planning for cutting and regrowth. The accurate data from aerial photography and satellite images are used for planning and monitoring of these activities.

Before logging can take place, GIS assessments of forest ecosystems are performed to assess the impact on local wildlife species. This is another application of GIS, which usually uses SPOT or AVHRR satellite data to map regions where animal habitats are located. A remotely sensed tree species inventory can be used to identify rare or endangered plant species, as well as the habitats of animal species, based on the type of surrounding land cover.

Once the distribution of species is known, it can be incorporated into detailed and extensive maps, which are used to plan logging and regrowth. By using remote sensing data, foresters can make optimally informed decisions. They can be aware of the species distribution in a forest, the projected yields from

logging, which areas contain habitats that cannot be disturbed, and how much land is needed for growth of settlements. After sections of forest are cut down, GIS and aerial photography techniques can be used to assess the speed and success of re-growth.

SOME OTHER APPLICATIONS OF REMOTE SENSING WHICH ARE HELPING FORESTRY

For ship route planning, Synthetic Aperture Radar (SAR) data is transmitted to ships in real-time. SAR systems provide long-range, high resolution images using extensive electronic processing of data, and can monitor the ocean surface and detect wave height and movement. Scatterometers, high frequency microwave radar sensors designed to sense ocean surface condition, are used to measure wind speed and direction at the surface. Combined data from these sensors provide reliable information on ocean activity and facilitate efficient route planning.

Ships themselves are tracked with radar to pinpoint their location and proximity to other ships. Using up-to-date remote sensing information, ships can travel via the most efficient routes, and can avoid hazardous conditions and collisions to transport timber without losses.

Finally, if an accident does take place during shipping, remote sensing can be used to minimize damage.

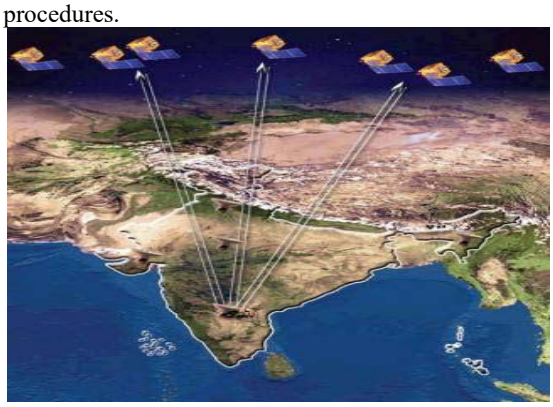
Rescue personnel use radar and aerial sensing to quickly locate a damaged ship. In the case of an oil spill, remote sensing information can be used to map the extent of the spill and track its spread by monitoring wave movement and wind speed.

By making shipping more effective, remote sensing aids the forestry industry at the end as well as the beginning of the timber cycle. From rising and monitor healthy forests to transporting the resulting timber to its destination, remote sensing is a valuable tool for forestry. However, forestry is only one example of the vast number of uses of remote sensing. With the use of multiple sensors and varied data locate and understanding techniques, remote sensing is a versatile tool that can provide data about the surface of the earth to suit to any need.

CONCLUSIONS

The range of applications reviewed in this paper is clear demonstration to the significant value of forests and the potential of GIS to aid in their management. Despite the diversity of applications, however, a number of broad conclusions can be reached about the role of GIS in forestry:

1. GIS applications can strongly benefit from remote sensing and image processing technologies. Forests are complex assemblages of species that lend themselves well to broad-level inventory through remote sensing. However, the need for strong ground-truth remains paramount and it is likely that satellite positioning systems(such as GPS) will play an important role in augmenting traditional forest survey activities.
2. Forests are a dynamic resource, affected by many concurrent ecological processes and direct management interventions. Simulation modeling has been applied in forestry. Simulation or *process* modeling is one of the more challenging areas of GIS applications and it is likely that this activity will increase as the research and tools to support this kind of application become more prevalent.
3. It is clear that throughout the world, forests are subject to many demands. As a result,many forest management problems have the nature of multi-objective planning procedures.



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GROUP MOBILITY MODEL BASED PROACTIVE AND REACTIVE ROUTING PROTOCOL IN MANET

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Abstract— A mobile ad hoc network (MANET) is a collection of wireless mobile nodes forming a dynamic network Topology without the aid of any existing network infrastructure or centralized administration. Each node participating in the network acts as a host and as a router , means they have to forward packets and identify route as well. Random waypoint is the most common mobility model in most of the simulation based studies of various MANET routing protocols. The Group Mobility Model has been generated by Impact of Mobility Patterns on Routing in Ad-hoc Network (IMPORTANT). In the present communication, we have analyzed the Packet Delivery Ratio (PDR), Average End to End delay, Average Throughput, Normalized Routing Load (NRL) and number of Drop packets in CBR and TCP traffic models using routing protocols namely AODV and DSDV. Research efforts have focused much in evaluating their performance with same number of nodes but divided in different number of groups. Simulations has been carried out using NS-2 simulator

Keywords- *MANET, IMPORTANT, CBR, TCP, PDR, NRL, NS-2.*

1. INTRODUCTION

A Mobile Ad hoc Networks (MANET) represents a system of wireless mobile nodes that move arbitrarily and dynamically self-organize in to autonomous and temporary network topologies, allowing people and devices to seamlessly communicate without any pre-existing communication architecture. Such infrastructure less networks are usually needed in battlefields, disaster areas, and meetings, because of their capability of handling node failures and fast topology changes. The most important characteristics are dynamic topology, where nodes can change position quite frequently, so we require such routing protocol that quickly adapts to topology changes.

Normal routing protocol, which works well in fixed networks does not show same performance in Mobile ad-hoc Networks. In MANET routing protocols should be more dynamic so that they quickly respond to topological changes[1]. A number of protocols have been developed to accomplish this task.

Routing paths in MANET potentially contain multiple hops, and each node has the responsibility to act as router[2]. Routing in MANET has been a challenging task because of high degree of node mobility.

MANET routing protocol must have the following characteristics:

1) Keep the routing table up-to-date and reasonably small,
2) Select the best route for given destination and
3) Converge within an exchange of a small amount of messages[3].

There are several mobility models such as Random Way Point Model, Freeway Mobility Model, Manhattan Mobility Model and Reference Point Group Mobility Model (RPGM) and Gauss Markov Mobility Model etc.

Bindra, Maakar and Sangal[4] have studied performance evaluation of two reactive routing protocols of MANET using Group Mobility Model. In which they compare the performance of AODV and DSR with CBR and TCP traffic. In present paper, we have compared two routing protocols (AODV and DSDV) with CBR and TCP traffic with Group Mobility Model. PDR, Average End to End delay, Average Throughput, Normalized Routing Load and number of Drop packets has been evaluated as the function of Group and constant mobility speed..

This paper is organized in five sections. Section 2 gives brief description of studied routing protocols. Section 3 describes simulation environment, Reference Point Group Mobility (RPGM) Model and performance metrics. Simulation results are discussed in section 4. Section 5 describes our conclusion and future scope.

2. Description of MANET Routing Protocols

Description of routing protocols AODV and DSDV in brief are as follows:

2.1. AODV (Ad-hoc On demand Distance Vector)

AODV[5] is a reactive protocol, which performs Route Discovery using control messages route request (RREQ) and route reply (RREP) whenever a node wishes to send packets to destination. To control network wide broadcasts of RREQs, the source node uses an expanding ring search technique. The forward

path sets up an intermediate node in its route table with a lifetime association RREP. When either destination or intermediate node using moves, a route error (RERR) is sent to the affected source node. When source node receives the (RERR), it can reinitiate route if the route is still needed. Neighborhood information is obtained from broadcast Hello packet. As AODV protocol is a flat routing protocol it does not need any central administrative system to handle the routing process. AODV tends to reduce the control traffic messages overhead at the cost of increased latency in finding new routes. The AODV has great advantage in having less overhead over simple protocols which need to keep the entire route from the source host to the destination host in their messages. The RREQ and RREP messages, which are responsible for the route discovery, do not increase significantly the overhead from these control messages. AODV reacts relatively quickly to the topological changes in the network and updating only the hosts that may be affected by the change, using the RRER message. The Hello messages, which are responsible for the route maintenance, are also limited so that they do not create unnecessary overhead in the network. The AODV protocol is a loop free and avoids the counting to infinity problem, which were typical to the classical distance vector routing protocols, by the usage of the sequence numbers [6].

2.2. DSDV (Destination Sequenced Distance Vector)

The Destination Sequenced Distance Vector is a proactive routing protocol. Which include freedom from loops in routing tables, more dynamic and less convergence time. Every node in the MANET maintains a routing table which contains list of all known destination nodes within the network along with number of hops required to reach to particular node. Each entry is marked with a sequence number assigned by the destination node. The sequence numbers are used to identify stale routes thus avoiding formation of loops. In DSDV[7], each node have a routing table, here each table must contain the destination node address, the minimum number of hops to that destination and the next hop in the direction of that destination. The tables in DSDV also have an entry for sequence numbers for every destination. These sequence numbers form an important part of DSDV as they guarantee that the nodes can distinguish between stale and new routes. Here each node is associated with a sequence number and the value of the sequence number is incremented only by the node the sequence number is associated with. Thus, these increasing sequence numbers here emulate a logical clock. Suppose a node receives two updates from the same source then the receiving node here makes a decision as to which update to incorporate in its routing table based on the sequence number. A higher sequence number denotes a more recent update sent out by the source node. Therefore it can update its routing table with more actual information and hence avoid route loops or false routes.

DSDV determines the topology information and the route information by exchanging these routing tables, which each node maintains. The nodes here exchange routing updates whenever a node detects a change in topology. When a node receives an update packet, it checks the sequence number in the packet. If the information in the packet is older than the receiving node has in its routing tables, then the packet is discarded. Otherwise, information is updated appropriately in the receiving node's routing table. The update packet is then forwarded to all other neighboring nodes (except the one from which the packet came). In addition, the node also sends any new information that resulted from the merging of the information provided by the update packet. The updates sent out in this case, by nodes resulting from a change, can be of two types that is either a full update or a partial update. In case of full updates, the complete routing table is sent out and in case of a partial updates only the changes since last full update are sent out.

3. Simulation Environment

The simulation is done with the help of NS-2 simulator version 2.34 [8]. The network contains 60 nodes randomly distributed under 3 and 4 groups in a 1000m X 1000m area with speed of 5m/s as basic scenario. The simulation time is 600s.

Parameter	Value
No. of nodes	60
No. of Groups	3, 4,5
Protocols	AODV, DSDV
Simulation Time	600s
Speed Deviation	5m/s,7m/s,10m/s
Angle of Deviation	5,10,15
Traffic Type	CBRP
Mobility Model	Group Mobility Model
Packet Size	512byte
Wireless Range	250m
Area	1000m X 1000m

Table 1: Basic Simulation Scenario

3.1. Reference Point Group Mobility Model (RPGM) Model

Group mobility can be used in military battlefield communication, where the commander and soldiers

form a logical group. Here, each group has a logical center (group leader or commander) that determines the group's motion behavior. Each member of the group (soldier) is uniformly distributed in neighborhood of group leader (commander). Subsequently, at every instant, each node has a speed and direction that is derived by randomly deviating from that of the group leader[9].

Each node derivates from its velocity randomly from that of leader. The movement in group mobility can be defined as follows:

$$| V_{member}(t) | = | V_{leader}(t) | + random() * SDR * max\_spee \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

$$| \Theta_{member}(t) | = | \Theta_{leader}(t) | + random() * SDR * max\_angle \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where 0 <= SDR (Standard Deviation Ratio) and ADR (Angle Deviation Ratio) <= 1.

SDR and ADR are used to control the deviation of the velocity of group members from that of the leader. Since the group leader mainly decides the mobility of group members, group mobility pattern is expected to have high spatial dependence for small values of SDR and ADR.

3.3. Performance Metrics

In present performance metrics, that we have been used for performance evaluation of ad-hoc network protocols. The following metrics are applied to comparing the protocol performance. These metrics are suggested by MANET working group for routing protocol evaluation [10].

Average Throughput: The sum of the data packets generated by every source, counted by k bit/s.

Average End to End Delay: This includes all possible delays caused by buffering during routing discovery latency, queuing at the interface queue, and retransmission delays at the MAC, propagation and transfer times.

Packet Delivery Ratio: The ratio between the number of data packets originated by the "application layer" CBR sources and the number of data packets received by the CBR sink at the final destination [11].

Normalized Routing Load: The sum of the routing control messages such as RREQ, RREP, RRER, HELLO etc, counted by k bit/s.

Number of Drop Packets: The number of the data packets originated by the sources failure to deliver to the destination.

4. Results

We have made an attempt to evaluate the performance of one reactive routing protocol, AODV and one proactive routing protocol, DSDV over 3 group, 4 group and 5 group in a area of 1000m X 1000m with CBR traffic under Group Mobility Model. The results, which obtain are as discussed.

The Average Throughput with Traffic Type AODV and DSDV with number of Groups is shown in the figure 1.

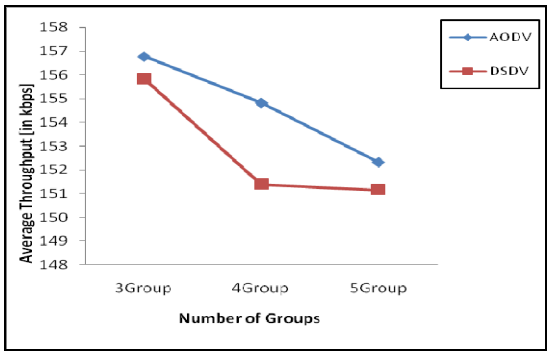

Figure 1: Average Throughput with Traffic Type of AODV and DSDV with Number of Groups

Figure 1 shows that Average throughput performance of both AODV and DSDV with increasing number of groups is decreases. The Average Throughput with AODV decreases nearly linear while in DSDV, Average Throughput is decreased from 3 Group to 4 Group and slightly decreased from 4 Group to 5 Group. In CBR traffic, AODV perform well over the DSDV in terms of Average Throughput.

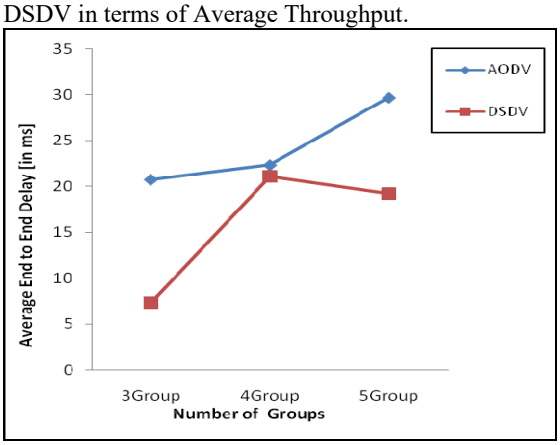

Figure 2: Average End to End Delay with CBR Traffic of AODV and DSDV with Number of Groups

Figure 2 shows that Average End to End Delay performance of AODV and DSDV with CBR traffic along with number of Groups. The Average End to End Delay with AODV slighty increases from 3 group to 4 group and increases rapidly from 4 Group to 5 Group while in DSDV The Average End to End

Delay increases from 3 Group to 4 Group and decreases from 4 group to 5 group. In CBR traffic, DSDV perform well over the AODV because it has less value.

The Packet Delivery Ratio (PDR) with Traffic Type of AODV and DSDV with Number of Groups is shown in the figure 3.

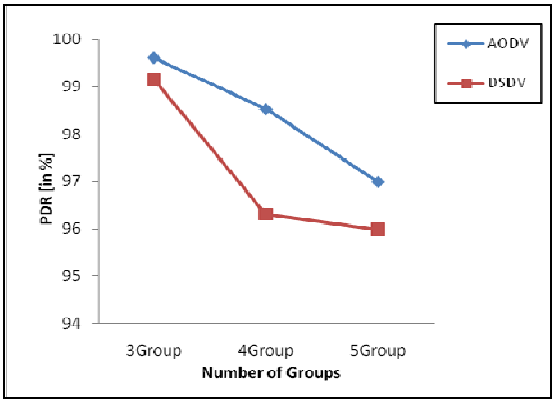

Figure 3: Packet Delivery Ratio with CBR Traffic AODV and DSDV with Number of Groups

Figure 3 shows that Packet Delivery Ratio (PDR) of both AODV and DSDV with CBR Traffic is decrease with increment in group.. In CBR Traffic, the Packet Delivery Ratio of AODV is better than DSDV with all the groups. The Normalized Routing Load with CBR traffic of AODV and DSDV with number of Groups is shown in the figure 4.

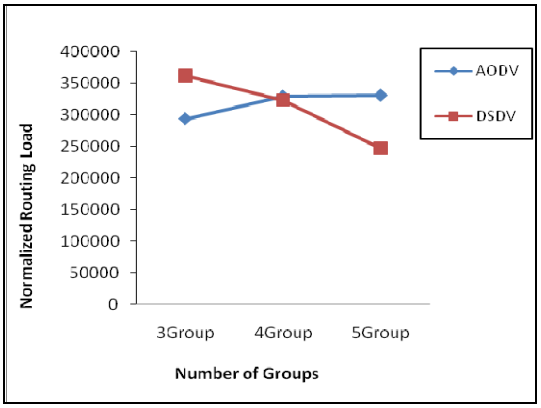

Figure 4: Normalized Routing Load with CBR Traffic of AODV and DSDV with Number of Groups

Figure 4 shows that Normalized Routing Load with CBR traffic of AODV protocol is increased with increasing group, while Normalized Routing Load with CBR traffic of DSDV protocol is decreased with increasing group. Normalized Routing Load of AODV protocol with CBR is less than DSDV protocol with 3 groups; thus AODV perform well over DSDV. The Normalized Routing Overload of DSDV protocol with CBR traffic is less than the AODV protocol with 5 groups, so DSDV perform well over the AODV protocol.

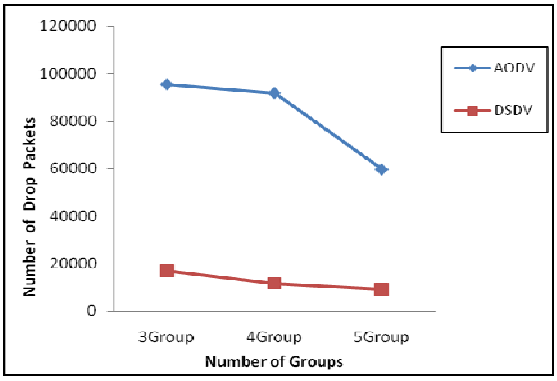

Figure 5: Number of Drop Packets with CBR Traffic of AODV and DSDV with Number of Groups

Figure 5 shows Number of Drop Packets with CBR traffic of AODV and DSDV with number of groups. It shows that Number of Drop Packets in both AODV and DSDV protocol with CBR traffic are decreases with increasing number of groups. The Number of Drop Packets in DSDV protocol is less than AODV protocol with all groups means DSDV performs well over the AODV in terms of Number of Drop Packets due to less route discovery Process.

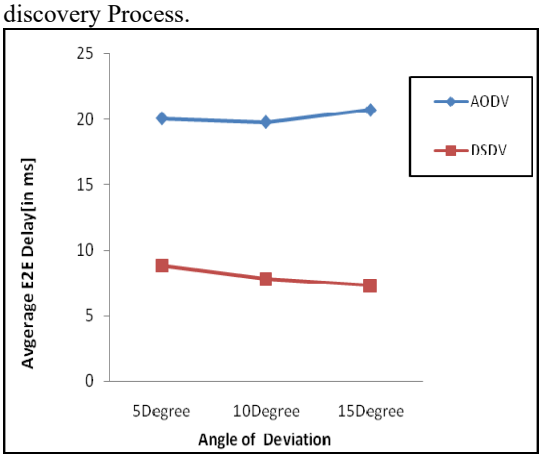

Figure 6: Average End to End Delay with CBR Traffic of AODV and DSDV with Angle of deviation

Figure 6 shows that Average End to End Delay performance of AODV and DSDV with CBR traffic along with 3 Group
for deviation of angles. The average End to End delay with AODV slightly increases with increment in angle, while in DSDV slightly decreases. Overall DSDV gives better performance over AODV.

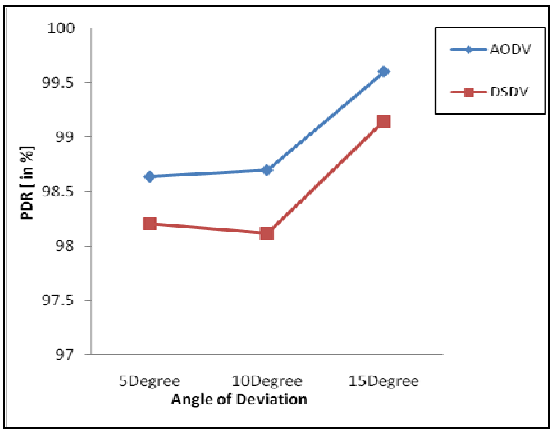

Figure 7: Packet Delivery Ratio with CBR Traffic AODV and DSDV with Angle of deviation

Figure 7 shows that Packet Delivery Ratio (PDR) of AODV with CBR Traffic slightly increases with increment in angle from 5 degree to 10 degree and rapidly increases in deviation of angle from 10 degree to 15 degree. The Packet Delivery Ratio(PDR) of DSDV with CBR Traffic slightly decreases in deviation of angle from 5 degree to 10 degree and then increases from 10 degree to 15 degree. In CBR Traffic, the Packet Delivery Ratio of AODV is better than DSDV with all the angles.

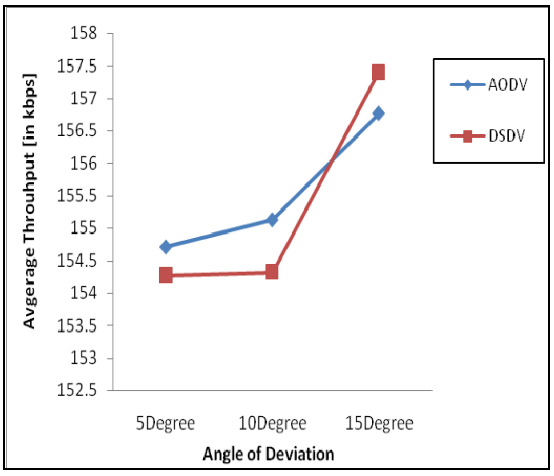

Figure 8: Average Throughput with Traffic Type of AODV and DSDV with Angle of deviation

Figure 8 shows that Average throughput performance of both AODV and DSDV with Angle of deviation. The Average Throughput with AODV increases with angle of deviation from 5degree to 15 degree while in DSDV, Average Throughput is slightly decreased from 5 degree to 10 degree and rapidly increased from 10 degree to 15 degree. In CBR traffic, AODV perform well over the DSDV in terms of Average Throughput with angle 5 degree and 10 degree while DSDV perform well over the AODV with angle 15 degree.

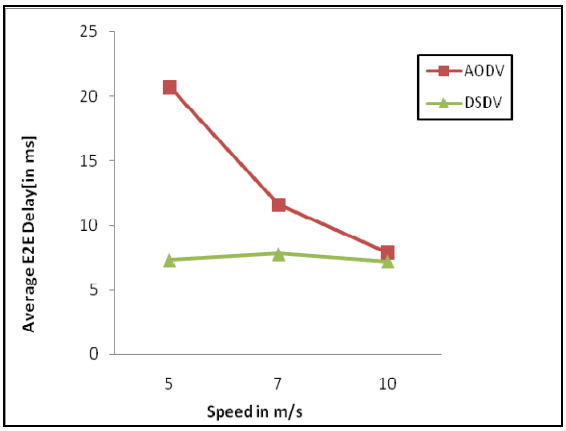

Figure 9: Average End to End Delay with CBR Traffic of AODV and DSDV with deviation in speed

Figure 9 shows that Average End to End Delay performance of AODV and DSDV with CBR traffic along with 3 Group
for deviation of speed. The average End to End delay with AODV decreases with increment in speed, while in DSDV slightly increases and then slightly decreases. Overall DSDV gives better performance over AODV.

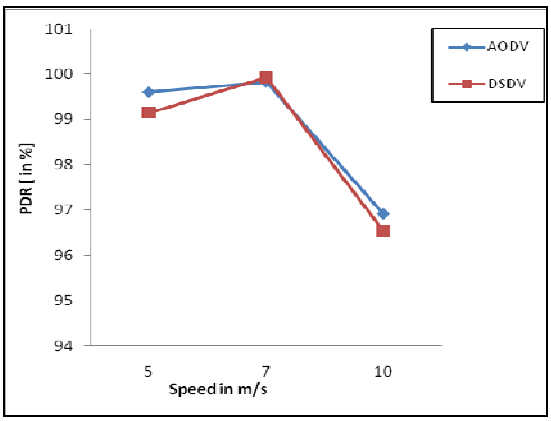

Figure 10: Packet Delivery Ratio with CBR Traffic AODV and DSDV with deviation in speed

Figure 10 shows that Packet Delivery Ratio (PDR) of AODV with CBR Traffic slightly increases with increment in speed from 5 to 7 m/s and rapidly decreases in from 7 to 10m/s. The Packet Delivery Ratio(PDR) of DSDV with CBR Traffic increases in from 5 to 7m/s and then decreases from 7 to 10m/s. In CBR Traffic, the Packet Delivery Ratio of AODV is better than DSDV with all speed.

Figure 11 shows that Average Throughput of AODV with CBR Traffic slightly increases with increment in speed from 5 to 7 m/s and rapidly decreases in from 7 to 10m/s. The Packet Delivery Ratio(PDR) of DSDV with CBR Traffic increases in from 5 to 7m/s and then decreases from 7 to 10m/s. In

CBR Traffic, the Average Throughput of AODV is better than DSDV with all speed

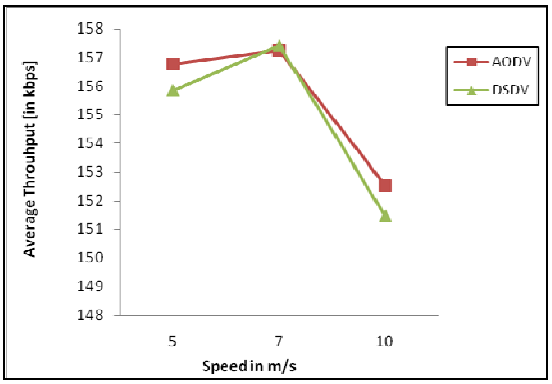

Figure 11: Average Throughput with Traffic Type of AODV and DSDV with deviation in speed

5. Conclusion and Future Scope

From the above simulation results, we observe that Average throughput performance of AODV with CBR traffic with all groups is better than DSDV, thus AODV perform well over the DSDV in terms of Average Throughput.

The Average End to End delay with CBR traffic, DSDV perform well over the AODV because it has less value. Average End to End delay of DSDV is less than AODV with all groups.

In CBR Traffic, the Packet Delivery Ratio of AODV is better than DSDV with all the groups. The Packet Delivery Ratio of AODV and DSDV is decreased with increasing number of group.

Normalized Routing Load of AODV protocol with CBR Traffic is less than DSDV protocol with 3 group, Normalized Routing Overload of DSDV protocol with CBR traffic is less than the AODV protocol with 5 groups.

The Number of Drop Packets in DSDV protocol is less than AODV protocol with all group means DSDV performs well over the AODV in terms of Number of Drop Packets.

In case of increasing Speed and Angle of Deviation AODV perform well over the DSDV in term of Average Throughput, Average End to End Delay and Packet Delivery Ratio.

These results indicate that AODV routing protocol perform well with CBR traffic in comparison of DSDV in terms of Average Throughput and Packet Delivery Ratio, while DSDV routing protocol perform well with CBR traffic over AODV in terms of Average End to End Delay and Number of Drop packets. Normalized Routing Load of AODV is less with 3 Group while Normalized Routing Load of DSDV is less with 5 Group.

In future we will try to evaluate and measure performance of these routing protocols with more number of groups under these scenarios and other routing protocol as well. Current work is an attempt under equal number of distribution of node in each group, in future the performance should be measured in unequal number of distribution of node in each group as well.

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FUZZY SET APPROACHES TO DATA MINING OF ASSOCIATION RULE

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Abstract:- Data mining on large databases has been a major concern in research community due to the difficulty of analyzing huge volume of data. This paper focuses on the large set area i.e. on fuzzy sets and knowledge discovery of data. Association rules* provide information in accessing significant correlations in large databases. We have combined an extended techniques developed in both fuzzy data mining and knowledge discovery model in order to deal with the uncertainty found in typical data.

INTRODUCTION

DATA MINING

Data mining, *the extraction of hidden predictive information from large databases*, is a powerful new technology with great potential to help companies focus on the most important information in their data warehouses. Data mining* tools predict future trends and behaviors, allowing businesses to make proactive, knowledge-driven decisions. The automated, prospective analyses offered by data mining move beyond the analyses of past events provided by retrospective tools typical of decision support systems. Data mining tools can answer business questions that traditionally were too time consuming to resolve. They scour databases for hidden patterns, finding predictive information that experts may miss because it lies outside their expectations.

FUZZY INFORMATION

Fuzzy sets are sets whose elements have degrees of membership. Fuzzy sets were introduced simultaneouslyby Lotfi A. Zadeh and Dieter Klaua in 1965 as an extension of the classical notion of set. In classical set theory, the membership of elements in a set is assessed in binary terms according to a bivalent condition — an element either belongs or does not belong to the set. By contrast, fuzzy set theory permits the gradual assessment of the membership of elements in a set; this is described with the aid of a membership functionvalued in the real unit interval [0, 1]. Fuzzy sets generalize classical sets, since the indicator functionsof classical sets are special cases of the membership functions of fuzzy sets, if the latter only take values 0 or 1. In fuzzy set theory, classical bivalent sets are usually called *crisp* sets. The fuzzy set theory can be used in a wide range of domains in which information is incomplete or imprecise, such as bioinformatics

A fuzzy set is a pair $(U, m)$where $U$is a set and $m: U \to [0, 1]$.

For each $x \in U$,the value $m(x)$is called the **grade** of membership of $x$in (U, m).For a finite set $U = \{x_1, \ldots, x_n\}$, the fuzzy set (U, m) is often denoted by $\{m(x_1)/x_1, \ldots, m(x_n)/x_n\}$.

Let $x \in U$.Then $x$is called not included in the fuzzy set (U, m)if$m(x) = 0$,$x$is called fully included if $m(x) = 1$,and $x$is called a **fuzzy member** if $0 < m(x) < 1$.The set $\{x \in U \mid m(x) > 0\}$is called the **support** of $(U, m)$and the set $\{x \in U \mid m(x) = 1\}$is called its **kernel**. The function $m$is called the **membership function** of the fuzzy set (U, m).

FUZZY LOGIC

Fuzzy logic is a form of many-valued logic or probabilistic logic it deals with reasoning that is approximate rather than fixed and exact. In contrast with traditional logic theory, where binarysets have two-valued logic, true or false, fuzzy logic variables may have a truth valuethat ranges in degree between 0 and 1. Fuzzy logic has been extended to handle the concept of partial truth, where the truth value may range between completely true and completely false. Furthermore, when linguistic variables are used, these degrees may be managed by specific functions.

UNCERTAINITY OF DATA MINING

Data is often associated with uncertainty because of measurement inaccuracy, sampling discrepancy, outdated data sources, or other errors. This is especially true for applications that require interaction with the physical world, such as location-based services and sensor monitoring. For example, in the scenario of moving objects (such as vehicles or people), it is impossible for the database to track the

exact locations of all objects at all time instants. Therefore, the location of each object is associated with uncertainty between update. These various sources of uncertainty have to be considered in order to produce accurate query and mining results. In recent years, there has been much research on the management of uncertain data in databases, such as the representation of uncertainty in databases and querying data with uncertainty. However, little research work has addressed the issue of mining uncertain data. We note that with uncertainty, data values are no longer atomic. To apply traditional data mining techniques, uncertain data has to be *summarized*into atomic values. Taking moving-object applications as an example again, the location of an object can be summarized either by its last recorded location, or by an expected location (if the probability distribution of an object's location is taken into account). Unfortunately, discrepancy in
the summarized recorded values and the actual values could seriously affect the quality of the mining results. Figure 1 illustrates this problem when a clustering algorithm is applied to moving objects with location uncertainty. Figure 1(a) shows the actual locations of a set of objects, and Figure 1(b) shows the recorded location of these objects, which are already outdated. The clusters obtained from these outdated values could be significantly different from those obtained as if the actual locations were available (Figure 1(b)). If we solely rely on the recorded values, many objects could possibly be put into wrong clusters. Even worse, each member of a cluster would change the cluster centroids, thus resulting in more errors.

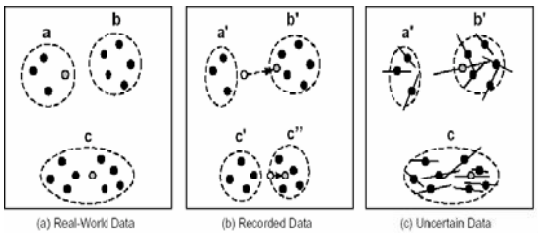


Figure 1.(a) The real-world data are partitioned into three clusters (a, b, c). (b) The recorded locations of some objects
(shaded) are not the same as their true location, thus creating clusters a', b', c' and c''. Note that a' has one fewer object than
a, and b' has one more object than b. Also, c is mistakenly split into c' and c''. (c) Line uncertainty is considered to produce
clusters a', b' and c. The clustering result is closer to that of (a) than (b).

FUZZY DATA MINING

Fuzzy set has been in pattern recognition , especially fuzzy clustering algorithms (Bezdek 1974*) . hence much of the effort in fuzzy data mining has been by the use of fuzzy clustering and fuzzy set approaches in neural network and genetic algorithm(Hirota and Pedrycz 1999*).In fuzzy set theory an important consideration is the treatment of data from a linguistic view point from this has developed an approach that uses linguistically quantified propositions to summarize the content of a data base by providing a general characterization of the analyzed data(Yager 1991 Kacprzyk and Zadrozny 2000*).A common organization of data for data mining is the multidimensional data queue in data warehouses.

Fuzzy data mining for generating association rules has been considered by a number of researchers.There are approaches using the SETM*(set-oriented mining)algorithm (Shu et al 2001) and other techniques(Bose and Pivert 2001*) but most have beenbased on important Apriorialgorithm.Extentions have included fuzzy sets approaches to quantitativesdata, hierarchies or taxonomies, weighted rules and interestingness measures.For our work, our main focus is onApriori algorithm motivated by some of the above development.

ASSSOCIATION RULES IN DATA MINING

Association rules* are if/then statements that help uncover relationships between apparentlyunrelated data in a relational databaseor other information repository.

An example of an association rule :

"If a customer buys a dozen eggs, he is 80% likely to also purchase milk."

Association rules are created by analyzing data for frequent if/then patterns and using the criteria *support* and *confidence* to identify the most important relationships.*Support* is an indication of how frequently the items appear in the database. *Confidence* indicates the number of times the if/then statements have been found to be true. In data mining association rules are useful for analyzing and predicting customer behavior. They play an important part in shopping basket data analysis, product clustering, catalog design and store layout.

$$\{\text{onions, potatoes}\} \Rightarrow \{\text{burger}\}$$

For example, the rule found in the sales data of a supermarket would indicate that if a customer buys onions and potatoes together, he or she is likely to also buy hamburger meat. Such information can be used as the basis for decisions about marketing activities such as, e.g., promotional pricing or product placement. In addition to the above example from market basket analysis association rules are employed today in many application areas includingWebusage

miningintrusion detectionandbioinformatics. As opposed to sequence mining, association rule learning typically does not consider the order of items either within a transaction or across transactions.

Example database with 4 items and 5 transactions

transaction ID	milk	bread	butter	beer
1	1	1	0	0
2	0	0	1	0
3	0	0	0	1
4	1	1	1	0
5	0	1	0	0

Following the original definition by Agrawal et al the problem of association rule mining is defined as: Let $I = \{i_1, i_2, \ldots, i_n\}$ be a set of n binary attributes called *items*. Let $D = \{t_1, t_2, \ldots, t_m\}$ be a set of transactions called the *database*. Each transaction in D has a unique transaction ID and contains a subset of the items in I. A *rule* is defined as an implication of the form $X \Rightarrow Y$ where $X, Y \subseteq I$ and $X \cap Y = \emptyset$. The sets of items (for short *itemsets*) X and Y are called *antecedent* (left-hand-side or LHS) and *consequent* (right-hand-side or RHS) of the rule respectively.

To illustrate the concepts, we use a small example from the supermarket domain. The set of items is $I = \{\text{milk}, \text{bread}, \text{butter}, \text{beer}\}$ and a small database containing the items (1 codes presence and 0 absence of an item in a transaction) is shown in the table to the right. An example rule for the supermarket could be $\{\text{butter}, \text{bread}\} \Rightarrow \{\text{milk}\}$ meaning that if butter and bread are bought, customers also buy milk.

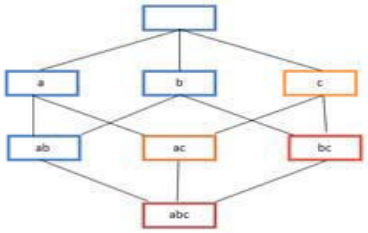
Useful Concepts

To select interesting rules from the set of all possible rules, constraints on various measures of significance and interest can be used. The best-known constraints are minimum thresholds on support and confidence.

- The *support* $\text{supp}(X)$ of an itemset X is defined as the proportion of transactions in the data set which contain the itemset. In the example database, the itemset $\{\text{milk}, \text{bread}, \text{butter}\}$ has a support of $1/5 = 0.2$ since it occurs in 20% of all transactions (1 out of 5 transactions)
- The *confidence* of a rule is defined $\text{conf}(X \Rightarrow Y) = \text{supp}(X \cup Y)/\text{supp}(X)$. For example, the rule $\{\text{milk}, \text{bread}\} \Rightarrow \{\text{butter}\}$ has a confidence of $0.2/0.4 = 0.5$ in the database, which means that for 50% of the transactions containing milk and bread the rule is correct (50% of the times a customer buys milk and bread, butter is bought as well). Be careful when reading the expression: here supp(X∪Y) means "*support for occurrences of transactions where **X and Y both appear***", not "*support for occurrences of transactions where **either X or Y appears***", the latter interpretation arising because set union is equivalent to logical disjunction.The argument of $\text{supp}()$ is a set of preconditions, and thus becomes more restrictive as it grows (instead of more inclusive).
- Confidence can be interpreted as an estimate of the probability $P(Y|X)$, the probability of finding the RHS of the rule in transactions under the condition that these transactions also contain the LHS
- The *lift* of a rule is defined as $\text{lift}(X \Rightarrow Y) = \frac{\text{supp}(X \cup Y)}{\text{supp}(X) \times \text{supp}(Y)}$ or the ratio of the observed support to that expected if X and Y were independent. The rule $\{\text{milk}, \text{bread}\} \Rightarrow \{\text{butter}\}$ has a lift of $\frac{0.2}{0.4 \times 0.4} = 1.25$.
- The *conviction* of a rule is defined as $\text{conv}(X \Rightarrow Y) = \frac{1 - \text{supp}(Y)}{1 - \text{conf}(X \Rightarrow Y)}$. The rule $\{\text{milk}, \text{bread}\} \Rightarrow \{\text{butter}\}$ has a conviction of $\frac{1 - 0.4}{1 - .5} = 1.2$, and can be interpreted as the ratio of the expected frequency that X occurs without Y , if X and Y were independent divided by the observed frequency of incorrect predictions. In this example, the conviction value of 1.2 shows that the rule

$\{milk, bread\} \Rightarrow \{butter\}$ would be incorrect 20% more often (1.2 times as often) if the association between X and Y was purely random chance.

Process



Frequent itemset lattice, where the color of the box indicates how many transactions contain the combination of items. Note that lower levels of the lattice can contain at most the minimum number of their parents' items; e.g. {ac} can have only at most $min(a, c)$ items. This is called the *downward-closure property*.[2]

Association rules are usually required to satisfy a user-specified minimum support and a user-specified minimum confidence at the same time. Association rule generation is usually divide up into two separate steps:

1. First, minimum support is applied to find all *frequent itemsets* in a database.
2. Second, these frequent itemsets and the minimum confidence constraint are used to form rules.

While the second step is straightforward, the first step needs more attention.

Finding all frequent itemsets in a database is difficult since it involves searching all possible itemsets (item combinations). The set of possible itemsets is the power set over I and has size $2^n - 1$ (excluding the empty set which is not a valid itemset). Although the size of the powerset grows exponentially in the number of items n in I, efficient search is possible using the ***downward-closure property*** of supportalso called *anti-monotonicit*) which guarantees that for a frequent itemset, all its subsets are also frequent and thus for an infrequent itemset, all its supersets must also be infrequent. Exploiting this property, efficient algorithms (e.g., Apriori[1]andEcla) can find all frequent itemsets.

CONCLUSION

We have presented an approach to discovery of association rules for fuzzy spatial data where we are interested in correlations of spatial data. We have combined and extended techniques developed in both spatial and fuzzy data mining in order to deal with uncertainty found in typical spatial data.

Some of our future work include hierarchies, weight and interestingness measures. Type II data of spatial relationship have cases that involve hierarchies. for example , the NEAR predicate could be organized as a hierarchy of relationships such as contains , intersects etc. Each of these might have a different strength in the hierarchy as well as being defined by fuzzymembership functions . The combination of these values is complex and must be worked out in the knowledge discovery context.

ACKNOWLEDGEMENT

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ANALYSIS OF UNIPATH AND MULTIPATH ROUTING PROTOCOLS IN MOBILE ADHOC NETWORKS.

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Abstract: A MANET is an interconnection of mobile devices by wireless links, which forms a dynamic topology. Routing protocols play a vital role in transmission of data across the network. The two major classifications of routing protocols are unipath and multipath. In this paper, we have evaluated the performance of a widely used on-demand unipath routing protocol called AODV and multipath routing protocol AOMDV and MDART . These protocol has been selected due to its edge over other protocols in various aspects, such as reducing delay, routing load etc. The evaluation of all the protocols is carried out in terms of different scenarios using NS2.

IndexTerms—*MANET, unipath, multipath routing , AOMDV,MDART,AODV,CBR,scenario patterns,N2*

I. INTRODUCTION

MANETs are considered an easy, quick and cost effective deployment option among other type of networks. Due to such features, the ad hoc network applications are no more limited to military, disaster recovery and emergency management but also extended to personal/local area networks.As MANET is a totally different kind of network, it needs a different set of protocols to perform network activities. Routing protocols are an important part of any network to discover and maintain routes between any given pair of node. Routing protocols in Ad Hoc network are differentiated in terms of hop-by-hop or source routing, reactive or proactive approach, single or multi-path, distance vector or link state based, uni-cast or multi-cast etc. Reactive approach is considered more efficient than proactive approach as it only discovers and maintains routes between nodes which need to communicate with each other .Multi-path routing protocols creates less overhead as compared to single-path routing protocols and are susceptible to high network load, frequent route failure due to mobility, congested networks etc.

The most popular on-demand routing protocol, Ad-hoc On-demand Multipath Distance Vector (AOMDV) routing protocol [1] is an improvement of Ad-hoc On-demand Routing Protocol (AODV). AOMDV discovers multiple paths between a source and destination to provide efficient fault tolerance by providing quicker and more efficient recovery from route failures in a dynamic network. As AOMDV discovering multiple paths in a single route discovery attempt, new route needs to be discovered only when all paths fail. This reduces not merely the route discovery latency but the routing overheads also.

AODV is a reactive and a single path routing protocol. It allows users to find and maintain routes to other users in the network whenever such routes are needed. The adhoc on demand distance vector routing protocol provides unicast, broadcast and multicast communications in adhoc networks. AODV initiates route discovery whenever a route is needed by the source node or whenever a node wishes to join a multicast group. Routes are maintained as long as they are needed by the source node or as long as the multicast group exists and routes are always loop free through the use of sequence numbers [2].

A multipath enhancement to DART [3] was proposed in [4] called Augmented Tree based Routing (ATR), but in ATR the DHT system is replaced by a global lookup table which is available to all the nodes, which results in a great impact on the address discovery, which is a key process of the whole routing protocol. Among the DHT based Routing Protocols, M-DART is an enhancement of shortest path routing protocol known as Dynamic Address Routing (DART) [3]. M-DART discovers and stores multiple paths to the destination in the routing table. The remainder of this paper is organized as follows. Section II discusses Dynamic Addressing and Dynamic Hash Table (DHT). Section III discusses M-DART and AOMDV routing protocols. Section IV discusses the simulation results of the two routing protocols with different parameters. Finally, we summarize and conclude our paper in section V.

The protocol, namely the multi-path dynamic address routing (M-DART), is based on a prominent DHT-based shortest-path routing protocol known as DART [4,5]. M-DART extends the DART protocol to discover multiple routes between the source and the destination. In such a way, M-DART is able to improve the tolerance of a tree-based address space against mobility as well as channel impairments. Moreover, the multi-path feature also improves the performances in case of static topologies thanks to the route diversity.

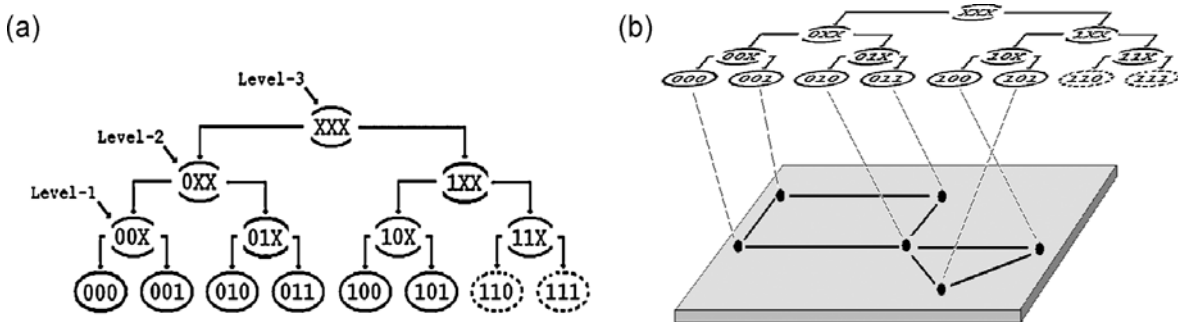


Figure 1. Relationship between the address space overlay and the physical topology

M-DART has two novel aspects compared to other multi-path routing protocols [6--7]. First, the redundant routes discovered by M-DART are guaranteed to be communication-free and coordination-free, i.e., their discovering and announcing though the network does not require any additional communication or coordination overhead. Second, M-DART discovers all the available redundant paths between source and destination, not just a limited number.

II. AN OVERVIEW OF MULTIPATH PROTOCOLS IN TERMS OF DYNAMIC ADDRESSING AND DHT.

Dynamic Addressing [3] separates the routing address and the identity of a node. The routing address of a node is dynamic and changes with movement of the node to reflect the node's location in the network topology.

a) MDART:

2.1. Address space: The network addresses are strings of l bits, thus the address space structure can be represented as a complete binary tree of l + 1 levels, that is a binary tree in which every vertex has zero or two children and all leaves are at the same level (Figure 1a). In the tree structure, each leaf is associated with a network address, and an inner vertex of level k, namely a level-k subtree, represents a set of leaves (that is a set of network addresses) sharing an address prefix of l – k bits. For example, with reference to Figure 1a, the vertex with the label 01X is a level-1 subtree and represents the leaves 010 and 011. Let us define level-k sibling of a leaf as the level-k subtree which shares the same parent with the level-k subtree the leaf belongs to. Therefore, each address has l siblings at all and each

other address belongs to one and only one of these siblings. Referring to the previous example, the vertex with the label1XXis the level-2 sibling of the address 000, and the address 100 belongs only to this sibling. In Figure 1b, the address space is alternatively represented as an overlay network built upon the underlying physical topology. Its tree-based structure offers simple and manageable procedures for address allocation, avoiding to rely on inefficient mechanisms like flooding.

2.2. Route discovery and packet forwarding

Each node maintains a routing table composed by l sections, one for each sibling, and the kth section stores the path toward a node belonging to the level-k sibling. Each section stores five fields: the sibling to which the entry refers to, the next hop, the cost needed to reach a node belonging to that sibling using the next hop as forwarder, the network id used for address validation, and the route log used by the loop avoidance mechanism.. The table has three sections: the first stores the best route, according to a certain metric, toward the node 001, the second toward a node belonging to the sibling 01X, and the last toward nodes belonging to the sibling 1XX.The routing state information maintained by each node is kept consistent through the network by means of periodic routing updates exchanged by neighbor nodes. Each routing update stores l entries, and each entry is composed by four fields: the sibling id, the cost, the network id, and the route log. The packet forwarding process exploits a hop-by-hop routing based on the network addresses and it is summarized by Algorithm 1. To route a packet, a node compares its network address with the destination one, one bit at a time starting with the most significant (left-side) bit, say the l th. If the I th bit is different, the node forwards the packet towards one the route stored in the I th section. With reference to the previous example, if the node 000 has to send a packet to the node with the address 101, then it will forward the packet to the next hop stored in the third
section (i.e., the node 010).

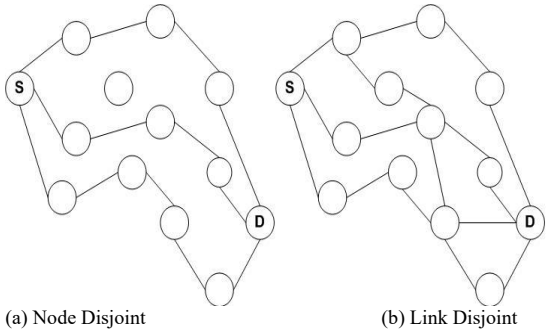
b) AOMDV:

AOMDV [2], [3] is a multi-path routing protocol. It is an extension to AODV and also provides two main services i.e. route discovery and maintenance. Unlike AODV, every RREP is being considered by the source node and thus multiple paths can be discovered in one route discovery. Being the hop-by-

hop routing protocol, the intermediate node can maintain multiple path entries in their respective routing table.

hop. To discover distinct paths, AOMDV suppresses duplicate route requests (RREQs) at intermediate nodes. Such suppression comes in two different variations, resulting in either node (illustrated in Fig. 2 (a)) or link (illustrated in Fig. 2(b)) disjoint. AOMDV can be configured to either discover the link (no common link between any given pair of nodes) or node (in addition to link disjoint, common intermediate nodes are also excluded between any given pair of nodes) disjoints paths.

Disjoint alternate paths are a good choice than overlapping alternate paths, as the probability of their interrelated and concurrent failure is smaller. This property can be helpful in an adversarial environment where malicious activity can also cause additional link failure. Finding a disjoint path is quite straightforward in source routing (as every node maintain complete path information for every path), but hop-by-hop routing i.e. AOMDV is considered more efficient in terms of creating less overhead Number of paths in any given source and destination is directly proportional to the number of nodes in entire network. AOMDV works more efficiently in dense and heavy networks.



(a) Node Disjoint (b) Link Disjoint

Fig. 2 AOMDV Multi-path

III.TRAFFIC PATTERNS

Traffic Patterns describe how the data is transmitted from source to destination. The two types oftraffic patterns employed in MANET are CBR and TCP Traffic patterns.

3.1. CBR Traffic Pattern

The qualities of **Constant Bit Rate** (CBR) traffic pattern [2,14] are i) unreliable: since it has no connection establishment phase, there is no guarantee that the data is transmitted to the destination, ii) unidirectional: there will be no acknowledgment from destination for confirming the data transmission and iii) predictable: fixed packet size, fixed interval between packets, and fixed stream duration.

3.2. TCP Traffic pattern

The qualities of **Transmission Control Protocol** (TCP) traffic pattern [8,9] are i) reliable: since connection is established prior to transmitting data, there is a guarantee that the data is being transmitted to the destination, ii) bi-directional: every packet that has to be transmitted by the source is acknowledged by the destination, and iii) conformity: there will be flow control of data to avoid overloading the destination and congestion control exists to shape the traffic such that it conforms to the available network capacity [8]. Today more than 95% of the Internet protocol traffic is carried out through TCP.

3.1 Simulation Parameters

The table below presents the parameters used in the Simulations that we can observe the parameters that Suffered variations and that stayed fixed during the simulations. The obtaining of the communication patterns and movement felt through the use of scripts in the distribution of network simulator 2(version 2.34). The simulator uses these patterns to vary the movement of nodes and communication between them.

Table1 Simulation Parameters

Parameter	Value
Simulator	NS2.34
Area	1000m x1000m
Number of Nodes	10,30,50,100,150.
Routing Protocols	AODV,AOMDV, MDART
Traffic Type	CBR
Simulation Time	100 sec

A. Average Throughput

As shown in Figure 3, for small number of nodes (<100) , the throughput of M-DART is very slightly better than AOMDV and AODV they behaves like M-DART up to 100 nodes, but it starts to behave poorly beyond this since it works on On-Demand technology.

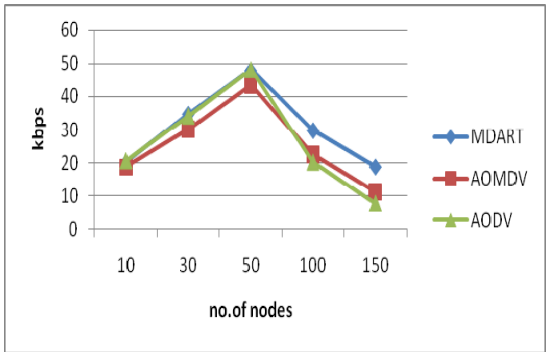


FIG.3 THROUGHPUT VS NUMBER OF NODES

B. Packet Delivery Ratio (PDR)

Many protocols in MANETs use packet delivery ratio (PDR) as a metric to select the best route, transmission rate or power. As shown in Figure 4, M-DART has better throughput than both AOMDV and AODV as the number of nodes increases.

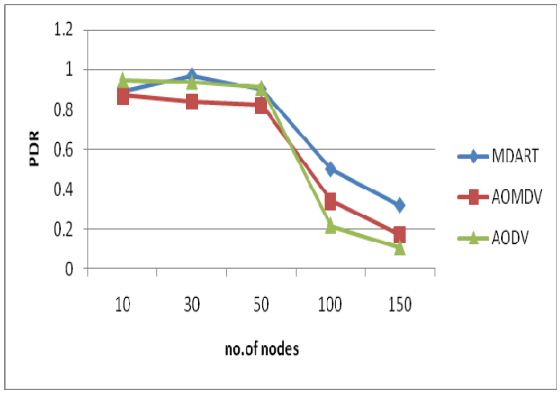


FIG. 4 PDR VS NUMBER OF NODES

C. Average End to end delay

As shown in Figure 5, for small number of nodes, AOMDV and M-DART shows approximately same End to End Delay. As the number of nodes increases, End to End Delay of M-DART grows linearly, whereas AODV shows higher growth than both AOMDV and M-DART.

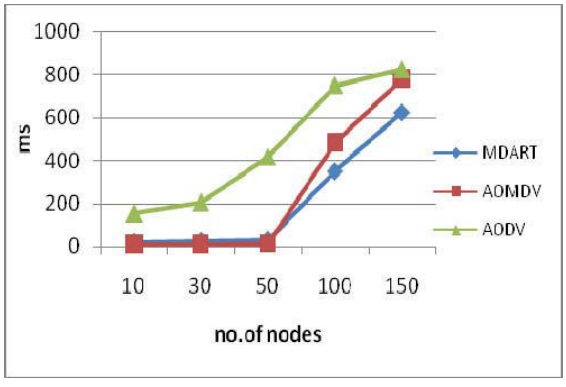
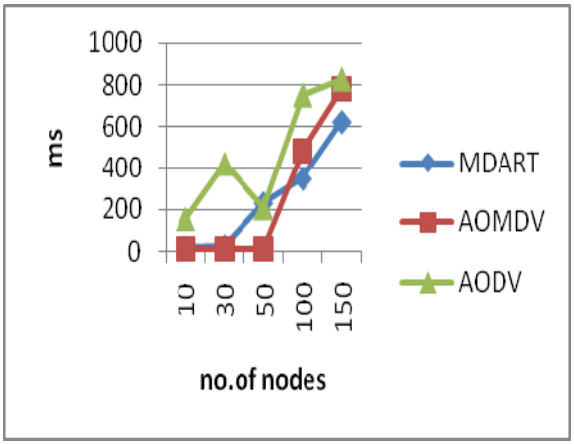


FIG.5 END TO END DELAY VS NUMBER OF NODES

D. Normalized Routing Overhead

Normalized Routing Overhead is the number of routing packets transmitted per data packet towards destination Figure6 shows the Normalized Routing Overhead of MDART, AOMDV and AODV upto 150 nodes.



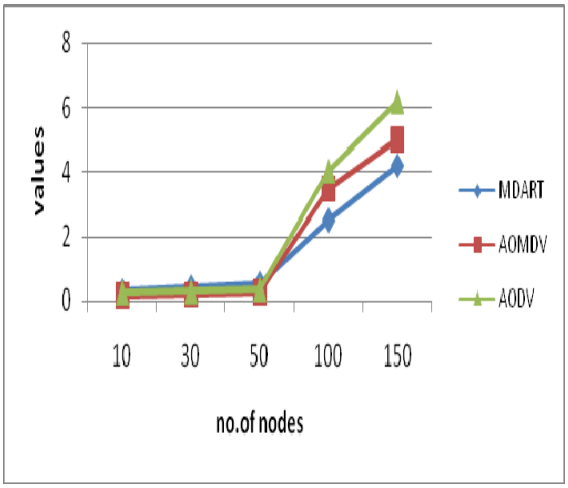


FIG.5 NRO VS NUMBER OF NODES

V. CONCLUSION

DHT based multipath routing supports scalability in various wireless networks as M-DART is an efficient protocol which gives improved performance in large networks. We have also found that when number of nodes grows, the performance of other multipath and unipath routing protocols like AOMDV and AODV is not appropriate while M-DART is performing better in terms of Throughput, PDR, End to End Delay and NRO. In future the work should be carried on some different traffic scenarios and others multipath protocols.

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LOW-POWER WITH AREA-EFFICIENT USING CSLA IN DATA PROCESSING PROCESSORS

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Abstract—Digital Adders are the core block of DSP processors. Carry Select Adder (CSLA) is used rapidly in data-processing processors to perform enormous arithmetic functions. An advantage production in Area and Power is determined by the usage of gate level implementation. According to the modification CSLA is implemented by equating with regular SQRT CSLA. Relating with the concept, regardless decrease in Area and Power with negativity of delay.This paper describe the performance of a method by considering the concept of Power, Area and Delay in Real time Application by using CMOS process technology. Comparison and consideration responses is more worthy in relation with SQRT CSLA.

Index Terms—Xilinx, area-efficient, Adders, Power consumption.

I. INTRODUCTION

Despite the performance limitations, delay in the VLSI chips should be decreased . Here we design a circuit to achieve the Low power and less area or to meet a delay constraints. The saying goes that if you can count, you can control. Addition is a fundamental operation for any digital system, digital signal processing or control system. A fast and accurate operation of a digital system is greatly influenced by the performance of the resident adders.

II. BASIC ADDER UNIT

The most basic arithmetic operation is the addition of two binary digits, i.e. *bits*. A combinational circuit that adds two bits, according the scheme outlined below, is called a half adder. A full adder is one that adds three bits, the third produced from a previous addition operation. One way of implementing a full adder is to utilizes two half adders in its implementation. The full adder is the basic unit of addition employed in all the adders. The basic Full Adder is shown in fig1.

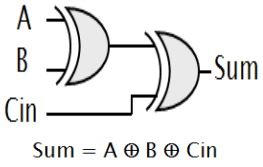


Figure 1: A Full Adder

Adders are also very important component in digital systems because of their extensive use in other basic digital operations such as subtraction, multiplication and division. Hence, improving performance of the digital adder would greatly advance the execution of binary operations inside a circuit compromised of such blocks. The performance of a digital circuit block is gauged by analyzing its power dissipation, layout area and its operating speed.

Ripple carry adder-small area but large delay.Gates, transistor and wires are more consumption elements.RCA having low power due to less number of transistors. RCA consists of Half Adder and Full adders as shown in Fig 2.

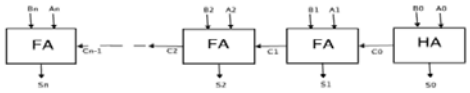


Figure 2: Ripple carry adder

Carry select adder- Area more than RCA. But delay less than RCA. The output of CSLA is considered from the multiplexer as shown in following figure 3.

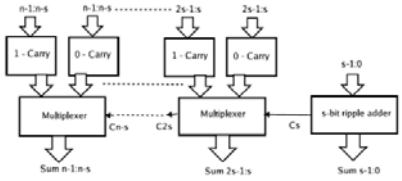


Figure 3: Carry Select Adder

In this paper we have studied 8-,16-,32- and 64-bit carry select. The design of the 16-b regular SQRT CSLA is shown in Fig. 4.

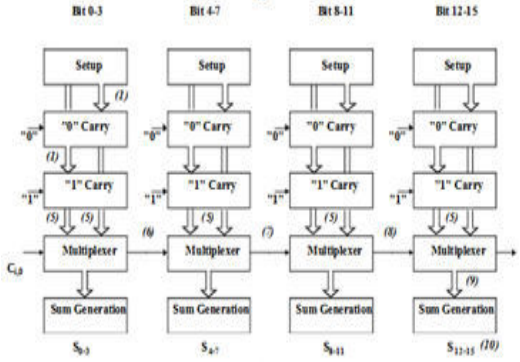


Figure 4: A 16 bit Regular Carry Select Adder

In the regular CSLA the area will be more. So to reduce the area we use BEC.The parallel RCAwith Cin=1 is replaced with BEC

III. BINARY EXCESS ONE CODE

Asstated above the mainideaoft his workis to useBEC instead of the RCA with C_{in} =1 inordertoreducetheareaandpowerconsumptionofthere gularCSLA.Toreplacethen-bitRCA, an n+1-bitBECis required. Astructure and the functiontableofa4-bBECareshowninFig.5andTable 1,respectively.
Fig.6illustrateshowthebasicfunctionoftheCSLAis obtainedbyusingthe4-bitBECtogetherwiththemux.Oneinputofthe8:4muxget sasitinput(B3,B2,B1,andB0)andanotherinputofthemu xistheBECoutput.Thisproduces thetwopossiblepartialresultsinparallelandthemuxisuse dtoselecteithertheBECoutputorthedirectinputsaccordi ngtothecontrolsignal Cin.TheimportanceoftheBEClogicstems fromthelarge siliconareareductionwhentheCSLAwithlarge numberofbitsaredesigned.TheBooleanexpressionsofth e4-bitBECislistedas(notethefunctionalsymbols ~NOT,& AND, ^XOR)

X0 = ~B0
X1 = B0^B1
X2 = B2 ^ (B0&B1)
X3 = B3 ^ (B0&B1&B2).

The basic idea of this work is to use Binary to Excess-1 Converter (BEC) instead of RCA with C_{in}=1 in the regular CSLA to achieve lower area and power consumption [2]–[4]. The main advantage of this BEC logic comes from the lesser number of logic gates.

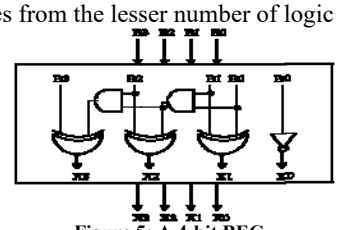


Figure 5: A 4-bit BEC

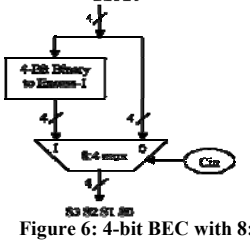


Figure 6: 4-bit BEC with 8:4 mux

TABLE 1
TRUTH TABLE OF 4-BIT BINARY TO EXCESS-1

Binary	Excess-1
0000	0001
0001	0010
0010	0011
0011	0100
0100	0101
0101	0110
0110	0111
0111	1000
1000	1001
1001	1010
1010	1011
1011	1100
1100	1101
1101	1110
1110	1111
1111	0000

TABLE 2
DELAY AND AREA COUNT OF A BASIC BLOCKS OF CLSA

Adder Blocks	Delay	Area
XOR	3	5
2:1 Mux	3	4
Half Adder	3	6
Full Adder	6	13

IV. EVALUATION OF DELAY AND AREA OF MODIFIED 16-BIT SQRT CSLA

The structure of the proposed 16-b SQRT CSLA using BEC for RCA with Cin=1 to optimize the area and power is shown in Fig. 7. We split the structure into five groups.
1) The group2 [see Fig. 8(a)] has one 2-b RCA which has 1 FA and 1 HA for Cin=0. Instead of another 2-b RCA with Cin=1 a 3-b BEC is used which adds one to the output from 2-b RCA. Based on the consideration of delay values of Table 2, the arrival time of selection input *c1[time(t)=7]* of 6:3 mux is earlier than the *s3[t = 9]* and *c3[t = 10]* and later than the *s2[t = 4]*. Thus, the sum3 and final *c3* (output from mux) are depending on s3 and mux and partial c3(input to mux) and mux, respectively. The sum2 depends on *c1* and mux.

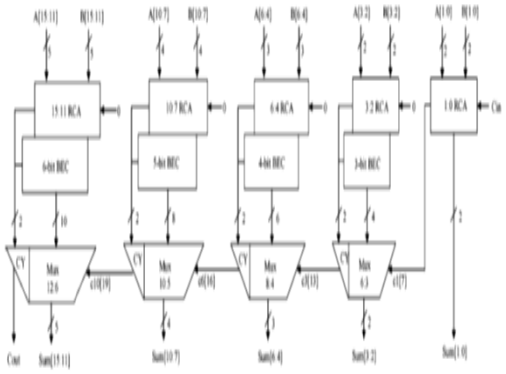
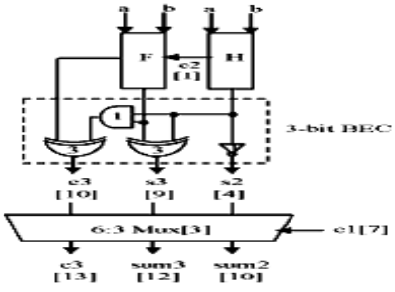


Figure 7: Modified16-bSQRTCSLA.

2) For the remaining group's the arrival time of mux selection input is always greater than the arrival time of data inputs from the BEC's. Thus, the delay of the remaining groups depends on the arrival time of mux selection input and the mux delay.



(a)

Figure 8: Delay and area evaluation of modified SQRT CSLA: (a) group2

3) The area count of group2 is determined as follows:

Gatecount = 43(FA+HA+Mux+BEC)
FA = 13(1*13)
HA = 6(1*6)
AND = 1
NOT = 1
XOR = 10(2*5)
Mux = 12(3*4)

It is clear that the proposed modified SQRT CSLA saves 113 gate areas than the regular SQRT CSLA, with only 11 increases in gate delays.

V. COMPARISION OF THE ADDERS

This square-root relation has a major impact, which is illustrated in the figure 9, where the delays of both the linear and square-root select adders are plotted as a function of N. It can be observed that from large values of N, tad becomes almost a constant.

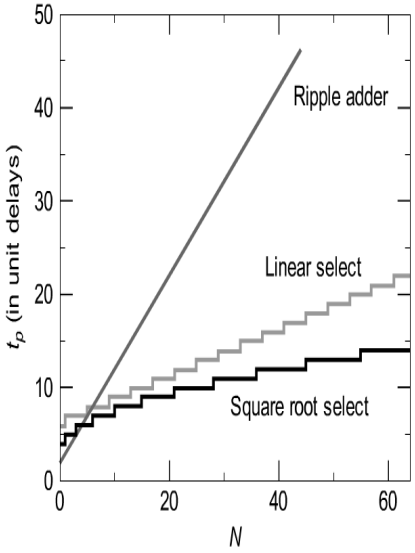


Figure 9: Comparison of delays

VI. ASIC IMPLEMENTATION

The proposed designs in this paper have been developed using Verilog-HDL and synthesized in Xilinx by using CMOS technology.

VII. CONCLUSION

A simple approach is proposed in this paper to reduce the area and power of SQRT CSLA architecture. The reduced number of gates of this work offers the great advantage in the reduction of area and also the total power. The compared results show that the modified SQRT CSLA has a slightly larger delay. The modified CSLA architecture is therefore, low area, low power, simple and efficient for VLSI hardware implementation. This adder's time delay can be improved by using the Square Root carry select adder method.This adder is one of the fastest adders, but it comes at the price of area and power usage.The simulation results of both the CSLA structuresin terms of Area and Delay is shown in Table 3

TABLE 3
COMPARISON OF REGULAR AND MODIFIED SQRT CSLA

	AREA (NUMBER OF SLICES)		*DELAY (NANO SECONDS)*	
	REGLAR	*MODIFIED*	*REGULAR*	*MODIFIED*
8 BIT	*9*	*7*	*14.758*	*15.123*
16 BIT	*25*	*23*	*18.962*	*19.936*
32 BIT	*50*	*45*	*32.918*	*34.664*
64 BIT	*99*	*91*	*60.830*	*64.120*

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BLUETOOTH BASED INDOOR POSITIONING SYSTEM: IMPLEMENTATION AND WORKING ALONG WITH AN ALARM CONTROL SYSTEM.

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Abstract: This paper presents a system, to locate and track people and assets indoors, based on Bluetooth technology. People are detected by the Bluetooth Positioning Beacons by wearing any kind of Bluetooth unit such as radio, headsets etc. People in distress can press their panic button, and a text message with location information will reach the colleagues or rescue central instantly. This system will create a much more effective working environment for Lone workers or Personnel with a high risk.Moreover, this system has its own practical applications and limitations which are enlisted further

INTRODUCTION:

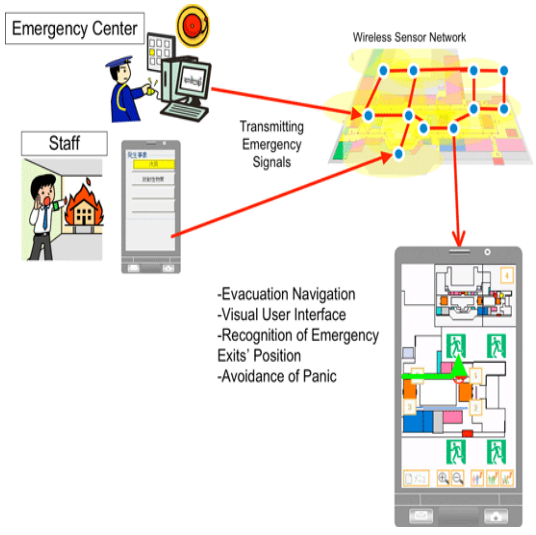
Indoor Positioning Module is a Bluetooth based localisation system. Any Bluetooth Units like Mobile Phones, TETRA Radio Terminals or Bluetooth Body-tags can be registered in the system. The Bluetooth Units can be seen by the system and act as a unique identification of the user. The positioning is done by a number of strategically mounted Bluetooth Positioning Beacons, which can monitor any bluetooth unit within its coverage area. If the Bluetooth Unit is registered in the Indoor Positioning Module software, its location is continuously monitored. The positioning is based on an enhanced cell-ID positioning technology where the position of a Bluetooth Unit is determined from an advanced calculation. Each Bluetooth Positioning Beacon is individually adjusted to cover a specific room or a geographical area and thereby creating a precise cell structure. The Indoor Positioning Module is tightly integrated with an alarm Control System. While the Indoor Positioning Module continuously monitors the position of Bluetooth Units the alarm Control System ensures appropriate actions in case a problem arises. The tight integration is made to ensure fast reaction to alerts in case the indoor positioning is used for lone worker protection.

Monitoring, Localization and Notification Examples:

There are numerous occasions where an Indoor Positioning Module helps locating employees:

1) When a lone worker lose consciousness or mobility, and do not respond inside a pre-set time interval, the Indoor Positioning Module can automatically notify colleagues or an outside rescue team of the exact position of the employee in danger.
2) Security personnel can be located quickly if attacked or calling for back-up.
3) Instead of having to convey the position by voice over the radio, security personnel can simply press the panic button on his radio. A few seconds later all his colleagues will know that he is in trouble and where he is in trouble.
4) Personnel with jobs, where there is a high risk of being attacked by clients (i.e. job centres or public institutions), can press their panic button if they are in a dangerous situation. Text messages with the exact location of the attack will then be sent directly to security personnel radio.

In all situations above and in many other - a quick and precise localisation of an employee is crucial for his safety. An automatic notification with position information from Indoor Positioning Module is the most efficient way to protect employees. With the solution lone workers can feel more secure and protected at work.



USING INDOOR POSITIONING:

Indoor positioning is established through a number of Bluetooth Position Beacons connected through a standard Ethernet LAN. The Beacons can be powered in two ways:

1. With power over Ethernet (POE), these beacons require only an Ethernet connection and a POE switch to function and to establish Bluetooth coverage.

2. With external 5VDC power supply

The indoor positioning system serves different purposes as described below:

i. If a user enables the Lone-Worker functionality on his mobile phone, lone worker supervision raises an alarm, the indoor location of the lone worker's Bluetooth unit can be detected and sent as text message to the on-call staff via the Alarm Control System.

ii. The Indoor Positioning Module is also able to establish automatic on-call alarm enable/disable functionality.

iii. With Indoor Positioning System it is possible to define critical areas in your building. These areas will require additional actions to be taken from your personnel.

SETTING UP THE INDOOR POSITIONING NETWORK:

The three steps for setting up the indoor positioning system using Bluetooth are:

1) A plan for where to best place the Bluetooth Position Beacons.

2) Selection of the right number of positioning beacons depending on the size of the installation.

3) Installation of the Alarm Control System with a valid license for the Indoor Positioning Module software.

BLUETOOTH NETWORK BEACONS:

The Bluetooth Position Beacon can be mounted on a wall or on the ceiling. The Beacon has an Ethernet connection and a power supply connector. Power-Over-Ethernet (POE) is also used to power the beacon, saving the external power supply. The beacons they support both mid-span and end-span POE.

INSTALLATION OF BLUETOOTH BASED BEACON:

Mount the Bluetooth Position Beacon on the wall or ceiling and connect the beacon to the Ethernet using a standard network cable. Connect the power supply to the Beacon and turn on the power if POE has not been chosen. The Beacon is registered on the network successfully if an LED on the network starts blinking.

THE TRACKING OF BLUETOOTH-UNITS:

Each beacon will constantly be requesting all nearby Bluetooth-units to send their Bluetooth identification address. Each time a Bluetooth-unit is registered, its location is updated in the Indoor Positioning System.

THE RIGHT PLACEMENT OF BLUETOOTH POSITIONING BEACONS:

An important step for a successful deployment of the Indoor Positioning System is the correct placement of the positioning beacons. When planning the placement of beacons, consider the following:

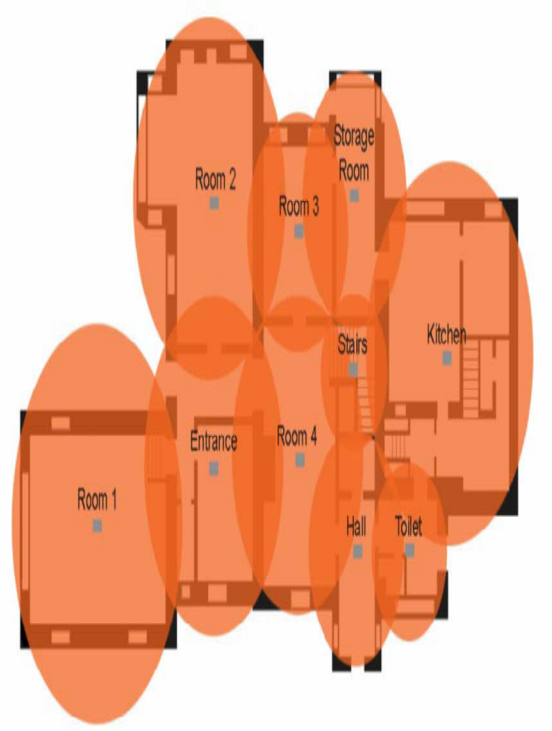
a) Decide the required level of granularity in the positioning system.
b) The front of the beacon is where the signal is slightly best, but otherwise the beacon emits a spherical signal.
c) Thick concrete walls and floors weaken the signal strength.
d) The signal emitting power of each beacon can be adjusted, but do not turn it down too low as some overlapping between signals from beacons is necessary to ensure coverage everywhere.
e) There should be no "holes" in the coverage area.
f) For greater granularity in the location information, there is a need to install a higher quantity of beacons, and decrease signal strength on each of these.
g) When installing on different floors of a building, try to place the Beacons on the same location on each floor.

WORKING:

Each of the small, discretely designed Bluetooth Positioning Beacons create a detection zone. The beacons are connected to the Alarm Control System software through a standard LAN network. In this way the whole setup is first brought up. People are detected by the Beacons by wearing any kind of Bluetooth unit. Every Bluetooth unit has its own unique identity, and it is registered in the original system. And now in case of any emergency, the

Alarm Control System dispatches alarms from any alarm source to the mobile phone or to an email account. Alarm Control System picks up alarms from any alarm source. The Alarm Control System is kept a solid standard product through Alarm Listeners and Alarm Dispatch Media. Alarm Listeners translate the language of the alarm sources to a language the main software can use or through IO, databases, command lines and emergency centre dispatchers. Alarm Control System then analyses the alarm and dispatches it through the dispatch media to the central rescue. It pairs the alarm with the right on-duty employee through the intelligent scheduler, ensuring that problems get handled at the right time by the right person. The alarms are sent as text messages directly to this person on his/her mobile phone or email account. This way alarms (i.e. Technical, Panic, Fire, OPC, BMS, I/O and so on) are channelled through the Alarm Control System to the right person on their digital hand-held mobile phones or e-mail.
The combination of the Alarm Control System and the Indoor Positioning System does not only make a safer working environment, but also a more efficient one with the automatic alarm dispatch.

EXAMPLE OF PLACEMENT OF 10 BEACONS, HIGH GRANULARITY:



In this example the system has a very high and accurate granularity provided by the installation of 10 Beacons. The Beacons have all been placed in the ceiling of the rooms. With granularity as high as this, the beacons are set at a low signal power, and place them in the centre of each room – giving each room an identity. The configuration of this example is very accurate and has a high reliability on the position readings. Each section of the building is covered and very accurate readings can be obtained.

LIMITATIONS:

- The range will be interrupted by walls or other obstacles as with any other wireless Radio-technology.
- An Ethernet infrastructure is always required to support the system
- When many units are in the vicinity of a single Bluetooth Position Beacon, the update frequency of positions may be reduced.

EXAMPLE OF BLUETOOTH BASED INDOOR POSITIONING SOLUTION:

"ZONITH Indoor Positioning Module" is a Bluetooth based localisation system.

The ZONITH indoor positioning module is tightly integrated with ZONITH Alarm Control System that collects critical alarms, offer protection to employees and create easy access to information, no matter where the employees are located. ZONITH Alarm Control System ensures that alarms are automatically distributed to the right person at the right time. This automated system saves important time and resources adding value as well as safety.

APPLICATIONS:

- DONG Energy is Denmark's largest power generator. As power plants become more automated, the number of employees decreases, and hence DONG Energy wants to maximize the security of the lone workers. As power plants become more automated, the number of employees decreases, and can often be characterized as lone workers. DONG Energy wants to maximize the security for these lone workers. DONG Energy decided on a solution for multiple power plants based on digital TETRA radio and ZONITH software. Not only does this solution make the plants safer, but also more efficient through automated alarm dispatch.
- Job Centres are usually calm and quiet, but sometimes frustrated and even violent clients are part of the workday. The Copenhagen Job Centre decided on a ZONITH solution, which is faster, more precise, more discreet and makes daily work more efficient. ZONITHS panic button solution enables security guards to react efficiently to this challenge by receiving panic alarms with location information in text - directly on their digital radios.

CONCLUSION

In this paper, we have presented a bluetooth based indoor positioning system which works along with an alarm control system. This system is used in three dimensional positioning. Furthermore, since the systems operate on slightly different bands, they provide you with more flexibility, reliability, and accuracy than a single band system. The Alarm Control System can be accessed through an internet browser. The level of efficiency and safety in a workplace increases. Public Employees who encounter threatening and violent clients in the workplace are well protected by the alarm control system.
This paper can be best concluded by the words of the following

"Employees feel much safer, knowing they can call help without the clients noticing"

LEIF MOLLER
Managing Security Guard,
Copenhagen Job Centre

"Not only do we have a safer working environment. It has become more efficient because employees receive technical alarms directly on their hand held radios"

RENE FRITZEN,
Project manager,
DONG energy

RADIO FREQUENCY IDENTIFICATION UHF TAG USING RCEAT

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Abstract: Radio Frequency Identification (RFID) UHF Tag based on RCEAT technique is proposed in this paper. RCEAT means Reliable and Cost Effective Anti-collision technique. The proposed system is designed with the help of Verilog HDL. The System is simulated using Modelsim SE 6.3f and it synthesized using XST. The RCEAT system is classified into two subsystems. One is Pre and another one is Post . By using Pre we have to detect the errors from incoming messages. And using Post we identify the tag.

Keywords*: Verilog HDL,CRC remover, Fast-search look up table,Xlinx ise.*

1. INTRODUCTION

A significant advantage of RFID devices over the others identification devices is that the RFID device does not need to be positioned precisely relative to the scanner. As credit cards and ATM cards must be swiped through a special reader. In contrast, RFID devices will work within a few feet (up to 20 feet for high-frequency devices) of the scanner. But the problem associated with this technique is the collision of tags. So inorder to avoid coliision of tags a technique has been proposed which is both reliable and also cost effective. And so call this technique as Reliable and Cost Effective Anti-Collision Technique(RECEAT). This proposed technique does not require the tag to remember the instructions from the reader during the identification process. Thus the tag is treated as an address carrying device only and memory-less tag can be designed which requires very low power.

Some common problems with RFID are reader collision and tag collision. Reader collision occurs when the signals from two or more readers overlap. The tag is unable to respond to simultaneous queries. Systems must be carefully set up to avoid this problem. Tag collision occurs when many tags are present in a small area; but since the read time is very fast, it is easier for vendors to develop systems that ensure that tags respond one at a time.

The tag collision can be eliminated using different techniques.They are mainly of two types: a)Tree Based Algorithms and ALOHA based algorithms. where Tree based algoritms consists of Binary tree algorithms and Query tree. Whereas the ALOHA based algorithms are classified into ALOHA,Slotted ALOHA and Frame Slotted ALOHA. Some hardwares also desigened for this purpose.

Here in this paper Tree algorithms has been considered with Fast Search Algorithm.

2. ARCHITECTURE:

The architecture consists of two parts:Pre RECEAT and Post RECEAT. The first part,the PRE RECEAT ensures that the incoming messages are errorless using a CRC-remover. In the CRC-remover the incoming messages are divided into two;the received ID and CRC. These two are sent to CRC checker for verification process where the received CRC is being checked with the recalcalucated CRC of the received message. If both are equal means no error and this is indicated by status bit which is set to zero. Otherwise the status bit is set to two. And then the status bit is updated and sent to status checker. If no errors are present then it is sent to the next part;the Post RECEAT part.

In PostRCEAT, the active tags are divided into a group of four for every Read cycle in order to reduce the number of iterations in the identification process. The PostRCEAT reads all the ID bits at once regardless of its length. This is performed by using the word-by word multiplexing. During the identification process, the Fast-search module identifies the four tag's IDs simultaneously in one Read cycle. The module firstly identifies the smallest ID bits until the largest one follows the Binary Tree with a maximum number of four leaves.

To avoid the four incoming packets from colliding with each other, these packets (IDs) are identified using the Binary Tree based technique with maximum four leaves. The reader selects these IDs using the proposed Fast-search Lookup table, and then the selected ID will be identified. The four IDs will be identified from the smallest value to the largest one in one Read cycle. Then the tag that has successfully identified will be acknowledged by sending the Kill-tag.

Once the tags are identified the most significant bit is represented by 1,which specifies that the tags are identified. So we use Cyclic Redundant Check for getting errorless incoming messages and then those are checked with the recalculated one and then goes to the Post part where using fast search algorithm four tags are considered at once then arranged into ascending order ,then comes out one by one using a parallel to serial converter. Which will be the final output which is both reliable and cost effective.

The whole process can be represented simply by using a block diagram as:

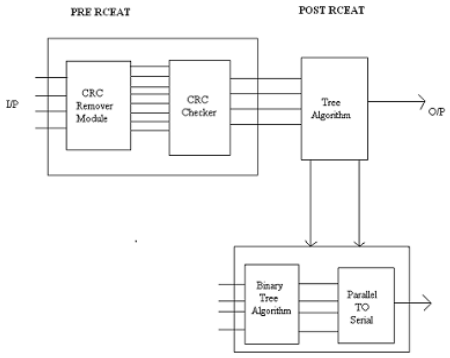
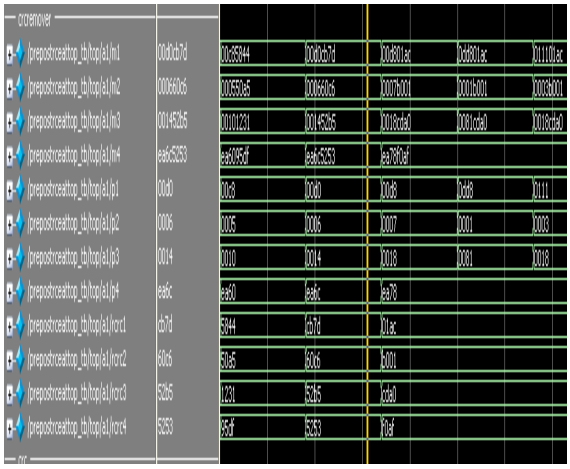


Fig:simple block diagram representation

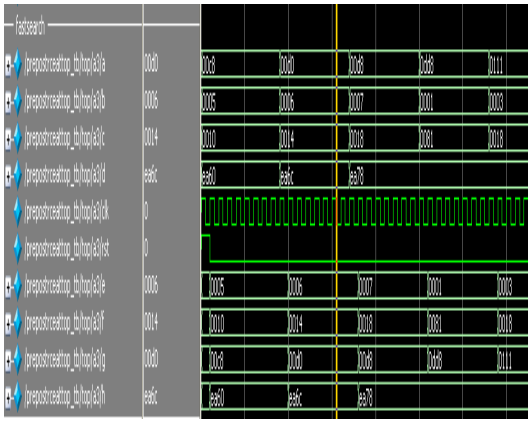
3. SIMULATION RESULTS:

The proposed technique has been simulated and verified using Modelsim and synthesized usisg Xlinx ISE and obtained the results. The obtained results are also shown:

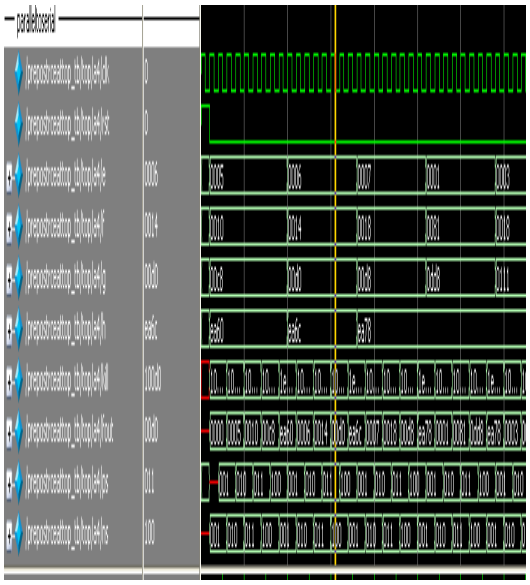
Simulation Results of crcremover :



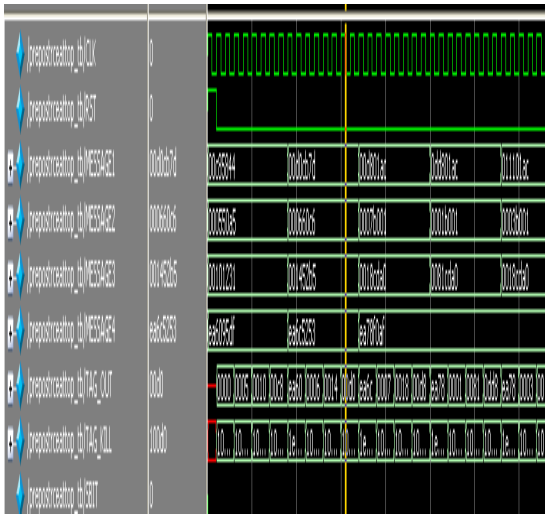
Simulation results of fast search algorithm:



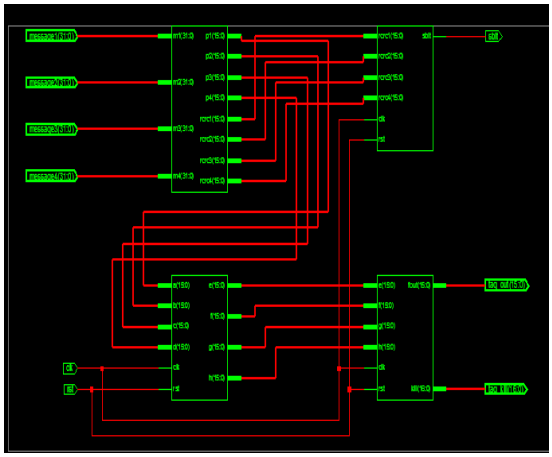
Simulation results of parallel to serial conversion:



Simulation result of prepostrceat module:



RTL Schematic:



4. DEVICE SUMMARY:

Device Utilization Summary			
Logic Utilization	**Used**	**Available**	**Utilization**
Number of Slice Flip Flops	89	9,312	1%
Number of 4 input LUTs	430	9,312	4%
Logic Distribution			
Number of occupied Slices	222	4,656	4%
Number of Slices containing only related logic	222	222	100%
Number of Slices containing unrelated logic	0	222	0%
Total Number of 4 input LUTs	430	9,312	4%
Number of bonded IOBs	100	232	43%
Number of BUFGMUXs	1	24	4%

5. CONCLUSION

A proposed Reliable and Cost Effective Anti-collision technique (RCEAT) is designed to achieve a reliable and cost effective identification technique of the tag. The RCEAT architecture consists of two main subsystems; PreRCEAT checks error in the incoming packets using the CRC scheme. PostRCEAT identifies the error free packets using Binary Tree based technique. The architecture has been synthesized using Xilinx Synthesis Technology (XST), Simulated using MODELSIM.

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FREQUENCY OFFSET ESTIMATION OF DDPSK IN OFDM

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Abstract-Multiple-symbol differential detection (MSDD) of differentially encoded phase-shift keying (PSK) signals in the presence of random frequency variation and additive white Gaussian noise is studied. It is shown that frequency variation distorts the transmitted signal through attenuating its amplitude and introducing a time-varying phase shift to the information symbols. A double differential PSK (DDPSK) modulation scheme is then introduced and a MSDD for detecting DDPSK signals in the presence of frequency offset (FO) is proposed. The proposed algorithm is based on the MSDD algorithm with the introduction of a mechanism for the estimation of the frequency offset (FO). The FO is estimated without any channel knowledge. One algorithm operates in the time domain (TD), while the other one operates in the frequency domain (FD). Finally the proposed frequency offset (FO) estimation algorithms in a known symbol padding orthogonal frequency-division multiplexing (OFDM) system, where the guard interval is filled with pilot symbols. As a result, the FD initialization algorithm results in a lower mean squared error (MSE). Both estimation algorithms reach the BER performance of a receiver with perfect knowledge about the FO.

Keywords- *Differential encoding, Phase shift keying, Multiple Symbol Differential Detection, Frequency Offset Estimation, Maximum-Likelihood detection, OFDM*

I. INTRODUCTION

In recent years it has been shown that Orthogonal Frequency Division Multiplexing (OFDM) [18] is a worthy technique to achieve a high data rate transmission over multipath fading channels. To tackle the inter block interference, which is typical for dispersive channels, an OFDM system inserts a guard interval between successively transmitted OFDM blocks. Among the most popular techniques to fill the guard interval are the cyclic prefix (CP) technique and the zero-padding technique (ZP) (see [7], [10]). In the CP technique, the last samples of each OFDM block are copied and transmitted before the actual OFDM block, whereas the guard interval is left empty in the ZP technique. For these two techniques, the content of the guard interval is predefined (zeros for the ZP technique and the last samples of the OFDM block, which depend on the unknown data symbols, for the CP technique). As a result, the guard interval is not very useful for channel estimation and sometimes insufficient for synchronization purposes [11]. In this contribution a third guard interval technique is considered: known symbol padding (KSP) [11], where the guard interval is filled with pilot symbols. One of the problems a receiver has to deal with in an OFDM system is the presence of a frequency mismatch between the oscillators in the transmitter and the receiver. A frequency offset (FO) causes inter carrier interference and attenuates the useful signal [16]. When an FO (even of the order of a fraction of the carrier spacing) is not compensated, the bit error rate (BER) performance can be severely degraded.

Differential detection of phase-shift keying (PSK) signals is a well-known strategy for mitigating the performance degradation due to unknown phase offset. The constellation rotation caused by the phase offset can be removed using a differential PSK (DPSK) modulation scheme along with a differential detector [1]. However, this detector suffers from a signal-to-noise power ratio (SNR) loss compared to a coherent detector [1]. An effective technique to mitigate this SNR loss is known as multiple-symbol differential detection (MSDD) [19]–[20]. The MSDD scheme is, indeed, a more general case of the conventional differential detection in which more than two consecutive samples are utilized to detect the information symbols. It is shown in [2] that by increasing the number of received samples in MSDD, the receiver performance approaches that of coherent demodulation of DPSK signals. However, the MSDD receiver analysis in [2], assumes that the frequency offset equals zero. In the case of nonzero frequency offset, conventional MSDD must take the frequency offset into account. Otherwise, increasing the number of the received samples in MSDD degrades the performance very quickly [9]. A double DPSK (DDPSK) modulation scheme (also referred to as second-order phase difference modulation) has been proposed in [21]–[25] for the case when the frequency offset is unknown. The proposed demodulator suffers from a SNR loss compared to a conventional MSDD with DPSK modulation when frequency offset is not present. However, as will be seen in the sequel, the SNR loss can be less than 3 dB for some modulation schemes resulting in a net performance gain relative to the autocorrelation demodulator (ACD) based MSDD scheme proposed in [21].

Therefore we present in this contribution two FO estimation algorithms: one that operates in the time domain (TD) and one that operates in the frequency domain (FD). Both algorithms exploit the presence of

the pilot symbols on the pilot carriers (FD pilots) and in the guard interval (TD pilots) in the received signal that corresponds to two or more consecutively transmitted OFDM blocks. Both estimation algorithms show an error floor for the mean squared error (MSE), which is caused by the interference from the unknown data symbols. The error floor can be lowered by increasing the number of considered OFDM blocks to estimate the FO . For the bit error rate (BER), the performance of a receiver with perfect knowledge about the FO but with estimated channel is reached by both estimation algorithms.

This paper is organized as follows. In Section II, we present the frequency offset estimation in time domain (TD)and frequency domain (FD). In Section III, we propose a new MSDD scheme for DDPSK signals and derive a lower bound on its error probability. Numerical results are presented in Section IV. In Section V, some conclusions are drawn.

II. FREQUENCY OFFSET ESTIMATION

The data detection process in a known symbol padding OFDM system consists of a sequence of operations that have to be carried out. First, the FO estimate(ε) is used to compensate the FO in the time domain. Then the contributions from the guard interval samples are removed from the received signal samples using the channel estimate. The resulting received signal is similar to a received signal from a zero padding OFDM system. The last v samples of the considered observation interval in Figure 1 are added to the first v samples, to restore the orthogonally between the carriers [10].After the removal of the guard interval samples, the resulting first N samples are applied to an FFT to transform the frequency selective channel in N parallel flat fading channels. Finally per carrier single tap equalization, for which the channel impulse response **h** is needed, and data detection are performed. Note that the receiver has to estimate ε and **h** first, to be able to perform data detection. The two proposed FO estimation algorithms to estimate ε are introduced in the next section. For the channel estimation we consider the algorithm proposed in [6].

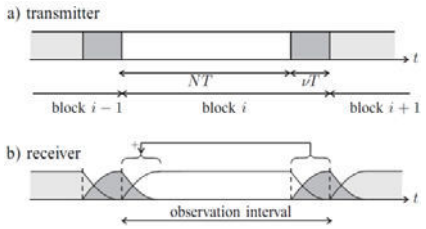

Fig 1.Time-domain signal of known symbol padding OFDM a) transmitted signal b) received signal and observation interval.

Both estimation algorithms need the received signal samples of $K(\geq 2)$ consecutively transmitted OFDM blocks, to start from The N + v received time-domain samples corresponding to the observation interval shown in Figure 1.b are given by

$$r_i = e^{j2\pi\frac{i(N+v)}{N}\varepsilon} E(\varepsilon)\tilde{H}s_i + w_i \quad (1)$$

where ε denotes the unknown FO between the transmitter and receiver oscillators expressed as a fraction of the inter carrier spacing. We assume that an initial estimation of the FO already has been performed so that $|\varepsilon| < 0.5N/(N+v)$. Typically, a coarse FO estimate is obtained using a suitable preamble which is transmitted before the actual OFDM data blocks.

We denote them as $r_{i,\ldots,} r_{i+K-1}$, which are given by [3]:

$$r_i = e^{j2\pi\frac{i(N+v)}{N}\varepsilon} E(\varepsilon)\tilde{H}\left(s_p + s_d^{(i)}\right) + w_i \quad (2)$$

$$r_{i+K-1} = e^{j2\pi\frac{(i+K-1)(N+v)}{N}\varepsilon} E(\varepsilon)\tilde{H}\left(s_p + s_d^{(i+K-1)}\right) + w_{i+K-1} \quad (3)$$

The pilot symbol contribution in r_{i+k} (i.e. the contribution from s_p), with $k=1,2,\ldots\ldots K-1$, is equal to the pilot symbol contribution in r_i multiplied by a factor $e^{j2\pi\frac{k(N+v)}{N}\varepsilon}$. We will exploit this fact to estimate the FO (ε).

A. TD Estimation

The first estimation algorithm operates in the time domain. When we consider the unknown data symbols as an additional noise term in (2), we can rewrite (2) as

$$r_{i+K} = e^{j2\pi\frac{(i+K)(N+v)}{N}\varepsilon} E(\varepsilon)\tilde{H}s_p + \tilde{w}_{i+K} \quad (4)$$

Where $\tilde{w}_{i+K} = w_{i+K} + e^{j2\pi\frac{(i+K)(N+v)}{N}\varepsilon} E(\varepsilon)\tilde{H}s_p^{(i+K)}$ .We compute the product of the Hermitian transpose of

r_{i+k} with r_{i+k-1} for $k=0,.....,K-2$. The summation of those K products yields a quantity that can be used to estimate ε

$$\sum_{k=0}^{K-2} r_{i+k}^{H} r_{i+k+1} = (K-1)e^{j2\pi\frac{(N+v)}{N}\varepsilon}\left|\tilde{H}s_p\right|^2 + \sum_{k=0}^{K-2} n_k \qquad (5)$$

Where n_k collects the contributions from $r_{i+K}^{H} r_{i+k+1}$ which depend on the noise and the unknown data symbols. The estimate of ε is then given by

$$\hat{\varepsilon} = \frac{1}{2\pi}\frac{N}{N+v}\angle\left\{\sum_{k=0}^{K-2} r_{i+K}^{H} r_{i+k+1}\right\} \qquad (6)$$

The main advantage of this approach is the fact that we do not need to send the received signal through an FFT first.

B. *FD Estimation*

First we transform the received vectors r_{i+k}, $k=0,1,.....K-1$ to the frequency domain. To achieve this, the last v samples of each vector are added to the first v samples. The first N samples of the resulting vectors are then applied to an FFT. The output of the FFT of OFDM block $i+k$ at carrier n is given by

$$Y_{i+k}(n) = e^{j2\pi\frac{(i+k)(N+v)}{N}\varepsilon}\left(H(\varepsilon,n)\sum_{m=0}^{M-v-1} b_c(m) I_{\alpha_m - n}(\varepsilon) + H(\varepsilon,n)\sum_{m=0}^{N+v-M-1} a_d^{(i+k)}(m) I_{\beta_m - n}(\varepsilon) + \sum_{l=0}^{L-1} B_g(\varepsilon,n,l) h(l)\right) + W_{i+k}(n) \qquad (7)$$

Where $I_m(\varepsilon)$, $H(\varepsilon,n)$ and $B_g(\varepsilon,n,l)$ are given by

$$I_m(\varepsilon) = \frac{1}{\sqrt{N(N+v)}}\frac{1-e^{j2\pi(m+\varepsilon)}}{1-e^{j2\pi\frac{(m+\varepsilon)}{N}}}$$

$$H(\varepsilon,n) = \sum_{l=0}^{L-1} h(l) e^{-j2\pi\frac{(n-\varepsilon)l}{N}}$$

$$B_g(\varepsilon,n,l) = \frac{1}{\sqrt{N+v}}\left(\sum_{k=0}^{l-1} b_g(v+k-l) e^{j2\pi\frac{(\varepsilon-n)k}{N}} + \sum_{k=1}^{v-1} b_g(k-l) e^{j2\pi\frac{(\varepsilon-n)(N+k)}{N}}\right)$$

and α_m and β_m are carrier indices belonging to the subsets of carrier indices of pilot carriers and data carriers, respectively. The samples $W_{i+k}(n)$, with $n=0,.....,N-1$, are Gaussian noise samples with zero mean and an autocorrelation matrix R defined as

$$(R)_{n,n'} = N_0\left(\delta_{n,n'} + \frac{1}{N}\sum_{k=0}^{v-1} e^{-j2\pi\frac{(n-n')l}{N}}\right) \qquad (8)$$

We collect the $M-v$ FFT outputs from the K OFDM blocks corresponding to the set S_p of pilot carriers in the vectors Y_{i+k}, $k=0,....,K-1$:

$$y_{i+k} = [Y_{i+k}(\alpha_0),....,Y_{i+k}(\alpha_{M-v-1})]^T = e^{j2\pi\frac{(i+K)(N+v)}{N}\varepsilon}\left(\tilde{b}+\tilde{a}_{i+k}\right) + W_{i+k} \qquad (9)$$

Where $\tilde{b}$ is the vector that contains the contributions from both time and frequency domain pilots. The vector $\tilde{a}_{i+k}$ collects the contributions from the unknown data symbols from the $(i+k)^{th}$ OFDM block and W_{i+k} contains the noise samples at the pilot carrier positions of the $(i+k)^{th}$ block. The summation over k of the multiplications of the Hermitian transpose of y_{i+k} with y_{i+k+1} for k = 0, . . . , K−2 results in a function which is used to estimate ε

$$\sum_{k=0}^{K-2} y_{i+k}^{H} y_{i+k+1} = (K-1)e^{j2\pi\frac{(N+v)}{N}\varepsilon}\left|\tilde{b}\right|^2 + \sum_{k=0}^{K-2}\tilde{n}_k$$

Where $\tilde{n}_k$ collects the contributions from the unknown data symbols and the noise samples from $y_{i+k}^{H} y_{i+k+1}$. The estimate of ε is then given by

$$\hat{\varepsilon} = \frac{1}{2\pi}\frac{N}{N+v}\angle\left\{\sum_{k=0}^{K-2} y_i^{H}\, y_{i+1}\right\} \qquad (10)$$

III. FREQUENCY OFFSET INSENSITIVE DIFFERENTIAL DETECTION

A. Receiver Derivation

Assume that the frequency offset and the phase offset are constant over N successive samples. Then, we can define a new variable $\tilde{r}_k$ as

$$\tilde{r}_k \cong r_k r_{k-1}^* \tag{11}$$

$$\tilde{r}_k = s_k s_{k-1}^* e^{j\psi} + \tilde{n}_k \tag{12}$$

Where

$$\tilde{n}_k \cong s_k e^{j(k\psi+\phi)} n_{k-1}^* + n_k s_{k-1}^* e^{-j[(k-1)\psi+\phi]} + n_k n_{k-1}^* \tag{13}$$

Assume that a PSK modulation is employed [2]. Then, the first and second terms on the right of (13) are independent Gaussian random variables each with mean zero and variance $\varepsilon_s \sigma_n^2$. In contrast, the last term has a complicated probability density function [5]. However, for practical SNR values this term is relatively small compared to the first two and can be ignored. Moreover, it can be shown that $\tilde{n}_k$ and $\tilde{n}_l$ are uncorrelated for $k \neq l$. Therefore, we approximate $\{\tilde{n}_k\}$ as a zero-mean Gaussian random sequence with

$$E\left\{\tilde{n}_k \tilde{n}_l^*\right\} = \varepsilon_s \sigma_n^2 \delta(k-l) \tag{14}$$

Where $\delta(.)$ denotes the Kronecker delta function. Assume now that ψ has a uniform distribution over the interval [0, 2π) and that any amplitude variations due to frequency offset can be ignored. As per assumption in (5) the term $s_k s_{k-1}^* = \varepsilon_s \exp(j\dot{\theta}_k)$ denotes the k^{th} transmitted symbol. Then, the maximum-likelihood (ML) receiver should maximize the metric [2]

$$\Lambda = \left| \sum_{i=0}^{N-1} \tilde{r}_{k-i} e^{-j\dot{\theta}_{k-i}} \right|^2 \tag{15}$$

$$= \left| \sum_{i=0}^{N-1} \tilde{r}_{k-i} e^{-j(\theta_{k-i} - \theta_{k-N+1})} \right|^2 \tag{16}$$

Where the last equation follows from the fact that multiplying the argument of the $|.|$ in (14) by θ_{k-N+1} does not change the metric [2]. Note that in this case we need $N+1$ samples to detect $N-1$ information symbols. It can be readily verified that

$$\dot{\theta}_{k-i} - \dot{\theta}_{k-N+1} = \sum_{m=0}^{N-i-2} \ddot{\theta}_{k-i-m} \tag{17}$$

Where, now $\ddot{\theta}_k = \dot{\theta}_k - \dot{\theta}_{k-1}$ is the information phase at the k^{th} time interval. Thus, (15) can be rewritten as

$$\Lambda = \left| \tilde{r}_{k-N+1} + \sum_{i=0}^{N-2} \tilde{r}_{k-i} \exp\left[-j \sum_{m=0}^{N-i-2} \ddot{\theta}_{k-i-m} \right] \right|^2 \tag{18}$$

Clearly, the metric in (17) is independent of the frequency offset and the phase offset. Assuming that and $\theta_{-1} = \theta_0 = 0$ using the identity $\theta_k = 2\theta_{k-1} - \theta_{k-2} + \ddot{\theta}_k$ one obtains

$$\theta_k = \sum_{i=1}^{k} (k-i+1)\ddot{\theta}_i \tag{19}$$

$$\theta_k = \sum_{i=1}^{k} \sum_{m=1}^{i} \ddot{\theta}_m \tag{20}$$

Encoding the information symbols using (19) is equivalent to encoding the information symbols using a DPSK encoder once, and then encoding the resulting symbols one more time with the same encoding rule. Note that the analysis presented in this section serves as the proof of optimality for the MSDD receiver when the $\{\tilde{n}_k\}$ are Gaussian. This occurs when the cross-noise term in (15) is negligible, i.e., when the SNR is relatively large.

B. BER and SER Estimator

For DDPSK signals, the I–Q demodulator presented in [25, Section V] is a special case of the proposed receiver when N = 2. In the absence of the frequency offset, an exact expression for the BER of the I–Q demodulator with binary DDPSK modulation has been derived in [23], [27]. However, an upper bound for the symbol error rate (SER) for the case where N = 2 has been derived in [23], [27].

We now obtain a reasonably tight lower bound on the BER of the MSDD for the case where $N \to \infty$. To this end, we recall a fact presented in [19] that the performance of the MSDD with DPSK modulation and $N \to \infty$, is lower bounded by that of the coherent detection of differentially encoded PSK [8] i.e.,

$$P_s^{LB} = P_s(2 - P_S) - \sum_{m=1}^{M-1} P_m \tag{21}$$

Where P_m is the probability that the AWGN moves the transmitted MPSK symbol m decision regions away from the correct region and P_s is the SER of the optimum MPSK detector in AWGN, whose decision rule is given as

$$\arg\max_{\theta_k} R\left\{ r_k e^{-j\theta_k} \right\} \qquad (22)$$

The lower bound in (22) is valid only when the received samples, $\{r_k\}$, are used to evaluate the MSDD's decision metric. However, the receiver proposed in Section IV.A uses the $\{\tilde{r}_k\}$ to evaluate the decision metric given by (13). Therefore, the lower bound in (16) should be adjusted to account for the above fact. To this end, by replacing r_k with $\tilde{r}_k$ in (17), one has that

$$\arg\max_{\theta_k} R\left\{ \tilde{r}_k e^{-j\theta_k} \right\} \qquad (22)$$

Eq. (22) denotes the decision rule of the optimum differential detector of MDPSK when N = 2. The SER of this receiver is given by [28]

$$P_S = \frac{1}{\pi} \int_0^{\pi - \frac{\pi}{M}} \exp\left(\frac{-\gamma_s \sin^2\left(\frac{\pi}{M}\right)}{1+\cos\left(\frac{\pi}{M}\right)\cos(\theta)} \right) d\theta \qquad (23)$$

For the special case when M = 2, p_b^{LB} can be expressed in closed-form as

$$p_b^{LB} = e^{-\gamma_b} - \frac{1}{2} e^{-2\gamma_b} \qquad (24)$$

Where γ_b denotes the SNR per bit. Note that for moderate to large values of SNR the square terms on the right of (18) are very small and can be ignored. Hence, for these SNR values P_s^{LB} is approximately equal to $2P_s$.

IV. SIMULATION RESULTS AND DISCUSSION

Figure 2, shows the receiver performance in the presence of the frequency offset and indicate how good the aforementioned approximation is. To this end, we evaluate the error probability performance of the proposed MSDD receiver as a function of ψ for γ_b = 10 dB and selected values of N. The results are shown in Figure 3. For binary DDPSK (BDDPSK) and quaternary DDPSK (QDDPSK) modulations.

Figure 3, shows the performances of the proposed receiver with BDDPSK modulation for ψ = 0.3 and selected values of N. It is assumed that the band pass filter prior to the ACD has a bandwidth of $8\pi/T$ [25]. When N = 2, the ACD outperforms the proposed receiver for SNR ≥ 11 dB. Increasing the observation interval improves the performance of the proposed receiver relative to the case where N = 2 rather rapidly. However, this increase does not have a significant impact on the performance of the ACD receiver. For example when the average BER equals 10^{-6}, increasing N from 2 to 8 results in a 3 dB SNR gain for the proposed receiver, whereas the corresponding gain for the ACD is approximately 0.35 dB.

Figure 4, compares the lower bound on the BER of the proposed receiver with the BER of coherent demodulation of DPSK for M = 2, 4, 8 and 16. When the BER = 10^{-5} and BDDPSK modulation is used, the gap between the lower bound and coherent demodulation of DPSK is approximately 0.6 dB. This gap increases to 2.4 dB for QDDPSK, which is still 0.6 dB less than that of the ACD-based MSDD proposed in [25]. The gap approaches 3 dB for M = 8 and 16. However, we still expect the proposed MSDD to outperform the ACD receiver. This is because the latter reaches the 3 dB gap when the AWGN is vanishingly small, whereas the proposed receiver does not require this extra condition.

The performance of the proposed frequency estimation algorithms is evaluated. We consider an OFDM system with N = 1024 carriers and a guard interval of length v = 100. Besides the 100 pilot symbols in the guard interval, an additional 100 carriers are selected as pilot carriers which means that a total number of M = 200 pilot symbols are transmitted. The data symbols are QPSK symbols. First we evaluate the performance of the estimators in terms of the MSE, which is defined as:

$$MSE = E\left[\left| \varepsilon - \hat{\varepsilon} \right|^2 \right] \qquad (25)$$

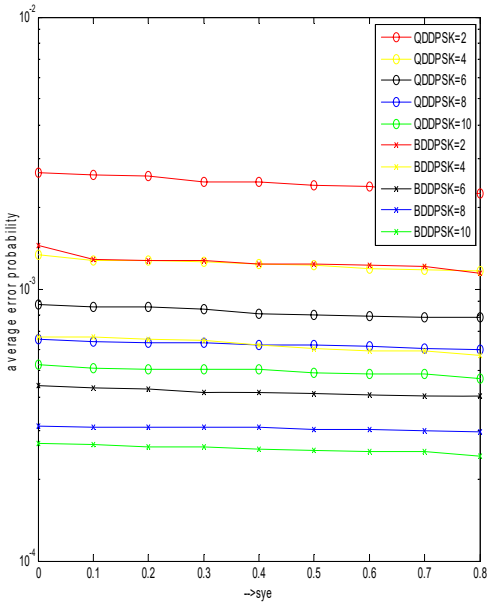

Fig 2. The average error probability of the proposed MSDD as a function of sye with BDDPSK and QDDPSK modulations for SNR = 10 dB and N =2, 4, 6, 8 and 10.

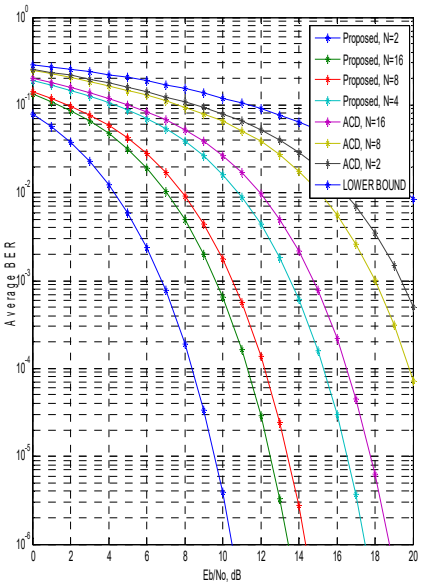

Fig 3. The average BER as a function of SNR for the proposed receiver and the autocorrelation demodulator with BDDPSK modulation, $\psi = 0.3$, and selected values of N.

Figure 5, show an error floor for high values of the Es/N0 when we plot the MSE versus the Es/N_0, as can be seen from Figure 5. This error floor is caused by the unknown data symbols which interfere with the pilot symbols. We see that the FD estimation obtains the lowest error floor. This behaviour is expected because for very small values of $\mathcal{E}$, the inter carrier interference becomes very small. In that case the interference of the unknown data symbols will be much smaller in the FD (and eventually equal to zero when $\mathcal{E} = 0$), while the interference in the TD is independent of the presence of a FO.

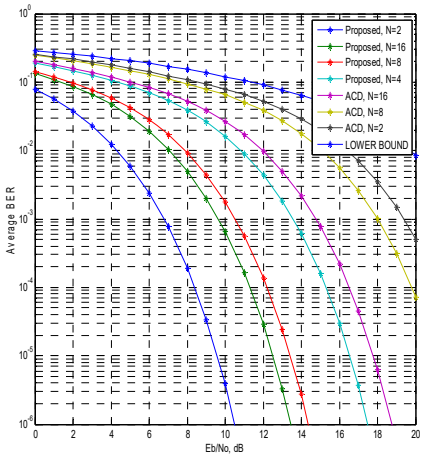

Fig 4. The lower bound on the BER of the proposed receiver and the average BER for coherent detection of DPSK as a function of SNR for $M = 2, 4, 8$ and 16.

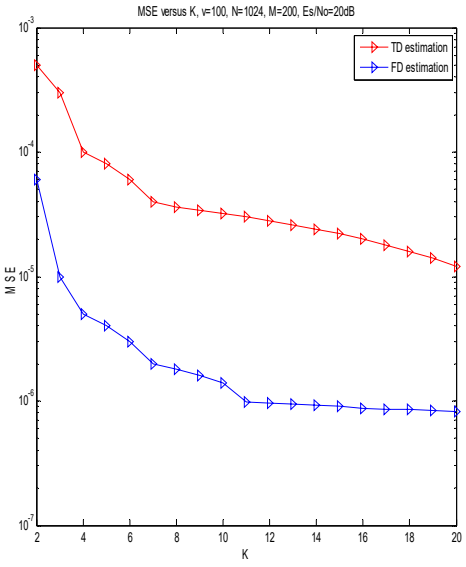

Fig. 5. MSE versus K, v = 100, N = 1024, M = 200, $Es/N_0 = 20$ dB

Figure 6, provides some better insights on the dependence of the MSE on the number of considered OFDM blocks. The considered Es/N_0 is equal to 20 dB. The results are similar for both proposed algorithms: The MSE decreases when the number of considered OFDM blocks increases because we get a better averaging of the contribution of the unknown data symbols.

Figure 7, shows the BER results. For low to moderate Es/N0, the BER of a receiver which applies the TD or FD estimation algorithm for the estimation of the FO, is close to the case when the FO is perfectly known (but with estimated channel). Increasing the number of received OFDM blocks that are used to estimate the FO results in a better BER performance especially for high Es/N_0 for both estimation algorithms.

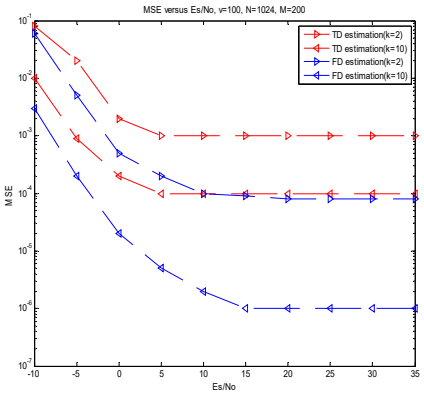

Fig 6. MSE versus Es/N_0 , v = 100, N = 1024, M = 200

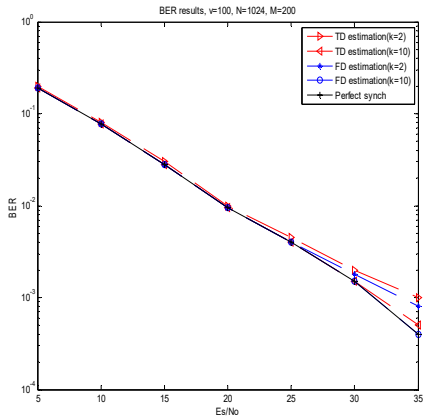

Fig 7. BER results, v= 100, N = 1024, M = 200

V. CONCLUSION

In this contribution Carrier frequency variation was shown to deteriorate the amplitude and the phase of a PSK signal transmitted over an AWGN channel. A MSDD scheme was proposed for detection of DDPSK signals in the presence of random frequency variation over AWGN. We propose two FO estimation algorithms: TD estimation and FD estimation. Both exploit the presence of the pilot carriers and the pilot symbols in the guard interval to estimate the FO without any knowledge about the channel. The MSE of both estimation algorithms shows an error floor for moderate to high Es/N_0 but FD estimation gives the better performance. The MSE can be decreased by increasing the number of received OFDM blocks to estimate the FO. A receiver with one of the proposed estimation algorithms to estimate the FO reaches the BER of a receiver with perfect FO knowledge. The TD estimation method has the advantage that no extra FFT operation is needed, so it has a lower computational complexity.

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NETWORK COUPLED SMART ELECTRICAL METERS

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Abstract - The present idea aims to advance the Power Sector in these countries in terms of to rectify the problem of electricity misuse and stealing and to smoothen the process of billing under the latest and reliable technical developments. This contains an electricity meter connected to a network through a SIM card similar to the one used in mobiles phones and a load resister is connected inside the meter between the input and output supply (figure 1) and a voltmeter is connected in parallel to the resistor to continuously record a voltage drop of the resistor. Now, if a direct connection is made to the input supply that's nothing but power stealing, there would not be any voltage drop across the voltmeter (the voltage drop will collapse). Instantly a message will be generated for the same and sent to the headquarter via network. Thus complete record for the supply would be maintained by the board and as a result any stealing could be easily tracked.

INTRODUCTION

It has been a very typical task for the electricity board of various countries to fairly collect complete revenue against the supplied electricity. Further, in the developing world the users are annoyed with conventional method of payment of bills and looking for a comparably easy way to settle down their bills. Smart meters are the electronic devices that completely track and record customers electricity use. Far advanced in technology than the old analog meters which requires manual reading every month, Smart meters transmit each and every record to headquarter for supply and distribution via wireless network. Also, capable of managing peak load remotely as well as through network.

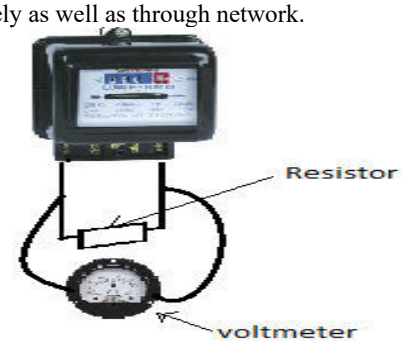

Figure 1 Circuit diagram of principle used in Smart Electrical Meters

PRODUCT REQUIREMENTS FOR SMART METERING SYSTEMS

A. DISPLAY

The meter provide information on: a) Smart Meter Variant Code; b) Current Rating; c) Voltage Rating; d) Frequency Rating; e) Number of Phases; f) Instructions describing the correct procedure for restoring the supply; e.g. including information to ensure appliances are turned off etc. The meter also displays: electricity consumed, current mode of operation, status of the supply, consumer's tariff plan (if any) and pre-paid balance in the account. In addition it shall also display emergency credit, energy debts, amount of time left before credit expires, current balance in the account i.e. credit left, current import or export rate.

B. INTERRUPT AND RESTORE CAPABILITY

A smart electricity meter shall be capable of remote interrupt of the consumer's electricity supply and provide for the remote enabling of the electricity supply through the use of a contactor or in-line switch. Smart meters also support unpredicted power cuts using an internal shut-off mechanism. Smart meters are capable of storing data regarding price, rate of import and imported energy in kWh.

C. DATA STORAGE AND MEMORY

The meter is installed with a memory setup capable of being read from and written to, over the mentioned temperature range where the data is continually being updated and operated on the principle of First In First Out principle.The meter shall be capable of being individually reset by authorized persons which would be possible by using a password.

D. PEAK LOAD MANAGEMENT

Peak Load Management Smart meters provide an option to the board for supply and distribution to limit total load; to a particular current rating above which the supply to the consumer shall be interrupted. The load limit can be activated for a certain hours, days, months or special days. Thus the load limit method can be implemented within the meter instead of disconnection. Further, status for load limit can be displayed i.e. whether active or inactive. Current drawn as a fraction of the load limit shall also be displayed by Smart meters. Also, the load limit can be configured locally as well as remotely via network by authorized persons. Meters are also capable of generating an audible sound or visual message when a marked load limit has been exceeded until: i) interruption is made in the supply ii) consumption

drops below the marked limit. Users shall be able to restore the supply locally after the interruption caused by exceeding the load limit. Ability to switch is also supported by the meter which is used to control an exterior contactor via a secondary key. Consumption of at least two switched loads is also measured by the meter independently.

E. BACKUP BATTERIES

Electricity meters shall include back-up batteries, or similar as appropriate, to maintain low level functionality (e.g. real time clocks) during temporary power losses.

F. ENVIRONMENT

Temperature and humidity: Smart meters, shall be suitable for use within the temperature range -25 °C to +55 °C and relative air humidity ranging from 30% to 100% condensing.

G. BENEFITS OF SMART METERS:

Smart meters are just a mark point for the beginning of major upgrade and rejuvenation of Power Sector, from generation to consumption, in houses, offices and industries. This is the technology that focuses on reduced energy demand by making aware of the users by pre displaying its cost estimation. Also, it provides the information, where and how much energy is being used, minute-to minute and day-today operation. Thus enabling users toremotely controlling smart electric appliances and thermostats.

Microgeneration is another important technique in the meters which substitute supplied electricity to the customer with their directly generated electricity through solar, wind or other renewable sources.

H. CONTROLLING SYSTEM

Being capable of tracking individual customer record Smart meters can also control the amount of electricity transferring into a house or industry through network system or can restrict non essential consumption at peak times. It works on a two way communication able to send and receive information to and from consumers and supply centers.

Smart meters will make a new energy future possible:

- Remote meter reading - Smart meters can be read remotely, much easier than to read them at their installed site.
- Remote service connection/disconnection – provides user with an option to mobilize their meters at a lower cost
- Efficiency and savings- Consumers can manage energy cost by adjusting the thermostat as smart meter provides user an ease to view their electricity usage history
- There are many disadvantages of using the old electronic meter; most importantly tampering of the meter by users putting a magnet on each side to slow it down.
- Further, stealing of power is directly made from transformers which cause a heavy loss to electrical companies besides many people die in the pursuit of free power.

Smart meters can benefit the electric company by-

- Eliminating manual meter reading
- Monitoring the electric system more fastly
- Utilizing power resources more efficiently
- Providing real-time information required for reducing wastage of electricity
- Managing cost of electricity as per demand
- Saving capital by effective energy consumption instead of more energy generation

Smart meters canbenefit the electric customer by-

- Forecasting the estimated electricity bill
- Reducing chances of system failure

Smart meters can ultimately benefit the environment by-

- Preventing need for new sources of electricity generation that would cause pollution
- Limiting greenhouse gas emission from existing power plants

J. ECONOMIC BENEFITS

Smart Meter deployment creates and retains jobs, from the manufacture, installation, and maintenance of meters; data maintenance to the construction and communications infrastructure; to computer hardware and software. Smart meters create new opportunities for employees, from metering, to telecommunications, to information technology, to business analysis, to effective savings. Thus many more jobs will be created and retained as the smart meter deployment is begun and construction is started.

Accelerating this project will require the manufacturing and installation of meters, relays, switching gear, and other hardware products. Creating and installing this technology will require a multi-disciplined, labor-intensive effort that will not only create jobs in the near term, but will create a sustainable job market. New hardware accessories and innovative software are also required for the implementation of this new technology. The development, implementation, and technical assistance required for this advanced technology will create many sustainable positions throughout the information technology sector.

These jobs will fall across a broad spectrum of the labor force. Factory employees will be hired or retained to manufacture more meters and switching gear, software and computer hardware sales will increase, and new employees will be needed to install meters and make necessary modifications to the company's utility distribution systemThus smart meters deployment create and retain jobs.

K. ENVIRONMENTAL BENEFITS, THE POWER FOR A CLEANER TOMORROW

Smart Meters open new possibilities for energy conservation. The ability to monitor energy use more frequently and in greater detail can be a powerful tool for consumers, encouraging them to make energy-saving changes in behavior such as turning off unneeded appliances, changing to more efficient lighting and adjusting their thermostats. If consumers conserve energy, less power may have to be produced.

Another important conservation tool made possible by smart meters is the ability of Retail Electric Providers (REPs) to offer lower rates for off-peak energy use - and higher rates during peak periods, such as hot summer afternoons. Such "time-of-use" rate structures could help reduce peak electric demand, which is generally the most costly energy produced as less efficient power plants are pressed into service. Moreover, reduced emissions from decreased power generation could translate into better air quality in Houston.

Smart meters will also reduce the consumption of resources associated with performing basic utility services such as connections, disconnections, and meter readings, which can be executed remotely with the new technology. This will significantly decrease CenterPoint Energy's transportation fuel consumption and associated emission of greenhouse gases and other pollutants, since we will not be required to "roll a truck" for all basic services.

Additionally,smart meters and the future smart grid will create a platform that will allow for the deployment and development of technologies for increasing distributed generation and energy storage capacity, such as wind and solar generation. Our smart meters measure surplus electricity generated as well as electricity received, eliminating the need for installation of expensive specialized distributed generation metering. Distributed generation can help reduce the need for new fossil-fuel generated capacity, now and in the future, and will therefore benefit the environment.

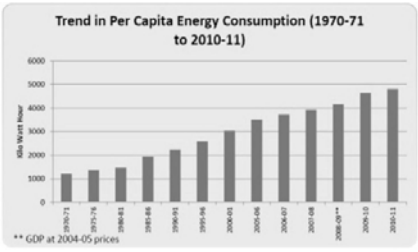

Figure IIPer Capita Energy Consumption [5]

L. Cost Estimation: According a report by UK Power Sector, installing smart meter leads tosaving 25 percent on his bill.The total cost of a limited Intelligent Grid deployment, to be completed in 2013, which will serve half a million people, is $100 million, as in [4]

M. Challenges to the Electric Companies, as in [1]

- Transitioning from old to new technology
- Acceptance of new meters by public
- Maintaining security of recorded data
- Making long term financial investment and commitment to the new metering technology

N. *Challenges to consumers*

- To verify the accuracy and precision of new meter
- Security and privacy of their personal data
- Paying additional money for the new meter installation

Smart meters pose these challenges to the environment-

- Disposal of the old meter sets

CONCLUSION

Of the 1.4 billion people of the world who have no access to electricity in the world, India accounts for over 300 million. [6] It is not factor of shortage of power but inappropriate consumption. Smart meters besides providing real-time consumption and scalable cost information to customers will help them to budget and avoid unexpected bills. These high performanceMeters automatically capture information about electricity consumption and transmit it back to electric companies. And also can track any direct connection made to supply without passing through meters. Thus uses an advanced technology to stop stealing electricity at the maximum possible level. The meter also have several other advantages including maintaining peak load limit, solving any interruption remotely as well as through network, displaying much more necessary information; thus warning users for misusing electricity.

Further the meter is connected to a network thus a prepaid recharge could be made likewise recharging mobile top-ups that could be done either online or like paper recharge to meet the smooth way of billing process.

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MODELLING AND SIMULATION OF LOW-COST SEMI-Z-SOURCE INVERTER FOR SINGLE-PHASE PHOTOVOLTAIC SYSTEMS

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Abstract—In recent years, due to energy crisis, renewable energy distributed power generators (DGs), such as wind turbine, photovoltaic (PV) cell, fuel cell, and thermoelectric generation (TEG) modules, are becoming more and more popular in industrial and residential applications. Many renewable energy DGs such as PV cell, fuel cell, and TEG module can only output dc voltage, so an inverter interface has to be utilized for grid-connected applications. Many inverter topologies have been proposed and reviewed recently. This project presents a family of single-stage nonisolated semi- Z-source inverters that can be used for the aforementioned renewable DG grid-connected application with low cost and doubly grounded features. The proposed circuit can achieve the same output voltage as the traditional voltage-fed full-bridge inverter does, with only two active switches. Compared with the traditional single-phase Z-source inverters, the proposed semi- Z-source inverters share the same form of Z-source network. But the Z-source network used in semi-Z-source inverter is in ac side, which is smaller in size than the traditional Z-source network used in dc side. The modulation strategy of the proposed circuit is also different. The traditional Z-source inverters use sinusoidal reference with extra shoot-through reference to output sinusoid voltage and achieve the voltage boost function. However, in order to output sinusoid voltage, the semi-Z-source inverter has to utilize its nonlinear voltage gain curve to generate a modified voltage reference. These differences are the reasons why the author uses the term semi-Z-source inverter to represent the proposed topologies and to distinguish it from the traditional single-phase Z-source inverter. The circuit operation and the modulation strategy of the proposed topology are analyzed in detail and verified by the experimental results.

Key words*: *Inverter , Photovoltaic, Z-source, semi Z-source, quasi Z-source.

I. INTRODUCTION

The Z-source converter employs a unique impedance network (or circuit) to couple the converter main circuit to the power source, thus providing unique features that cannot be obtained in the traditional voltage-source (or voltage-fed) and current-source (or current-fed) converters where a capacitor and inductor are used respectively. The Z-source converter overcomes the conceptual and theoretical barriers and limitations of the traditional voltage-source converter (abbreviated as V-source converter) and current-source converter (abbreviated as I-source converter) and provides a novel power conversion concept. The Z-source concept can be applied to all dc-to-ac, ac to-dc, ac-to-ac, and dc-to-dc power conversion. There exist two traditional converters: voltage-source (or voltage-fed) and current-source (or current-fed) converters (or inverters depending on power flow directions).

II. VOLTAGE SOURCE CONVERTER

Fig. 1.1 shows the traditional three-phase voltage-source converter (abbreviated as V-source converter) structure. A dc voltage source supported by a relatively large capacitor feeds the main converter circuit, a three-phase bridge. The dc voltage source can be a battery, fuel cell stack, diode rectifier, and/or capacitor. Six switches are used in the main circuit, each is composed traditionally by a power transistor and an anti parallel (or free-wheeling) diode to provide bi-directional current flow and uni-directional voltage blocking capability.

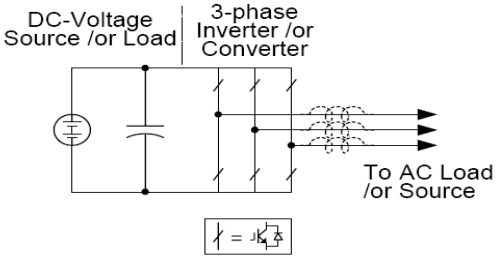

Fig 1 The traditional voltage-source converter

III CURRENT SOURCE CONVERTER

Fig. 2 shows the traditional three-phase current-source converter (abbreviated as I-source converter) structure. A dc current source feeds the main converter circuit, a three-phase bridge. The dc current source can be a relatively large dc inductor fed by a voltage. source such as a battery, fuel cell stack, diode rectifier, or thyristor converter. Six switches are used in the main circuit, each is composed traditionally by a semiconductor switching device with reverse block capability such as GTO and SCR or a power transistor with an series diode to provide uni-directional current flow and bidirectional voltage blocking.

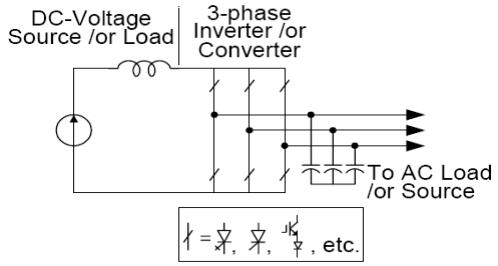

Fig 2 The traditional current-source converter

IV PROPOSED SEMI-Z-SOURCE/SEMI-QUASI-Z-SOURCE INVERTERS AND TOPOLOGY DERIVATIONS

This topic will concentrate on semi-quasi-Z-source inverter and the PWM control strategy. For the proposed semi-Z-source and quasi-Z-source inverter, only two bidirectional current conducting and unidirectional voltage blocking switching devices, such as insulated gate bipolar transistor (IGBT) and MOSFET, are needed for the operation. Because the voltage gain of the fullbridge inverter is a straight line, the sinusoidal PWM (SPWM) control strategy can be used to output the sinusoid voltage.

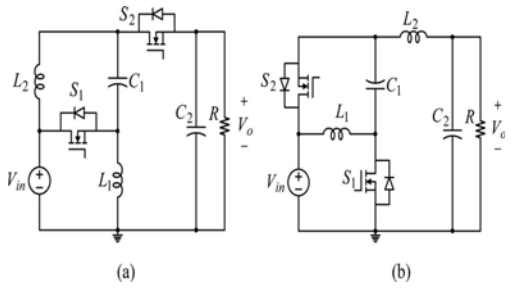

Fig 3 Proposed single-phase semi-Z-source inverters. (a) Semi-Z-source inverter.
(b) Semi-quasi-Z-source inverter.

V OPERATING PRINCIPLE OF SEMI-Z-SOURCE INVERTERS

Fig. 3(a) shows state I when switch *S*1 is conducted. During this period, capacitor *C*1 and the input voltage source charge the two inductors, and the inductor current is increased. Fig. 3(b) shows state II when switch *S*2 is conducted. During this period, the two inductors become the source and the inductor current is decreased. The inductor current reference and the capacitor voltage reference direction are marked in the figure.

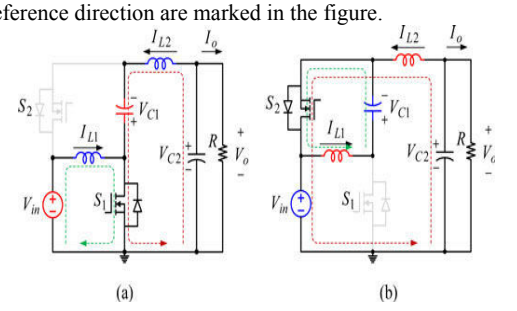

Fig 4 Semi-quasi-Z-source operation modes in one switching period.
(a) **State I *S*1 is ON. (b) State II *S*2 is ON**.

$$\frac{V_o}{V_{\text{in}}} = \frac{1-2D}{1-D} \quad (1)$$

$$V_{C1} = \frac{D}{1-D} V_{\text{in}} \quad (2)$$

$$I_{L2} = -I_o \quad (3)$$

$$I_{L1} = -\frac{D}{1-D} I_o. \quad (4)$$

$$V_o = V \sin \omega t \quad (5)$$

$$M = \frac{V}{V_{\text{in}}} \quad (6)$$

$$D = \frac{1 - M \sin \omega t}{2 - M \sin \omega t} \quad (7)$$

$$D' = \frac{1}{2 - M \sin \omega t}. \quad (8)$$

VI MODULATION OF SEMI-Z-SOURCE INVERTERS

Below figure shows the traditional single-phase Z-source H-bridge inverter and its modulation method. Simple boost control is used as an example. The correct conduction time of each switch of two-phase legs is generalized by two sinusoid voltage references compared with a triangle carrier voltage. The two sinusoid voltage references v∗ A and v∗ B are 180◦ phase shift from each other. Two straight lines *vP* and *vN* are used to generalize the shoot-through zero state. When the carrier is higher than the upper straight line, phase leg A goes to shoot-through state, whereas phase leg B goes to shoot-through state when the lower straight line is greater than the carrier.

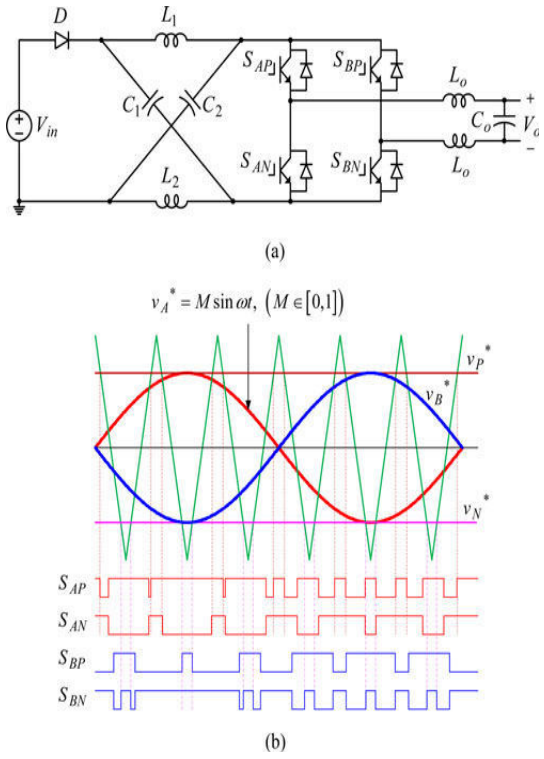

Fig 5 Traditional single-phase Z-source H-bridge inverter and its modulation method.

Fig 6 shows the proposed modified SPWM method of semi-Z-source inverters. Instead of using the sinusoid voltage reference, a modified voltage reference is used as the reference signal for the conduction of switch *S*2 in order to output the sinusoid voltage. When the reference is greater than the carrier, switch *S*2 is turned ON; otherwise, *S*2 is turned OFF. And the gate signal of *S*1 is complementary with switch *S*2 . shows the situation when the modulation index $M = 2/3$ as an example.

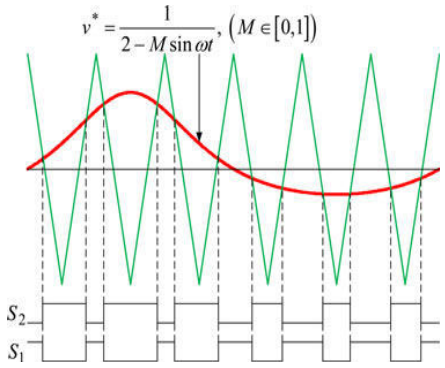

Fig 6 Proposed modified SPWM method for semi-Z-source inverters.

$$V_S = V_{in} + V_C = \frac{1}{1-D}V_{in} = (2 - M\ \sin\omega t)V_{in} \quad (9)$$

$$I_o = I\ \sin\omega t \quad (10)$$

$$I_S = I_{L1} + I_{L2} = \frac{-1}{1-D}I_o = -(2\ \sin\omega t - M(\sin\omega t)^2)I. \quad (11)$$

Fig 7 shows the duty cycle operation region with different output voltages when the modulation index is equal to 1. The *x*-axis of below figure is the output voltage angle ωt. With the change of ωt, the sinusoidal output voltage can be achieved. It can be shown from below figure that in order to output the sinusoid voltage, the duty cycle *D* is limited in the region (0–2/3).

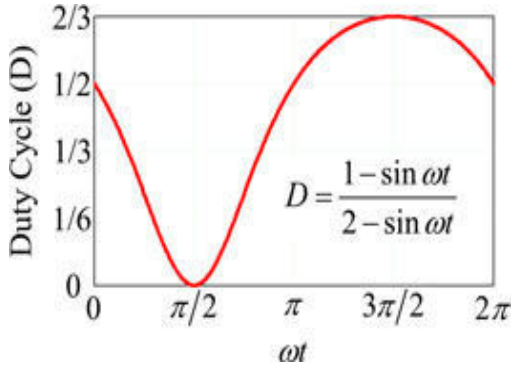

Fig 7 Duty cycle operation region of semi-Z-source inverters when the modulation index is equal to 1.

$$V_{C1} = \frac{D}{1-D}V_{in} = (1 - M\ \sin\omega t)V_{in} \quad (12)$$

$$I_{L1} = \frac{D}{D-1}I_o = -(\sin\omega t - M(\sin\omega t)^2)I \quad (13)$$

$$\Delta V_{C1} = \frac{(1-D)T_s I_{L1}}{C1} = \frac{-\sin\omega t + M(\sin\omega t)^2}{2 - M\ \sin\omega t}\frac{T_s}{C1}I \quad (14)$$

$$\Delta I_{L1} = \Delta I_{L2} = \frac{V_{in}T_s D}{L_1} = \frac{V_{in}T_s}{L_1}\frac{1 - M\ \sin\omega t}{2 - M\ \sin\omega t}. \quad (15)$$

VII TOPOLOGY EXPANSION AND DISCUSSION

The proposed single-phase semi-Z-source inverter can be expanded to two-phase or three-phase inverter very easily, which are similar to boost or buck–boost inverters. The voltage gain of two-phase or three-phase semi-Z-source inverter can also be increased, because the operation range of the duty cycle can be increased from (0–0.667) to (0–1).

Fig 8 shows the two-phase semi-quasi-Z-source inverter as an example, which can also be used in the split single-phase application.

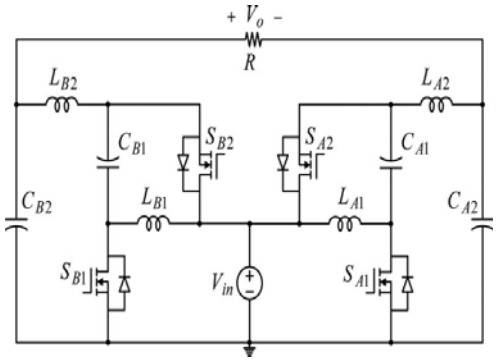

Fig 8 Two-phase semi-quasi-Z-source inverter.

The corresponding modified reference signal with different voltage gain is shown in below figure.

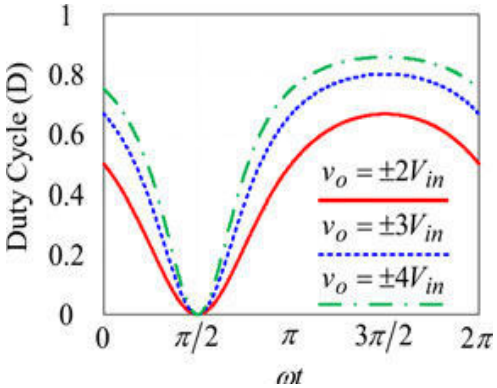

Fig 9 Modified reference signal for two-phase semi-quasi-Z-source inverter with higher output voltage.

VIII CONCLUSION

In this paper, several single-stage single-phase nonisolated semi-Z-source inverters are proposed. They are especially suitable for a PV panel in low-voltage grid-connected application as a low-cost micro inverter with high-voltage SiC switching devices. By employing the Z-source or quasi-Z source network, the proposed inverters are able to utilize only two active switching devices to achieve the same output voltage as the traditional full-bridge inverter does. Different from the traditional single phase Z-source inverter with an extra shoot-through zero state to achieve the boost function, the two switches of the semi-Z-source inverter are controlled complementarily.

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SMART ENERGY MANAGEMENT SYSTEM FOR DOMESTIC APPLICATIONS IN PAKISTAN

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Abstract—Modern lifestyle has put natural resources under unprecedented strain. The ever increasing demand for energy asks for not only increase in the production of energy but for ways and means to efficiently manage energy from various sources. Pakistan is experiencing the worst energy crisis in its history that has crippled its economy and impeded its GDP growth. Absence of any potent government effort to resolve the crisis has forced the households to look for alternate sources of energy. The solutions employed by the household range from gas powered generator units to solar and wind power units. Fluctuations in gas supply have necessitated the diversity of power sources. Households employing diverse sources of energy need a system that can efficiently manage the available sources of energy to meet the baseline and peak load requirements by using a cost effective mix of the available sources. This paper proposes a smart energy management system that provides the household with a cost effective mix of energy from the available power sources i.e. solar, wind, gas powered generator and the utility (grid).

Keywords- *Efficiently, Energy, management system, Crisis, Fluctuations, Cost effective.*

I. INTRODUCTION

As a matter of fact, demand for energy around the globe is increasing day by day [1]. Though it is very hard to go in parallel as in the form of enhancing the energy production, yet another option there is the proper management of all the available resources in the form of proper utilization according to their presence and keeping in view the economical pattern [2].

This situation demands for an intelligent and time efficient management system to utilize the available sources of energy and distribute the load according to their availability [3], [4].

As mentioned earlier, handling the whole load throughout by the available power from the Grid may not be possible due to the ever growing demand for power around the globe in general and in Pakistan for particular. So other available resources e.g. energy from the wind, solar and gas run generator to be used in such a way to take the load according to the availability of the sources and keeping in view their cost and weather factor especially for wind and solar systems [5].

Maximum energy from sun can be extracted by using the best possible design of solar tracking system [6].

Similarly maximum possible contribution from the wind energy according to the meteorological conditions of Pakistan can be there if the low wind speed profiles are introduced for the purpose [7]. The presence of such available sources demands for a hybrid system for their utilization and proper management [7].

Various energy management systems and novel techniques have been designed and proposed for the purpose, which hybrid mostly two sources into a single package [7]. Such kinds of systems lack the opportunity to take advantage of natural resource all in one.

This paper proposes a solution for the increasing demand in energy in the form of a switching and management circuitry all in a single package keeping in view the availability of sources and the economical pattern. The sources under consideration for the proposed design on the basis of this paper are wind, solar, gas run generator and the power available from the grid. These sources may or may not be available at the same time and in such a situation this piece of work proposes a switching and management circuitry to switch between the sources on the basis of their availability and cost both set by the priority set and demand for the load. The switching part of the circuit switches in between the sources labeled as source S1, S2, S3 and S4 and this switching may be set according to a predefined priority set which is flexible in the sense that a reset option is always there while the management part of the circuit manages the load according to its demand in the form of overload and under load.

II. SYSTEM OVERVIEW

The components used in the circuitry package include an eleven pin relay Sara ANK 3P-N and a relay socket of PF113A. The main purpose of the relay is to switch in between the assigned sources, which comes in the switching part of the project.

For the management part of the circuitry thermal overload relay LR2K0306 is used. The main feature of this relay is to ensure that when any discrete source gets overloaded or under loaded it compensates the load by switching to alternative source. The energy management system is summarized in figure 1.

As shown in figure 1, the sources can be selected on the basis of their readily availability and that fulfill the economic aspect as well. For example in areas where the

solar energy is available in abundance we can set its priority to default and the next abundant source will be used as second priority and so on.

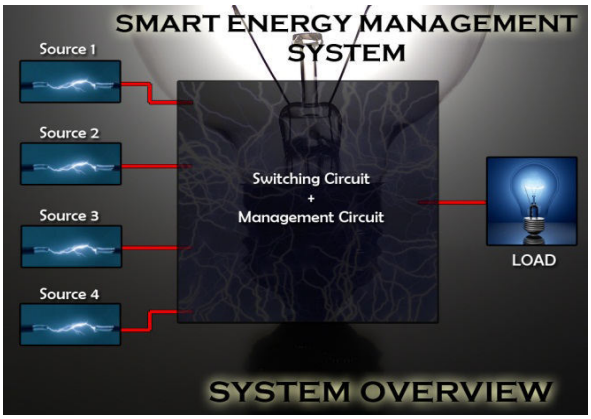

Figure.1. Overview of energy management system

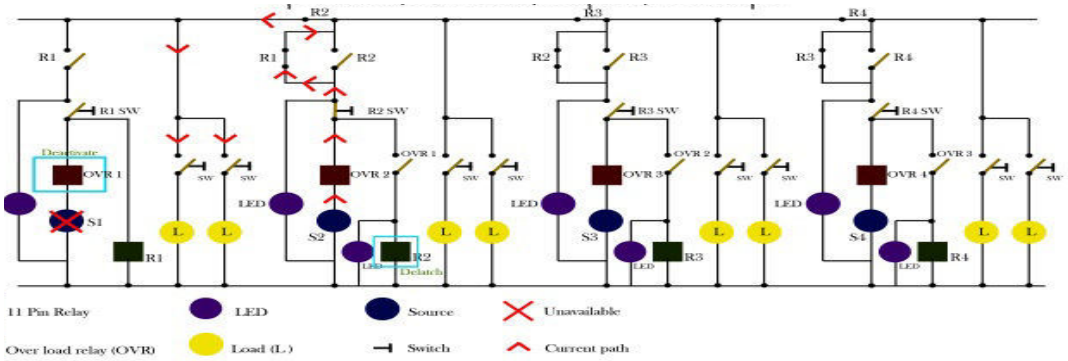

Figure 2. Source S1 is unavaailable

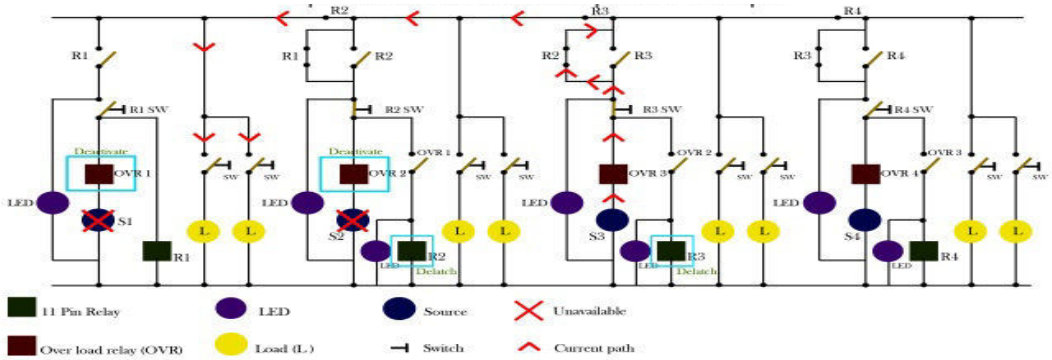

Figure 3. Sources S1 and S2 both are unavailable

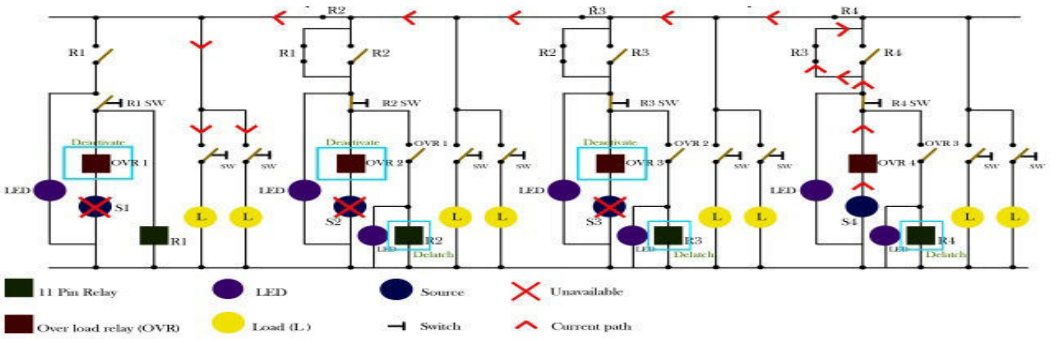

Figure 4. Sources S1, S2 and S3are unavailable

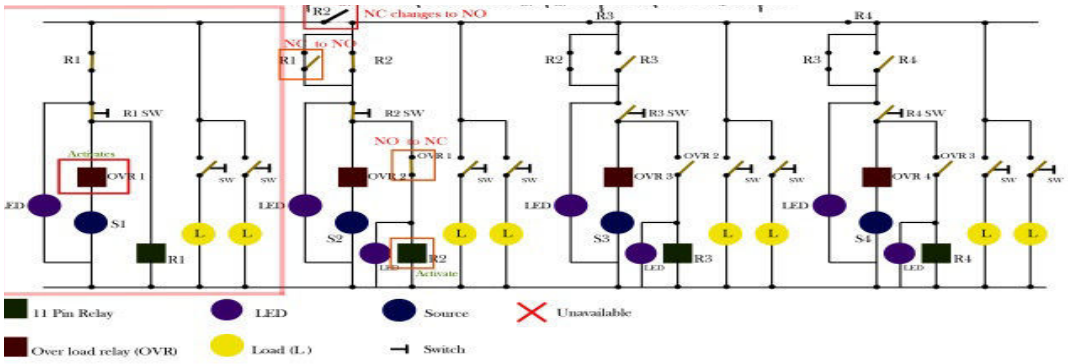

Figure 5. Source S1 is overloaded

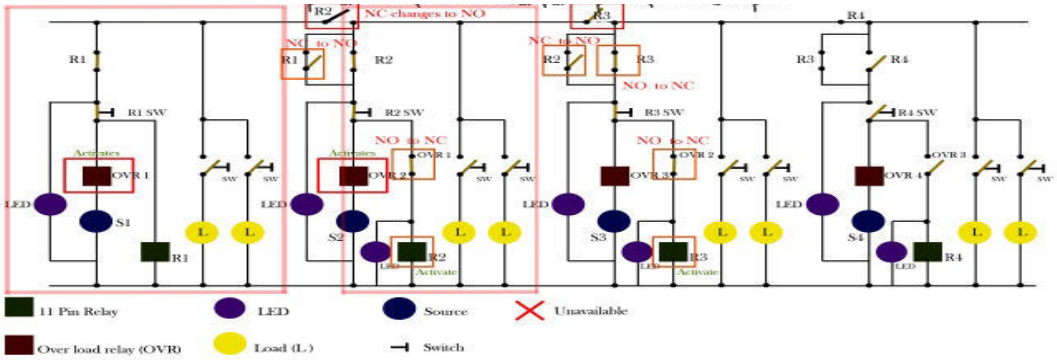

Figure 6. Source S2 is overloaded

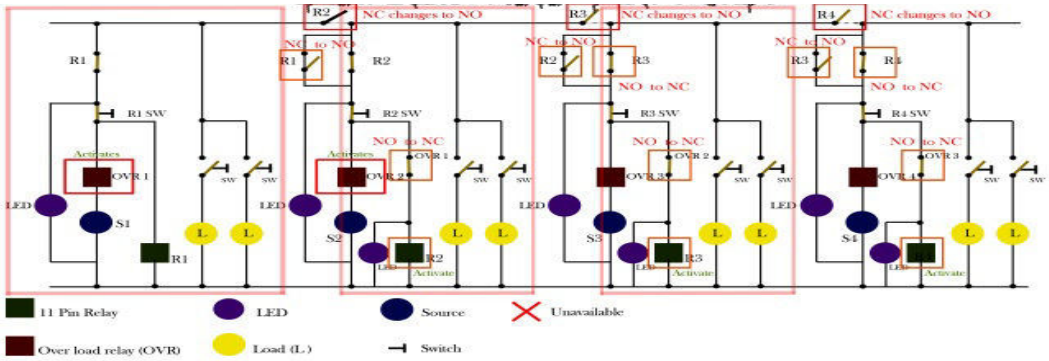

Figure 7. Source S3 is overloaded

A. Working of Switching and management circuit

The switching circuit is actually an uninterruptable power supply (UPS) with multi sources that provides emergency power to a load when the input power source typically mains power fails.

The management circuit manages the load according to the capacity. The circuit ensures if the load exceeds the
capacity of the source it would be compensated by the second available source.

B. Various Cases of Circuit Functionality

Looking at the switching part of the circuit, when the first source (S1) becomes unavailable then the load that is being upheld by the first source is compensated by the second source by means of the following path as shown in figure 2.

As Source S1 is cut off, over load relay OVR1 deactivates which results in de-latching of relay R2 and hence the current is supplied to the load through normally closed (NC) contact of R2.

As a second scenario when sources S1 and S2 are unavailable, it results in deactivating over load relays OVR1 and OVR2 which would ultimately delatch relays R2 and R3
and the current is supplied to the load by means of normally closed (NC) contacts of relays R3 and R2.

In the third scenario when sources S1, S2 and S3 are unavailable it results in deactivating over load relays OVR1, OVR2 and OVR3 which would ultimately delatch relays R2, R3 and R4 and the current supplied to the load by means of normally closed (NC) contacts of R4, R3 and R2

Analyzing the management part of the circuit through case1, 2 and 3 described in figures 5, 6 and 7 we have three possible cases under consideration. When Load on source (S1) exceeds its limit then the extra load is compensated by the second source in such a way as shown in figure 5.

TABLE. 1

Switching Circuit										
	Source 1	Source 2	Source 3	Source 4	Overload 1	Overload 2	Overload 3	Overload 4	Relay 1	Relay 2	Relay 3	Relay 4
Case 1	unavailable	available	available	available	Deactivate	Load dependent	Load dependent	Load dependent	delatched	delatched	Overload 2 dependent	Overload 3 dependent
Case 2	unavailable	unavailable	available	available	Deactivate	Deactivate	Load dependent	Load dependent	delatched	delatched	delatched	Overload 3 dependent
Case 3	unavailable	unavailable	unavailable	available	Deactivate	Deactivate	Deactivate	Load dependent	delatched	delatched	delatched	delatched

Table for Switching Circuit

TABLE 2.

Management Circuit										
	Source 1	Source 2	Source 3	Source 4	Overload 1	Overload 2	Overload 3	Overload 4	Relay 1	Relay 2	Relay 3	Relay 4
Case 1	available	available	available	available	activate	load dependent	load dependent	load dependent	latched	latched	Overload 2 dependent	Overload 3 dependent
Case 2	available	available	available	available	activate	Activate	load dependent	Load dependent	latched	latched	latched	Overload 3 dependent
Case 3	available	available	available	available	activate	activate	activate	Load dependent	latched	latched	latched	latched

Table for Management Circuit

As the load exceeds, the over load relay OVR1 gets activated which results in changing the normally open (NO) contact of over load OVR 1 into normally closed (NC) contact which latches relay R2 and ultimately changes the normally closed (NC) contact of relay R2 into normally open (NO) contact and hence it distributes the load on the second source (S2).

As a second situation on management side when load on Source (S2) exceeds then the extra load is compensated by the second source in such a way as shown in figure 6.

As the load exceeds, the over load relay OVR2 gets activated which results in changing the normally open (NO) contact of over load relay OVR2 into normally closed (NC) contact which latches relay R3

and ultimately changes the normally closed (NC) contact of relay R3 into normally open (NO) contact and hence it distributes the load on the third source (S3).

When load on Source (S3) exceeds its capacity, the extra load is compensated by the second source in such a way as shown in figure 7.

As the load exceeds the over load relay OVR3 gets activated which results in changing the normally open (NO) contact of over load relay OVR3 into normally closed (NC) contact which latches relay R4 and ultimately changes the normally closed (NC) contact of R4 into normally open (NO) contact and hence it distributes the load on the fourth source(S4).

C. Prototype Design

On the basis of proposed design and available sources the prototype is developed and tested for various available sources and under different operating conditions. This prototype is shown in figure 8. The whole experimental process on the proposed design tested for switching as well as management purposes is summarized in table 1 and table 2.

Figure.8 Prototype of energy management system

III. CONCLUSION

The main goal of the project is to utilize and manage the sources which are readily available to us in our daily life according to our requirements. The management part of the project consists of a switching and management circuit. The purpose of the switching Circuit is to provide uninterruptable power supply with multi sources that provides emergency power to a load when the input power source typically main power fails, in addition to this it is also capable in varying degrees of correcting common utility problems.

The management circuit manages the load according to capacity. This circuit ensures if the load exceeds the capacity of the source it would be compensated by the second available source according to the priority set. The goal is achieved using relay logic.

IV. FUTURE RECOMMENDATIONS

For future advancement the relay logic can be replaced by programmable logic controller and micro controller. Further the thermal overload relay LR2K0306 can be replaced with a more precise over load relay e.g. E45 DU for accurate and fast switching. The advanced controllers and fast relays will shorten the delay time between switching in between the available sources.

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PERSONAL COMPUTER BASED ROBOTIC ARM WITH VISION

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Abstract – The visionary robot i.e. a robot with a vision which is controlled by the personal computer is being studied in this paper. A new visual serving concept for dynamic grasping for image color identification is presented. By optimal fusion of both camera information using a fuzzy decision making algorithm a robust visually controlled grasping of objects is achieved even in the case of disturbed signals or dynamic obstacles. The colors are also identified for the identification of the object the user requires.

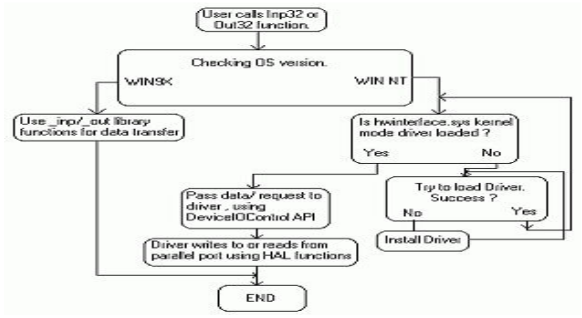
Keywords- *Robotic Arm, Robotic Rehabilitation System, data acquisition, Visual Basic.net*

I. INTRODUCTION

In this topic we are going to build a mechanical hand which will controlled by PC having number of motions for all activities right from holding things, pickup things to individual working of each finger. It has motions same as human hand and also humb motion. All motions are controlled using centralized controller which is connected to PC on parallel port (25 pins). This arm will be build up using aluminum plate to make it light weight, easy to fold, drill, shaping etc. The arm is mainly mechanical so no more circuits are required. No wireless devices are used, for control it will be connected to parallel port of a PC and for angle to angle movement stepper motor are used. The joint of palm with the arm is just like joystick-hand joint, to make it turn at any direction.

A. INTRODUCTION TO FRONT-END

For making the robot arm the project code is developed in VB because implementation of GUI is easy. VB don't have function or module to directly get or set value to/from parallel port. For that we will use some 3rd party functions or modules (controls), which are able to get or set data to/from parallel port. Software will generate different code for different motion and passes code to controller circuit and circuit will control the mechanism or motions of hand.'



B. WORKING / LOGIC

Logic behind project is each motion will operated using some special cables. Same as we have in our bike or moped as we use accelerator cable for acceleration, break cable for break etc. Each cable consists of another small cable inside which is responsible for motion. In case of software part, the functions/software used to interact with the arm mechanism, send data in binary which will convert later into voltage signal. This voltage signal (+5V or 0V) will activate the mechanism controller circuit through some transistor switches, which in turn give movements to the arm. Putting it all together we can say first used driver loading by getting driver info from system. Then get the camera window and load single frame in memory as variable. Then create 3D array of pixel detail now to comparing any of the pixel we can used direct condition as per show above.

Consider an example where if R is 255 and other is 0 then it is clear that this is red color pixel.

Overall Flow

- capGetDriverDescription
- capCreateCatureWindow
- Bm as bitmap / getObject
- Idata as byte / getBitmapBits
- Var R , G , B
  - *If R=255 & G=0 & B=0 then color="Red"*

II. USE OF A PC PRINTER PORT FOR CONTROL AND DATA ACQUISITION

A PC printer port is an inexpensive and yet powerful platform for implementing projects dealing with the control of real world peripherals. The printer port provides eight TTL outputs, five inputs and four bidirectional leads and it provides a very simple means to use the PC interrupt structure. This article discusses how to use program the

printer port. A larger manual which deals with such topics as driver circuits, op to isolators, control of DC and stepping motors, infrared and radio remote control, digital and analog multiplexing, D/A and A/D is available.

A. Printer Port Basics

1) A. Port Assignments

Each printer port consists of three port addresses; data, status and control port. These addresses are in sequential order. That is, if the data port is at address 0x0378, the corresponding status port is at 0x0379 and the control port is at 0x037a. The following is typical.

Printer	Data Port	Status	Control
LPT1	0x03bc	0x03bd	0x03be
LPT2	0x0378	0x0379	0x037a
LPT3	0x0278	0x0279	0x027a

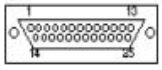
My experience has been that machines are assigned a base address for LPT1 of either 0x0378 or 0x03bc. To definitively identify the assignments for a particular machine, use the DOS debug program to display memory locations 0040:0008. For example:

```
>debug
-d 0040:0008 L8
0040:0008      78 03 78 02 00 00 00 00
```

Note in the example that LPT1 is at 0x0378, LPT2 at 0x0278 and LPT3 and LPT4 are not assigned. Thus, for this hypothetical machine;

Printer	Data Port	Status	Control
LPT1	0x0378	0x0379	0x037a
LPT2	0x0278	0x0279	0x027a
LPT3	NONE		
LPT4	NONE		

An alternate technique is to run Microsoft Diagnostics (MSD.EXE) and review the LPT assignments. 2) B. Outputs Please refer to the figures titled Figure #1 - Pin Assignments and Figure #2 - Port Assignments. These two figures illustrate the pin assignments on the 25 pin connector and the bit assignments on the three ports.



View is looking at Connector side of DB-25 Male Connector.

Pin	Description	
1	Strobe	PC Output
2	Data 0	PC Output
3	Data 1	PC Output
4	Data 2	PC Output
5	Data 3	PC Output
6	Data 4	PC Output
7	Data 5	PC Output
8	Data 6	PC Output
9	Data 7	PC Output
10	ACK	PC Input
11	Busy	PC Input
12	Paper Empty	PC Input
13	Select	PC Input
14	Auto Feed	PC Output
15	Error	PC Input
16	Initialize Printer	PC Output
17	Select Input	PC Output

Pin Assignments

Note: 8 Data Outputs
4 Misc Other Outputs

5 Data Inputs

Note: Pins 18-25 are Ground

Fig 1. Pin Assignments

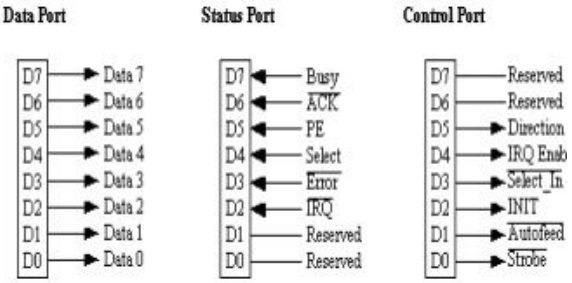


Fig 2. Port Assignments

Note that there are eight outputs on the Data Port (Data 7(msb) - Data 0) and four additional outputs on the low nibble of the Control Port. /SELECT_IN, INIT, /AUTO FEED and /STROBE. The modern nonlinear control theorem's failure in taming planets which suffer from problems like lack of certainty or unknown parameters in their modeling, complex or prolix regnant equations and etc are predictable sequent of this fact that all classical control theorems are based on the exact identification of systems. This has caused the domination of conventional control theories, like PID, over today's practical systems [16]. Common mechanical manipulators are vastly used systems which make an example of mentioned issue; in [16] and even in discrete form in [17] the famous sliding mode method has been utilized to control robotic manipulator with its dynamic equations which has caused to tremendous design and computational efforts, in [7] another common nonlinear control method ,feedback linearization, has been used for the purpose with similar results, more computationally voluminous adaptive control has been implied on such system

in [10], even more recent approaches like neural networks has been used to adjust conventional PIDs in [10]&[3], even most recent neural networks based approaches like NARMA could be used only for single variable systems as mentioned in [1]and[11]; In this thesis after describing the relations over a three dimension robotic arm a new control strategy is introduced with aim of inflicting the reference input trajectory behavior on its wrist point movement.

B. Related work

The existing work in tracking and modeling addresses subsets of the problem we are trying to solve; however, no one paper addresses them all. We make use of depth, visual, and encoder information to provide a tracking and modeling solution for enabling active object exploration for personal robotics. Below, we discuss a number of areas of research related to our own work. Krainin et al. 3. In addition to the robots and their subsystems, extensive work has been devoted to command systems that drive the robots. Command systems have been: playback supervisors, teleoperation masters, and various higher level approaches based on work from the AI community. Playback interfaces have included motion capture mechanisms that provide movement-stream information to storage systems configured for later, repeated and coordinated, operation of many robots and associated mechanisms. Play-back command systems use human commands, from an "earlier" time, to command motions that are played out, over and over, mindlessly. Teleoperation" masters", that operate in real-time with the robot, have ranged from simple motion capture devices, to more complex force reflective exoskeletal masters. Teleoperation interfaces have been composed of complex kinematic structures designed to perform motions compatible with operator movements and are attached via appropriate soft tissue interfaces. The masters emit lower level commands (joint angles) in real-time using the natural intelligence and sensory systems of the operator. AI-based command sources, blend higher level The International Journal of Robotics Research (simple) commands, with system and existing environmental states, to make decisions for the management of the robot. As with the playback systems, AI-based systems are programmed earlier to perform later operations. In the AI case, however, adaptive intelligence and sensory capabilities reside in the robot. Broadly speaking, object modeling techniques in robotics can be divided into two categories: ones where a sensor is moved around a stationary object and ones where the object is picked up and moved in front of a sensor. The first category avoids the difficult problem of robotic grasping and can be applied even to objects too large or delicate to be picked up. The second category, into which our technique falls, has the advantages of being able to move the object to see previously occluded sides and also lends itself to extracting further properties such as weight and stiffness. The first category of papers is closely related to the problem of 3D mapping as it involves motion of a depth sensor in a stationary scene. Triebel et al. (Triebel et al., 2004) mount a SICK laser range finder on a four DOF manipulator for 3D volumetric modeling and exploration. They use the manipulator encoder values for sensor pose estimation.Other approaches for environment and object modeling with a depth sensor include Henry et al.'s RGB-D mapping (Henry et al., 2010) and Strobl et al.'s Self-Referenced DLR 3D-Modeler (Strobl et al., 2009). Both use visual feature tracking as the primary means of camera pose estimation. The former uses ICP to improve pose estimates, while the latter uses an IMU to provide better image flow predictions. In the second category, Kraft et al. (Kraft et al., 2008) model contours of objects using a robotic manipulator and a stereo camera. The representations they learn, however, are not complete surface models but rather sparse sets of riented 3D points along contours. Another important difference to our approach is that the authors assume precise camera to robot calibration and precisely known robot state at all times. We believe these assumptions to be too restrictive for the technique to be generally applicable. Ude et al. (Ude et al., 2008) use robotic manipulation to generate training examples for object recognition. Their approach involves generating motion sequences to achieve varied views of an object, segmenting the object from images, and extracting training examples for a vision-based classifier. Unlike Kraft's work, their paper assumes neither known camera calibration nor precisely known joint angles. However, the paper does not deal with constructing 3D models and therefore does not require precise object pose. Similarly, Li and Kleeman (Li and Kleeman, 2009) use a robotic manipulator to achieve varied views of an object for visual recognition. They store Scale-Invariant Feature Transform (SIFT) features for frames at discrete rotation angles and perform detection by matching the features of an input image against each viewpoint of each modeled object. The authors mention that such models could be useful for object pose estimation. We assert that this requires estimating the motion of the object between viewpoints using techniques such as those we propose in this paper.

C. Robotic Rehabilitation Systems

In the case of wheeled mobile platforms, which include a large part of the land mobile manipulators, except mainly humanoids and all-terrain systems, the rolling without slipping (r.w.s.) of the wheels on the ground introduces specific difficulties in the modeling. The platform, which cannot move instantly in any arbitrary direction, is then said to be nonholonomic. If we restrict our study to that large category of wheeled mobile platforms, we must evoke the excellent contribution of Campion, Bastin, and D'Andréa-Novel (1996), which offers good tools for the generic

modeling of robotic systems built from wheeled mobile platforms. We propose this modeling in this paper after we introduce the kinematic modeling of the subsystems: platform and robotic arm. This is the purpose of Section 2. This reveals, in particular, the existence of the control of mobility of the mobile manipulator, which represents the control producing instantaneous velocities of the end effector (EE) of the mobile manipulator. Also we obtain the instantaneous kinematic location model (IKLM) of the mobile manipulator, which sets the derivative of the EE location as a function of the control of mobility. Prior work has studied the ability of the MIME (Mirror- Image Motion Enabler) device (Burgar et al. 2000) to assist limb movements and facilitate recovery of motor function in subjects with chronic hemiparesis due to stroke. MIME incorporates an industrial robot and operates in three unilateral modes and one bimanual mode. In unilateral operation, passive, active-assisted and guided movements against a resistance are possible. The bimanual mode enables the subject to practice bilateral, coordinated movements with rate and range under his or her control. In the current version of MIME, subjects are seated in a wheelchair modified to improve seating support and reduce movements of the upper body. They can sit close to either the front or rear of an adjustable height table. A PUMA-560 robot is mounted beside the table. It is attached to a wrist-forearm orthosis (splint) via a six-axis force transducer, a pneumatic breakaway overload sensor set to 20 Nm torque, and a quick release coupling mechanism. The subject's arm is strapped into the splint with the wrist in neutral position. Robot/forearm interaction force and torque measurements from the transducer are recorded and archived by a personal computer. The control program monitors these data and the motion of the robot in order to prevent potentially hazardous situations from occurring. Switches and mechanical stops are strategically placed to permit rapid de-activation of the robot, if necessary. In an initial study with MIME including 28 subjects (two groups of 14) all had improved motor function as a result of therapy (Burgar et al. 2000). The robot group, compared to the control group, had larger improvements in the proximal movement portion of the Fugl-Meyer (FM) test after one month of treatment and also after two months of treatment. The robot group also had larger gains in strength and larger increases in reach extent after two months of treatment. At the six-month follow-up, the groups no longer differed in terms of the Fugl- Meyer test, however the robot group had larger improvements in the Functional Independence Measure (FIM). As a conclusion of our project we declare that our project has been completed successfully and working properly as per problem definition. During the project many problems occurred but using some proper logic those problem are solved. Project takes total seven month including seminar preparation, logic designing, study regarding project and study of programming language. In future development we are tying following things

- If implemented with bio technology then can be work as arm for handicap people.

- Smooth and more option can be provided.

The ability to recognize and manipulate objects is important for mobile robots performing useful services in everyday environments. In recent years, various research groups have made substantial progress in recognition and manipulation of everyday objects (Ciocarlie et al., 2007; Berenson and Srinivasa, 2008; Saxena et al., 2008; Collet Romea et al., 2009; Glover et al., 2009; Lai and Fox, 2009; Rasolzadeh et al., 2009). While the developed techniques are often able to deal with noisy data and incomplete models, they still have limitations with respect to their usability in longterm robot deployments in realistic environments. One crucial limitation is due to the fact that there is no provision for enabling a robot to autonomously acquire new object models as it operates in an environment. This is an important limitation, since no matter how extensive the training data, a robot might always be confronted with a novel object instance or type when operating in an unknown environment

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INTERNET BASED REMOTE CONTROL OF DC MOTOR USING EMBEDDED ETHERNET BOARD AND MICROCONTROLLER

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Abstract: Now days microcontroller are extensively used in control and remote monitoring system. microcontrollers are low cost embedded systemthat control and monitor consumer appliances.In our system we monitor remote dc motor speed by using Ethernet controller .several industrial application utilizes industrial lan for network controlled system but we use Ethernet based protocols for network .such as TCP/IP,UDP,ICMP of Ethernet. this is flexible control system monitoring speed through sensor and it transfers the same to remote user and he can send the commands such as increase speed, decrease speed from remote place in this system we exploited capability of microcontroller connecting to internet.

Index Terms—*Remote monitoring system.ethernet network TCP/IP, UDP,ICMP.*

I. INTRODUCTION

The speed control of dc motor is very crucial especially in the application where precision and protection is required in past speed control of dc motor is mostly mechanical requiring large size hardware to implement. connecting a complex control system with various sensors, actuators and controllers as a networked control system by shared network can effectively reduce complicated wiring connection this system is easy to install and maintain. the recent trend is to use maintain networked control systems for time sensitive applications[1].in the proposed system we incorporate simple open loop control system speed control of dc motor finds application in rolling mills, printing press ,textile mills Adjustable speed drives are may be operated over wide range by controlling armature if field excitation Speeds below rated by armature voltage and above rated using field excitation variation. development of various solid state switching devices like IGBT has made dc drives more accessible for various application .Electrical motor drive can be one of following type torque or force control, acceleration control and speed control and complexity depends upon control configuration[2].

As it is discussed about the facilities of that provided for microcontroller [3] for dc motor speed control hardwired approach is very complex compared to software approach because major hardware approach is rigidity design .

II . INTERNET BASED REMOTE CONTROL OF DC MOTOR

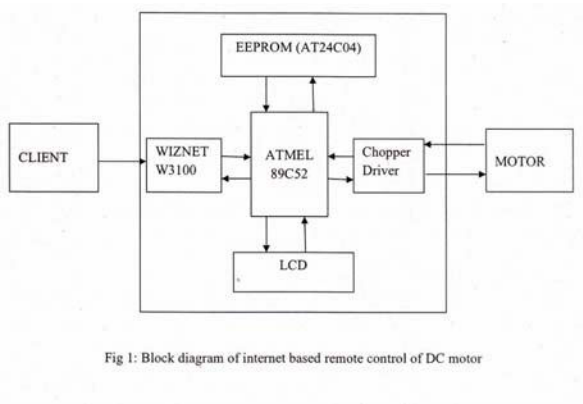


Fig 1: Block diagram of internet based remote control of DC motor

The figure1 shows the internet based remote control.the objective of project is to develop hard module for executing online based embedded Ethernet microcontroller The system works on principle of remote sensing and control the person is hooked up on to LAN at machine end system will carry hardware parts for providing control of machine to which it has been connected there is a LCD LCD on remote microcontroller which will indicate the information whatever the controlling person has updated this microcontroller is connected to person sitting remote place via network embedded Ethernet board consist of Ethernet controller for supporting connectivity on network via wiznet W3100. Microcontroller for this application used is AT89C52 which is 8 bit CPU with flash memory onchip. Microcontroller send and recives signal from remote client and speed control of DC motor is achieved using PWM technique the chopper circuit generates pwm signal to motor the microcontroller and power circuit of DC motor are isolated using optoisolator as it is easy to generate PWM from microcontroller is

at the level of 5v and this variation is converted to high voltage using chopper circuit and it is possible to speed to 900rpm to 100rpm. The w3100 is an LSI OF hardware protocol stack provides an easy low cost solution for internet connectivity

for digital devices by allowing simple installation of TCP/IP stack , w3100 contain TCP/IP Protocol stack such as TCP,UDP,IP,ARP,ICMP protocol it offers socket API similar to windows socketAPI.RS232 cable is used to communicate Ethernet controller and microcontroller.

III.SOFTWAREIMPLEMENTAIONPHASE

in the implementation cycle we use KEIL embedded development environment for programming microcontroller. Now onwards it is referred as server machine the user is given addres to acess the machine which is stored into EEPROM. By opening the hyper terminal menu based interface the flow of event is as shown in fig 2.and the speed control by using

PWM algorithm. And connection set up for remote controller as shown fig3.

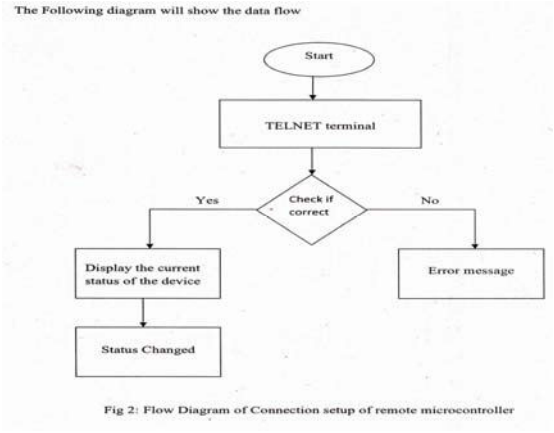


Fig 2: Flow Diagram of Connection setup of remote microcontroller

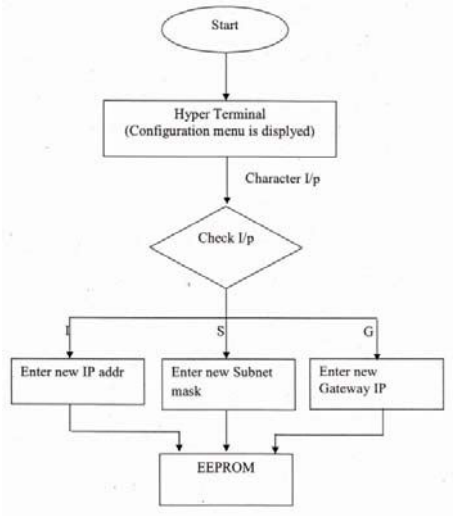
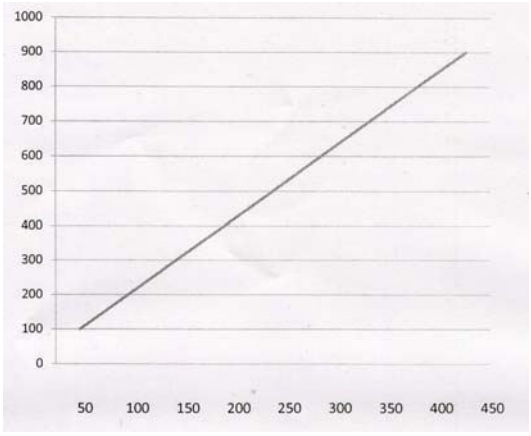


Fig 3: Flow Diagram of Net Configuration

Embedded C modules we develop for LCD display, serial communication and socket programming.

IV . RESULTS :

Armature votage In Volts	Load Current In Amps	Speed in RPM
65	0.20	300
75	0.21	350
90	022	450
100	0.23	550
125	0.24	650
140	0275	760
195	0.325	760
210	035	910



V.CONCLUSION: The microcontroller based remote control for speed control has been developed and experimental results have been obtained for proposed control system the result showed that the capability of microcontroller has enhanced for network based control DC drivers are used as part of electromagnetic actuators, which is key role in industry in future we can enhance the project for design and implement PD and PI for DC motor control and java GUI can be used for streaming the video signal.

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WATCH WITH A SOLAR MOBILE CHARGER

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Abstract: A portable mobile charger is what every human in this world is searching for. Till now we have Solar Mobile chargers and watches. But these two innovations are for a single purpose. So two gadgets has to be carried to see time and the other to charge your mobile. But what if these two gadgets are combined into a single gadget? To be precise, you can see time and also charge your mobile in a single gadget. The central theme of my idea is to limit the number of components and the price required to see time and charge your mobile. A watch with a mobile charger is something amusing and sounds easy to use it. A normal watch (running in battery) can charge a mobile if solar panels are around it. Simply a dual purpose gadget. A part of strap of the watch is made from solar cells (small size) which can deliver a sufficient voltage. Using solar cells on the both side of the body of watch in either series/parallel connection may increase the output voltage/current as required. The voltage so produced can be stored in a battery from which the charge stored can be used to charge a mobile through an output pin. This idea can be done using a circuit with necessary components. This design will surely help in any kind of emergency situations where you are lost in some lonely area with your mobile switched off.

Keywords: *Zener diode, Solar panel, Battery, Schottky Diode.*

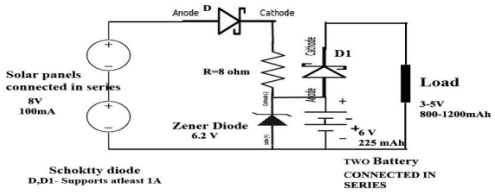
INTRODUCTION:

As said human's thirst for sophistication will never come to an end. Every human in this world searches and will search for an alternate to every new things . Technology is the ultimate solution to this thirst. New trending technologies reduces human's time and make them comfortable. For example mobile, the one and only gadget you can expect every man to possess. Charging can be done with a simple mobile charger in your home/car/office but what if it can be done with a portable mobile charger? Yes this technology has been found in the form of solar chargers. But you can't expect them to be carried under sunlight and use it for charging in caseof emergency/needed situations. But most of us wear watches where noramlly we roam in daytime (under sun) for atleast 3 hours, just think if these watches have the facility of charging a mobile using solar panels. Yes it sounds good though its not a great innovation but a good application of an innovated thing. I propose of having solar panels on the strap near the watch which can act as a mobile charger if fed with an ideal circuit. Cheap and simple components will be needed for this purpose to be done. I hope that this will serve as a boon to all the people in this world who are in search of such gadgets which I have proposed.

CIRCUIT AND COMPONENTS:

The main components to build up the circuit for charging the mobile is

1. Two Solar panels connected in series- each 4V 100mA 0.4W, totally 8V 100 mA 0.8W.
2. Two Schottky Diode-Supporting atleast 1A.
3. Zener Diode- 6.2V 1457 mW.
4. Two Lithium batteries connected in series- each 3V 225 mAh 0.675 Wh, totally 6V 225 mAh 1.35 Wh.
5. Resistor- 8 ohm 423 mW (calculated).
6. Pin which connects to the load for charging. In the circuit diagram it is represented directly as load instead of a pin. Load specifications- 3-5V 800-1200 mAh (approximately). The circuit diagram is represented below



FIG(A):

This circuit comes under the body of the watch in the form of PCB which is enclosed by a metal body. This circuit design idea is modified according to the required ratings. The load specifications are the normal rated voltage and current for a widely used cell phone battery (say Nokia). The Solar panels and Batteries mentioned above are available in the market with the suitable dimensions such that the panels fit into the strap and the Batteries (PCB circuit) fit under the body of the watch. The ratings of the solar panel and battery which are available in market are explained below:4V 100mA Mini Solar Panel: Model:ST-M6060 – Maximum Power (Pm) : 0.4W. – Operating Voltage (Vmp): 4V. – Operating Current (Imp) : 100mA. – Power Tolerance: ±5%. – Dimension: 60*60*3mm. – Type: Monocrystalline silicon solar cell. – Sealed Technology : Encapsulated with epoxy resin.

CR2032 PANASONIC LITHIUM COIN CELL BATTERY:

Specifications:
- Chemistry: Lithium.
- Voltage: 3V.
- Brand: Panasonic.
- Dimensions: 20 mm x 3.2 mm.

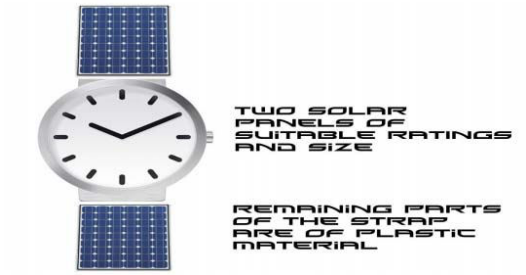
Weight -3.2g
- 225 mAh.
- 0.675 Wh

Features:
- High Energy & Continuous Voltage Supply .
- Long shelf Life (up to 10 years).
- Ideal Temperature Resistance.
- Superior Storage capacity.

The sole reason for using a battery instead of directly applying to the load is that the mobile can be charged at night time also. The solar panels also get charged under high intensity of some lights/bulbs used in our house. Zener Diode along with the resistor (current limiting resistor) acts as a voltage regulator and it prevents over charging of the battery since the value of zener voltage is slightly higher than the value of battery voltage. The Schottky Diode D used acts as a blocking diode and prevents reverse conduction (prevents discharging during night). The reason why schottky diode is used over other diode is that it has lower voltage drop compared to other diodes ranging between 0.2-0.4V. These diodes which acts as switch supports continuous flow of current upto 1 Amp. The value of resistor of 8 ohm is chosen upon calculations.Model:

Fig(1):

The PCB circuit which consists of the entire components including the battery will be enclosed in a metal body under the body of the watch with small holes in case of heat dissipation. These heat dissipation may occur due to zener diode but its very rare. The pin lead is shown which connects the load through a suitable wire.



Fig(2):

This is the model of the top view of the watch where the strap is made of solar panels close to the body of the watch. The entire strap is not made of the solar panel (only areas of the strap near the watch body is made of solar panel) where the remaining part of the strap is made of normal materials (plastic or leather) preferably plastic for insulation purpose. Also the bottom part of the solar panels are insulated. The amount of time required to charge the Lithium battery from the solar panels is approximately about 4 hours approximately (calculated), but practically it may vary. It is not the efficient method to charge your mobile from lithium battery but its highly useful (to make atleast one call) during emergency/needed situations for which this idea is proposed. There is no need of any by-pass diodes in the circuit since it a small voltage application. There is no fear of any damage to the circuit since this circuit is designed with great precautions and calculations. May be in future solar panels and batteries of smaller size with good output ratings may replace my proposed solar panels and batteries so that the size of watch becomes considerably smaller.Demerits:

1. Bigger in size compared to normal watches.
2. Not completely flexible since it has solar panels near the watch body.

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