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2022-23

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An Invocation to EVOLUER

Evoluer has a French origin meaning “to evolve”. Evolver is here for you to change your thinking, wisdom and implement the truth of technical knowledge in you. As you scroll through the pages you would find a new insight to the advancements in science and technology. This magazine will bring in you the inquisitiveness for technology, and thereby keep you updated of the technical world. Thus we hope that our sincere effort in bringing out the 2023-2024 edition of EVOLUER will add a spark to your knowledge in this techno-world

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Foreword from Chairperson, Trident Academy of Technology

I am extremely happy that the Electronics Society of our students is bearing out the next issue of their in house magazine "Evoluer". I am sure that this literary creation will bring to increase the potentiality among the young players and will prove to be a proper platform to present their talents and ideas. I wish all the best to "Evoluer".

Mrs. Smitarani Panigrahi

Chairperson,
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Foreword from Principal, Trident Academy of Technology

I am glad that the electronics society which is under the department of Electronics & Telecommunication engineering Trident Academy of Technology is publishing a magazine, "EVOLUER". Manufacturing of electronics system have taken rapid strides in improvement with respect to speed, size and cost. The very purpose of the magazine is to inspire creativity among students and provide a platform to showcase their potential. I am confident that the deliberation in magazine would render valuable service to the students in providing an insight to the technological updates. I wish all the success to "E-Society".

Prof. (Dr.) Debanarayan Pattanayak

Principal
Trident Academy of Technology,
Bhubaneswar



EDITORIAL

Every issue of “EVOLUER” honour an individual who has made significant contributions of Electronics and Telecommunication Engineering and whose achievements are inspirational. After the release of the last issue, which I'm sure that all of you must have enjoyed reading, we have arrived at the happy situation of bringing the next issue. I take this opportunity to once again thank all the editorial board members. From the inception of the development of thought , the process is responsible for expanding the boundaries of our knowledge to understand the field behind the application to our syllabus. Exploration and development increase the human knowledge and experience. The pupils in this issue have struggled for more productive creativities in pursuit of excellence. The technologies that aid in integration of various sources of information and knowledge will find critical need in future for facing the challenges of understanding the field of telecommunication.

Articles exposing new frontiers of knowledge in the arenas of current advancements are published in this “EVOLUER”, will contribute to future progress in the evolution of new methodologies for different valuable applications. The diversity of topics is nicely blended into this issue and I'm sure that the readers will enjoy and get sufficiently educated to appreciate the facets of this new technological prospects. I look forward to these contributions with great anticipation.

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A Recent Investigation on Detection and Classification of Epileptic Seizure Techniques Using EEG Signal

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ABSTRACT

In Epilepsy — also known as a seizure disorder — is a brain disorder that causes recurring seizures. There are many types of epilepsy. In some people, the cause can be identified. In others, the cause isn't known.

Epilepsy is common. It's estimated that 1 in 26 people develops the disorder, according to the Epilepsy Foundation. Epilepsy affects people of all genders, races, ethnic backgrounds and ages.

Seizure symptoms can vary widely. Some people may lose awareness during a seizure but others don't. Some people stare blankly for a few seconds during a seizure. Others may repeatedly twitch their arms or legs, movements known as convulsions or spasms.

Having a single seizure doesn't mean you have epilepsy. Epilepsy is diagnosed if you've had at least two unprovoked seizures at least 24 hours apart. Unprovoked seizures don't have a clear cause.

Treatment with medicines or sometimes surgery can control seizures for most people with epilepsy. Some people require lifelong treatment. For others, seizures eventually go away. Some children with epilepsy may outgrow the condition with age.

INTRODUCTION

Some people with focal seizures experience warning signs in the moments before a seizure begins. These warning signs are known as aura. They might include a feeling in the stomach. Or they might include an emotion such as fear. Some people might feel déjà vu. Aura also might be a taste or a smell. It might even be visual, such as a steady or flashing light, a color, or a shape. Some people may experience dizziness and loss of balance. Others may see things that aren't there, known as hallucinations.

Seizures are classified as either focal or

generalized, based on how and where the brain activity causing the seizure begins.

When seizures appear to result from activity in just one area of the brain, they're called focal seizures. These seizures fall into two categories:

- Focal seizures without loss of consciousness. Once called simple partial seizures, these seizures don't cause a loss of consciousness. They may alter emotions or change the way things look, smell, feel, taste or sound. Some people experience déjà vu. This type of seizure also may result in involuntary jerking of one body part, such as an arm or a leg, and spontaneous sensory symptoms such as tingling, dizziness and flashing lights.
- Focal seizures with impaired awareness. Once called complex partial seizures, these seizures involve a change or loss of consciousness or awareness. This type of seizure may seem like being in a dream. During a focal seizure with impaired awareness, people may stare into space and not respond in typical ways to the environment. They also may perform repetitive movements, such as hand rubbing, chewing, swallowing or walking in circles.
- Symptoms of focal seizures may be confused with other neurological disorders, such as migraine, narcolepsy or mental illness. A thorough examination and testing are needed to distinguish epilepsy from other disorders.

Types of focal seizures include:

- **Frontal lobe seizures**-Frontal lobe seizures begin in the front of the brain. This is the part of the brain that controls movement. Frontal lobe seizures cause people to move their heads and eyes to one side. They won't respond when spoken to and may scream or laugh. They might extend one arm and flex the other arm. They also might make repetitive movements such as rocking or bicycle pedaling.
- **Temporal lobe seizures**- Temporal lobe seizures begin in the areas of the brain called the temporal lobes. The temporal lobes process emotions and play a role in short-term memory. People who have these seizures often experience an aura. The aura may include sudden emotion such as fear or joy, a sudden taste or smell,

- a feeling of déjà vu, or a rising sensation in the stomach. During the seizure, people may lose awareness of their surroundings, stare into space, smack their lips, swallow or chew repeatedly, or have unusual movements of their fingers.
- **Occipital lobe seizures**- These seizures begin in the area of the brain called the occipital lobe. This lobe affects vision and how people see. People who have this type of seizure may have hallucinations. Or they may lose some or all of their vision during the seizure. These seizures also might cause eye blinking or make the eyes move.

DESCRIPTION

Long term video or ambulatory EEG has an important role in the assessment of patients who present diagnostic or management difficulties following clinical evaluation and routine EEG.

Ambulatory EEG is most suitable when concurrent synchronised video to document clinical features is not essential, or for monitoring in an outpatient setting or specific environment. Inpatient video EEG telemetry is expensive and labour intensive, and a limited resource. Specialised telemetry units have the advantage of dedicated ward based staff, experienced in the identification of subtle clinical events, and close management of patients during seizures. Duration of study depends on frequency of attacks; in practice, long term EEG monitoring is unlikely to be productive if the patient's events occur less than once per week. Methods to increase likelihood of seizures include antiepileptic drug reduction (utilising specific protocols, and best reserved for pre-surgical evaluation) and provocation techniques. There is a risk that provocation by suggestion may lead to false positive results particularly in psychogenic non-epileptic seizures, and use of other techniques such as saline injection or alcohol swabs carries ethical difficulties.

Long term monitoring generates very large amounts of data for analysis, which can be reduced by use of commercially available spike and seizure detection algorithms (accepting these may underestimate or overestimate relevant events). There is current research interest in methods that

anticipate or predict seizures, by detection of non-linear changes in EEG data at least several minutes before an epileptic seizure. Specificity and sensitivity of these methods has not been fully evaluated, and their clinical role is as yet uncertain.

In partial epilepsies, the most important ictal EEG changes for seizure localisation are those that occur within the first 30 seconds after the seizure onset. Broadly speaking, localised changes are more common in temporal lobe epilepsy than in extratemporal seizures, and epileptiform or high frequency discharge is more likely to occur in neocortical epilepsy, particularly if the focus is relatively superficial. In mesial temporal epilepsy, the typical ictal onset pattern is a rhythmic θ (5–7 Hz) discharge localised to the anterior mid temporal lobe, with up to 80–90% of patients showing such change. In lateral temporal seizures, ictal onset EEG changes are usually lateralised, and more likely to have a repetitive epileptiform appearance than mesial temporal seizures. Frontal lobe epilepsy ictal EEG onset patterns are most often generalised or widespread, comprising high frequency activity or slow rhythms or attenuation. Localised changes are rare, for a number of reasons—inaccessibility of much of the frontal lobes to scalp electrodes, widespread anatomical connections, likelihood of bifrontal damage in post-traumatic frontal epilepsy, and variability in size and distribution of epileptogenic regions. Interictal discharges in frontal lobe epilepsies are often generalised or non-localised for similar reasons. Ictal EEG changes may also be obscured by the hypermotor clinical manifestations of FLE. Ictal onset EEG patterns in parietal and occipital seizures vary, in part dependent on pathways of seizure propagation. Localised and lateralised ictal onset may occur, particularly in non-mesially sited epileptogenic foci. However, the rate of false localisation and lateralisation is highest in these two seizure types, thus limiting the role of ictal recording in parietal and occipital lobe epilepsy.

Scalp EEG commonly shows no change in simple partial seizures, because the focal ictal discharge is distant or deep, or involves

too small a neuronal aggregate for synchronised activity to register on the scalp. This is unfortunate given how difficult diagnosis of simple partial seizures can be on clinical grounds.

Role of neurophysiology in evaluation of patients for epilepsy surgery

Interictal and ictal EEG remain pivotal in pre-surgical assessment, although their role has evolved with the advent of high resolution volumetric magnetic resonance imaging (MRI) and other imaging techniques. The importance of neurophysiological investigation also depends on the surgical procedure. It is high in resective surgery (lesionectomy, lobectomy) and multiple sub-pial transection, moderate in hemispherectomy, and low in callosotomy or vagal nerve stimulation, except to exclude the possibility of a resective procedure.

Most candidates for epilepsy surgery can be adequately investigated by scalp interictal and ictal EEG. The purposes of neurophysiological assessment are:

- to confirm that the individual has epileptic seizures (4–10% of patients in surgical programmes have co-morbid psychogenic non-epileptic seizures; if untreated before surgery, non-epileptic attacks often become more florid and present a major management problem)
- to characterise electroclinical features and establish whether these are concordant with other data (MRI, functional imaging, psychometry)
- to demonstrate epileptogenicity of the presumed pathological substrate of refractory epilepsy
- to identify possible other epileptogenic foci
- to assess cortical function when pathology is in or close to eloquent cortex.

Some patients require invasive neurophysiological studies. The proportion who do in a given epilepsy surgery centre depends on complexity of case mix, availability of non-invasive localising investigations such as SPECT, PET, MEG, and fMRI-EEG, and to some extent the traditional practice of the centre. Invasive EEG utilises depth electrodes (inserted surgically under stereotactic MRI guidance) and subdural

electrodes (strips or grids, the latter requiring craniotomy for placement). Cortical stimulation can be performed with either type of electrode. Electrode selection and placement is determined by the location of the epileptogenic zone. In general, wider areas of cortex are covered by subdural electrodes; depth electrodes are more suitable for deep lying foci, but have the disadvantage of sampling only small areas of brain. The risks of invasive EEG—infection, haemorrhage, cortical damage—depend on electrode type and number. The main indications for invasive EEG are dual or possibly multiple potential epileptogenic pathologies, bilateral hippocampal sclerosis, and focal lesions in eloquent cortex. Invasive EEG might also be offered to a patient with no underlying structural pathology identified on neuroimaging, but in whom other investigations have generated a plausible hypothesis as to location of the epileptogenic region.

The number of seizures that need to be recorded, and thus length of study, in either scalp or invasive EEG video telemetry depends on type of epilepsy and findings in other investigations, particularly MRI. Video EEG telemetry may be unnecessary if there is strong concordance of interictal scalp EEG with other investigative modalities. Some centres have reported good outcome after temporal lobectomy in small series of unilateral hippocampal sclerosis evaluated by interictal EEG without seizure recording.

CONCLUSION

Non-convulsive status epilepticus (NCSE) covers a range of conditions, with variable clinical features, and pathophysiological, anatomical, and aetiological bases: generalised absence status, de novo absence status, simple partial status epilepticus, complex partial status, electrographic status with subtle clinical manifestations, and electrical status epilepticus in sleep. EEG manifestations reported in NCSE include continuous or virtually continuous spike wave discharge, discrete focal electrographic seizures, diffuse slow activity with or without spikes, and periodic or repetitive epileptiform discharges. Complex partial status in patients with existing epilepsy is relatively

benign, probably under-recognised, and readily diagnosed on clinical grounds. Most other clinical situations in which NCSE occurs require EEG for diagnosis, which can be confirmed if the EEG shows continuous or virtually continuous paroxysmal activity, and preferably improvement simultaneous with clinical response to anticonvulsant medication such as intravenous/oral benzodiazepines. Electrographic diagnosis is relatively easy in generalised absence status (de novo absence status of late onset, or in patients with existing/previous IGE), in which there is a prolonged state of altered consciousness associated with generalised 3 Hz spike wave EEG activity. EEG confirmation is also usually straightforward in persistent electrographic status after control of convulsive status, and in children with ESES. More problematic are cases of simple partial status, in which the EEG is unchanged or non-specific; or the patient with acute cerebral damage (caused by anoxia, infection, or trauma) whose EEG shows frequent or continuous abnormalities which may be due to the primary pathology per se; or those with epileptic encephalopathy who have clinical symptoms suggestive of NCSE, but show similar ictal and interictal EEG patterns. For these situations, internationally agreed criteria for EEG diagnosis of NCSE are needed urgently.

An VLSI Based FPGA For SERC

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ABSTRACT

In this paper, a convolution code namely low density parity check is proposed and implemented in VLSI architectures (FPGA). In general a digital communication system suffers from errors due to noise, distortion and interference during the data transmission and commonly uses various algorithms to correct the errors. A third generation wireless communication system uses convolutional codes for transmission of voice and control signals. whereas in existing system the convolution code namely the turbo codes are used with the belief propagation algorithm that plays a vital role in VLSI implementation which have low bit error rate and low signal to noise ratio but high decoding error rate and high decoding complexity. The Tanner graphs are used to construct longer codes from smaller ones to perform row and column operations. The Low Density Parity Check uses the message passing algorithm that acts as the superior performer and iterative decoding technique for low decoding complexity and high decoding rate that helps in parallel processing for updating large number of messages and transferring between check nodes and bit nodes. The optimised method of Moore's Law is implemented. This attracts the public attention as a code for fourth generation in communication system and provides high security. The simulation results indicate that our proposed scheme can reduce the power dissipation by overcoming the soft error process which is the incorrect switching or an impractical activity of a memory cell and provides an optimal circuit in order to enhance the VLSI Technologies.

INTRODUCTION

The objective of the project is to estimate the power dissipation and nanometer range and reduce it by using the Low Density Parity Check Code to enhance the circuit to be optimal. Flexible and reconfigurable architectures have gained wide popularity

in the communication field through Low Density Parity Check due to its high security significance. Node to node communication is done through message passing Algorithm. The low density parity check plays a vital role in the resilient of FPGA. Therefore, the number of non-zero bits increases as the code length increases, as a result of which the memory size is to be large. The coding is done through Tanner graph. Soft error due to bit miss is detected using built in self test and overcome by the error correction method using Low Density Parity Check. This helps in reducing the nanometer range. With the growing trend towards portable computing and wireless communication, power dissipation has become one of the most critical factors in the continued development of the microelectronics technology. The power dissipation is due to the improved performance of the circuits and to integrate more functions into each chip. As a result, the magnitude of power per unit area is growing leading to large amount of power leakage and therefore digital bits are missed which leads to the occurrences of soft errors which are the signal or datum which is wrong caused due to the cosmic ray particles or alpha particles by the incorrect switching of a memory cell. This is overcome by the Low Density Parity Check in order to reduce the nano meter range of the circuits. In 1971 the Intel had a chip with the range of 800nm at present there are chips at a range of 22nm which provides a reliable and optimal circuit. And through this paper, the nanometer range is expected to be reduced more by increasing the number of transistors, thus reducing the chip size to provide a reliable circuit by the reduction in power dissipation.

DECODING ALGORITHM

Turbo and LDPC decoding algorithms are characterized by strong resemblances: they are iterative, work on graphbased representations, are routinely implemented in logarithmic form, process data expressed as logarithmic likelihood-ratios (LLRs) and require high level of both processing and storage parallelism. Both algorithms receive intrinsic information from the channel and produce extrinsic information that is exchanged across iterations to obtain the a

priori information of uncoded bits, in the case of binary codes, or symbols, in the case of non binary codes. Moreover, their arithmetical functions are so similar that joint or derived algorithms for both LDPC and turbo decoding exist. The decoding of LDPC codes stems from the Tanner graph representation of where two sets of nodes are identified: Variable Nodes (VNs) and Check Nodes (CNs). VNs are associated to the bits of the codeword, whereas CNs corresponds to the parity-check constraints. The most common algorithm to decode LDPC codes is the Belief Propagation (BP) algorithm. There are two main scheduling schemes for the BP: two-phase scheduling and layered scheduling. The latter nearly doubles the converge speed as compared to two-phase scheduling. In a layered decoder, parity check constraints are grouped in layers each of which is associated to a component code. Then, layers are decoded in sequence by propagating extrinsic information from one layer to the following one. This process is iterated up to the desired level of reliability.

POWER DISSIPATION DETECTION

Power dissipation occurs as the scale of integration improves, more transistors, faster and smaller than their predecessors, are being packed into a chip. This leads to the steady growth of the operating frequency and processing capacity per chip, resulting in increased power dissipation. It is the rate at which the energy is taken from the source and converted into heat. Heat energy has to be dissipated from the chip to avoid an increase in chip temperature that can cause temporary or permanent failure. Analysis that are concerned for the accurate estimation of power leakage and Optimization which is the process of generating the best design without violating the design specifications are the techniques used to detect and correct power dissipation in the circuits. By the power dissipation correcting the impact to the circuit delay is enhanced, performance and throughput of the chip and its area are improved, which reduces the manufacturing costs. Other factors of chip design such as the design cycle time, testability, quality, reusability are achieved.

Therefore, power efficiency cannot be achieved without yielding to one or more of these factors. The task of a design engineer is to carefully weigh each design choice within the specification constraints and select the best implementations.

LOW DENSITY PARITY CHECK

In information theory, a low-density parity-check (LDPC) code is a linear error correcting code, a method of transmitting a message over a noisy transmission channel and is constructed using a sparse bipartite graph. LDPC codes are capacity-approaching codes, which means that practical constructions exist that allow the noise threshold to be set very close (or even arbitrarily close on the BEC) to the theoretical maximum (the Shannon limit) for a symmetric memory less channel. They are based on constrained random code ensembles and iterative decoding algorithms. The noise threshold defines an upper bound for the channel noise, up to which the probability of lost information can be made as small as desired. Using iterative belief propagation techniques, LDPC codes can be decoded in time linear to their block length. LDPC codes are finding increasing use in applications requiring reliable and highly efficient information transfer over bandwidth or return channel-constrained links in the presence of corrupting noise. Although implementation of LDPC codes has lagged behind that of other codes, notably turbo codes, the absence of encumbering software patents has made LDPC attractive to some. In order to achieve desired power and throughputs for current applications (e.g., > 1Mbps in 3G wireless systems, > 1Gbps in magnetic recording systems), fully parallel and pipelined iterative decoder architectures are needed. Compared to turbo codes, LDPC codes enjoy a significant advantage in terms of Coding is the conversion of computational complexity and are known to have a large amount of inherent parallelism .However, the randomness of LDPC codes results in stringent memory requirements that amount to an order of magnitude increase in complexity compared to those for turbo codes. A direct approach to implementing a parallel

decoder architecture would be to allocate, for each node or cluster of nodes in the graph defining the LDPC code, a function unit for computing the reliability messages, and employ an interconnection network to route messages between function nodes.

CONCLUSION AND FUTURE WORK

As a result, power dissipation in circuits is reduced by overcoming the soft error through message passing algorithm in node to node communication. The soft error is overcome for preventing damage of the circuits. This reduces chip size, interconnection delay, complexity of circuits and increases quality, security, and speed. Therefore, the nanometer range of circuits will be reduced which provides an enhancement for optimal and reliable circuits that acts as a superior advancement in VLSI technologies.

MIPv6 and HMIPv6 : A Comparative Study

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ABSTRACT

Recent research in wireless communications technologies has focused to the development of Next Generation wireless systems (NGWS) which integrate various existing wireless networks technologies, each of which is optimized for some specific services such as WLANs, WiMAX, General Packet Radio Service (GPRS) and Universal Mobile Telecommunications System (UMTS). The Most important and challenging issue is to realize seamless handoff with small handoff latency and packet loss to ensure Quality of service (QoS) in NGWS. Mobile IP is a solution for mobility support in the global Internet. The mobile node can experience disruptions or even intermittent disconnections of an ongoing real time session during handovers. This can heavily affect user satisfaction when traffic on the network is high. Therefore handoff delay needs to be minimized to provide good quality Mobile IP services. In this paper we discuss different type of protocols for NGWS and their comparative study and analysis.

INTRODUCTION

Rapid progress in the research and development of wireless networking and communication technologies has created different types of wireless communication systems, such as Bluetooth for personal area, IEEE 802.11 WLANs for local area, Universal Mobile Telecommunications System (UMTS) for wide area, and Satellite networks for global networking. These networks are complimentary to each other and, hence, their integration can realize unified NGWS that have best features of individual networks to provide ubiquitous "always best connected" to the mobile user. The architecture of NGWS should have following characteristics:-

- Economical-The architecture should use as much of existing infrastructure as possible and minimize the use of new infrastructure.

- Scalable- The architecture should be able to integrate any number of wireless system both existing and future service provider.
- Reliable-The architecture should be robust enough to provide fault tolerance.
- Secure- The architecture should be secure and provide privacy equivalence.
- Seamless mobility support-The architecture should support seamless mobility management to eliminate connection interruption and QoS degradation.

In the integrated NGWS, users are always connected to the best available network and switch between different networks based on their service needs. It is an important and challenging issue to support seamless mobility management in the NGWS. Mobility management contains two components : Location Management: It enables the system to track the locations of mobile user between consecutive communications. Handoff management: It is the process by which user keep their connections active when they move from one base station (BS) to another. There are efficient location management technique however, seamless support of Handoff management in NGWS is still an open research issue. In the NGWS, two types of handoff scenarios may arise horizontal handoff and vertical handoff Types of Handoff Horizontal handoff: Handoff between two BS of the same system. Horizontal handoff can be further classified into:- Link layer handoff: Handoff between two BS that are under the same foreign agent (FA). Intrasystem handoff: Horizontal handoff between two BSs that belong to two different foreign agent (FAs) and both FA belong to the same system and hence, to same gateway foreign agent (GFA). Vertical Handoff (Inter system handoff): Handoff between two BSs that belong to two different systems and, hence, two different GFAs. For efficient Intra and intersystem handoff protocols should have the following characteristics to support seamless handoff in NGWS

- Minimum handoff latency: The handoff management protocols introduce only minimum handoff latency.
- Low packet loss: Packet loss during

- handoffs should be minimized
- Limited handoff failure: Handoff failure probability should be limited to desired value.

HANDOFF MANAGEMENT PROTOCOLS

Mobile IPv6

Mobile IPv6 is mainly proposed to keep any communication between a mobile node and a correspondent node (CN) while the mobile node moves from one IPv6-based subnetwork to another one. In this design, each MN has a home address identifying its home network [12]. Within its home network, each MN uses the traditional routing functions to exchange IP datagram with its CN. Whenever an MN moves from its local network to a new network, its home address becomes invalid and then the MN can create a new address called care-of address (CoA) from a router advertisement message sent by the new visited network [12]. A binding between MN's CoA and its home address is updated to the MN's home agent to keep continuous communications between the MN and its correspondent(s). In this way, MN's home agent can always detect coming communication packets to MN with MN's home address, and locate the current position of MN with MN's CoA. At the beginning of the handover procedure, an MN can use "Neighbour Discovery" scheme, which is based on reception of Router Advertisement (RA) sent by current access router (AR), to detect its movement to a new subnet. After verifying the uniqueness of its link local address on the new link, the MN will create an IPv6 address called CoA from the corresponding prefix in RA [15]. After that, MN will exchange binding update information which include MN's CoA with its HA and its CN to allow all of them to maintain their connections. Mobile IPv6 can reasonably keep track of MN's new address by timely binding update between the MN and its home agent. However, before finishing binding update, data packet communications are interrupted. The MN needs to spend time discovering new subnet, establishing new care-of address, and exchanging information between MN and its home agent. For NGWS, all of them will create a lot of signalling traffic and latency, resulting in packet loss. It is even

worse when an MN roams between two ARs several times. This frequent roaming will cause ping pong effects, which refer to the situation in which too frequent and unnecessary location updates and handoffs occur in a short time. In this case, MN cannot keep normal continuous communications with its CN(s). In the mean time, all packets destined for the old care-of address are dropped. Therefore, we need to improve binding update procedure of Mobile IPv6 handover schemes to reduce handoff latency and signalling traffic.

Hierarchical Mobile IPv6

Hierarchical Mobile IPv6 (HMIPv6) is developed to reduce the amount of signalling traffic required, which affects handoff latency of MN's communications. Unlike MIPv6, HMIPv6 addresses the issue of local mobility and global mobility separately, which means local handoffs are managed locally without notifying home agent, while global mobility is managed with the MIPv6 protocol. In HMIPv6, the global internet is divided into regions for local area mobility and each region is connected to the rest of IP network with a new node called Mobility Anchor Point (MAP), which is a kind of anchor point in charge of several ARs. In this scheme, each mobile node has two care-of addresses. One is a regional care-of address and the other is a local care-of address. The regional care-of address is local to the MAP's covered region. An MN communicates with its correspondent nodes via its regional care-of address. When an MN moves into a new region or domain, it will first get a regional care-of address from MAP advertisement information, and then the MN will inform its home agent and its correspondents about its "regional location" as its raw location information [15]. When the MN moves between two ARs in the same region covered by a same MAP, MN will update its localization into the domain and get a new local care of address by sending local registration to the MAP, instead of sending to its home agent. The MAP intercepts data packets designated to MN's regional care-of address and tunnels them to the corresponding MN's local care-of address. So in this way, handoff latency

and signalling traffic are reduced because each MN hides its local movements in a region from its home agent and correspondents, and meanwhile MN can keep unbroken communications with its correspondent(s).

CONCLUSION

In this paper there has been overview of handoff management in NGWS, and comparison of current handoff techniques for IP-based NGWS. Specifically, we have described and analysed handoff protocol schemes in details, Mobile IPv6, Hierarchical Mobile IPv6. Mobile IPv6 protocols define a care-of address for MN in a new visited network. Among we analyze handoff latency of MIPv6 and HMIPv6 protocol schemes. Future work should be carried out in determining other new obstacles in handoff schemes and protocols needs to be improved.

DSR, DSDV and ZRP: A Comparative Analysis

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ABSTRACT

A Mobile Ad-hoc Network (MANET) consists of a number of mobile wireless nodes, among which the communication is carried out without having any centralized control. MANET is a self organized, self configurable network having no infrastructure, and in which the mobile nodes move arbitrarily [1]. A routing protocol is used to find routes between mobile nodes to facilitate communication within the network. The main goal of such an ad hoc network routing protocol is to establish correct and efficient route between a pair of mobile nodes so that messages delivered within the active route timeout interval. Route should be discovered and maintained with a minimum of overhead and bandwidth consumption. A recent trend in ad hoc network routing is the reactive ondemand philosophy where routes are established only when required. The protocols are Dynamic Source Routing (DSR), Destination sequenced distance vector routing (DSDV) routing protocol, Zonel routing protocol (ZRP). The performance of these routing protocols is analyzed in terms of their average through-put, average end to end delay, packet delivery ratio and their results are shown in graphical forms.

INTRODUCTION

A MANET consists of a number of mobile devices that come together to form a network as needed, without any support from any existing Internet infrastructure or any other kind of fixed stations. Each device in a MANET is free to direction, and will be change its links to other devices frequently. Depending upon the nature of application, appropriate routing protocol is implemented. Proactive and reactive protocols are the two classes of MANET routing protocols and each constitute a set of protocols. Depending upon the nature of application, appropriate routing protocol is implemented. Some of the routing protocols

are proactive, reactive, hybrid protocols. Figure: 1 Classification of routing protocols Mobile ad hoc network is a group of wireless mobile computers (or nodes) in which nodes collaborate by forwarding packets for each other to allow them to communicate outside range of direct wireless transmission. Ad hoc networks require no centralized administration or fixed network infrastructure such as base stations or access points, and can be quickly and inexpensively set up as needed. A MANET is an autonomous group of mobile users that communicate over reasonably slow wireless links. The network topology may vary rapidly and unpredictably over time, because the nodes are mobile. The network is decentralized, where all network activity, including discovering the topology and delivering messages must be executed by the nodes themselves.

SIMULATION NETWORKS

Ns-2 is a discrete event simulator targeted at networking research. It provides substantial support for simulation of TCP, routing and multicast protocols over wired and wireless networks. It consists of two simulation tools. The network simulator (ns) contains all commonly used IP protocols. The network animator (nam) is use to visualize the simulations. Ns-2 fully simulates a layered network from the physical radio transmission channel to high-level applications. Version 2 is the most recent version of ns (ns- 2). The ns-2 simulator has several features that make it suitable for our simulations [2]. Ns-2 is an object-oriented simulator written in C++ and Tcl. The simulator supports class hierarchy in C++ and a similar class hierarchy within ianagaram, AP 461 International Journal of Engineering Research & Technology (IJERT) Vol. 3 Issue 2, February - 2014 IJERT ISSN: 2278-0181 IJERTV3IS20374 www.ijert.org the Tcl interpreter. There is a correspondence between a class in the interpreted hierarchy and one in the compile hierarchy. The reason to use two different programming languages is that Tcl is suitable for the programs and configurations that demand frequent and fast change while C++ is suitable for the programs that have It not only supports most commonly used IP protocols but also allows the users to extend

or implement their own protocols. It also provides powerful trace functionalities, which are very important in our project and since various information need to be logged for analysis. The full source code of ns-2 can be downloaded and compiled for multiple platforms such as UNIX, Windows and Cygwin.

CONCLUSION AND FUTURE WORK

The goal of this paper was performance evaluation of MANET routing protocols such as reactive routing protocol, proactive routing protocol, hybrid routing protocol. The protocols are DSR, DSDV, ZRP..In this paper, the performance of MANET routing protocols have been analyzed under the three quantitative performance metrics (Throughput, Packet-delivery ratio and End to End Delay).The simulation result shown in the below table. The performance of DSDV is high for small number of nodes and large number of nodes than DSR and ZRP in terms of average throughput and packet delivery ratio. The performance of end to end delay is high for large number of nodes in terms of ZRP and end to end delay performance is high for less number of nodes in DSR. This work can be extended to the real time network which consists of more number of nodes. In this paper we choose only quantitative performance metrics, in future we will choose qualitative metrics such as security, scalability, multicasting loops.

A Survey on Localized and Distributed Channel Assignment Framework For Cognitive Radio Network

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ABSTRACT

Cognitive radio (CR) technology allows the observation of the network conditions to dynamically discover available and underutilized spectrum. A cognitive network is the framework that uses the CR to take advantage of underutilized spectrum. The availability of using multiple interfaces and channels with cognitive radio abilities in wireless devices is expected to alleviate the capacity limitations that exist in traditional single channel wireless mesh networks. Although having multiple radio interfaces and available channels can generally increase the effective throughput, a problem arises as to what is the best strategy to dynamically assign available channels to multiple radio interfaces for maximizing effective network throughput by minimizing the interference. This paper presents a survey on distributed and localized interference-aware channel assignment framework for multi-radio wireless mesh networks in a cognitive network environment.

INTRODUCTION

Wireless network applications have increased dramatically over the last decade. Many wireless standards have been introduced during this period including Wifi, Ultra Wide Band (UWB), Bluetooth, and WiMax. Increased usage of these applications is encouraged by technology advocates, but a limiting factor of these applications is that they must coexist within a fixed amount of spectrum. This creates a spectrum underutilization problem which can be defined as the inefficient reuse of the available physical spectrum within a particular environment. A main source of limited spectrum arises from the traditional wireless network hardware that is used to support these applications. In traditional wireless hardware predetermined analog operating

parameters are utilized to assign the spectrum to facilitate the operation of these applications. With an increased saturation of wireless devices, the fixed spectrum usage strategy has been shown to strain the available spectrum. This strain of available spectrum is not because of a physical limitation of usable spectrum, it is conversely the result of inefficient partitioning of the spectrum space. There have been studies [1] that have verified large underutilization of spectrum.

CONGNITIVE NETWORKS

To better utilize available spectrum, suggestions have been given to design network hardware and protocols that are able to adapt to the environment. A network that can dynamically adapt to the environment and use the available spectrum effectively will alleviate the spectrum limitation problem. These smart and adaptive networks have been generally known as cognitive networks. A cognitive network has been defined as a cognitive process that can perceive current network conditions, and then plan, decide and perform actions based on those conditions. The network can learn from these adaptations and use them to make future decisions, all while taking into account end to-end goals [2]. Network operators and networks user's perspectives end-to-end goals should also be taken into account. Dynamic and intelligent switching of frequencies at a radio interface requires the use of many technologies namely a software defined radio, signal-processing and machine-learning procedures. In addition, dynamic and intelligent cross-layer design of the network stack is needed to implement a cognitive network.

RESULTS AND DISCUSSION

The cognitive networks isreconfigurability and adaptability to environment stimuli. As a result there are many applications that this technology has already infiltrated and will penetrate in the future. Cognitive networks have garnered heavy interest for use in military applications. There may be unavoidable interference to military networks because of the sharing of the local spectrum. Cognitive networks would be

able to detect and select the best channels for communications in an unknown environment. Cognitive networks can provide large improvements in the capabilities of emergency network applications. For example, if there is an emergency in a chemical factory, each worker must be advised immediately about leakages through a network capable of multicasting information reliably. The cognitive network would be able to self organize in these emergency situations to setup the necessary communications systems. a cognitive network is that it is typically an ad-hoc network. This leads to its possible use in extreme applications. One such application is underground communications. The network would be able to self configure itself even in environments without any predetermined infrastructure.

CONCLUSION

The operation of the cognitive network involves the detection of available channels that are not being used for communication by primary users. Once these channels are known the decision of how to utilize these channels to maximize network throughput, arises. we can achieve significant interference reductions, and subsequent capacity enhancements, for both local UDP traffic and global TCP traffic. We can effectively perform channel assignments in networks with different primary user deployments.

Stepped Rectangular Dielectric Resonating ANENNA for 5.0 Ghz Wireless LAN Applications

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ABSTRACT

This paper presents an approach which combines the two Dielectric Resonating Antennas together as if one resonator is loading the other one. A stepped DRA is presented here which produces enhanced bandwidth in micro and millimeter region of spectrum. A new design of compact and stacked DRA is presented which gives a bandwidth of 34% and a return loss of -39 db. This design uses two materials one is Rogers RT 5880 as a thin dielectric having a $\epsilon_r = 2.2$ and the other one is Rogers TMM10 having a $\epsilon_r = 9.2$. The software used for the simulation is the CST Microwave Studio which is an analytical tool that provides an accurate 3D EM simulation results for high frequency design.

INTRODUCTION

MODERN communication systems require wide bandwidth to support the demand of high data rate transfer for various multimedia applications. To fulfil this requirement, most wireless mobile systems have to be operated at the millimetre wave frequencies [1]-[2]. For ease of space allocation, it is highly desirable to have small size, low profile equipment. Hence, the antennas for modern wireless communication system should be low in profile and efficient in high frequencies. Dielectric resonator antennas (DRAs) have attracted broad attentions in various applications due to their attractive features in terms of high radiation efficiency, light weight, small size and low profile [3]-[6]. Dielectric resonator (DR) antennas are attractive due to their advantages of low loss and high efficiency and research to broaden its bandwidth is being conducted. Over last decades, various bandwidth enhancement techniques have been developed for DRAs. An overview on these techniques has also reported in [6], where

these techniques were classified into three broad categories: Lowering the inherent Q-factor of the resonator; using external matching networks; and combine multiple dielectric resonators. Dielectric resonator antennas (DRA) have been the interest of research and investigation due to its highly desirable characteristics such as small size, light weight, highly efficient in microwave and mm wave spectrum. The most popular shape studied for practical antennas applications have been the cylindrical dielectric resonator antennas, rectangular dielectric resonator antennas, spherical dielectric resonator antennas and many more different structure are reported. The stacked DRA has also been tested [7]-[12] with a resulting increase in bandwidth that is much wider than the bandwidth of the micro strip antennas. Two or multi-resonators are defined as those having different sizes with the same or different dielectric materials, they may be loaded or separated from each other. The excited modes in the resonators may be the same or not. For the same modes, the corresponding radiation performances have a good agreement. For the different modes, similar patterns can also be obtained after choosing suitable parameters. With the above approach, an earlier design is a pair of slot coupled-DRAs [13]. The proposed structure consists of two rectangular dielectric resonators that are displaced near the two edges of a single slot on a ground plane. Since the two DRAs have the same shape and material but the different sizes, it may be possible to get the same resonance modes but with the different resonance frequencies. The advantage of this approach is that each resonator can be tuned more or less independently, allowing for a great deal of design flexibility, this reduces the complexity in a trial design. The disadvantage lies in the added real-state required, which increases the size of antenna and may preclude some of these configurations from being used in an array environment. There is also one alternative approach proposed for the combination of two dielectric resonators together as if one resonator is loading the other one. For example, a dielectric resonator is stacked on the top of the other [14]-[18], or a smaller

size dielectric resonator is inserted into another larger size dielectric resonator [19], [20] In this approach, the combined two dielectric resonators can usually operate at the same modes or at the different modes.

ANTENNA GEOMETRY AND DESIGN

Geometry of the proposed antenna is illustrated in Fig.1. As shown initially, the dimensions of the slot are 40x40x14.8 mm³. Dielectric resonating antenna is simulated both at CST and HFSS software. DRA which was simulated on CST has the following specifications:- 1) It is a stacked DRA which is made up of two dielectric materials First is Rogers 5880 with dielectric constant of 2. Second is Rogers TMM 10 with dielectric constant of 9.8 2) Dimensions of Ground are Width = 40mm, length= 40 mm, and height =1.6 m 1) Dimensions of Ground are Width = 12mm, length= 8 mm, and height =2.4 mm 2) Dimensions of Ground are Width = 12 mm ,length= 8 mm, and height =12 mm Fig. 2 shows the surface current distribution of the proposed antenna for center frequency of 5.818 Ghz.

RESULTS AND DISCUSSION

Proposed antenna is simulated by taking $\epsilon_r=2.2$ and 9.2. Antenna is resonating for frequency ranging from 4.2544- 6.1731 GHz. By taking $S_{11} \leq -10$ db and VSWR= 2:1 the bandwidth calculated for every resonating frequency comes out to be $\geq 34\%$. Another frequency range obtained from 13.452-13.806 using the same parameters Simulated DRA is showing 34% bandwidth at a range of 4.19 GHz to 6.13 GHz, which is a very useful band in hand phone, and Bluetooth applications.

CONCLUSION

DRA is the device which provides high gain, better return losses more bandwidth, polarization agility as compare to the microstrip patch antenna. MSA is regarded as one of the narrow impedance device until and unless some active device is not attached with that, but by using DRA better frequency range can be obtained .In this design the obtained frequency is 5.1 GHz and the bandwidth obtained is 34% which is quite good as compare to MSA.

Technological overview on PB- System of TV Programmes

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INTRODUCTION

Television has become a wide ranging and powerful medium of mass communication in this ever shrinking world. It had now become possible to have an international programs with global coverage by linking national TV systems through satellites. Communication satellites in geo stationary orbits have opened new vistas for global television broadcasting. Direct to Home (DTH) broadcasting satellites for television have been launched by several countries including India. These satellites emit high power radiations enough to be received directly through low cost medium to small size dish antennas on conventional TV receivers augmented by a front end converter. The INSAT 2 & 4 series satellites launched by India are widely being used for TV programme and for other communications.

STANDARD CHANNEL CHARACTERISTICS

In the CCIR system B-standards for the TV channel the upper side is fully transmitter while the lower side and is passed up to only 0.75MHz. The end slopes are allowed 0.5MHz so that the lower side band is suppressed fully at 1.25 MHz while the upper side band is fully attenuated at 5.5 MHz.

The sound carrier with frequency modulation carrier deviation up to 50KHZ is positioned at the extremely of the fully transmitted sideband at 5.5MHz with respect the visual carrier. This is a logical place for it to minimize the interference between the sound and picture signals. The channel width is thus 7MHz, from -1.25MHz to +5.75MHz with respect to the picture carrier, allowing for a guard band of 0.25MHz as separation between adjacent channels.

COLOUR TV SYSTEM

In TV camera the scene is focused on the photosensitive surface of pick up device and optical image is formed. The photoelectric properties of the pick-up

device convert the optical image to electric charge image depending on the light and shade of the scene (picture elements). Now it is necessary to pick up this information and transmit it. For this purpose scanning is employed. Electron beam scans the charge image and produces optical image. The electron beam scans the image line by line and field by field to provide signal variations in a successive order.

ANTENNA

Antenna is usually a metallic device (as a rod or a wire) used for radiating or receiving electromagnetic waves. The radio frequency power developed at the final stage of a transmitter is delivered through cables/feeders, without themselves consuming any power to the transmitting antenna. This travels in the free space in the form of radio waves (electromagnetic waves). The receiving antenna picks up the radio waves and delivers useful signal at the input of a receiver for reception of signals. The transmitting and receiving antennae are reciprocal in the sense, any characteristics of the antenna in general applies equally to both.

CONCLUSION

Thus, television has been widely used in the telecommunication medium thus aiding in the transfer of information from the transmitter to the receiver system. We acquired a detailed knowledge on the mechanism of data transfer between the two ends of the communication system. The different types of modulation schemes employed and the various stages involved in the transmission process were briefly explained. Further more details regarding tuning was thrown upon and the usage of DTH from doordarshan was illustrated which was highly beneficial to us.

A Novel Controller Based on PC

Name: **Ankita Pati**
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Branch: **ETC**

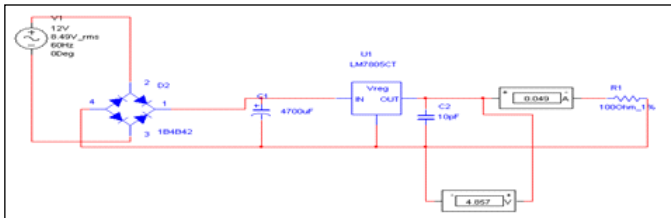
INTRODUCTION

This project can be used for the controlling of various appliances using PC. It consist a circuit for using the printer port of a PC, for control application using software and some interface hardware. The interface circuit along with the given software can be used with the printer port of any PC for controlling up to eight equipment. Parallel port is a simple and inexpensive tool for building computer controlled devices and projects. The simplicity and ease of programming makes parallel port popular.

BRIDGE RECTIFIER

A bridge rectifier makes use of four diodes in a bridge arrangement to achieve full-wave rectification. This is a widely used configuration, both with individual diodes wired as shown and with single component bridges where the diode bridge is wired internally.

CIRCUIT DIAGRAM OF POWER SUPPLY



RELAY:

A relay is an electrical switch that opens and closes under the control of another electrical circuit. In the original form, the switch is operated by an electromagnet to open or close one or many sets of contacts. It was invented by Joseph Henry in 1835. Because a relay is able to control an output circuit of higher power than the input circuit, it can be considered to be, in a broad sense, a form of an electrical amplifier.

Here relay is used for the isolation of various heavy appliances to the PC. Since the PC operates on very low current, but the current in various appliances is in Amperes therefore isolation is necessary and relay is required. Here we have used single pole dual through relay for the purpose.

CONCLUSION

The greatest learning experience in this project comes from the design and construction of “PC Based Appliance Controller” which answer a lot of questions regarding the real implementation of Embedded system, Electro-mechanical relays and Opto-couper, ULN 2803, Parallel Port of PC .

A New ECG Circuit for Heart Attack Detection

Name: **Ananya Mohapatra**
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The Walking Stick with Heart Attack Detection is equipment that is used daily to indicate heart condition, to detect heart attack and to call for emergency help. It was designed specially to help senior citizens and patients with heart disease. It consists of three basic sub projects Ecg Circuit, Analysis Algorithm and Bluetooth Communication. The first unit is worn on the user's wrist captures abnormal heart beat signal from the patient., and the rest two are installed in the stick..The microcontroller on the stick runs a heart attack algorithm. Warning is given out to the person about his heart condition. The Bluetooth emergency calling system calls for medical help at the moment of heart attack. The effectiveness of the proposed method is confirmed by experiments on a commercially available walking stick. Each of the three subprojects responded positively. The proposed Walking Stick with Heart Attack Detection is cost effective and can save the lives of millions of old people by helping them in getting the earliest medical help in the condition of heart attack.

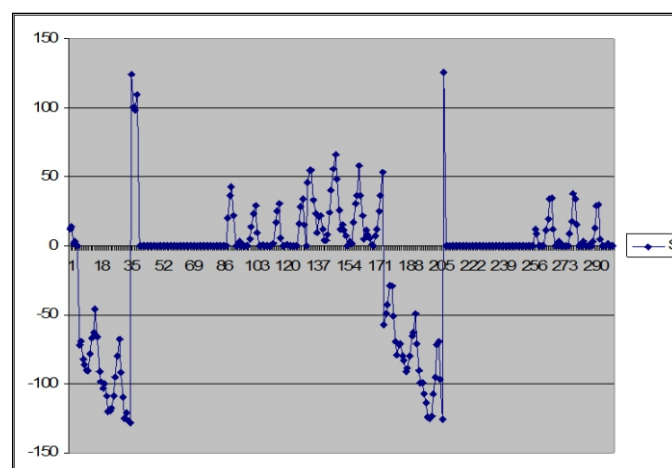
INTRODUCTION

The National Heart, Lung, and Blood Institute states that “more than 3million persons in the India have a heart attack and about half of them die in each year.About one-half of those who die do so within 1 hour of the start of symptoms and before reaching the hospital”.A heart attack happens to a person when the blood flow and oxygen supply to heart muscle is blocked, and it is mostly caused by the Coronary Artery Disease (CAD).CAD occurs when the arteries that supply blood to the heart muscle (coronary arteries) become hardened and narrowed .It often causes irregular heart beat or rhythm by blocking blood stream .The National Heart, Lung, and Blood Institute suggest that “everyone should know the warning signs of a heart attack and how to get emergency help”.

The symptoms of heart attack can be detected by observing electrocardiogram (ECG) waveform. An ECG is an electrical recording of the heart and is used in the investigation of heart disease. An electrical impulse initiates muscle contraction, which results in heart beating. The spacing between pulses provides a measure of the heart's rhythm, whereas the height of the pulses is an indicator of pumping strength. By observing the ECG waveform, the heart condition of the patients can be explained by doctors.

DATA TRANSMISSION BETWEEN WRIST AND THE WALKING STICK

Our original design was to transmit the analog ECG waveform directly out of the ECG analog circuitry to the walking stick. We would use the analog signal transmission capability of the HP-3 transceiver. We wanted to make this data transmission wireless from the wrist to the stick. This would avoid the inconvenience of the stick attachment to the wrist. User can go into a car and put his stick at the back seats without detaching any wire between his wrist and the stick. He also does not have to switch the device off. When the stick falls down, it won't drag the user's wrist to the ground.



Sample Normal ECG Waveforms

After we browsed through the data sheet of the HP-3 transceiver, we discovered that the analog bandwidth of the transceiver pair is between 50 Hz and 28000 Hz. ,normal ECG waveform has frequency range between 50 Hz and 70 Hz. However, to cover all the possible scenarios like sleeping and fast walking, the lower and the upper cutoff frequencies were decided to be 0.5 Hz and

150 Hz. Since the range from 0.5 Hz and 50 Hz is outside the transmission bandwidth of the HP-3 transceiver, we thought about using mixer and oscillator to raise the lowest frequency of analog signal, which is 0.5 Hz, to 60 Hz. This would ensure correct transmission of the analog signal. We here introduce the RS232 capability of PIC. Since RS232 signal is digital, we can use the same transceiver to transmit digital signal. We no longer have to worry about the lowest frequency of the analog signal along with the mixer and the oscillator.

HEART ATTACK DETECTION

When the microcontroller on the walking stick has received digital ECG data from the wrists, it will check for heart attack symptoms. We decided to use the heart attack algorithm developed by the previous project. We would like to indicate to the user his heart condition so that he can take proper action like slowing down or taking a rest before heart attack really happens to him..

CONCLUSION

The ECG Library shows many samples of abnormal ECG waveform, and they are mostly collected from aged people who are more than 55 years old .The senior citizens are more prone to have heart attack than young people. The Walking Stick with Heart Attack Detection is specially designed to help the senior citizens who need walking aids by walking sticks and have the most possibility of heart attack. The walking stick is used as detection unit and as the medium asking for medical help.

Next Generation Power Control System Mobile Phone

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INTRODUCTION

The fastest development of the cell phone company has outcome under millions of costumers of battery powered and handheld cell phones. Several costumers of these mobile phones would result telephones to be switch off since they should create an outgoing call and hence protecting the energy of the battery for weeks or days.

ARCHITECTURE

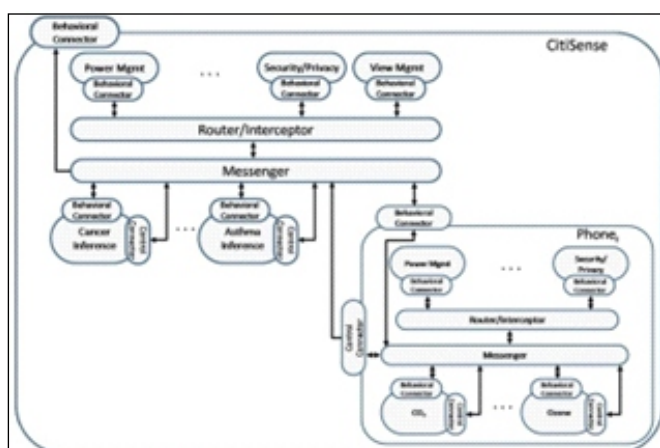
Modern trends reduced in size considerably during the incorporation of many qualities and operations which need much battery energy. The outcome of this technological progress is the internal battery of the phone of net total physical volume of the phone and result for the great of net weight of the unit. The wish for lengthy functional time periods among battery recharge has enhanced.

When the gadgets find the incoming call then the gadget sends the signals to turn on the power of the battery to the microprocessor of the cell phone. It even sends the saved registration data to the microprocessor and hence permitting the phone to quickly make the dormant to active and to reply incoming call. This concept permits the phone to contend productively for weeks without the requirement of recharging of battery.

Elements of mode of subsystem of power function to manage the less power and dormant functional mode of the cell phone. They are radio frequency (RF) to get RF signals. The mobile identification number (MIN) detector linked to result of RF receiver and the idle power is functional to switch. The memory saves registration data of telephone. The baseband converter changing from MIN detector of analog RF signals to digital signals. The battery power circuit functions the switch of the mobile telephone.

CONCLUSION

The power organization of mobile telephone of concept and methods is revealed which positions the phone within the idle, dormant, or mode. Under this dormant, the power of the battery is merely supplied to the gadget including mobile phone which functions incoming signals of radio frequency (RF).



GSM Embedded System

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This is the model for displaying notices in colleges on electronic notice board by sending messages in form of SMS through mobile; it is a wireless transmission system which has very less errors and maintenance. The hardware board contains microcontroller AT89c52 at the heart of the system. The microcontroller is interfaced with GSM Modem via MAX232 level convertor. It is used to convert RS232 voltage levels to TTL voltage levels and vice versa. The hardware also has a 64K EEPROM chip AT24C64. This EEPROM is used to store the timings and messages to be displayed. Hardware also contains a real time clock DS1307 to maintain track of time. A 16x2 Character LCD display is attached to microcontroller for display. Microcontroller coding will be done using Embedded C and Kiel. PC Coding will be done using Visual Basic. Multiple Users are authorized to update notices on the electronic notice board by providing them password. We can use a PC with an administrator for monitoring the system.

INTRODUCTION

Wireless communication has announced its arrival on big stage and the world is going mobile. We want to control everything and without moving an inch. This remote control of appliances is possible through Embedded Systems. The use of "Embedded System in Communication" has given rise to many interesting applications that ensures comfort and safety to human life.

In this paper, it is proposed to design a model where the message to be displayed is sent through a SMS from an authorized transmitter. The toolkit receives the SMS, validates the user and displays the desired information after necessary code conversion.

HARDWARE DESCRIPTION

a. Microcontroller

Microcontroller is used for interfacing the LCD display with PC to display messages.

The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is compatible with the industry-standard 80C51 and 80C52 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer which provides a highly-flexible and cost-effective solution to many embedded control applications.

b. GSM Modem

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.

c. Display Unit

One of the most common devices attached to an 8051 is an LCD display. Here we have used 16x2- that means 2 rows and 16 characters. It is a Hitachi HD44780 compatible module, having 16 pins including 2 pins for backlight.

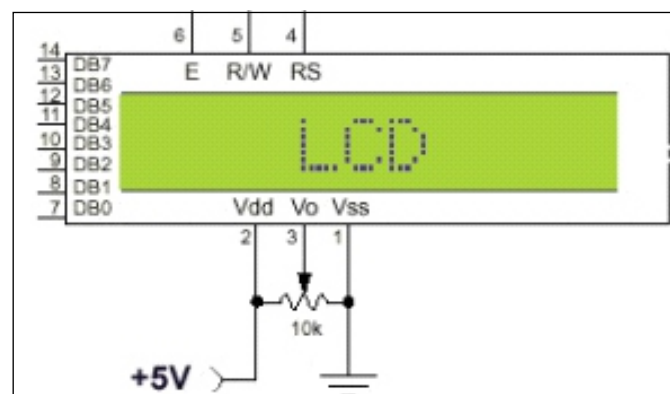


Fig. 3 Pin Description of LCD IC Hitachi HD44780

d. MAX 232

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply EIA-232 voltage levels from a single 5-V supply. Each receiver converts EIA-232 inputs to 5-V TTL/CMOS levels. Each driver converts TTL/CMOS input levels into EIA-232 levels.

e. Power Supply

Power Supply is an important part of a circuit. It provides required supply to different blocks of the circuit from input 230 VAC.

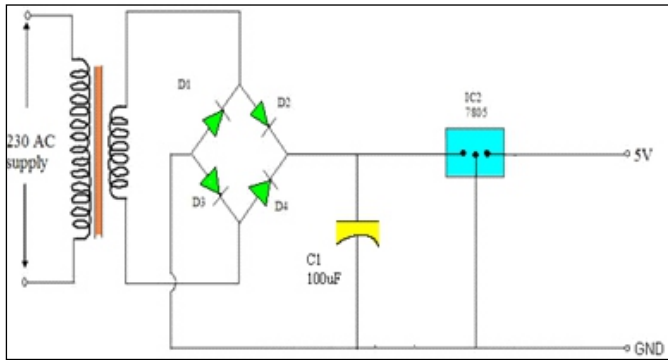


Fig. 4 Block Diagram of Power Supply

CONCLUSION

By introducing the concept of wireless technology in the field of communication we can make our communication more efficient and faster, with greater efficiency we can display the messages and with less errors and maintenance. This model can be used very efficiently in establishments like chain restaurants wherein the order and special discounts can be displayed at all branches simultaneously, in colleges wherein students and staffs can be informed simultaneously in no time. It can be set up at public transport places like railways, bus station, and airport and also at roadside for traffic control and in emergency situations, it is cost efficient system and very easy to handle. Latency involved in using of papers in displaying of notices is avoided and the information can be updated by the authorized persons.

DIS Algorithm for VLSI Implementation

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INTRODUCTION

Image segmentation is the process by which the original natural image is partitioned into meaningful regions. In other words image segmentation is segregating the interested parts from the original image.

DIGITAL IMAGE SEGMENTATION ALGORITHM

The algorithm has six functional steps with some modification on EGION[3] described above. They are given below.

- Initialization.
- Calculation of Leader cell.
- Self excitation of Leader cell.
- Calculation of dependent cell.
- Excitation of dependent cell.
- Inhibition of all excited cells.

ALGORITHM FLOW:

The program flow is explained for a 5 by 3 matrix image. Remember it is a toy problem. Actual image size will be very high compared with this 15 pixel image. In order to explain the flow only, this example is taken.

1) Input ROM values.

24	36	36
127	24	36
127	127	24
128	126	24
36	24	127

2) Weight calculation block values.

276	550	786
516	573	1060
767	773	826
344	476	1043
24	280	135

3) Leader cell1 output

The Leader threshold value is taken as 1000.

0	0	0
0	0	1
0	0	0
0	0	1
0	0	0

CONCLUSION

In this paper image is segmented by slightly modifying the LEGION approach. Here the analog technique of LEGION is converted into digital technique. And the architecture of the above algorithm is realized in FPGA...Using Model-sim 5.8 C tool the architecture is simulated and using Xilinx 6.3 the architecture is synthesized. The segmented images are verified by using Matlab tool.

VLAN : A Specific Design Procedure

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INTRODUCTION

Virtual Lan Network are special purpose devices and computers that just transfer messages from one network to another. Before we look deep into the topic Virtual LAN's, let us see the basic devices used in the network backbone. They are: Bridges, SWITCHES, ROUTERS and .HUBS

BRIDGES:-Bridges operate at the data link layer. They connect two LAN segments that use the same data link and network protocol.

SWITCHES:-Like bridges, switches operate at the data link layer. Switches connect two or more computers or network segments that use the same data link and network protocol.

ROUTERS:-Routers operate at the network layer. Routers connect two or more LANs that use the same or different data link protocols, but the same both the basic system interconnection and the necessary translation between the protocols in both directions.

HUBS: - Physical layer devices that are really just multiple port repeaters. When an electronic digital signal is received on a port, the signal is re-amplified or regenerated and forwarded out all segments except the segment from which the signal was received.

MOBILE BASED LAN NETWORK ARCHITECTURE

In a broadcast environment, a broadcast is sent out by a host on a single segment would propagate to all segments, saturating the bandwidth of the entire network. Also, without forcing some method of checking at an upper layer, all devices in the broadcast domain would be able to communicate via Layer 2. This severely limits the amount of security that could be enforced on the network. Before the introduction of switches and VLANs, networks were divided into multiple broadcast domains by connectivity through a router .Because routers do not

forward broadcasts, each interface is in a different broadcast domain. Each segment is an individual IP subnet and regardless of a workstation's function, its subnet is defined by its physical location. A group of devices on one or more logically segmented LANs (configured by use of software), enabling devices to communicate as if attached to the same physical medium, when they are actually located on numerous different LAN segments. VLANs are based on logical instead of physical connections and thus are tremendously flexible.

CONCLUSION

A VLAN is logical broadcast domain that can span multiple physical LAN segments .A VLAN can be designed to provide independent broadcast domains for station logically segmented by functions, project teams, or applications without regard to the physical location of users. Each switch port can only be assigned to only one VLAN. Ports in a VLAN share broadcasts. Ports that do not belong to the same VLAN do not share broadcasts. This control of broadcast improves the network's overall performance. VLANs enable switches to create multiple broadcast domains within a switched network. Any user in this VLAN would receive a broadcast from any other member of the VLAN; users of other VLANs would not receive these broadcasts. Each of the users in a given VLAN would also be in the same IP subnet.

Application of WSN

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TECHNICAL DESCRIPTION

The advent of nano-technology has made it technologically feasible and economically viable to develop low-power devices that integrate general-purpose computing with multi-purpose sensing and wireless communications capabilities. It is expected that these small devices, referred to as sensor nodes, will be mass-produced and deployed, making their production cost negligible. Individual sensor nodes have a small, non-renewable power supply and, once deployed, must work unattended. For most applications we envision a massive deployment of sensor nodes, perhaps in the hundreds or even thousands. Aggregating sensor nodes into sophisticated computational and communication infrastructures, called sensor networks, will have a significant impact on a wide array of applications ranging from military, to scientific, to industrial, to health-care, to domestic, establishing ubiquitous wireless sensor networks that will pervade society redefining the way in which we live and work. Sensor networks are currently being established as a specific sub-task of the rapidly unfolding area of ubiquitous and pervasive computing.

The fundamental goal of a sensor network is to produce globally meaningful information from raw local data obtained by individual sensor nodes. Importantly, this goal must be achieved in the context of prolonging as much as possible the useful lifetime of the network and ensuring that the network remains highly available and continues to provide accurate information in the face of security attacks and hardware failure. The sheer number of sensors nodes in a sensor network, combined with the unique characteristics of their operating environment (anonymity of individual sensors, limited power budget and a possibly hostile environment), pose unique challenges to the design of sensor networks and their applications. For one thing, the

limited power budget at the individual sensor node level mandates the design of ultra-lightweight communication protocols. Likewise, issues concerning how the data collected by individual sensor nodes could be queried and accessed and how concurrent sensing tasks could be executed internally are of particular significance. An important guideline in this direction is to perform as much local data processing at the sensor level as possible, avoiding the transmission of raw data through the sensor network. Indeed, it is known that it costs 3J of energy to transmit 1Kb of data a distance of 100 meters. Using the same amount of energy, a general-purpose processor with the modest specification of 100 million instructions/watt performs 300 million instructions. Recent advances in hardware technology are making it plain that the biggest challenge facing the sensor network community is the development of ultra-lightweight communication protocols ranging from training, to self-organization, to network maintenance, to security, to data collection and fusion, to routing, among many others.

There are several possible techniques that can be used to harvest the information produced by a sensor network. Perhaps the simplest involves using one or several sink nodes, special long-range radios, deployed alongside with the sensor nodes. In this scenario, the raw data collected by individual sensor nodes is fused, in stages, and forwarded to the sink nodes that provide the interface to the outside world. However, in some applications, it is impossible or impractical to deploy sink nodes within the sensor network. In such cases the task of harvesting the information produced by the sensor network and that of providing an interface to the outside world may be performed by aircraft and/or helicopters over-flying the sensor network, or by laser transmission to a satellite constellation. In this latter case, the bulk of the inter-sensor communications is by radio, since such communications are point to multi-point, while specialized sensors acting as local sinks communicate with the satellite constellation using laser beams.

While preserved energy can supply short-term applications, sensors dedicated to work over years may need to scavenge energy from the specific environment they are placed into, employing light, temperature, vibration, kinetics, magnetic fields, etc.

The ultra-lightweight protocols may leave not much room for advanced encryption schemes, so protection against overhearing in military applications and privacy protection in personal systems needs to be inherently built into the concepts from the beginning.

Reliability is expected to be a result of the large number of sensors deployed for a specific task. However, this can only be obtained if defective sensors can be excluded from the communication, and the sensors are calibrated – either individually or collectively, either before deployment or continuously in their environment.

The Network and Security Analysis For Wireless Sensor Network

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INTRODUCTION

The emergence of sensor network as one of the dominant technology in current and coming decade [1] has posed various unique challenges to the researchers. WSN comes to spot light because of its low cost solution for a variety of practical application and real time need. Originally, WSN technology was designed for military monitoring and surveillance with a objective of structuring a system that was cheap, quick to deploy and at the same time hard to destroy. Most common application frame work of WSN range from troop and tank detection at battle field, wild life monitoring, land slide detection, pollutant monitoring, green house monitoring, measuring traffic flow on road, industrial quality control, infrastructure health monitoring etc. Offering of better capability and higher flexibility at a low cost as compared to traditional infrastructure based wired network makes WSN an effective and alternative network solution for mankind.

SECURITY CHALLENGES IN WSN

The networked nature of large, ad-hoc, wireless sensor networks raises new threats and significant challenges in designing security schemes. We are going to present four of the most common challenges in Wireless Sensor Network security. A. Wireless Medium The pervasive applications proposed for sensor networks necessitate vast wireless communication links. The wireless medium allows an attacker to easily intercept valid packets and easily inject malicious ones i.e. various forms of data into the network without joining the network. B. Ad-hoc Deployment The ad-hoc nature of sensor networks means no structure can be statically defined before hand. The network topology is always subject to changes due to node failure, addition, or mobility. Nodes may be deployed

SECURITY GOALS AND REQUIREMENTS FOR WSN

The security goals are classified as primary and secondary [20]. The primary goals are known as standard security goals such as data confidentiality, data authentication, data integrity, data availability and the secondary goals are data freshness, self organization, time synchronization, secure localization etc. A. Data Confidentiality Confidentiality is the ability to conceal messages from an attacker so that any message communicated via the sensor network remains confidential. Confidentiality protection ensure that an attacker cannot read data being transferred. The standard approach for keeping sensitive data secret is to encrypt the data with a secret key that only intended receivers possess.

TYPES OF SECURITY ATTACK

Security attacks can be classified into two major categories, according to the interruption of communication act, namely Passive attacks and Active attacks. Figure:9 shows the classification of attacks under general categories. A. Passive Attacks The monitoring and listening of the communication channel by unauthorized attackers are known as passive attack. The Attacks against privacy is passive in nature. To a passive attack it is said that the attacker obtain data exchanged in the network without interrupting the communication. B. Active Attacks The unauthorized attacker monitors, listens to and modifies the data stream in the communication channel are known as active attack. Meaning is when it is referred to an active attack it can be affirmed that the attack implies the disruption of the normal functionality of the network by information interruption and modification etc. Other categories of attacks can be, Outsider.

An Introduction on WSN With Future Scopes

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WISENET is a wireless sensor network that monitors the environmental conditions such as light, temperature, and humidity. This network is comprised of nodes called "motes" that form an ad-hoc network to transmit this data to a computer that function as a server. The server stores the data in a database where it can later be retrieved and analyzed via a web-based interface. The network works successfully with an implementation of one sensor mote

The first goal of WISENET is to create a new hardware platform to take advantage of newer microcontrollers with greater functionality and more features. This involves selecting the hardware, designing the motes, and porting TinyOS. Once the platform is completed and TinyOS was ported to it, the next stage is to use this platform to create a small-scale system of wireless networked sensors.

Wireless sensor-actuator networks can provide the ability to continuously monitor the integrity of structures in real-time, detect damage at an early stage, and provide robustness in the case of catastrophic failures with a fraction of cost associated with today's wired networks. However, sensor-actuator networks require a new paradigm of computing—one, which explicitly addresses less capable hardware, unreliable communication with, limited bandwidth, and severe energy constraints. The algorithms and software tools will facilitate monitoring and protection of civil structures using such networks.

Smart environments represent the next evolutionary development step in building, utilities, industrial, home, shipboard, and transportation systems automation. Like any sentient organism, the smart environment relies first and foremost on sensory data from the real world. Sensory data comes from multiple sensors of different modalities in

distributed locations. The smart environment needs information about its surroundings as well as about its internal workings; this is captured in biological systems by the distinction between exteroceptors and proprioceptors.

The challenges in the hierarchy of: detecting the relevant quantities, monitoring and collecting the data, assessing and evaluating the information, formulating meaningful user displays, and performing decision-making and alarm functions are enormous. The information needed by smart environments is provided by Distributed Wireless Sensor Networks, which are responsible for sensing as well as for the first stages of the processing hierarchy. The importance of sensor networks is highlighted by the number of recent funding initiatives, including the DARPA SENSIT program, military programs, and NSF Program Announcements.

The figure shows the complexity of wireless sensor networks, which generally consist of a data acquisition network and a data distribution network, monitored and controlled by a management center. The plethora of available technologies makes even the selection of components difficult, let alone the design of a consistent, reliable, r o b u s t o v e r a l l s y s t e m .

The study of wireless sensor networks is challenging in that it requires an enormous breadth of knowledge from an enormous variety of disciplines. In this chapter we outline communication networks, wireless sensor networks and smart sensors, physical transduction principles, commercially available wireless sensor systems, self organization, signal processing and decision-making, and finally some concepts for home automation.

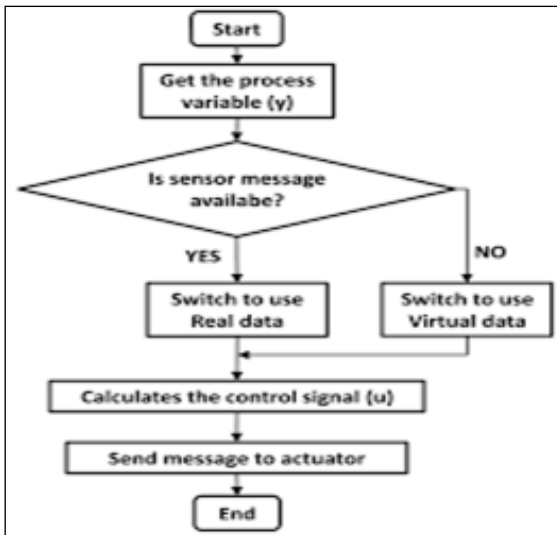
A Framework on Multi-rate Medium Access Control

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Ability of a wireless card to automatically operate at several different bit-rates (e.g. 1, 2, 5.5, and 11 Mbps for 802.11b) , Part of many existing wireless standards (802.11b, 802.11a, 802.11g, HiperLAN2...) Virtually every wireless card in use today employs multi-rate.

Example Carrier Modulations:

Binary Phase Shift Keying ,One bit per symbol , Made by the carrier and its inverse , Quadrature Phase Shift Keying , Two bits per symbol , Uses quadrature carrier in addition to normal carrier (90° phase shift



Example Carrier Modulations (cont.) :

16 - Quadrature Amplitude Modulation ,, 4 bits per symbol ,Also uses quadrature carrier , Each carrier is multiplied by +3, +1, -1, or -3 (amplitude modulation) , 16 possible combinations of the two multiplied carriers
64 - Quadrature Amplitude Modulation , 6 bits per symbol , Also uses quadrature carrier , Each carrier is multiplied by +7, +5, +3, +1, -1, -3, -5, or -7 (amplitude modulation) , 64 possible combinations of the two multiplied carriers

FRAME EXCHANGE OVERHEAD: Exchange means not all time is spend sending actual data

Hops vs. Throughput :

Since the medium is shared, adjacent

transmissions compete for medium time ,Effective end-to-end throughput decreases when sending across multiple hops

Auto Rate Protocols : Selects the rate to use for a packet , ARF Adaptive based on success/failure of previous packets , Simple to implement , Doesn't require the use of RTS CTS or changes to 802.11 spec ,Receiver Based Auto Rate (RBAR) ,USes SNR measurement of RTS to select rate , Faster & more accurate in changing channel , Requires some tweaks to the header fields , Opportunistic Auto Rate (OAR) ,Adds packet bursting to RBAR , Allows nodes to send more when channel conditions are good ,Implements temporal fairness instead of packet fairness

MAC Layer Fairness Models :

Per Packet Fairness: If two adjacent senders continuously are attempting to send packets, they should each send the same number of packets. Temporal Fairness: If two adjacent senders are continuously attempting to send packets, they should each be able to send for the same amount of medium time. In single rate networks these are the SAME!

Channel Model :The transmitted radio frequency signal is reflected by both natural and man-made objects. Thus, the signal at the receiver is a superposition of different reflections of the same signal, received with varying delays and attenuations. Based on the relative phases of different reflections at the receiver, the different copies of the same signal may add coherently or tend to cancel out. Coherent addition of the copies can result in large received signal powers and cancellation eventually leads to zero received signal power. The signal power strength is heavily dependent on the spatial location of the transmitter, receiver, the reflecting objects and the material of the reflecting objects. Any motion, be that of the surrounding environment, the sender, or the receiver, causes the strength of the received signal to vary with time.

Technological Aspects of Wireless Medium Access Methods

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INTRODUCTION

Multi-transmitter Interference Problem , Similar to multi-path or noise , Two transmitting stations will constructively/destructively interfere with each other at the receiver Receiver will "hear" the sum of the two signals (which usually means garbage)

Medium Access Control :

Protocol required to coordinate access , I.E. transmitters must take turns , Similar to talking in a crowded room , Also similar to hub based Ethernet

Carrier Sense Multiple Access (CSMA) :

Procedure : Listen to medium and wait until it is free (no one else is talking) , Wait a random back off time then start talking , Advantages , Fairly simple to implement , Functional scheme that works , Disadvantages , Cannot recover from a collision (inefficient waste of medium time)

Carrier Sense Multiple Access with Collision Detection (CSMA-CD)‡:

Procedure : Listen to medium and wait until it is free , Then start talking, but listen to see if someone else starts talking too , If a collision occurs, stop and then start talking after a random back off time , This scheme is used for hub based Ethernet , Advantages , More efficient than basic CSMA , Disadvantages ,, Requires ability to detect collisions Channel Model The transmitted radio frequency signal is reflected by both natural and man-made objects. Thus, the signal at the receiver is a superposition of different reflections of the same signal, received with varying delays and attenuations. Based on the relative phases of different reflections at the receiver, the different copies of the same signal may add coherently or tend to cancel out. Coherent addition of the copies can result in large received signal powers and cancellation eventually leads to zero received signal power. The signal power

strength is heavily dependent on the spatial location of the transmitter, receiver, the reflecting objects and the material of the reflecting objects. Any motion, be that of the surrounding environment, the sender, or the receiver, causes the strength of the received signal to vary with time

Collision Detection Problem:

\ Transmit signal is MUCH stronger than received signal ‡ Due to high path loss in the wireless environment (up to 100dB) , Impossible to "listen" while transmitting because you will drown out anything you hear , Also transmitter may not even have much of a signal to detect due to geometry Carrier Sense Multiple Access with Collision Avoidance (CSMA-CA): Procedure : Similar to CSMA but instead of sending packets control frames are exchanged , RTS = request to send , CTS = clear to send , DATA = actual packet , ACK = acknowledgement

Carrier Sense Multiple Access with Collision Avoidance (CSMA-CA):

Advantages; Small control frames lessen the cost of collisions (when data is large) , RTS + CTS provide "virtual" carrier sense which protects against hidden terminal collisions (where A can't hear B)

Carrier Sense Multiple Access with Collision Avoidance (CSMA-CA) :

Disadvantages : Not as efficient as CSMA-CD ,, Doesn't solve all the problems of MAC in wireless networks (more to come) Random Contention Access : Slotted contention period :

Contention Window :

Random number selected from $[0, cw]$, Small value for cw , Less wasted idle slots time , Large number of collisions with multiple senders (two or more stations reach zero at once) , Optimal cw for known number of contenders & know packet size , Computed by minimizing expected time wastage (by both collisions and empty slots) , Tricky to implement because number of contenders is difficult to estimate and can be VERY dynamic

Adaptive Contention Window :

Adaptively sets cw , Starts with $cw = 31$, If no CTS or ACK then increase to $2*cw+1$ (63, 127, 255) , Reset to 31 on successful transmission , adaptive scheme is unfair , Under contention, unlucky nodes will use larger cw than lucky nodes (due to straight reset after a success) , Lucky nodes may be able to transmit several packets while unlucky nodes are counting down for access , Fair schemes should use same cw for all contending nodes (better for high congestion too) , DCF (CSMA-CA) , Full exchange with “virtual” carrier sense (called the Network Allocation Vector)

Security Issues in MANETs

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INTRODUCTION

A Mobile Ad hoc Network is a group of wireless mobile computers in which nodes cooperate by forwarding packets for each other to allow them to communicate beyond direct wireless transmission range. Application such as military exercises, disaster relief, and mine site operation may benefit from ad hoc networking, but secure and reliable communication is a necessary pre-requisite for such applications.

MANETS are more vulnerable to attacks than wired networks due to open medium, dynamically changing network topology, cooperative algorithms, lack of centralized monitoring and lack of clear line of defense. Security is a process that is as secure as its weakest link

Security Problems in MANETs

MANETs are much more vulnerable to attack than wired network. This is because of the following reasons :

- Jamming.
- Snooping.
- FloodStormattack.
- PacketModificationsandDropping.
- Repeaterattack.
- IdentityImpersonation.
- BlackHoleattack.
- Wormholeattack.
- Rushingattack.

CONCLUSION

So, in order to make MANETs secure, all its weak points are to be identified and solutions to make all those weak points safe, are to be considered. Some of the weak points and solutions to strengthen the mare

Geographic Ad-Hoc Routing

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GLS is a new distributed location service which tracks mobile node locations. GLS combined with geographic forwarding allows the construction of ad hoc mobile networks that scale to a larger number of nodes than possible with previous work. GLS is decentralized and runs on the mobile nodes themselves, requiring no fixed infrastructure. Each mobile node periodically updates a small set of other nodes (its location servers) with its current location.

A node sends its position updates to its location servers without knowing their actual identities, assisted by a predefined ordering of node identifiers and a predefined geographic hierarchy. Queries for a mobile node's location also use the predefined identifier ordering and spatial hierarchy to find a location server for that node. Experiments using the ns simulator for up to 600 mobile nodes show that the storage and bandwidth requirements of GLS grow slowly with the size of the network. Furthermore, GLS tolerates node failures well: each failure has only a limited effect and query performance degrades gracefully as nodes fail and restart. The query performance of GLS is also relatively insensitive to node speeds. Simple geographic forwarding combined with GLS compares favorably with Dynamic Source Routing (DSR): in larger networks (over 200 nodes) our approach delivers more packets, but consumes fewer network resources.

INTRODUCTION

This paper considers the problem of routing in large ad hoc networks of mobile hosts. Such networks are of interest because they do not require any prior investment in fixed infrastructure. Instead, the network nodes agree to relay each other's packets toward their ultimate destinations, and the nodes automatically form their own cooperative infrastructure. We describe a system, Grid, that combines a cooperative infrastructure

with location information to implement routing in a large ad hoc network. We analyze Grid's locality. Jinyang Li and John Jannotti are supported by DARPA contract N66001-99-2-8917. David Karger is supported by NSF contract CCR-9624239, an Alfred P. Sloane Foundation Fellowship, and a David and Lucille Packard Foundations Fellowship.

However, to be useful in a larger context, a system based on geographic forwarding must also provide a mechanism for sources to learn the positions of destinations. To preserve scalability, this location service must allow queries and updates to be performed using only a handful of messages. Of course, the location service itself must operate using only geographic forwarding. It should also be scalable in the following senses: 1. No node should be a bottleneck—the work of maintaining the location service should be spread evenly over the nodes. 2. The failure of a node should not affect the reachability of many other nodes. 3. Queries for the locations of nearby hosts should be satisfied with correspondingly local communication. This would also allow operation in the face of network partitions. 4. The per-node storage and communication cost of the location service should grow as a small function of the total number of nodes.

GEOGRAPHIC FORWARDING

We use a simple scheme for geographic forwarding that is similar to Cartesian routing [7]. Each node determines its own geographic position using a mechanism such as GPS [1]; positions consist of latitude and longitude. A node announces its presence, position, and velocity to its neighbors (other nodes within radio range) by broadcasting periodic HELLO packets. Each node maintains a table of its current neighbors' identities and geographic positions. The header of a packet destined for a particular node contains the destination's identity as well as its geographic position. When node needs to forward a packet toward location P, the node consults its neighbor table and chooses the neighbor closest to P. It then forwards the packet to that neighbor, which

itself applies the same forwarding algorithm. The packet stops when it reaches the destination.

A packet may also reach a node that does not know about any nodes closer than itself to the ultimate destination. This dead-end indicates that there is a "hole" in the geographic distribution of nodes. In that case, the implementation described in this paper gives up and sends an error message to the packet's source node. Recovering from dead-ends is possible using the same neighbor position table used in geographic forwarding. Karp and Kung propose GPSR [12], a geographic routing system that uses a planar subgraph of the wireless network's graph to route around holes.

They simulate GPSR on mobile networks with 50–200 nodes, and show that it delivers more packets successfully with lower routing protocol overhead than DSR on networks with more than 50 nodes. Bose et al. independently demonstrate a loop-free method for routing packets around holes using only information local to each node. The method works only for unit graphs, in which two nodes can communicate directly in exactly the cases in which they are within some fixed distance of each other (GLS)

GLS RESULTS

The results in this section involve only GLS (and geographic forwarding), without any data traffic. The default simulation parameters for this section are an 802.11 radio bandwidth of 1 Megabit per second, and a communication model in which each node initiates an average of 15 location queries to random destinations over the course of the 300 second simulation, starting at 30 seconds. The location update threshold distance is an important parameter that may need to be tuned. For this reason we present results for three values of the threshold: 100, 150, and 200 meters.

CONCLUSIONS

Wireless technology has the potential to dramatically simplify the deployment of data networks. For the most part this potential has not been fulfilled: most wireless networks use costly wired infrastructure for all but the final hop. Ad hoc networks can fulfill this potential because they are easy to deploy: they require no infrastrucRE..

An Enhanced Distributed Coordination Function

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IEEE 802.11e Medium Access Control (MAC) is an emerging supplement to the IEEE 802.11 Wireless Local Area Network (WLAN) standard to support Quality-of-Service (QoS). The 802.11e MAC is based on both centrally-controlled and contention-based channel accesses. In this paper, we evaluate the contention-based channel access mechanism, called enhanced distributed coordination function (EDCF), in comparison with the 802.11 legacy MAC.

The EDCF provides differentiated channel access to frames with different priorities. We also consider an optional feature of the EDCF, called contention-free burst (CFB), which allows multiple MAC frame transmissions during a single transmission opportunity (TXOP). Through our simulation study, we conclude that the EDCF can provide differentiated channel access for different traffic types. Furthermore, the CFB is found to enhance the EDCF performance by increasing the overall system throughput and achieving more acceptable streaming quality in terms of frame losses and delays.

INTRODUCTION

In recent years, IEEE 802.11 WLAN [1] has emerged as a prevailing technology for the (indoor) broadband wireless access. Today, IEEE 802.11 can be considered a wireless version of Ethernet by virtue of supporting a best-effort service (not guaranteeing any service level to users/applications). The IEEE 802.11 Working Group is currently defining a new supplement to the existing legacy 802.11 medium access control (MAC) sub-layer in order to support Quality of Service (QoS) [3][6]. The new 802.11e MAC will expand the 802.11 application domain by, for example, enabling such applications as voice and video services.

The mandatory part of the current 802.11 MAC is called the distributed coordination function (DCF), which is based on Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). A new component

of the upcoming 802.11e MAC is called the Enhanced DCF (EDCF), which is the enhanced version of the legacy DCF. The EDCF provides differentiated channel access to frames of different priorities as labeled by the higher layer.

IEEE 802.11 DCF:

The IEEE 802.11 legacy MAC [1] is based on the logical functions, called the coordination functions, which determine when a station operating within a Basic Service Set (BSS) is permitted to transmit and may be able to receive frames via the wireless medium. Two coordination functions are defined, namely, the mandatory DCF based on CSMA/CA and the optional point coordination function (PCF) based on poll-and-response mechanism. Most of today's 802.11 devices operate in the DCF mode only. We explain how the DCF works in this section as it is the basis for the Enhanced DCF (EDCF), which we discuss in this paper.

802.11E MAC ENHANCED DCF (EDCF):

The 802.11 legacy MAC does not support the concept of differentiating frames with different priorities. Basically, the DCF is supposed to provide a channel access with equal probabilities to all stations contending for the channel access in a distributed manner. However, equal access probabilities are not desirable among stations with different priority frames. The emerging EDCF is designed to provide differentiated, distributed channel accesses for frames with 8 different priorities (from 0 to 7) by enhancing the DCF.

As distinct from the legacy DCF, the EDCF is not a separate coordination function. Rather, it is a part of a single coordination function, called the Hybrid Coordination Function (HCF), of the 802.11e MAC. The HCF combines the aspects of both DCF and PCF. All the detailed aspects of the HCF are beyond the scope of this paper as we focus on the HCF contention-based channel access, i.e., EDCF.

Contention-Free Burst (CFB):

In this scenario, we simulate with four voice stations and four video stations both with and without the CFB in order to show the

utility of the CFB. Fig. 6 shows the EDCF performances for these two different cases: the first with no CFB, i.e., only one frame is transmitted per TXOP; and the second using the CFB option. The EDCF TXOP limit values are shown in Table III for each traffic type. With 5 msec TXOP, a video station can transmit up to three pending frames consecutively at 11Mbps. The rest of EDCF parameters used for the simulation are those shown in Table III, with the exception of AIFS for video traffic, which is assigned DIFS in this scenario. This is to avoid excessive collisions between 8 stations using the same AIFS value.

CONCLUSION

In this paper, we introduced the contention-based channel access scheme for QoS support, called the EDCF, of the emerging 802.11e MAC. Based on the simulation, we compared the legacy 802.11 DCF and the 802.11e EDCF to show that the EDCF can provide differentiated channel access among different priority traffic. We also evaluated an optional feature called CFB, which allows a station to transmit multiple MPDUs with the SIFS time gaps within the time bound of the TXOP limit.

The CFB is shown to improve the global system performance at the cost of a delay increase for certain traffic types. We would like to remark on two important aspects: first, it should be noted that in this work, we did not attempt to optimize the network performance via the fine-tuning of the EDCF parameters. One should be able to optimize the EDCF channel access by adapting the EDCF parameters including the TXOP limit during the run-time depending on the network load and supported applications. Second, for acceptable QoS provisioning, there should be an admission control process in place along with the properly-chosen EDCF parameters.

Actually, the 802.11e draft also defines a distributed admission control algorithm, in which the AP can control the traffic load from each AC as well as each station by announcing the traffic load and available bandwidth for each AC periodically [3]. We would like to note that this admission control

mechanism is an interesting piece of the work while the actual performance and its utility are subject to further evaluation.

SRW Systems

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Of all the currently emerging short-range wireless solutions, which one is poised to take us into the next era of computing? This paper intends to show that the answer is Ultra-wideband or UWB. UWB is not perfect; the FCC has not yet approved UWB for commercial release because of possible interfere with other devices. Still, no other wireless solution has the promise of Ultra-wideband.

Introduction

In a perfect world, without wires we could, "send a lot of data, very far, very fast, for many separate uses, [and] all at once." Unfortunately, we do not live in a perfect world; there are physical barriers that will not allow all of these goals to occur simultaneously. It is necessary to minimize one or two of them to maximize the others. In the past, the main requirement of wireless communications was to travel very long distances (like transatlantic radio) because there was an absence of a suitable infrastructure for crossing these expanses. We achieved those exceptional distances at a cost of everything else. Today, we have a wired infrastructure that reaches almost every part of the globe; therefore our wireless mediums need only travel far enough to tap into the current infrastructure. Our current cellular systems are an excellent example of this idea. The only distance covered, without wires, is from a cell tower to a phone and back, everything else, is wired.

With the current proliferation of high-speed wired Internet access, short-range wireless (SRW) is poised to step in, as cellular did with the phone system. By definition, short-range wireless passes on range in favor of the other attributes; SRW systems have a range of 100 meters or less.[1] The current leading SRW technologies are Bluetooth, IEEE 802.11b, IEEE 802.11a, and our focus, Ultra-wideband.

Summary

Uses of Short-range Wireless

Short-range wireless has a wide variety of uses. Depending on which technology is implemented, SRW can also be used to create a personal area network (PAN), with a range of zero to ten meters (Bluetooth), or a local area network (LAN) with a range of zero to 100 meters (802.11b). Bluetooth's current main use is to create a PAN between devices like cell phones, PDA and PC's. Combining many small range systems in one building, such as a mall, airport, or hotel can provide either Internet access or access to a proprietary system (for example, to check into your hotel room without waiting in line) to anyone that enters the building.[1]

How to Compare SRW Systems

If too many systems are operating in the same area at the same time (as in the previous example) they will degrade or even nullify each other's capacity. This leads to a new measurement beyond simply data rate or range. It is necessary to look at the number of systems that can safely be used in the same area, at the same time. Then we need to look at the "spatial capacity"[2] of the technology. Spatial capacity can be determined by calculating total data rate supplied by all the systems in a given area and then dividing by the area to arrive at bits per second per square meter.

Overview of SRW Technologies

IEEE Standard 802.11a

802.11a operates in 5GHz U-NII band; at this frequency level there is about 200 MHz of useable spectrum. It has a projected operating range of 50 meters. 802.11a has been measured to have a peak speed of 54 Mbps. As many as twelve 802.11a systems can operate at the same time within a given 50 meter circle. Twelve operating systems deliver a total data rate of 648 Mbps. 648 Mbps spread over a 50 meter circle delivers a spatial capacity of 83 Kbps.[2]

IEEE Standard 802.11b

802.11b operates in the 2.4Ghz ISM band. This standard has a larger operating range than 802.11a at 100 meters, which is better suited to form a LAN than a PAN. Although 802.11b has the larger operating range, there is less usable spectrum available to it at only 80 MHz. This available spectrum

allows for three systems to interoperate in the same 100 meter area. The top speed of 802.11b is 11Mbps. The three simultaneously operating systems then have a total speed of 33 Mbps. 33 Mbps calculated over the 100 meter coverage produces a spatial capacity of only 1 Kbps.[2]

Bluetooth

Bluetooth also utilizes the 2.45 GHz ISM band. Unlike the other technologies, Bluetooth is designed to be ad hoc, which means that a connection can be established between any two Bluetooth devices; most systems have a base through which all devices must communicate.[3]

Since it does not utilize a base site for communications, Bluetooth forms 'piconets'. Although there is no defined base, for many items to communicate something has to coordinate them. A piconet is formed when at least two devices attempt to communicate, one is named the "master" and the other "slave" such that the master defines frequencies and the timing of signals between all slaves within its' piconet.[3] Ten such piconets can safely operate at the same time within a 10 meter circle; each has a data transfer rate of 1 Mbps. That allows for a total maximum of 10 Mbps inside the given 10 meter circle, which translates to a 30 Kbps spatial capacity.[2]

Ultra-wideband

UWB is not limited to a specific frequency although it generally falls between 1.5 GHz and 4.0 GHz.[1] This covers a wider range of frequencies than does any of the other technologies as will be discussed shortly. Ultra-wideband is defined as "any radio system that has a bandwidth greater than 25 percent of its center frequency, or greater than 1.5 GHz." [1] This is a much wider channel bandwidth than is supported by any of these other standards. This is one of the great advantages of UWB, as we will discuss later.

Ultra-wideband systems have been tested and have achieved data rates of 50 Mbps at distances of 10 meters. Projections indicate that 6 of the tested systems could operate simultaneously within a 10 meter circle. This gives us a maximum of 300 Mbps

within our circle, which coincides with a spatial density of 1,000 Kbps. Therefore, UWB has a maximum capacity more than 12 times its closest competitor, 802.11a, which is only 83 Kbps.

Ultra-wideband, Differences and Advantages

As mentioned briefly before UWB utilizes a much wider channel bandwidth than any of the other mentioned technologies. This is what allows UWB to attain such a high spatial capacity. A look at the Hartley-Shannon law demonstrates how this is possible, " $C = B \log_2 (1 + S/N)$ ". In this equation C equals the maximum channel capacity, B is the channel bandwidth in hertz, S is signal power and N is noise power, both in watts. We can see that as the bandwidth of the channel grows the capacity also grows, linearly. Since the other technologies are much more limited in their available channel bandwidth, their capacity cannot match that of Ultra-wideband.[2]

The nature of the UWB signal allows it to, theoretically, be interoperable with almost any narrow-band technology. This is necessary because the large range of operating frequencies that are utilized by UWB overlaps with many already assigned frequencies, including those of other SRW technologies. UWB operations in the vicinity of a "narrowband" receiver will simply act to raise the floor noise of the system with which UWB overlaps.[2] It is a combination of both the large signal bandwidth and the low power level of a UWB transmitter that create this effect.

The power emitted from a UWB transmitter is so low that it falls within the allowable limits for "incidental radiation" as defined by FCC Part 15.[1] Incidental radiators are electronic devices that unintentionally emit signals that could possibly interfere with other devices; incidental radiators cannot radiate power higher than a specific limit or they must be regulated separately from FCC Part 15. Most electronic devices that are not intentional radiators, like transmitters, do still radiate some power and hence are incidental radiators. UWB systems can operate with 50-70 milliwatts of power; this is one ten-thousandth of that which is used by the average cell phone.

Increasing the power output would greatly increase the distance and the data rate for Ultra-wideband but then UWB would no longer be viable given that the frequencies needed by UWB are already assigned.

Although it limits our data rate and range, the low power has many advantages. Obviously, as was just demonstrated, the low power helps to efficiently use the frequency spectrum by giving UWB the ability to interoperate across many currently used frequencies. The low power requirements can greatly increase battery life for devices that communicate using UWB over other SRW technologies. Power consumption can also play a financial role when SRW is used on a large-scale basis; the less power the computer systems need to transmit data, the less power the company has to buy. A UWB system that was tested with higher than normal power output, allowing data in excess of 100 Mbps, still only used 200 microwatts of radiated power. This is about one-fifth the amount of a low-power Bluetooth link.

UWB transmitters and receivers are also simpler than traditional radio transmitters as used in the other given SRW technologies. This will allow for easier mass production and maintenance. The UWB system does not rely on the standard super-heterodyne circuit or a variant thereof, used to create a radio signal, as does Bluetooth. Architectures based on these circuits can be very complex because they require crystal oscillators and the addition of power amplifiers, and synthesizers.. Ultra-wideband systems merely need a single chip capable constructing and modulating the pulses through which UWB data is sent.[2] When the rate at which chips are improving, and at the same time their price is dropping, is taken into account, choosing a single chip over a complex architecture seems like an easy decision

The FCC Hurdle

The biggest obstacle to a commercial release of UWB technology is FCC regulation. Even though ultra-wideband technology generally falls within the limits for incidental radiators there are two main objections. Although UWB does fall under the acceptable noise levels for incidental

radiators, UWB is not an incidental radiator; it acts as an intentional radiator. The FCC is currently considering specific rule changes that would allow UWB transmitters within the scope of Part 15 even though it is an intentional radiator. The FCC has much to consider because there have been many filings in response to the Notice of Inquiry (docket 98-153) filed in 1998. The FCC is also considering special regulations to lower the limits for incidental radiators in certain frequencies to protect the critical GPS system and other devices that operate below 2 GHz and this is part of the range covered by UWB. Although tests have shown that, when properly implemented, UWB can fall under the limits for incidental radiators, it does cause some interference. Testers have concluded that this level is acceptable, but that can also depend on how one defines acceptable in each situation.[

CONCLUSION

With the incredible spatial capacity gap between Ultra-wideband technology and the rest of the SRW world, it appears that UWB is the future of wireless. The technology has been progressing even though FCC approval is still pending; the peak speed of UWB only 2 years ago was 2.5 Mbps. FCC Chairman Michael Powell informed Congress that the FCC would address this issue before the end of 2001.[4] If and when FCC approval has been granted expect to see UWB flood the market quickly, and just as quickly it will likely dominate the wireless market.

Architecture Based HAAP Communication Systems

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The look angle, defined to be the angle subtended between the local horizon and the airplane with the user terminal at the vertex; will be greater than a minimum value of 20 degrees. (The minimum look angle (MLA) for a given user terminal along the perimeter of the service footprint is defined to occur whenever the airplane achieves the longest slant range from that terminal while flying within the designated High Altitude Aeronautical Platform Stations (HAAPS) is the name of a technology for providing wireless narrowband and broadband telecommunication services as well as broadcasting services with either airships or aircraft's. The HAAPS are operating at altitudes between 3 to 22 km. A HAAPS shall be able to cover a service area of up to 1000 km diameter, depending on the minimum elevation angle accepted from the user's location. The platforms may be airplanes or airships (essentially balloons) and may be manned or un-manned with autonomous operation coupled with remote control from the ground. HAAPS mean a solar-powered and unmanned airplane or airship, capable of long endurance on-station possibly several years.

A high altitude telecommunication system comprises an airborne platform typically at high atmospheric or stratospheric altitudes with a telecommunications payload, and associated ground station telecommunications equipment. The combination of altitude, payload capability, and power supply capability makes it ideal to serve new and metropolitan areas with advanced telecommunications services such as broadband access and regional broadcasting. The opportunities for applications are virtually unlimited. The possibilities range from narrowband services such as paging and mobile voice to interactive broadband services such as multimedia and video conferencing.

For future telecommunications operators such a platform could provide blanket coverage from day one with the added advantage of not being limited to a single service. Where little or unreliable infrastructure exists, traffic could be switched through air via the HAAPS platform. Technically, the concept offers a solution to the propagation and rollout problems of terrestrial infrastructure and capacity and cost problems of satellite networks. Recent developments in digital array antenna technology make it possible to construct 100+ cells from one platform. Linking and switching of traffic between multiple high altitude platforms, satellite networks and terrestrial gateways are also possible. Economically it provides the opportunity for developing countries to have satellite-like infrastructure without the funds flowing out of the country due to gateways and control stations located outside of these countries.

Architecture

A typical HAAP-based communications systems structure is shown

The platform is positioned above the coverage area. There are basically two types of HAAPS. Lighter-than air HAAPS are kept stationary, while airplane based HAAPS are flown in a tight circle. For broadcast applications, a simple antenna beams signals to terminals on the ground. For individualized communication, such as telephony, "cells" are created on the ground by some beam forming technique in order to reuse channels for spatially separated users, as is done in cellular service. Beam forming can be as sophisticated as the use of phased-array antennas, or as straightforward as the use of lightweight, possible inflatable parabolic dishes with mechanical steering. In the case of a moving HAAP it would also be necessary to compensate motion by electronic or mechanical means in order to keep the cells stationary or to "hand off" connections between cells as is done in cellular telephony.

DESIRABLE FEATURES

Some desirable features of the HALO

Network include the following:

- Seamless ubiquitous multimedia services
- Adaptation to end-user environments
- Rapidly deployable to sites of opportunity
- Bandwidth on demand for efficient use of available spectrum

Signal footprint will cover an area of approximately 2,000 to 3,000 square miles, large enough to encompass a typical city and its neighboring communities. Such a high value for the MLA was chosen to ensure a line-of-sight connection to nearly every rooftop in the signal footprint and to ensure high availability during heavy rainfall.

By selecting MMW frequencies, a broadband network of high capacity can be realized. The airborne antenna array can be configured to project a pattern of many cells numbering from 100 to more than 1,000. Each cell on the ground will cover an area of a few square miles to several tens of square miles.

CONCLUSION

The HALO network will provide wireless broadband communication services. The HALO network has several advantages over terrestrial wireless networks. The latter have complex geometries involving many base stations interlinked by cabling or microwaves. Moreover, each time cell splitting is used to increase system capacity, the network can demand significant reengineering. On the other hand, satellite networks require more expensive terminals with high power to achieve the same data rates possible through the HALO Network. Also, the longer propagation delays demand more complex algorithms to achieve interactivity. The capacity of a satellite network can be increased, but at higher expense than the HALO Network, typically only by adding more satellites. And, like terrestrial networks, reengineering of the entire satellite network may be required. The HALO Network has striking advantages over proposed large LEO (LOWER EARTH ORBIT) constellations, including ease of repair and rapidly evolving performance.

Abstract: SMA has drawn massive interest and hobby in today's years in a great form of an extensive sort of commercial applications, due to their precise and superior properties, this concern improvement has been bearing with the useful resource of way of improvement and carried out research studies. SMA can heal its original shape at a certain temperature even under maximum loads applied and huge inelastic deformation. In this overview, we describe the primary functions of SMAs, their constitutive models, and their features. We also explained various properties that help to build a device/system. These devices help in cueing health issues such as heart treatment emptying urine so on. SMA has important in reducing the vibration of structures by increasing damping of the materials and this has effective in energy dissipating comparing with other materials. In the aerospace industry wing aircraft, rotorcraft, spacecraft, and micro-electromechanical systems are made up of SMA. In the automobile sector, fuel injectors and thermal valves are constructed with SMA materials. Current work focuses on various applications and properties of SMA, in the field of Medical, Civil structure, Automobile, and Aerospace industry.

Keywords: Shape memory, pseudoelasticity, Stents, Catheter, Isolator, Hydroxyapatite, multi-functionality, Energy dissipation.

I. INTRODUCTION

In the recent modern world, biomaterials play a vital role, any matter or surface that interacts with biological systems are known as biomaterials. Every material available can't be a biomaterial. Biomaterials should be bio-compatible and bio-functional. Bio-functionality means material should perform bio-material functions like restoring feature and facilitating restoration for people after damage or disorder and to assist, enhance, or update damaged tissue or a biological feature. Whereas, biocompatibility is the property

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of material being compatible with living tissue i.e. it shouldn't be poisonous or produce immunological reaction while exposed to the body or bodily fluids (1). Titanium is diagnosed to be one of the maximum biocompatible substances because of the capacity to shape a strong titanium oxide layer on its floor. In a most appropriate situation, it smiles able to supper osteointegration with the bone and it could shape a calcium phosphate-rich layer on its floor, which could be very like hydroxyapatite and also corrosion-resistant. A spare effective asset is that in case of unfavorable the protecting layer of the titanium oxides and calcium phosphate layer is regenerated. Nitinol poses bio functionality and biocompatibility which allow the flexibility to use in biomedical applications. Nitinol is a Shape memory alloy [SMA] that can memorize their previous state(2). Nitinol poses a low modulus of elasticity which is equal to natural bone material(3). Along with biomedical applications Shaper memory alloys[SMA] are mainly used in different sectors like Automobile (4–9), Aerospace(10–15) and construction filed(16–19) The SMA is characterized by two solid phases, namely Austenite and other is the martensite. Austenite is secure at high temperatures and proportions where martensite is secure at low temperatures and symmetry. Martensite exits in two configurations, one as a twinned multivariate crystallographic structure that is not associated with macroscopic deformation. The second form is identifying by detwinned configuration. This is a single variant form and is associated with macroscopic deformation.

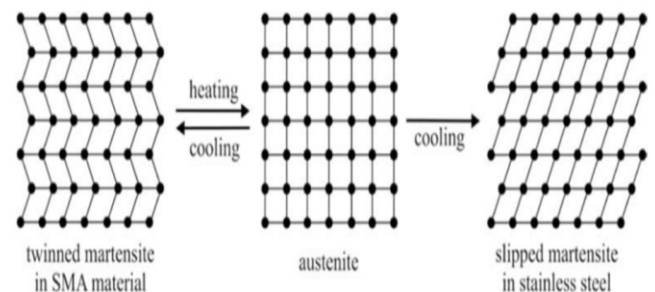


Fig 1:- Martensite transformation in shape memory alloys and steels

When there is temperature addition or increase in temperature martensite will act as twinned martensite consisting of twenty-four variants further these twenty-four variants consist of six different crystallographic structures [20]. These different crystallographic structures can be either in monoclinic conditions or orthorhombic conditions. The variation which is taking place between the austenite and martensite region is called Thermoelastic martensite transformation [TMT][21-24].

When the temperature of the material is greater than the austenite final temperature (A_f) then there will be the conversion of new austenite to single variant martensite and when the load is removed it returns to its original stage. The same process repeats concerning the starting temperature of martensite (M_s). This occurrence is known as two-way shape memory effects. This process whatever is explained above forms a hysteresis loop [25-27]. The stress hysteresis along with high utility in the martensite phase, high privation corrosion to resistance, and fatigue are the main characteristics of Ni-Ti-based shape memory alloys [28].

SMA has a wide range of family including AgCd, Au, CuAlNi, CuAlBe, CuZn, InTi, NiAl, FePt, FePd, MnCu, FeMnSi. Among these materials Ni-Ti based alloys consisting of 48-52%weight of Ni is widely used and has large applications in aerospace, automobile, biomedical and construction field, etc., Some of the listed fields are discussed in detail in the present paper.

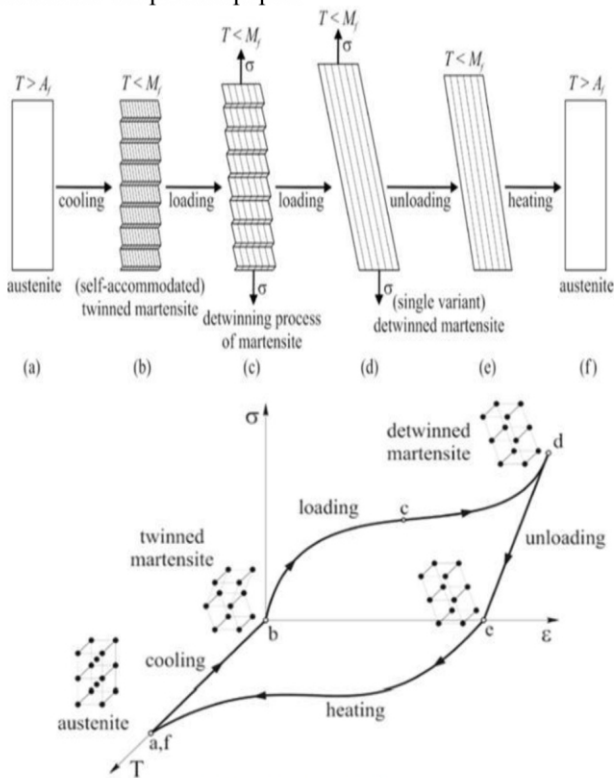


Fig:-2. Shape memory effect.

II. EXPERIMENTAL/COMPUTATIONAL DETAILS

Bio-Medical

Since SMA has features like Bio-compatibility and Bio-functionality and it will not create any allergic reactions to the host surface that i.e., skin. This is the main reason to use in the field of the medical sector. SMA-based material like Ni-Ti is widely used in medical treatment [29]. Ni-Ti materials-based devices/instruments are used to cure few diseases. The composition of nickel and titanium elements existing around uniform atomic percentage this composition form Nitinol. This Nitinol alloys show unique properties that are similar to SMA. It has special characteristics like corrosion resistivity. The corrosion resistivities are explained as follows. The human body is fully electrochemical device. This body constitutes aggressive corrosion due to surrounded by bodily fluids like aerated solution (hold point nine percentage sodium chloride), serum (blood), salts ions, amino

acid, enolsuper molecule, alkaloid hydrocarbon, aldol, acid anhydrides nitric ester nucleus, and proteins. These may all alter nearby corrosion impact to a body if the steel is on the plant in a body to cure a disease this may steel creates corrosion and allergic reaction due to presence of excessive acidic fluids in the body. Acidity can rumble near the steel in plants because of inflammatory reactions of local tissue conciliating with hydrogen peroxide reactive oxygen and nitrogen compounds in the human body. A small change in local Ph value may create infected till use or close to hematomas in a small quantity these may change can redesign biological procedures and also alter the chemistry across the implant. Implant material should have better surface roughness and surface finish these are the most important factors to enhance the corrosion preventing and hence biocompatibility of medical instruments or devices (30 -31) for SMA corrosion preventing study has made in vivo on animals and plants. Stents have been inserted into sheep and dogs for a few months. The corrosion tests have been observed with help of a microscope then the stents have been removed on suitable pitting is installed. As a result, has been observed and improvement of corrosion-resistant is made by coatings and in some cases, pitting is resized from 100 μ m to 10 μ m in diameter. Hydroxyapatite naturally occurs in the form of the phosphorus apatite calcium, mineral calcium, and oxygen that's structure is hexagonal. Pure hydroxyapatite is a white color it does not have any different color. Hydroxyapatite is used to make human bone shape and builds tooth enamel. Even though scientists have studying to current developments of hydroxyapatite in the field of material science and nanotechnology for the utilization of medical uses.

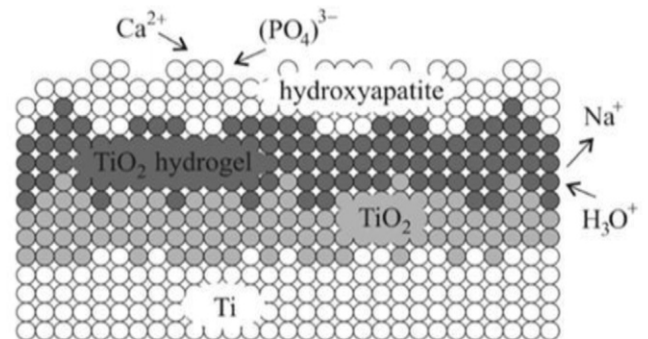


Fig 3:- Formation of hydroxyapatite layer on titanium oxide film

Among the bioactive material, Hydroxyapatite is an extraordinary fabric so it is one of the few lab-made materials on the way to assets bones and enamel grow. Modified Nitinol surfaces are used in the Analysis of in vitro/in vivo plasma protein adsorption and platelets adhesion pertinent, It is also used for self-expanding in plate devices(32) like stents which are used in treatment for blockages in veins, mainly in the heat treatment.

The stunts are inserted into veins through leg or hands and then they are guided to the particular location and at the particular location and are expanded by applying load/heat. Once they expand then the remaining stent part is removed from the location.

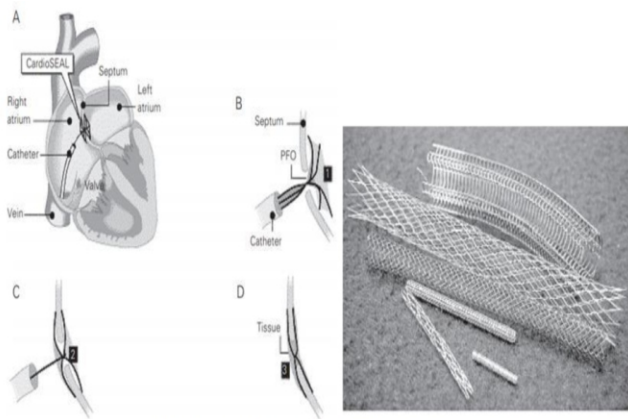


Fig 4:- Atrial septal occlusion device and Shape memory self-expanding stents

The catheter is a tender hole tube, which is passed into the bladder to empty urine. Catheters are now and then vital for folks that for an expansion of reasons cannot empty their bladder in the standard Mainer, i.e. passing urine right into a restroom or urinal. Catheters are normally required as a quick-term for some weeks or months, while non-stop bladder drainage is wanted, but once in a while, they may be required for lengthy-term use. For this, we want a fabric that should be biocompatible and bio-function able.

Septal is inserted in the body through a guidewire using X-ray imaging techniques and magnetic resonance imaging [MRI]. Insertion of septal avoids blue baby condensations where impure blood mixes with pure blood in the atrial. Thus atrial hole is sewn through SMA and is used because these wires are the waterproof film of polyurethane[33-36]. Septal occlusion a ventricular septal disorder is a not unusual coronary heart defect most usually present at delivery, but it can arise in adults after a surgical operation or coronary heart assets. It entails a hollow within the wall between the heart's lower chambers. Signs may additionally consist of a bluish tint on the pores and skin, lips, and fingernails, together with negative feeding, poor weight gain, and rapid breathing. Maximum holes near on their personal, even many of them want surgical treatments or a catheter-primary based system to close the hole. Surgery materials and miniature surgery materials which are convenient to insert into the body are made up of Ni-Ti-based SMA, for their bio-compatibility and bio-function ability.

Other usages of SMA in medical applications are open heart stabilizers i.e., whenever arteries cannot supply enough blood to the heart, one needs to go through coronary artery bypass graft (CABG) surgery. Bypass surgical strategies are achieved on the heart while it's for beating. The heart will no longer be stopped duration of the surgical procedure. For this mechanism, the person is no need for the heart-lung machine. Coronary Heart and lungs will keep forming in the course of surgical treatment. Surgeons will use a tissue stabilization device to immobilize the region of the heart in which they want to work.

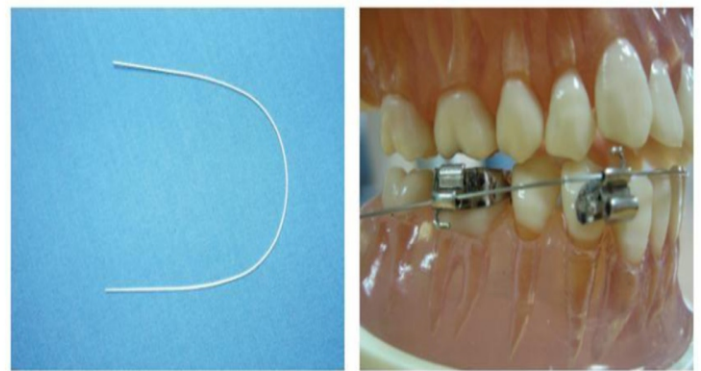


Fig 5:- SMA orthodontic wires.

Guidewires are bio-compatible and bio-functional and they are made up of SMA. The function of these guide wires is to direct the biological equipment like septal or catheter or stunts to their host location inside the human body. [37] dilatator is a surgical instrument or medical implement which is used to induce dilation, that is to expand an opening or passage such as the cervix, urethra, esophagus, or vaginal introits. The tissue spreader allows the accurate and Atraumatic mobilization of tissue. Whenever operations are about to be performed, the upper skin layer should be moved apart as much as possible to insert tools and medical equipment. Using this instrument we can nearly eliminate injuries of nerves, muscles, and ligaments. Since bone and Nitinol have homogeneous stress-strain attributes, Nitinol acts as a replacement material for bone and it perfectly suits for trauma surgery in orthopedics [38-40]. Metals and metal alloys, bio-stable plastics, bioabsorbable polymers, bio-composite polymers/ceramics, bio-ceramics, collagen, and extracellular matrices are some of the materials used in orthopedic surgeries. But these materials have their limitations concerning the human body. Mainly the materials should be biofunctional and biocompatible. A device like SMA embracing fixation can heal the fractures at a faster rate by applying necessary constant force because its structure consists of saw tooth arms and body. This device will apply constant axial stress to fracture bone [41-44] SMA has pores that enable the transport of body process, thus heals the pain quickly.

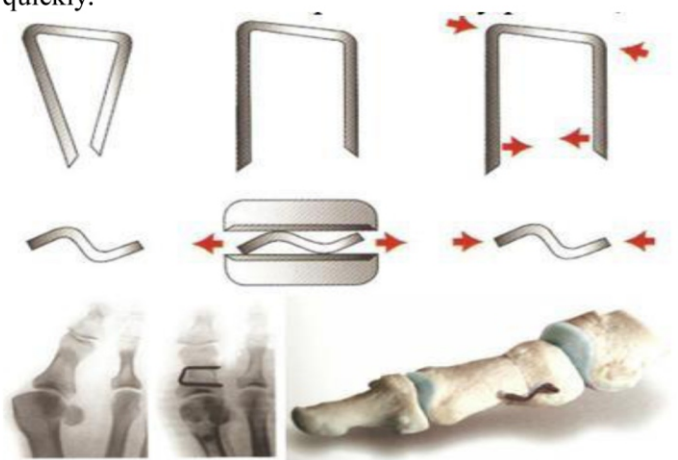


Fig 6:- Orthopedic staple

This property helps in the fixation of fractured bones Staple shaped compression device is used for internal bone fixation in spine fractures of vertebra [45-46]

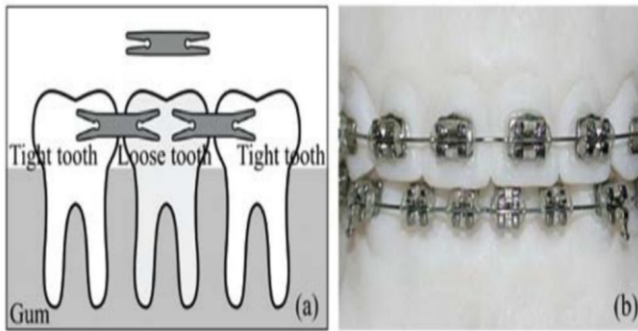


Fig 7:- Dental applications of Nitinol

Devices like dental drills which are used for root canal treatments are made up of Nitinol-based SMA because they can bend to a large scale and can accommodate for high cycle rotations [47]. The advantage of using Nitinol-based SMA Materials will overcome the kink resistance and have the same diameter compared to other materials, kink resistance means resistance developed in wire-like materials [48], these sharp twists are bend to avoid breakage of materials. SMA can also be used in the manufacturing of new surgical tools because of their superelasticity. These new surgical tools are miniatures [49] and these materials are extremely successful because of their properties like the possibility and performance of invasive surgeries and their biocompatibility [50].

That means these materials can enter the body easily compared to traditional materials, [51-53].



Fig 8:- Shape memory alloy glove.

Gloves that are made up of shape memory wires [SMW] near the finger region can reproduce the activity of muscles in hand movement. Two-way shape memory effect property plays a key role in this particular thing, when gloves are heated wire length decreases and vice versa. Thus exhibits muscle activity.[54] One more important application of Ni-Ti-based SMA is the rods utilized in the treatment of scoliosis, which means that bones will grow indifferent rather than in a particular direction.

A special type of belt is used to prevent further growth in the unwanted direction [56-58]. Baskets made up of SMA are help to remove kidney bladder and bile duct stones. On supplying heat, these baskets open up for their function [59]. Shape memory alloys gaining attraction because of these features like recovery of regain its initial shape after large deformation and maintaining the shaper up to the point till the heat is in the materials [60-61]. Along with above mentioned medical applications, some more applications in the field are emerging as listed below in the treatment of bleary obstruction [62-64] a type of careers and tracheal stenosis [65-66] esophageal [67-69], rectosigmoid [70], prostatic[71], urethral [72-73], strictures.

III. CONSTRUCTION FIELD [CIVIL ENGINEERING]

SMA has great potential to enhance civil Engineering structures. Vibration suspension in civil engineering can be achieved by utilizing active control, semi-active control, and passive control. Passive control mode does not require an external power source where active control requires a power source and semi-active control requires less power. [74]

There are mainly three classifications in SMA-based structure controls. They are

1. Passive structure control.
2. Active frequency turning
3. Active damage control.

SMA or passive control

Advantages of the SMA damping property are reduced response and consequently, it reduces the plastic deformation of the structure which are under severe loading. This vibration reduction can be carried out by two methods i.e., ground isolation system and energy dissipation system. Ground isolation system is inserted between ground and structure which filters the

seismic energy transferring from ground to structure so that the structure should not receive any sort of severe loading, foil and in energy dissipation system, Martian site or austenite SMA materials attached with structure observesvibration energy is depending on the hysteretic stress-strain relationship and these devices provide variable stiffness.

Isolation devices:-

The isolator is used in high-way bridges, re-centering devices, and a spring isolation system. The study is made on the investigation of isolation systems for highway bridges with superelastic SMA bars. Dolce et. has implemented and tested wide range for SMA based material are Nitinol wire is utilized for isolation system for the new seismic isolation and energy dissipation which feasible the study on Nitinol wire vibration isolation [75-77]

A study on SMA isolation at convention isolation is carried out at 3 excitation levels. SMA forms links by pier and deck. Results showed that the SMA isolation system provides variable responses for small excitation values. For medium excitation, SMA undergoes stress included Martian site transformation, and at drastic loading on SMA moves elastic range of martensite.

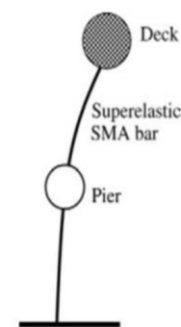


Fig:-9 Schematic of the SMA isolation device for elevated highway bridges [75]

SMA wires are wound around stub, so whenever there is a reciprocal moment between ground ad structure, the wire elongates and the vibration magnitude is damped. Based on this principle energy dissipation device works.[78]

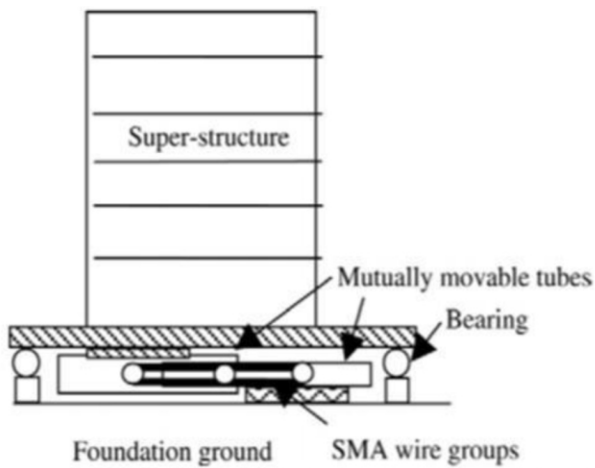


Fig:-10. Schematic of the SMA isolation system for buildings [78]

Energy dissipation devices

1, SMA based support for frame structure:- this support is arranged diagonally in the structure as the frame undergoes deformation and dissipates energy Han.et.et have made a study on energy dissipation and developed eight damped instruments by utilizing the SMW and steel wires. These materials are installed diagonally as shown below figure. The test has made by 2 methods experimental analysis and numerical analysis methods to find the effectiveness of SMW dampers to reduce the vibrations [79]

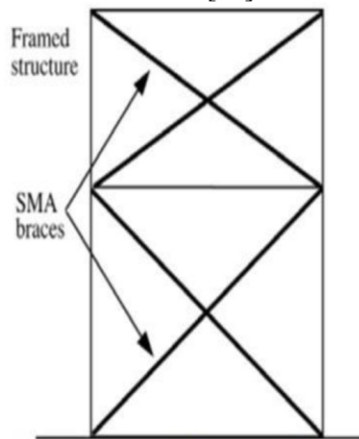


Fig:-11. Schematic of the SMA tendon isolation system for a MDOF structure [79]

Damping elements for bridge

In damping elements, SMA features like martensite super elastic are used as a damper for bridges.

Li. It has made studies on vibration mitigation including cable SMA damper system which can be utilized to stay Cable Bridge.

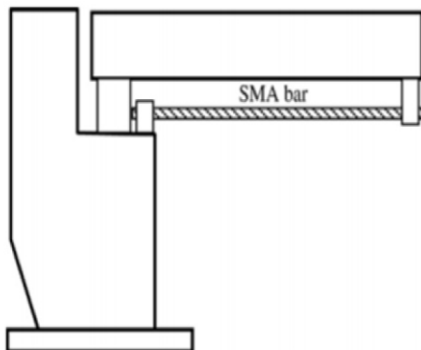


Fig:-12. Schematic of the setup of SMA restrainer for a simple-supported bridge.

SMA connectors

Usually, these are connections between two links in a structure these links or connectors will be stable at stable condition, but whenever there are rapid changes in the situation like earthquake normal connectors fails and the

structure will collapse easily. This deficiency will be overcome by using SMA connectors. Tamai and coauthors prepared a model consisting of a base made up of SMA which has seismic resistance. This SMA is made up of Ni-Ti of 20-30mm diameter and steel bars. These are effective in dissipating energy and reduce vibration and save the structure.

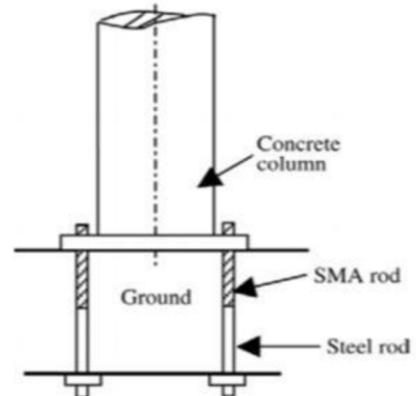


Fig:-13. Schematic of SMA bar anchorage for a column.

This SMA is also known as smart materials because of its peculiar properties. In today's life, one needs to have slender, wide-spanned structures with adapting capacity to changes while using and one needs to have the low structural mass to reduce economy. SMA will answer all these factors alone. SMA consisting of iron-manganese silicon-chromium is used to strengthen the bridge girder to prevent the suffering of cracks cause inadequate shear resistance [80]. The use of SMA to fix and strengthen architectural heritage structure and the use of nickel-titanium in SMA has developed a device. These devices were mounted within the structure to avoid large deformation of slender structures. SMA takes advantage over are its unique properties, this helps to decrease the response and ensuing plastic deformation of the structure concerned with severe loading. SMA's application like vibration control for civil structures has been investigated by many researchers [81]. SMA can be effectively used via two varieties of devices like vibration isolation system and energy dissipation device. A vibration isolation system is fixed in the upper structure and foundation this reduces the transmission of vibration energy. Energy dissipation device is utilized to grasp or consume a portion of the input energy from earthquake and wind which reduces the structural actions and protects structural members. SMA-based energy dissipation devices are capable of dissipating vibration energy and reducing the dynamic response of structural. Properties of SMA depend on alloys composition and thermomechanical treatment [82-85]. SMA is used in the seismic device, this device is designed to protect the structural elements of bridges during extreme hazards like earthquakes by engrossing or dissipating input from external energy [86], SMA possessions like damping capacity and this help passive of civil structures by severing dynamic loading caused by the earthquake, wind, external impact [87].

Temperature vibration frequency range and stress mode for wire bar and rod materials [88].

IV. AEROSPACE

These are necessary for the increase in reliability and multi-functionality of the materials used in the aerospace industry. So engineers and scientists throughout the world looking for one such material which can compensate both the said/specified qualities, active materials like SMA are gaining attention in this field in recent years[89]. The new era scientists are trying to utilize SMA in other fields apart from biomechanical, in such case aerospace industry stood in the first place. The aerospace industry is actively adopting the changes that are taking place in the development of SMA. The application of SMA is increasing in the aerospace industry. Since they have good structural material and these materials can effectively decrease the difficulty of the system. This simple structure leads to reliability at a lower cycle.

The denser arrangement can be accomplished with the integration of actuators and structures. The result of high energy density due to the high actuation strain and stress by this we can obtain the dense arrangement. This arrangement of an SMA attractively active materials applicant in the aerospace industry to achieve the intelligent and smart structure of a system.

Initially engineers and other designers inventing another way to transform heat energy into mechanical work align the crystallography phase transform of SMA [90].

Since earlier times designers have to carry with utilizing both the pseudoelastic and shape memory effect of SMA. In solving engineering difficulties in the aerospace industries the characteristics of SMA helps to connect the area of rotorcraft, spacecraft, fixed wings aircraft, and microelectromechanical system.

V. FIXED-WING AIRCRAFT AND ROTORCRAFT APPLICATION

In the propulsion system and structural configuration of fixed wings now a day's smart wing are used, these smart wings are made up of active materials like SMA. These are used to develop and demonstrate the optimized performance of lifting bodies, these SMA or SME are used as actuators by using shape recovery which occurs at non-zero stress. SMA can provide satisfactory results at a sixteen percent scale it was found that as we go on increasing the SMA percentage in torque tube it is possible to provide full-scale actuation. The experiment was conducted by Defense Advanced Research Projects Agency (DARPA) and the monitored by Air Force Research Lab (AFRL).

Percent scale, it was found that as we go on increasing the SMA percentage in torque tube it is possible to provide full-scale activation. The experiment was conducted by Defense Advanced Research Projects Agency (DARPA) with monitored by the Air Force Research Lab (AFRL)

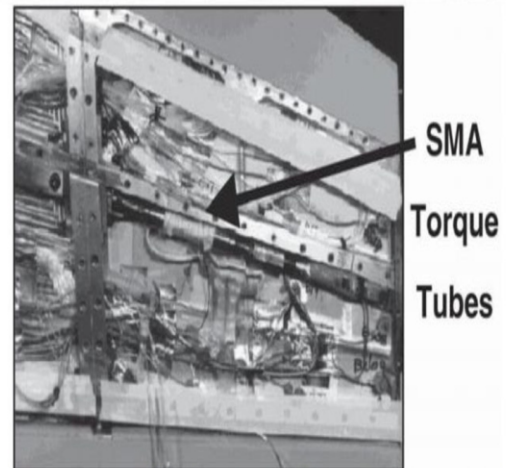


Fig 14:-Total and cut-away view of SMA torque tube as installed in the model wing of the SMART Wing

SMA cables are wrapped around the aft section in the jet engine to change the region of the fan nozzle in the individual region of the flight regime. During take-off and arrival exhaust is at a high temperature which converts SMA materials to austenite. This aids maximum opening of the nozzle which optimizes the performance at altitudes.



Fig 15:- The SAMPSON inlet cowl as installed in the NASA Langley Transonic Wind Tunnel

VI. MICRO-ELECTROMECHANICAL SYSTEM

Nitinol-based SMA has the greatest applications in the area of Micro-Electro-Mechanical system (MEMS), which are mechanical elements along with integrated sensors, actuators electronic devices on regular silicon-based through silicon microfabrication. Using micromachining technology every component is mounted on a common IC (Integrated circuits). MEM enables the development of smart materials which are nothing but SMA's.

The microactuators and microsensors are the key components in any MEMS, where micro-sensors collect the details from the environment through measuring mechanical, chemical, optical, thermal, magnetic, and biological phenomena microelectronics collect the details from sensors and through decision-making capacity direct the system/micro actuators to respond to the action [91]. The crucial applications of these SMA and particular MEMS are listed here they are microvalves [92-94]. Micro pumps[95-97], Optical switches [98], imaging display [99-100] micro relays [101]i.e., all the devices listed here used any one of the actuator mechanism based on the phenomena listed as follows electrostatic, magnetic, piezoelectric, bimetallic or thermo pneumatic. The primary application of these devices is antenna actuator for British satellite system [102]. It also includes promising applications like nozzles used in aero-engines which reduces the noise level generated [103]. Application within gas turbine is to magnitude heavier due to additional robust requirement and higher temperature [104]. Engineers who are developing SMA for aerospace applications are now a day's using a bunch of wires instead of a single wire. From individual material to blend with hydraulic technology and electronic SME are used everywhere in the area of aerospace. SMA can integrate control, sensing, and drive in a single body because of energy density and unique memory effect. SMA can gain the exchange of electro-mechanical using servo control. It controls flexibility and can reduce vibration and noise. SMA can actively control the material damage, healing of material and structure when sensors and actuators are made from SMA.

VII. AUTOMOBILE

SMA things help many recent vehicles at combative market prices. The SMA leads the actuators to do not require the bulky and complex mechanical design to function.

Traditional automobiles are associated with some problems in the modern automobile system and we are trying to overcome these limitations. Along with these things engineers are trying to incorporate safety, more comfort, and trying to improve performance. To get these qualities one needs to have sensors more electronic systems and electric actuators but if one installs these materials, the overweight of the vehicle increases which affects adversely [105]. So one need to get these things when a change needs to adopt is to replace existing electronic equipment with microsensors, microelectronic, microactuators which are made up of SMA [106-108].

These are three types of automotive actuators namely. They are.

- 1) Low power actuators for comfort and bodywork function.
- 2) High power vehicle control actuator.
- 3) High-frequency engine control actuators.

SMA is mainly suitable for low-power actuators and high-power actuators and not suitable for high-frequency actuators due to small operations frequency and narrow bandwidth. Due to flexibility, SMA has the potential to expand in various fields of automobile especially they can be used in an application with lower bandwidth and moderate temperature operation like bodywork and comfort. SMA suits very well the current trend of automobile drive-by-wire while choosing an SMA one needs to look after certain things like operating temperate range performance (like force, stroke,

and bandwidth), durability, and reliability. Based on listed things engineers need to choose materials like shape, design, size loading configuration and cooling techniques and type of sensor and controller smart sensing and self-healing are two major areas where SMA can be effectively used as they are suitable for adaptive operations (smart types and airbags). In the thermal valve, SMA materials like Ni-Ti springs are used while the temperature is above the high-quality fee Ni-Ti spring enlarge and thrust on metallic spring which opens a secondary valve to permute added cool water to glide and vice versa. The benefit of the usage of this form of the actuator is that it doesn't require additional

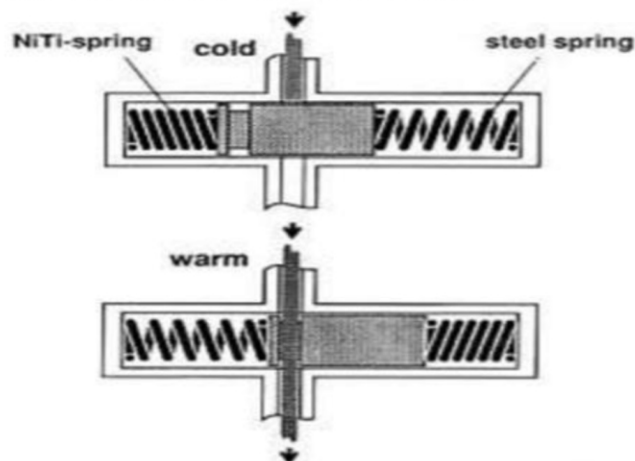


Fig:-16 Thermal valves

One of the recent applications is the warmness-to-get better Ni-TiNb plug for sealing excessive-force fuel entrance in diesel flue injectors. A regular heavy-duty diesel fuel injector consists of a solenoid manipulate valve, a plunger cylinder, and a fuel motion that links the initial two elements. Via this progress fuel communiqué is mounted, in which the fuel is brought into the plunger cylinder thru the manage valve.

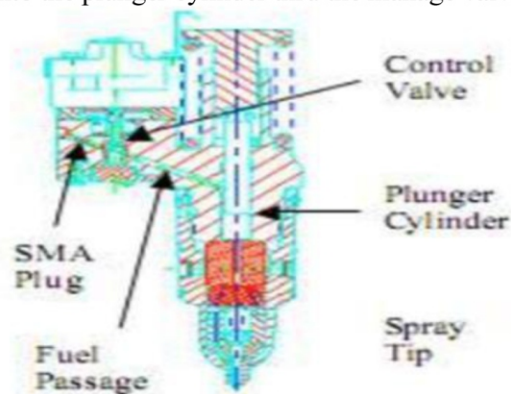


Fig17. Typical construction of a diesel fuel injector

You can use color figures as per the requirement but fonts should be in black. Authors can use any number of the color diagram, chart, picture, screenshots, and any snap which is required for the research of the title.

VIII. CONCLUSION

This article immediately a review of the basic properties of shape memory alloys (SMA) and their applications in the field of Medical, Civil structures, Automobile, and Aerospace industries.

The unique behavior of SMA materials is shape memory effect, Biocompatibility, Biofunctionality and friendly with a human body this feature helps in medical treatments. SMA materials such as Atrial, Septal, Orthodontic wires, Orthopedic staple, and hand glove play a vital role in the medical sector. In the scope of civil structures, SMA materials-based devices like ground isolation system, energy dissipation system, re-centering devices, and Seismic isolation reduces the vibration prevents large deformation of the slender structures and they are effective in dissipating energy. The functions like reliability and multi-functionality are required in the Aero-space industry. These functions are including in SMA materials and these SMA materials play a crucial part in the Aero-space industry to reduce the complexity of the system and leads to reliability at a lower cycle. Even though shape memory actuation can provide significant advantages over the traditional gadgets in the Automobile region, SMAs are mainly suitable for low-power actuators and high-power actuators. Ni-Ti spring is used in the thermal valve which will reduce the additional device. In almost all the sectors SMA is used, SMA gives better replacement for other materials.

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Abstract: In our modern society, the demand of wireless communications increases exponentially. All the indoor and outdoor everything converting from wire to wireless. Even the newly invented devices, cars, TV, refrigerator, washing machine all the advanced things uses wireless technology. Because of the reason, there are more fields to do research in this area. WiFi is one of the important technology in wireless communications. In this work, we have developed a device which will useful to build an wireless network. The device used to monitor and to control supply-chain management of any organization. We have used WiFi which works as two different modes; one is AP (Access Point) and another is STA (STation). In this paper, AP acts as a Server where STA act as a Client. We have developed a wireless network system using self organized sensor nodes (each node has one AP, one STA and one Controller) to communicated each other serially to exchange data and request task accordingly. Because of its serial distributed formation the WiFi range is also be increased with different topology. All the command and request can be done using computer or smartphone. This system (we named it WARKS) can be implemented in home, industrial, hospital, farms, forest, agriculture and many more. To verify the system capabilities and work performance, we do the experiment in indoor and outdoor using required hardware and software.

Keywords: Access Point, Arduino, NodeMCU, STation, WARKS, WiFi, Wireless Sensor Networks.

I. INTRODUCTION

Wireless devices have grown tremendously within recent few years due to the appearance of global adoption, various functionality and wide applications. Future WiFi probably dedicate broadband speeds. Wireless access is consider to both indoor and outdoor environments. For high quality of service (QoS), WiFi enabled devices (i.e., smartphones, tablets, laptops, smart TVs, cameras, sensors etc.) improve user experience and attract them to this technologies. The communication technologies currently used in D2D (device-to-device) communications, to interconnect multiple sensor nodes spread into a particular area. Access to communication technology can play a pivotal role in social and economic development.

The choice of technology to achieve this a significant aspect [1]. If the network has to cover a larger area than router is not capable of transmitting to, or if signals have to penetrate through obstacles, performance will take a hit. Interference is also a big issue, signals from other wireless networks and electronics can impact speeds. The goal of this work is to analyse WiFi feasibility and evaluate its performance and applications in different fields by using a WiFi network with sensors, kits and multimedia support. This work improve D2D communications in a significant way, appointing intermediate multi hop WiFi nodes with different network topology. The objective of this work to retain the WiFi communications without boosting the signals for both static and dynamic cases (maintaining the order and range of WiFi nodes).

For static purpose this network is usable in house, colony, factory, hospital, office, hostel, restaurant, forest etc. Also for dynamic purpose this network is usable in agriculture, animal monitoring, mountain, train, army and rivers etc. Authors intention to establish a online/offline data processing enable network for communication [2]. WiFi deals with the specification of an unlicensed bands worldwide use in wireless local area network supporting a set of scenarios based on number of devices, range, and energy constraints. WiFi offers a simple, robust, and efficient solution in the industrial, scientific, and medical radio band (ISM band) compared with other existing technologies. WiFi technology enables devices to exchange information and perform actions without human intervention. Due to their short wireless range and high obstruction losses, current WiFi require the use of intermediate nodes, to reduce complexity of the network. This paper upsurge our experiences, should create a revolution in offline WiFi network and keep the impression at peoples mind [3]. In the following sections we describe four different perspective relevant to the WiFi networks,

- Introduction
- Network Models
- Network Applications
- Conclusion and Future Plan
- Acknowledgment
- Reference

This network will be adoptable for future communication technologies to establish a convenient environment.

II. NETWORK MODELS

Authors intention to construct a network which can be use in different field and for different purpose with various functionality. Which produce a secure, reliable, energy shaven, portable and simple local area network, that favor in both cellular and ad hoc compositions.

1) *Concepts*: Multiple walkie talkies use a single radio channel, and only one radio on the channel can transmit at a

time, and others walkie talkies receive it. The goal of authors

Table I. Comparison with Existing Technologies

Technology	WiFi	Bluetooth LE	ZigBee	WiMAX	LoRa	LTE	4G
Standard	IEEE 802.11	IEEE 802.15.1	IEEE 802.15.4a	IEEE 802.16a	IEEE 802.15.4g	IEEE 802.16	IEEE 802.16m
Frequency	2.4 GHz, 5 GHz	2.4 GHz	2.4 GHz, 868 MHz, 915 MHz	2.5–5.8 GHz	433, 868, 780, 915 MHz	824–1990 MHz	1.8–2.5 GHz
Bandwidth	20–40 MHz	1 MHz	1 MHz	1.25–20 MHz	125–500 KHz	1.4 MHz	5–20 MHz
Range	10–150 m	10–50 m	10–100 m	5–30 km	2–15 km	10–30 km	10–30 km
Protocol	CSMA/CA	BR/EDR	CSMA	CSMA/CA	ALOHA	TCP/IP	TCP/IP
Modulation	BPSK, QPSK, QAM	GFSK	BPSK, QPSK	CSK	CSS	QPSK, QAM	PSK, QAM
Data Rate	54 Mb/s, 6.75 Gb/s	1 Mb/s	20–250 Kb/s	30–40 Mb/s	50 Kb/s	50–100 Mb/s	50–100 Mb/s
Network Topology	Star	Star, P2P	Star, Tree, Mesh	Star, Tree, Mesh	Star	Cellular	Cellular
Band	ISM	ISM	Wireless	Wireless	Wireless	Wireless	Wireless
Duplex	Half	Half	Half	Full	Half	Full	Full
Spectrum	Unlicense	Unlicense	Unlicense	License	Unlicense	License	License
Transmission Technique	OFDM	FHSS	DSSS	CDMA	OFDM	OFDMA	OFDMA
Latency	3 ms	6 ms	20 ms	5 ms	2 ms	2 ms	2 ms
Power Use	6 W	0.01–0.5 W	Low	High	Low	High	High
Battery Life	Months to Years	Days to Weeks	Months to Years	Months to Years	Months to Years	Days to Weeks	Days to Weeks
Transmit Power	1–100 mW	1–10 mW	1–100 mW	200–20000 mW	10–2000 mW	200–20000 mW	200–20000 mW
Sensitivity	-95 dBm	-97 dBm	-100 dBm	-100 dBm	-149 dBm	-120 dBm	-122 dBm
Packet Length	100 bytes	200 bytes	100 bytes	100 bytes	200 bytes	1200 bytes	1240 bytes
Security	WEP, WPA, WPS	128 bit AES with counter mode CBC MAC	Low	Low	Low	Low	Low
Module Price	\$10	\$10	\$40	\$50	\$60	\$70	\$80

is to build a network, which can work as both cellular and ad hoc, with multi hop connection. Which can use in home for static network and in outdoor dynamic network for natural disaster. By walkie talkie the voice data can transfer, but this WiFi network must include various sensors, kits and enable multimedia support. So the concepts are increase the capability of network with different functions. Such that it is possible to form different topology by this network.

2) *Opportunities*: This technique implement for various field of applications. By this network it is possible multi hop nodes communication. If any person control a device/machine of 7th node with mobile connection from 1st node Fig. 1, then it is also possible to monitor another device/machine of 4th node with mobile connection from 8th node, and so on simultaneously. In this way multiple device can be control by one clients. WiFi devices are easily portable, so they are use in both static and dynamic purpose. This technique increase the range and the number of connections. Also both short and long range WiFi connection may use to provide good services.

3) *Hardware*: In this network an AP, a STA, a Controller, various sensors and kits have been used to model the WiFi network. AP and STA are connected each other with wire connections, STA/Master connected to a Controller and a display with wire. At each nodes different type of sensors and kits have used, which are connected with wire to Controller. AP, STA and Controller are connected with power bank by USB (Universal Serial Bus).

AP and STA, AP works as Server and STA as Client.

4) *Duplex*: Four type of half-duplex protocol have been used in this network. WiFi communication between AP and STA is half-duplex, UART communication between AP and STA is half-duplex, I2C communication between STA and Controller is half-duplex and HTTP communication between AP and Client (mobile) is also half-duplex. This means no device can send and receive, or upload and download, simultaneously.

5) *Mapping*: By mathematics, since ‘STAs’ and ‘APs’ are two sets and by some given rule, element of STAs corresponds to a unique element of APs, so the rule is called a mapping of ‘STAs’ into ‘APs’. Here ‘STAs/ Clients’ set include mobile, laptop, wireless sensors etc. and ‘APs’ set include all Servers/APs in the network. Mapping are two types “one one” and “many one”. Since many STAs can connect with one Server therefore the map are many one mapping. And STAs/Clients connected to a Server/AP of a node with wire connection is a many one mapping, Similarly Controllers connected to a STA with wire in this node also a many one mapping, Sensors/Kits are connected to a Controller with wire is also form a many one mapping.

6) *Topology*: The topology of this network can form tree, star, bus, line, chain or combination of them. But that nodes of this network should not form ring or mesh topology.

Because the data will forward from one node to all others nodes. Since each node forward data to all others nodes, which nodes are connected to it. Therefore if some nodes form a ring or mesh topology of this network then the data will turn around in, which happen continuously and will hang this network. For n nodes network, total $2n$ numbers of AP and STA are needed.

7) *Security*: For establish a connection to a node of this network by mobile or computer, peoples should go through some authentication password. After network authentication, users also should go through Second password for access specific node of this network. A web server has been design for receive/request instruction of specific node of this network from mobile/computer. By this web server peoples can control or monitor specific node's relay, sensors, devices and also can do, multimedia communications online/offline.

8) *Experiment*: The experiment has done in the Hostel and in the Department of Jadavpur University. Which cover different floors of building with distributed rooms for indoor purpose. This experiment also has done in the playground of University for outdoor purpose, where each node placed at 20 meters distance from others. All external clients (mobile) Fig.1 are connect to the AP/Server of a node of this network for monitoring or controlling any sensor/kits of other nodes. AP of any node receive and request the instruction from clients and forward to all STA and AP (both wire and wireless) by these Serial and WiFi connections. Total eight nodes are used, each node have one AP, one STA and one Controller. STA work like a Client, one display and one controller are connected to it. Controller works like a Slave of STA/Master. Various sensors/kits are connected to the Slave by wire. Seven mobile are used as an external clients. Both command and request are done simultaneously. Message of any client flash to the screen of display. In case of connection lost of any node to this network, this also flash to all nodes display that which node lost the connection. The connection speed was approximately 112kbps for using seven mobiles to receive/request instructions of eight nodes network. The receive/request instruction also work if maximum three

STA/Clients connected to one AP and access to other different nodes.

9) *Challenges*: For static/dynamic situation, if some nodes lost connection, then it automatically reconnect to its previous node, that it was connected to in this network. Since STA can connect only one AP and many station can connected to a AP Fig.1. If some cases, connection is not define (i.e STA can randomly select an AP). In this type of cases if connection lost, STA of any node search random AP within its range. If it get another node (not previously connected node) and connect it's AP. Then the network may form two or more disconnected sub network with different topology. Same node STA and AP can connect each other. This is a great challenge to this network. Since one STA can connect only one AP wirelessly therefore the whole system will suffer for it. So for random connection, should make a manual connection configuration.

Table II Comparison of different board we used for this system

Specs/Board	ESP32	ESP8266	Arduino Uno
Number of Cores	2	1	1
Architecture	32 Bit	32 Bit	8 Bit
CPU Frequency	160 MHz	80 MHz	16 MHz
WiFi	Yes	Yes	No
Bluetooth	Yes	No	No
RAM	512 Kb	160 Kb	2 Kb
Flash	16 Mb	16 Mb	32 Mb
GPIO Pins	36	17	14
Busses	SPI, I2C, UART, I2S, CAN	SPI, I2C, UART, I2S	SPI, I2C, UART
ADC Pines	18	1	6
DAC Pines	2	0	0

String Processing					
DNID	SNID	CMD	REQ	MSG	TERM
16 bits	16 bits	32 bits	32 bits	N bits	8 bits

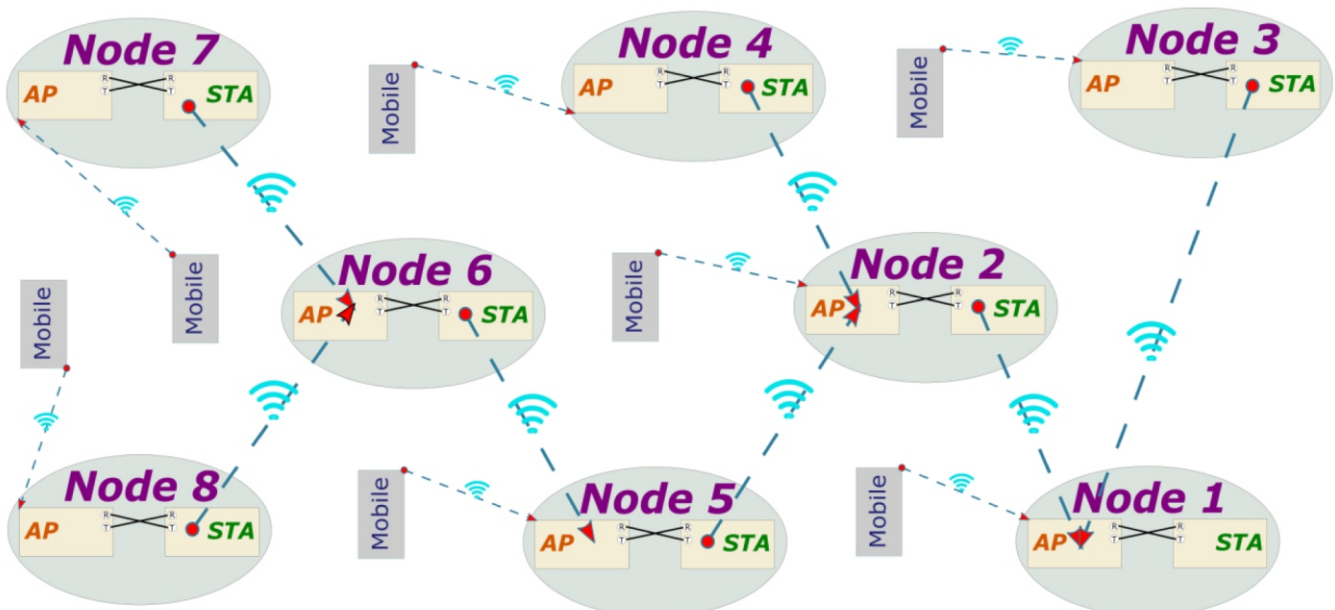


Fig. 1. Wi Fi Communications using WARKS

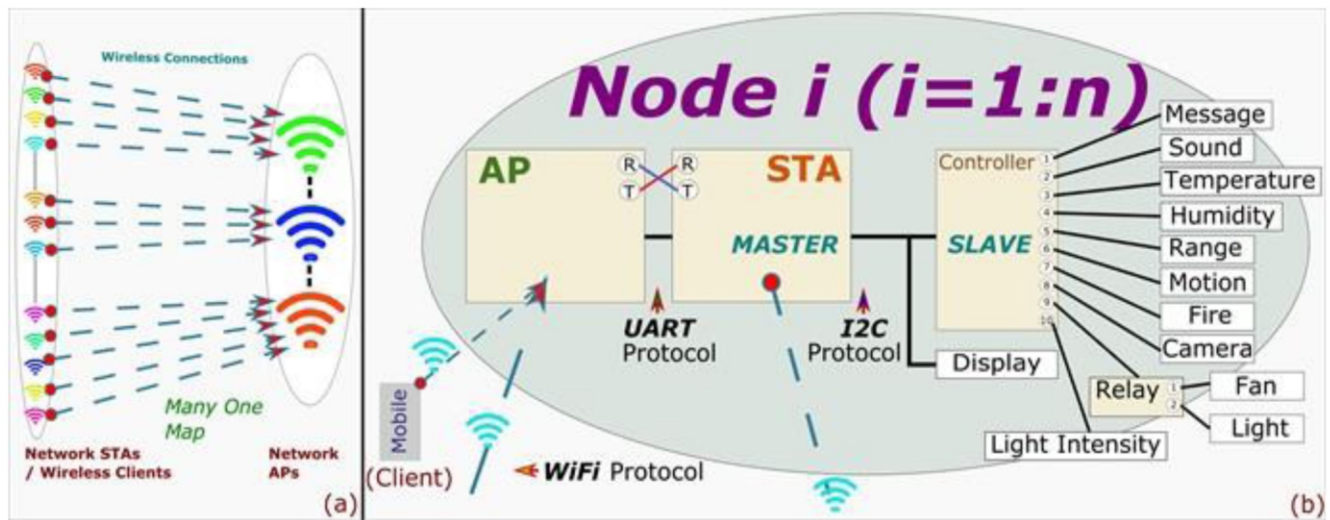


Fig. 2. (a) STA/Clients map into APs/Servers, (b) Hardware design of i th Node with communication protocol and sensors/kits of the Network

Command	Descriptions
RLY[number]	It will control the relay board
FAN[O/F]	Control Fan On/off
Li [O/F]	Light
WIN[O/F]	Windows close or open
DOR[O/F]	Door close or open
Ref[O/F]	Refrigerator On/off
ALL[O/F]	All control on or off
MSG	Message from requested node to source node

Request	Descriptions
TEM	Temperature
HUM	Humidity RSS Received Signal strength
LDR	Light intensity measurement
DIS	Ultra-Sonic range finder
SMK	Smoke Sensor MOS Motion Sensor

III. NETWORK APPLICATIONS

Several scope of applications [4] of this network are present in multiple fields Fig.3, some of them are describe as follows,

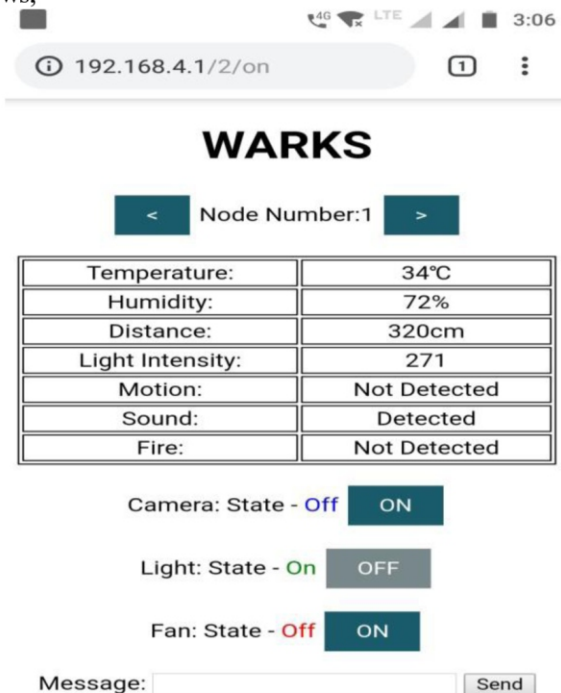


Fig. 3. WARKS user interface

A. Industry

Automatic control has played a vital role in the advance of engineering and science and it has become an important and

integral part of modern manufacturing and industrial processes. It makes the process easier and time shaven. One of the main ingredients of automation is undoubtedly control, which means information being collected, processed and delivered back to each sensors. Workers of a factory can easily control various machine with their mobile, using WiFi connections. Also they can receive real time temperature, humidity, gas, radio frequency, fire, smoke, alarm etc., to their mobile app. Moving robots or vehicles can be control. Workers can get access to this network by connecting moving robots or vehicles, they act as multi hop nodes of WiFi network. From first WiFi connection from mobile, workers can control a robot and by second connection from mobile to robot's node (this time robot's node work as multi hop node) can monitor/control another device or machine. All data will store to the servers through multi hop connections.

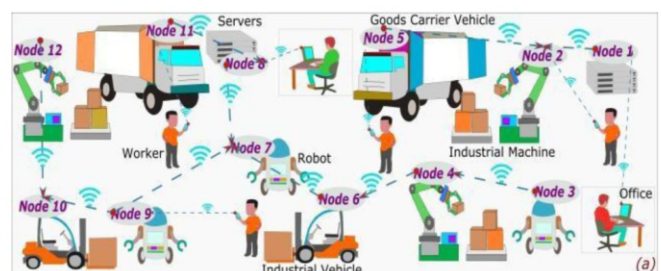


Fig. 4. Applications in Industry

A. Train

WiFi network connections enable operators to manage carriage to carriage and train to ground communications with increased efficiency and create attractive onboard multimedia services that give passengers safe and environmentally friendly transportation. At each carriage of a train should have some WiFi nodes which have some sensors. Passengers can access this network using mobile by connecting to a single node of the network. They can receive information about temperature, humidity, fire, smoke, alcohol etc., can access movie, music to their mobile from the network servers. Passenger can do, chat to other coaches passengers, order foods, complaints, take necessary helps from other passengers or securities. This network should distributed among authority, security, kitchen and coaches. Train authority can control air conditioner, doors, send message, alarms to passengers. The authority can collect all information to server by this multi hop nodes. In this way restaurants, shopping mall can provide services to their customers.

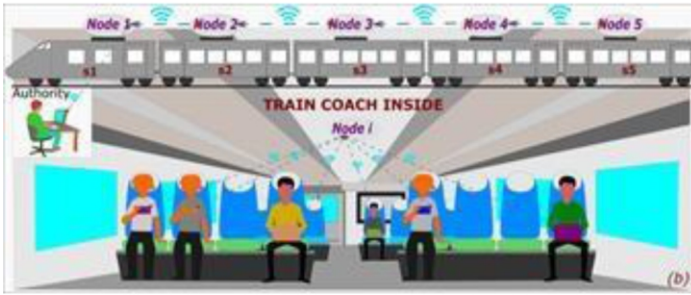


Fig. 5. Applications in Train

C. Hospital

In a hospital constant health care monitoring system is necessary for the patient's physiological parameters. In case of emergency patient should need medical treatment or shifted to other hospital. For this purpose a communication network need among patient, doctors, patient relatives, nurses, inquiry, pharmacy, ambulances and offices. This WiFi network full fill all functionality and take care about hospital emergency management. Patients are placed in different ward, it is difficult to look after all patients if lack of doctors or nurses in hospital. So by WiFi sensors, camera and various devices, it is easy to monitoring to all patients physical conditions from different places with mobile or computer by this network. Using real time data this system will be faster.



Fig. 6. Applications in Hospital

D. Agriculture

WiFi reduce effort and time for monitoring agricultural environment [5]. The utilization of WiFi technology allow for remote measurement of temperature, humidity, crop condition, atmospheric pressure, soil moisture, water level

and insects detection, observation etc. The WiFi system will reduce the cost. Sensor location can easily repositioning. Also enhance the flexibility and mobility of sensing points. Greenhouse farming growth, germination, sprouting, flowering and fruit development monitoring with WiFi reduce the labor of farmers. This proposed idea introduce together a controlling and monitoring system which activate or deactivate automatic irrigation, reaper, seed planter and agricultural vehicles of an agricultural fields with short and long range multi hop WiFi nodes. A farmer can fly a drone by mobile, together with drone node WiFi (i.e. three hop connection) the farmer can communicate with other farmers. Any animals, birds or human activity to the crop field can easily identify from any corner or share data to each other by multi hop WiFi network. Dairy farming easily look after with deploying various WiFi sensors. For short of connection farmers can access to network with moving agricultural vehicles. Fishermen can communicate each other by this WiFi network from fishing boats.

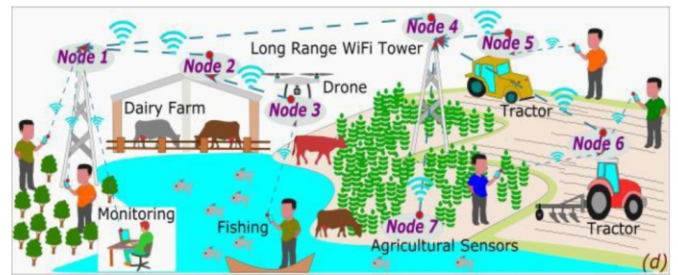


Fig. 7. Applications in Agriculture

E. Mountain

Mountaineering is the set of activities which involves ascending mountains. Mountaineering related activities include traditional outdoor climbing (rock and ice), hiking, backpacking, skiing, and traversing via ferratas. Mountaineer are travel long distance for climb up to horn of the mountain. Sometime they leave behind their accompany or needs to medical helps. As there is no network coverage, so it is impossible to communicate each other. For this purpose they should need both short and long range WiFi communication networks. Long range WiFi [6] are deploy like mobile tower (base station) and short range WiFi communicate among the group of mountaineer. If any group want to communicate another group to whom they leave behind, simply connect to long range WiFi network, by mobile WiFi and can communicate with each other. In case of medical emergency, can get help from administrator or rescue camp by connecting to long range WiFi network. Administrator or mountaineer can share any problem with others by connecting one node of this network such that rest of group can avoid this difficulties. Since each and everyone are connected to the long range WiFi network.

So by RSSI values [7] one group can find other groups node location to the mountain and how far away this group traveling from a WiFi tower can be identify. In the same way, this technology can be use in desert.

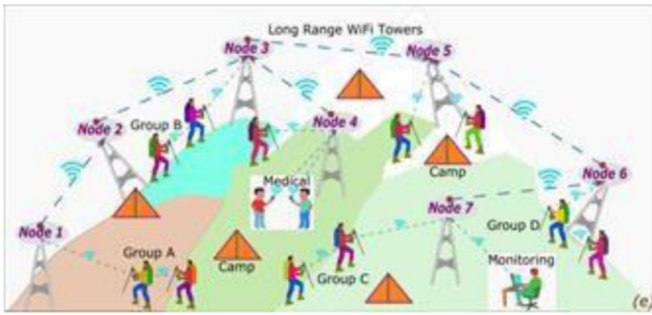


Fig. 8. Applications in Mountain

F. Forest

The forest is a complex ecosystem consisting mainly of trees that buffer the earth and support a myriad of life form. Wild animals graze in forest, sometime herd of several wild animals or birds migrate together one forest to another. They are need monitoring from different place of forest. Also the forest needs security from poaching, forest fire etc. To get away from this problem this WiFi network is a good solution. Each node of this WiFi network should have camera, fire detector, motion sensors, sound detector etc., and will be a combination of short and long range WiFi network. By this network, animal, birds or any unauthorized human activity can easily track for taking necessary steps.

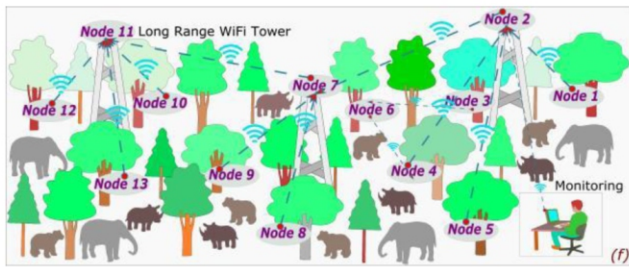


Fig. 9. Applications in Forest

G. Army

Military automation has changed the face of battle, and WiFi devices have played a key role. The air force, the army and the navy all get benefit and improve their function. Army communicate each other for battlefield operations. It may be take place in forest, hill, sea, urban or rural areas. Army can communicate among them, using drone or vehicles to aerial vehicles by WiFi network. Even inside the army camp this technology may use. In case of natural disaster, i.e. earthquake, flood, fire etc. this technology will use. The advantage of this network is, it can use dynamic, static and both together.



Fig. 10. Applications in Army

H. Home

A home automation system will control TV, light, fan, door, window, climate, entertainment etc [8]. It may also

include home security, such as alarm, motion, gas, fire, smoke, baby care systems.

All of this sensor devices can control and monitor connecting with one node by mobile, present in any place of network coverage area. Use this multi hop WiFi connection people can communicate among multi floors with multi buildings. Any person can send message to any people or a group of people by this WiFi networks. Also can control their cars from multi floor building using this network. The same technique may use in office buildings.



Fig. 11. Applications in Home

IV. CONCLUSION AND FUTURE PLAN

This work is done to make the living environment easier for controlling and monitoring remotely using mobile or computer. The proposed system can be used in agriculture, home automation, industrial automation, smart cities, army, fishing, mountain tracking etc. Distance can be find using RSSI technique [7], [9], [10], [11], [12], [17]. In this model all the AP has variant SSID but unique IP address and port number. Making unique SSID for all AP and variant IP address is under process.

Our future plan is to implement this system into swarm robotics to create dynamic formation using wireless communication to solve the complex problem which can be finding shortest path of path following robot [3], [13], [14], [16] rescue people from danger, battle field fighting technique and many more. To improve the hardwares, we have to use the LiFi or future technology to create a super speed wireless data transfer. To improve softwares, we plan to develop a new programming language to configure required wireless network hardwares easily.

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Abstract: According to WHO, breast cancer is the disease that affects people the most frequently and most dangerously in the world. Researchers are paying more attention to breast cancer because of how deadly it is and how early detection can prevent it. Since the advent of supervised machine learning algorithms, the early detection of breast cancer has advanced. The usage of several machine learning techniques as well as ensemble algorithms is demonstrated in the study. The outcomes were extremely precise, allowing for the best-possible cancer prediction. The paper's modest goal is to save people suffering from the disease by enabling them to know if the detected tumour is cancerous or non-cancerous, being Malignant. It focuses on early diagnosis of breast cancer. This paper would be useful and aiding for those who are novel researchers in prediction and diagnosis of breast cancer using machine learning.

Keywords: Breast Cancer Prediction, Machine Learning, Ensemble XG Boost, AdaBoost.

I. INTRODUCTION

According to the statistics of World Health Organization during 2020, breast cancer has been the most prevailing disease of the world. It has mentioned that during 2020, 2.3 million of women across world has been diagnosed with breast cancer and by the end of the month, almost 7.8 million of women had been surviving in the world with the record of past five years [1]. Breast cancer has been an invasive disease since 1930 and is right now an area of attraction for researchers to infringe this invasive disease and bring awareness amongst the population with early detection and diagnosis of the disease. Breast cancer disease can be treated effectively when detected in its early stages. This early detection is an area where many researchers are working today. There are several researchers working on medicine development and its discovery for eliminating the meddlesome disease. Thus cancer biology is found to be gearing up the interest of researchers across the world. Breast cancer is not a contiguous or transferrable disease. It is a disease spreading widely due to mutations in cells. It is not a viral or bacterial infectious disease but is mutant to changes in gene material, particularly protein sequencing. Though breast cancer is mostly observed in females, some 1% of males are also victims to this disease. The disease is caused by a lump in

the breast. This lump is painless but it is abnormal and hence should be treated urgently by consulting surgeons. There are basic two genes called Breast Cancer Gene 1 and Gene 2, usually referred as BRCA1 and BRCA2 which produce proteins to remove ruptured DNA. These genes help in suppressing tumors in the body. But any pathogenic disorders or any mutations in the gene sequence of any of these genes, leads to breast cancer. About 13% of women in the general population will develop breast cancer sometime during their lives (N et al., 2020). By contrast, 55%–72% of women who inherit a harmful BRCA1 variant and 45%–69% of women who inherit a harmful BRCA2 variant will develop breast cancer by 70–80 years of age [2], [3]. Breast cancer is represented in two different ways. The lumps in breast cancer can be either cancerous or non-cancerous. All those lumps which are non-cancerous are usually called as Benign type which means there exists no cancer. While all those lumps which are cancerous in nature are termed as Malignant tumors. These malignant tumors need diagnosis using biopsy of the lump mass or can be diagnosed using breast imaging. The objective of the WHO Global Breast Cancer Initiative (GBCI) is to reduce global breast cancer mortality by 2.5% per year, thereby averting 2.5 million breast cancer deaths globally between 2020 and 2040. Reducing global breast cancer mortality by 2.5% per year would avert 25% of breast cancer deaths by 2030 and 40% by 2040 among women under 70 years of age. The three pillars toward achieving these objectives are: health promotion for early detection; timely diagnosis; and comprehensive breast cancer management [4]. There is an organization called National Breast Cancer Coalition (NBCC) which works dedicatedly towards the end of breast cancer through action and advocacy. According to their study carried out in 2022, breast cancer is found to be the most common disease where there are estimated to be 2,87,850 new cases of invasive breast cancer in women and 2710 new cases in men. They have even shown that there will be an additional 51,400 cases of ductal carcinoma in situ diagnosis in women. The claim made by the NBCC is depicted in the below figure which even justifies the rise in mortality rate as age increases.



Figure I.1 An Image Showing the Statistics of Breast Cancer From 1975 to 2022. [5]

Breast Cancer Prognosis using Machine Learning Ensemble Techniques

Breast cancer diagnosis has been a major concern for decades and thus, there are several research communities working on this area for finding solutions to the cancer, its treatments, or maybe even drug discovery. The diagnosis and treatment of breast cancer has been an area of interest for researchers of the computer science community today. Those interested in biomedical research or life sciences bioengineering are focusing on healthcare industries today and its solvability implementing computer fundamentals like Artificial Intelligence (AI), Machine Learning, Block chain Technology, and Deep Learning. Machine Learning is a recent technology that is used to train machines with various algorithms in order to improve automatically through learning. As discussed in the paper, benign tumors are non-cancerous by nature. The diagnosis of tumors in benign or malignant conditions can prevent a human from unnecessary treatments if found benign. The bifurcation of breast cancer into benign or malignant, just in order to avoid unnecessary surgery and treatment if not cancerous, is much research specific today. Due to its uniqueness in feature categorization, breast cancer diagnosis of complex datasets uses Machine Learning (ML) as one of the most prevailing methods. There are certain ML algorithms classified into supervised and unsupervised learning algorithms and its enhancements as ensemble learning algorithms. Researchers opt for various sets of algorithms and even sometimes use more than one learning algorithm to help in analysis of datasets. In the paper [6], use of Machine Learning supervised algorithms on Wisconsin Diagnostic Breast Cancer Dataset (WDBC) was carried out showing the accuracy and F1 score for several algorithms. The code was done in the R environment using RStudio Framework. The WDBC dataset contains around 569 observations only which was found to be very less for training a machine learning model. Secondly the diagnosis was carried out using Statistical Programming Language R which was found to be visually a bit less in exploration of data analysis as compared to Python. The paper focused on basically three algorithms namely Support Vector Machine (SVM), General Linear Model (GLM) and Single Neural Network (NNET) where the accuracy obtained by SVM was best among all three algorithms. Moving an extra mile ahead, this paper focuses on Python technology and Supervised Machine Learning Algorithms. This paper focuses on the result and analysis between different ensemble classifiers as well. A comparative representation of supervised with ensemble is also justified with the results obtained.

II. MATERIALS AND METHODS

To carry out the prediction of breast cancer occurrence in terms of malignant “M” and benign “B”, a mammography dataset of breast masses known as CBIS which is Curated Breast Imaging Subset of Digital Database for Screening Mammography, usually known as CBIS - DDSM, was used. DDSM is a database containing 2620 scanned film mammography studies. The images here are decompressed and converted in DICOM format, which was then used to get access to the .csv file. Here the dataset used consisted of records of “B” and “M” kinds of breast cancers for exactly 1319 patients. Further the analysis of breast cancer with various machine learning supervised algorithms were carried

out. The results obtained have been discussed in chapter 4 of the paper. Though the algorithms gave better accuracy, using ensemble algorithms was recommended. Hence, two ensemble mechanisms, AdaBoost and Xtreme Gradient (XG) Boost were used. The coding of the algorithms for the CBIS-DDSM dataset was done on Python Platform, online, using Google COLAB. The model constructed is depicted in the figure below:

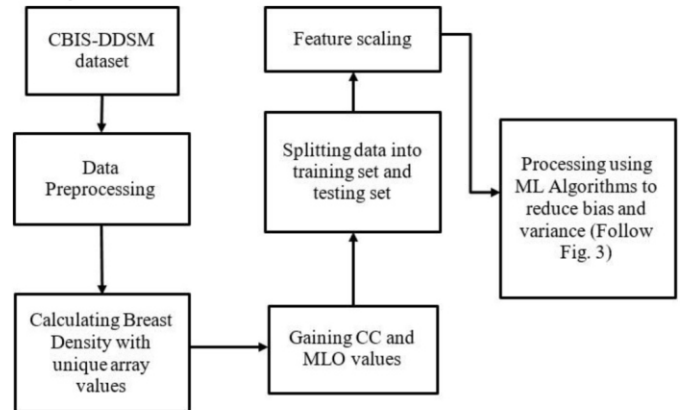


Figure II.1 Processing of CBIS-DDSM dataset

The Algorithms mainly targeted, experimented and analyzed here are Ensemble Random Forest algorithm, Ensemble AdaBoost algorithm and Ensemble XGBoost algorithm. Figure 3 represents the data pre-processing steps and the outcomes targeted after using the mentioned supervised and ensemble techniques.

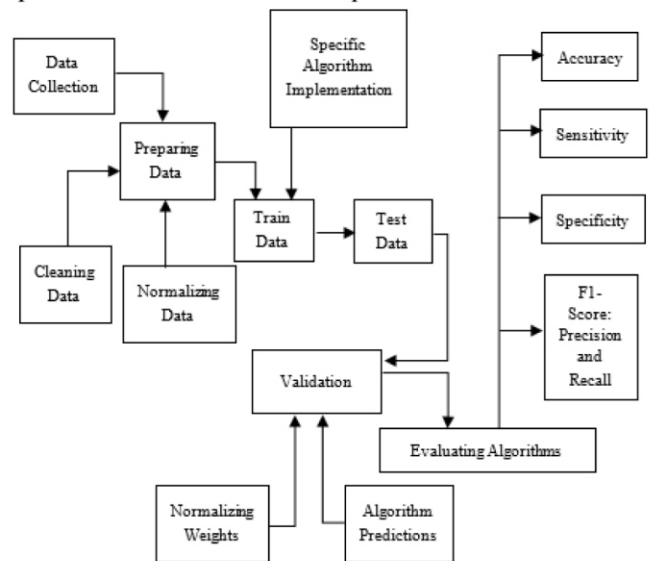


Figure II. 2 Data Processing Stages and algorithm implementation model to achieve desired result

III. RESULTS AND DISCUSSION

The conduction of data analysis for predicting breast cancer was carried out on an unscaled and then feature scaling data. Feature scaling of data is important in Machine Learning as it helps in standardizing all the independent variables or features present in the data for a fixed range. Though, sometimes the problem of outliers may pop up due to this scaling, which may lead to unwanted results.

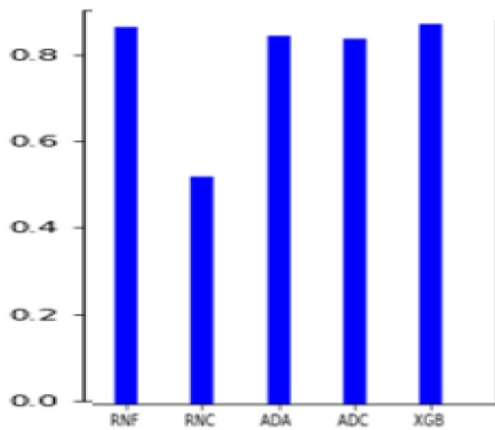
The results were obtained in terms of Accuracy, Precision, Recall and lastly the F1-Score. Table 1 depicts the results of each algorithm.

Table III-1 Comparison of all the supervised algorithms in terms of Accuracy, Precision, Recall and F1-Score

Algorithm	Accuracy	Precision	Recall	F1-Score
Random Forest Ensemble Classifier	85.05	91.06	84.02	0.8843
AdaBoost Ensemble Classifier	83.24	87.76	85.49	0.8661
XGBoost Ensemble Classifier	85.86	92.30	86.15	0.8912

After fetching the results, the study was concluded with comparative analysis of each of the algorithmic values with scaled / unscaled except the two ensemble algorithms which are boosting algorithms and hence does not require scaling the values. The below figure 4 indicates the bar chart showing the comparative analysis of all the algorithms.

Table III-1 Comparison of ensemble algorithms with the obtained accuracy values



IV. CONCLUSION

Breast Cancer prediction has been a very novel topic for data analysts as it helps diagnosing breast cancer and today many researchers are also working on drug discovery on the basis of the prediction. This paper aims at predicting breast cancer with accuracy ratio of supervised algorithms in machine learning. While carrying out the experiment on the CBIS-DDSM dataset, it was found that supervised learning algorithms gave pretty good results but using ensemble algorithms would enhance the accuracy and finally the F1-score. Hence, Random Forest ensemble, AdaBoostensemble and XGBoost ensemble were used and to our hypothesis, it proved to be better. As depicted in the result shown in table 1, F1-score for Ensemble methods were found to be comparatively higher than the normal supervised algorithms. From the analysis done, it can be concluded that using XGBoost Ensemble technique would enhance the performance of the model and will lead to better F1-score. F1-score, is basically a harmonic mean between precision and recall and is primarily used to compare the performance of classifiers. Better the F1-Score, better is the classification of observations into perfect classes. F1-score lies between 0 to 1

and the score obtained in XGBoost is 0.8912 which is better than every other algorithm used, which justifies optimal and better classification of the observations in the dataset. This paper can aid researchers in carrying out their study on breast cancer prediction. It may further help in diagnosing the mammography directly. Here the mammographic dataset was converted into a csv file and then the prediction was carried out, but any researcher can directly diagnose mammography also without converting it into a csv. The paper can be enhanced in future to show the AUC scores of predicted probabilities with a mammographic dataset.


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The logo for Trident Group of Institutions, featuring the word "TRIDENT" in a bold, white, serif font inside a blue, rounded rectangular border with a slight shadow effect.

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A wide, paved walkway lined with lush greenery and pink flowers, leading towards a modern building complex. The buildings are multi-story with a mix of orange and white facades. In the background, a taller glass-fronted building is visible, with the words "IA TOWER" partially legible on its facade. A few people can be seen walking on the path in the distance.

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