INTELLIGENT PUBLIC TRANSPORT MANAGEMENT SYSTEM USING EMBEDDED TECHNOLOGY

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Abstract- Nowadays, usage of motor vehicles is becoming mandatory for almost every people. So, due to the increasing the number of vehicles on roads traffic controlling became crucial one and also major problem for general public as well as government. In this paper, a vehicle monitoring system is proposed by using the embedded system technology, which gives the intelligent management of public transport. This design includes the GPS, GPRS, ARM, Embedded Linux operation system etc. the proposed design provides the scheduling of communication, location tracing and stops broadcasting, video monitoring and also counts the number of public transport vehicles. The proposed design is prototype for desired application.

Key words - Embedded Linux system, GPS, GPRS, ARM, Public Transport

I. INTRODUCTION

In present, the motor transport increasing so the controlling of vehicles on roads becomes a major issue. This also effects on normal people and restricts the development of current city. If we provide a system that monitors and controls this transport on roads it helps to overcome this problem [1].

A good number of tracking systems had so far been developed with a wide range of tracking facilities [2]–[4]. But the operation cost of most of these systems is higher which prevents from widespread use. On the other hand, the rate of car theft, asset theft, child kidnapping in many countries are increasing at a higher rate [5]. The objective of this research is to reduce the cost of the tracking system using the latest technologies and making it available to the common people. The system uses an On-Vehicle Module consists of GPS receiver and GSM modem, the device resides in the vehicle to be tracked. In order to track the movement of the vehicle Google Maps used for mapping the location. The GSM modem fetches the GPS location and sends it to the server using GPRS. Extensive research work had been carried in the field of object based system ranging from GSM based location determination [6] to GPS based location determination [7]. The integration of GPS and GSM was first established using SMS as a method of transmitting GPS coordinates. The inclusion of GPRS technology to transmit location coordinates to a remote server facilitates the tracking of object remotely using any computer connected to the web.

AVL-Automatic Vehicle Location system was discussed in details by Al-Bayari and Sadoun that presented under GIS environment [7]. However a complete FPGA implementation of the vehicle position tracking system using short messages services (SMS) was reported by Hapsari [8]. Xiaobo Fan etc. discussed the design and implementation of a mobile object management system that makes use of the existing GSM networks and its extension GPRS for data communication [9]. Hsiao and Chang developed analytical model to analyse the optimal location update strategy with the objective of minimum total cost [10]. Tamil etc. did similar works compared with ours but used the SMS for the communication [11]. A more recent work by Nishikanta Pation video surveillance and tracking of moving civilian vehicle added new dimension to the development of the tracking systems [12].

The entire paper presented here is by introduction, representation of the block diagram, proposed system with hardware connection
followed by results. Finally, the paper has been concluded with some important notations.

II. BLOCK DIAGRAM REPRESENTATION

Here, we are presenting the system with GSM and GPS modules in such a way that these modules can be controlled by Microcontroller. The modules are represented in the figure-1.

LPC2148 is the widely used IC from ARM-7 family. It is manufactured by Philips and it is pre-loaded with many inbuilt peripherals making it more efficient and a reliable option for the beginners as well as high end application developer.

![LPC2148 Development board](image)

LPC2148 is one of the most widely used IC of ARM-7 families which is manufactured by NXP Semiconductors formerly known as Philips. It uses the RISC Architecture and Harvard Architecture. Harvard architecture has separate bus line for both Program Memory and Data Memory which is used for fast data Transfer. It has many features like it is having 64-pin High-Performance ARM Microcontroller. It has two Ports and each port consists of 32pins. In that 3pins are reserved for future applications and 16Pins are hidden which is used to boost up the remaining pins operation. Pins are available up to nine edge or level sensitive external interrupt.

There are only 45 GPIO Pins which can use for I/O applications. It has 512 kb of flash program memory and 32kb of Static RAM Data Memory. It has two UART’s which is used for Serial Communication Between two modules. It is and Interface width of 128bit which enables the operating frequency of 60MHZ. It is a low power Consumption with Operating voltage of 3.3v. It has four stages of Pipe-line which is used make an sequence flow of execution. Crystal operating frequency of up to 60MHz because it consists of Phased Lock Loop(PLL). Two I2C serial interfaces, Two SPI serial interfaces Two 32-bit timers, Watchdog Timer, PWM unit, Real Time Clock with optional battery backup, Brown out detect circuit. It has In-System Programming (ISP) and In-Application Programming (IAP).
GSM (Global System for Mobile):

The GSM based communication for mobile and Telecommunications Standard Institute (ETSI) to describe protocols at the time of second generation (2G) digital cellular networks utilized by mobile phones. This GSM board is shown in Fig-2. The GSM standard has been build-up as an alternate for first generation (1G) analogue cellular networks, and originally estimated a digital, circuit switched network optimized for fully duplex voice telephony. This was extensive over a time to cover data communications, initially by circuit switched transport, and then it has been moved to packet data transport via General Packet Radio Services (GPRS) and Enhanced Data rates for GSM Evolution or EGPRS (EDGE). There after improvements were developed when the 3G made third generation (3G) UMTS standards continued by fourth generation (4G) LTE Advanced standards.

"GSM" is a trademark fessed by the GSM Association. GSM is a cellular network, which signifies that mobile phones connect to it by explore for cells in the bordering area.

Global Position System (GPS):

GPS, formally called as NAVSTAR, is satellite navigation/routing system utilized for influencing one accurate location at the most anyplace on Earth. A GPS unit takes time signal transmissions from individual satellites, and measures its place by triangulating this information. The GPS was modelled by and is authorized by the United States Department of Defence and it can be used by anybody for free of cost. The cost of managing the system is nearly 400 million dollar per year.

Global Position System (GPS):

Evaluation uncertainty of the bulk of commercial GPS recipients changes from $10^{-11}$ to $10^{-13}$ by the frequency scale, and from 100 ns to 50 ns by the time scale, being dependent on the recipients design. The major sources of dubiety in GPS measurements are the GPS recipient position fault, the orbital fault, the satellite and receiver clock faults, the ionosphere and the troposphere retard, the receiver internal retard, the satellite antenna and cable retard, the receiver noise, and the multipath fault. The frequency dubiety for a GPS recipient is higher than that for Cs-standard by 2-3 orders within a small-time interval (i.e. 1 – 1000 s), and by one order within a long term separation of about 6-7 days.

IR SENSOR:
IR Sensor is nothing but Infra-Red Sensor, mainly it works with the Principle of Line of sight. When the obstacle is placed in front of the IR Sensor, it detects and sends an information to the Receiver. Receiver receives the information and transmits to the Micro-controller.

**PIR SENSOR:**

PIR Sensor is nothing but Passive Infra-red Sensor which is used to detect the human begins. When coming to the Passive Infra-red Sensor (PIR) is too different when compare to the Infrared Sensor because Passive Infrared sensor detects only human begins but Infrared sensor detects the human being also an object.

**Liquid Crystal Display(LCD)**

LCD consist of 16Pins. They are Vss, Vcc, Vee, Back Light Anode and Back Light cathode. There are 8 data pins (D0-D7), One Read Select (RS), One Read/Write (R/W) and Enable.

**IV. PROPOSED SYSTEM**

This Intelligence counting system is mainly consists of 32bit ARM RISC based Harvard architecture micro-controller and Infrared Sensor (IR). This system consists of two Infrared sensors, one is placed at the front of the vehicle and another one is placed at the back of the vehicle. When the person is entering into the bus Infrared Sensor which is present at the front of the vehicle gets activated, Micro-controller External Interrupt gets enabled and counts the Person as a Passenger. When the Person gets down from the bus Infrared Sensor which is present at the back side of the
vehicle gets activates and decreases the passenger with “-1”.

For this system we write a loop execution program using Increment and Decrement statements. When the Front Infrared sensor in activation mode , it going to be in increment mode [(+1) or (++)]. When the Back Infrared Sensor in activation mode, it going to be in decrement mode [(−1) or (––)].

In this section we are presenting the hardware kit for the proposed system for public transport management.

Here, the system what we are presented and discussed is a prototype one only. By taking some options we are analysed the results. In this proposed system the Microcontroller plays a key role for the desired application i.e this can be control the entire modules. This proposed can be used for the efficient transport system management in desired manner.

V. EXPERIMENTAL RESULTS

In this section, the experimental results are taking in to consideration that the how the public transport system is managed accordingly.

![Fig-8: Hardware](image)

![Fig-9: (a)](image)

![Fig-9: (b)](image)

![Fig-9 (a-b): Experimental setup for the hardware](image)

VI. CONCLUSION

In this work we are discussed and implemented a public transport control system by using the GSM, GPS and ARM microcontroller. By this system we can get the desired application and also it will be useful for the public. Since it is a prototype for the actual application if we implement in real time it exhibits efficient results in desired manner. By the presented system the vehicles can be controlled by available modules which are available in human mobiles and also vehicles.

REFERENCES


Authors Profile:

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Underwater Acoustic Sensor Networks: Research Challenges and Technology

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Abstract— Nowadays underwater acoustic sensor networks’s [UASN’s] are emerging technology in communication era. Two third of the earth is covered with water and there has been a growing interest in monitoring underwater medium for scientific exploration and attack protection. Data in underwater sensor networks (UWSNs) is transmitted by acoustic signals; the characteristics of a UWSN are different from those of a terrestrial sensor network. We identify research directions in short range acoustic communications, MAC, time synchronization, and localization protocols for high-latency acoustic networks, long duration network sleeping, and application-level data scheduling. Underwater acoustic networking is the enabling technology for these applications.

Keywords: acoustic sensor networks; Underwater networking; terrestrial.

I. INTRODUCTION

Underwater sensor networks are envisioned to enable applications for oceanographic data collection, pollution monitoring, offshore exploration, disaster prevention, assisted navigation and tactical surveillance applications. Multiple unmanned or autonomous underwater vehicles (UUVs, AUVs), equipped with underwater sensors, will also find application in exploration of natural undersea resources and gathering of scientific data in collaborative monitoring missions. To make these applications viable, there is a need to enable underwater communications among underwater devices. Underwater sensor nodes and vehicles must possess self-configuration capabilities, i.e., they must be able to coordinate their operation by exchanging configuration, location and movement information, and to relay monitored data to an onshore station.

Underwater Acoustic Sensor Network (UASN): A collection of sensor nodes which communicates among them through the emerging underwater acoustic communication technology is known as UASN. Acoustic communication technology is the best choice when compare to the radio waves and optical waves that is why it was chosen for the communication in underwater. Underwater acoustic network gaining attentions due to their importance in underwater applications for military and commercial purpose. Some of the major applications of UASN are [1]

I. Exploring the unpredictable underwater world.
II. Reports Ocean related disaster like tsunami to Coastal areas.
III. Exchange information among nodes.
IV. It can perform pollution monitoring in Lakes & Rivers e.g. Oil leakage, chemical pollution, Biological pollution etc.
V. It can also helps in detecting minerals, oil fields etc.
VI. UAN with acoustic and optical sensors can be used to perform rapid environmental assessment and detect mine like objects.

Fig. 1. Represent underwater acoustic environment
Major challenges in the designing of UASN are
I. Battery power is limited.
II. Limited available bandwidth.
III. Due to corrosions underwater sensors are more prone to failure.
IV. Bit error rates are quite high.
V. Propagation delay.
VI. Channel is severely impaired.

Wireless underwater acoustic networking is the enabling technology for these applications. Under-Water Acoustic Sensor Networks (UW-ASNs) consist of a variable number of sensors and vehicles that are deployed to perform collaborative monitoring tasks over a given area. To achieve this objective, sensors and vehicles self-organize in an autonomous network which can adapt to the characteristics of the ocean environment.

The above described features enable a broad range of applications for underwater acoustic sensor networks:

- **Ocean sampling networks:** Networks of sensors and AUVs, such as the Odyssey-class AUVs, can perform synoptic, cooperative adaptive sampling of the 3D coastal ocean environment. Experiments such as the Monterey Bay field experiment demonstrated the advantages of bringing together sophisticated new robotic vehicles with advanced ocean models to improve the ability to observe and predict the characteristics of the oceanic environment.

- **Environmental monitoring:** UW-ASNs can perform pollution monitoring (chemical, biological and nuclear). For example, it may be possible to detail the chemical slurry of antibiotics, estrogen-type hormones and insecticides to monitor streams, rivers, lakes and ocean bays (water quality in situ analysis). Monitoring of ocean currents and winds, improved weather forecast, detecting climate change, understanding and predicting the effect of human activities on marine ecosystems, biological monitoring such as tracking of fishes or micro-organisms, are other possible applications. For example, in the design and construction of a simple underwater sensor network is described to detect extreme temperature gradients (thermoclines), which are considered to be a breeding ground for certain marine micro-organisms.

- **Undersea explorations:** Underwater sensor networks can help detecting underwater oilfields or reservoirs; determine routes for laying under-sea cables, and assist in exploration for valuable minerals.

- **Disaster prevention:** Sensor networks that measure seismic activity from remote locations can provide tsunami warnings to coastal areas, or study the effects of submarine earthquakes (seafquakes).

- **Assisted navigation:** Sensors can be used to identify hazards on the seabed, locate dangerous rocks or shoals in shallow waters, mooring positions, submerged wrecks, and to perform bathymetry profiling.

- **Distributed tactical surveillance:** AUVs and fixed underwater sensors can collaboratively monitor areas for surveillance, reconnaissance, targeting and intrusion detection systems. For example, in a 3D underwater sensor network is designed for a tactical surveillance system that is able to detect and classify submarines, small delivery vehicles (SDVs) and divers based on the sensed data from mechanical, radiation, magnetic and acoustic micro sensors. With respect to traditional radar/sonar systems, underwater sensor networks can reach a higher accuracy, and enable detection and classification of low signature targets by also combining measures from different types of sensors.

- **Mine reconnaissance:** The simultaneous operation of multiple AUVs with acoustic and optical sensors can be used to perform rapid environmental assessment and detect mine-like objects.

Underwater networking is a rather unexplored area although underwater communications have been experimented since World War II, when, in 1945, an underwater telephone was developed in the United States to communicate with submarines. Acoustic communications are the typical physical layer technology in underwater networks. In fact, radio waves propagate at long distances.

**II. COMMUNICATION ARCHITECTURE**

In this section, we tend to describe the communication design of underwater acoustic sensing element networks. Above all, we tend to introduce Reference architectures for two-dimensional and three-dimensional underwater networks, and gift many sorts of autonomous underwater vehicles (AUVs) which might enhance the capabilities of underwater sensing element networks. The topology is normally a vital consider decisive the energy consumption, the capability and also the dependability of a network. Hence, the topology ought to be rigorously built and post-deployment topology improvement ought to be performed, once potential.

Underwater watching missions will be extraordinarily pricey owing to the high value of underwater devices. Hence, it's necessary that the deployed network be extremely reliable, thus on avoid failure of watching missions owing to failure of single or multiple devices. For instance, it's crucial to avoid...
planning the constellation with single points of failure that would compromise the general functioning of the network. The network capability is additionally influenced by the constellation. It’s vital to arrange the constellation such the simplest way that no communication bottleneck is introduced. The underwater device constellation is an open analysis issue in itself that desires more analytical and simulative investigation from the analysis community. Within the remainder of this section, we have a tendency to discuss the subsequent architectures:

Three types of underwater acoustic sensor network are:

- Static two-dimensional UW-ASNs for ocean bottom monitoring. These are constituted by sensor nodes that are anchored to the bottom of the ocean. Typical applications may be environmental monitoring, or monitoring of underwater plates in tectonics.

- Static three-dimensional UW-ASNs for ocean-column monitoring. These may be used for surveillance applications or monitoring of ocean phenomena (ocean bio-geo-chemical processes, water streams, pollution).

- Three-dimensional networks of autonomous underwater vehicles (AUVs). These networks include fixed portions composed of anchored sensors and mobile portions constituted by autonomous vehicles.

**A. Static-Two Dimensional UASN (for Ocean Bottom Monitoring):**

**B. Two-dimensional underwater sensor networks:**

A Reference design for two-dimensional underwater networks is shown in Fig. 2. A gaggle of detector nodes square measure anchored to rock bottom of the ocean with deep ocean anchors. Underwater detector nodes square measure interconnected to 1 or a lot of underwater sinks (uw-sinks) by means that of wireless acoustic links. Uw-sinks, as shown in Fig. 3, square measure network devices to blame of relaying information from the bed network to a surface station. To realize this objective, uw-sinks square measure equipped with 2 acoustic transceivers, specifically a vertical and a horizontal transceiver. The horizontal transceiver is employed by the uw-sink to speak with the detector nodes so as to: (i) send commands and configuration information to the sensors (uw-sink to sensors); (ii) collect monitored information (sensors to uw-sink). The vertical link is employed by the uw-sinks to relay information to a surface station. In problem applications, vertical transceivers should be long vary transceivers because the ocean will be as deep as ten metric linear unit. The surface station is supplied with AN acoustic transceiver that’s ready to handle multiple parallel communications with the deployed uw-sinks.

It is additionally endowed with an extended vary RF and/or transmitter to speak with the onshore sink (os-sink) and/or to a surface sink (s-sink).

**Fig. 2 Represent architecture for static 2D UASN**

It is a collection of sensor nodes that are anchored to the lowest of the ocean bed. The device nodes square measure connected to 1 or additional sinks by the means that of wireless acoustic links and have vertical and horizontal transceiver. Main application may be environmental observation. The most important drawback bestowed during this design is numerous multihop methods which may increase communication overhead over the networks likewise because the quality of routing protocols.

**Fig. 3. Architecture for 2D underwater sensor networks.**

Sensors will be connected to uw-sinks via direct links or through multi-hop ways. Within the former case, every sensing element directly sends the gathered knowledge to the chosen uw-sink. However, in UW-ASNs, the ability necessary to transmit could decay with powers larger than 2 of the space, and also the uw-sink could also be removed from the sensing element node. Consequently, though direct link affiliation is that the easiest way to network sensors, it should not be the foremost energy efficient resolution. Further-more, direct links area unit terribly doubtless to scale back the network turnover thanks to increased acoustic interference owing to high transmission power. Just in case of multi-hop ways, as in terrestrial sensing element networks, the
information created by a supply sensing element is relayed by intermediate sensors till it reaches the uw-sink. this might end in energy savings and increased network capability, however in-creases the quality of the routing functional-ity. In fact, each network device typically takes half in a very cooperative method whose objective is to diffuse topology data specified efficient and loop free routing choices will be created at every intermediate node. This method involves sign and computation. Since energy and capability area unit precious resources in underwater environments, as mentioned on top of, in UW-ASNs the target is to deliver event options by exploiting multi-hop ways and minimizing the sign overhead necessary to construct underwater ways at an equivalent time.

C. Three-dimensional underwater sensor networks:

Three dimensional underwater networks area unit wont to discover and observe phenomena that can\'t be adequately ascertained by means that of bed detector nodes, i.e., to perform cooperative sampling of the 3D ocean atmosphere. In 3 dimensional underwater networks, detector nodes float at different depths so as to look at a given development. One attainable answer would be to connect every uw-sensor node to a surface buoy, by means that of wires whose length are often regulated therefore on change the depth of every detector node . However, though this answer permits simple and fast preparation of the detector network, multiple floating buoys might hinder ships navigating on the surface, or they will be simply detected and deactivated by enemies in military settings. moreover, floating buoys area unit susceptible to weather and meddling or pilfering.

For these reasons, a different approach are often to anchor detector devices to very cheap of the ocean. during this design, delineate in Fig. 4, every detector is anchored to the bed and equipped with floating buoy that may be inflated by a pump. The buoy pushes the detector towards the ocean surface. The depth of the sensor can then be regulated by adjusting the length of the wire that connects the sensor to the anchor, by means of an electronically controlled engine that resides on the sensor. A challenge to be addressed in such an architecture is the effect of ocean currents on the described mechanism to regulate the depth of the sensors.

Many challenges arise with such an architecture, that need to be solved in order to enable 3D monitoring, including:

- Sensing coverage. Sensors should collaboratively regulate their depth in order to achieve 3D coverage of the ocean column, according to their sensing ranges. Hence, it must be possible to obtain sampling of the desired phenomenon at all depths.
- Communication coverage. Since in 3D underwater networks there may be no notion of uw-sink, sensors should be able to relay information to the surface station via multi-hop paths. Thus, network devices should coordinate their depths in such a way that the network topology is always connected, i.e., at least one path from every sensor to the surface station always exists.

III. AUTONOMOUS UNDERWATER VEHICLES

AUVs will perform while not tethers, cables, or remote, and so they need a multitude of applications in earth science, environ-mental watching, and underwater resource study. Previous experimental work has shown the practicableness of comparatively cheap AUV submarines equipped with multiple underwater sensors that may reach any depth within the ocean . Hence, they will be accustomed enhance the capabilities of underwater sensing element networks in many ways. the mixing Associate in Nursing improvement of mounted sensing element net-works with AUVs is an nearly undiscovered re-search space which needs new network coordination algorithms such as:

- Adaptive sampling: This includes management ways to command the mobile vehicles to places wherever their information are most helpful. This approach is additionally called adaptive sampling and has been planned in pioneering watching missions like, as an example, the density of device nodes will be adaptively inflated during a
given space once the next rate is required for a given monitored development.

- **Self-configuration:** This includes management procedures to mechanically find property holes because of node failures or channel impairment. Associate in Nursing request the intervention of an AUV. Further-more, AUVs will either be used for installation and maintenance of the device network infra-structure or to deploy new sensors. They'll even be used as temporary relay nodes to revive property.

One of the planning objectives of AUVs is to form them have faith in native intelligence and fewer obsessed on communications from on-line shores . In general, management ways square measure required for autonomous coordination, obstacle dodging and steering ways. solar power systems enable increasing the lifespan of AUVs, i.e., it's not necessary to recover and recharge the vehicle on a daily. Hence, star supercharged AUVs will acquire continuous information for periods of your time of the order of months .

Several sorts of AUVs exist as experimental platforms for underwater experiments. a number of them jibe small-scale submarines (such because the Odyssey-class AUVs developed at MIT). Others square measure less complicated devices that don't include such refined capabilities. as an example, drift-ers and gliders square measure oceanographic instruments of-ten utilized in underwater explorations. roamer underwater vehicles drift with native current and have the power to maneuver vertically through the water column.

They are used for taking measurements at predetermined depths . Underwater gliders square measure battery battery-powered autonomous underwater vehicles that use hydraulic pumps to vary their volume by a couple of hundred boxy centimeters so as to come up with the buoyancy changes that power their forward soaring. once they emerge on the surface, international positioning system (GPS) is employed to find the vehicle. This data will be relayed to the onshore station whereas operators will act by causing management data to the gliders. Depth capabilities vary from two hundred m to 1500 m whereas operational lifetimes vary from a couple of weeks to many months. These long durations square measure potential as a result of gliders move terribly slowly, generally twenty five cm/s (0.5 knots). In, an impact strategy for teams of gliders to hand in glove move and recon-figure in response to a perceived distributed setting is bestowed. The planned framework permits conserving the symmetry of the cluster of gliders. The cluster is forced to keep up a consistent distribution PRN, however is absolute to spin and presumably wiggle with this. In , results square

measure re-ported on the appliance of the speculation in on a fleet of autonomous underwater gliders throughout the experiment on bay in 2003 .

IV. DESIGN CHALLENGES

In this section, we tend to describe the planning challenges of underwater acoustic device networks. especially, we tend to itemize the most variations between terrestrial and underwater device networks, we tend to detail key style problems and readying challenges for under-water sensors, and that we offer motivations for a cross-layer style approach to boost the network potency within the essential underwater surroundings.

A. variations with terrestrial device networks:

The main variations between terrestrial and underwater device networks area unit as follows:

a. **Cost:** whereas terrestrial device nodes area unit expected to become more and more cheap, underwater sensors area unit big-ticket devices. this is often particularly because of the a lot of complicated underwater transceivers and to the hardware protection required within the extreme underwater surroundings.

b. **Deployment:** whereas terrestrial device networks area unit densely deployed, in underwater, the readying is deemed to be a lot of thin, because of the price concerned and to the challenges associated to the readying itself.

c. **Power:** the ability required for acoustic underwater communications is beyond in terrestrial radio communications because of higher distances and to a lot of complicated signal process at the receivers to atone for the impairments of the channel.

d. **Memory:** While terrestrial sensor nodes have very limited storage capacity, uw-sensors may need to be able to do some data caching as the underwater channel may be intermittent.

e. **Spatial correlation:** While the readings from terrestrial sensors are often correlated, this is more unlikely to happen in underwater networks due to the higher distance among sensors.

B. Underwater sensors:

The typical internal architecture of an underwater sensor is shown in It consists of a main Controller/PCU which is interfaced with an oceanographic instrument or sensor through a sensor interface circuitry. The controller receives data from the sensor and it can store it in the onboard memory,
process it, and send it to other network devices by controlling the acoustic modem. The electronics are usually mounted on a frame which is protected by a PVC housing.

Fig. 4. Internal architecture of an underwater sensor node.

Sometimes all sensor components are protected by bottom-mounted instrument frames that are designed to permit azimuthally omnidirectional acoustic communications, and protect sensors and modems from potential impact of trawling gear, especially in areas subjected to fishing activities. In, the protecting frame is designed so as to deflect trawl-ing gear on impact, by housing all components beneath a low-profile pyramidal frame.

Underwater sensors include sensors to measure the quality of water and to study its characteristics such as temperature, density, salinity (interferometric and refractometric sensors), acidity, chemicals, physical phenomenon, pH scale (magnetoeelastic sensors), element (Clark-type electrode), hydrogen, dissolved gas gas (METS), and turbidness. Disposable sensors exist that observe albumen, the extremely toxic super molecule found in castor beans and thought to be a possible act of terrorism agent. Desoxyrribonucleic acid microarrays will be wont to monitor each abundance and activity level variations among natural microbic populations. Alternative existing underwater sensors embody hydrothermal compound, silicate, voltammetric sensors for spectrophotometry, gold-amalgam conductor sensors for sediment measurements of metal ions (ion-selective analysis), amperometric micro-sensors for H2S measurements for studies of associate degree oxygenic chemical process, compound oxidation, and salt reduction of sediments. Additionally, force/torsion sensors for underwater applications requiring coincidental measurements of many forces and moments have additionally been developed, likewise as quantum sensors to live light-weight radiation and sensors for measurements of harmful protoctist blooms.

The challenges associated with the preparation of low price, low scale underwater sensors, area unit listed as follows:

- It is important to develop less costly, strong ‘‘nanosensors’’, e.g., sensors supported nano technology, that involves development of materials and systems at the atomic, molecular, or molecule levels within the dimension vary of roughly 1–500 nm.
- It is important to plot periodical cleanup mechanisms against corrosion and fouling, which can impact the lifespan of underwater devices. For instance, some sensors for pCO2, pH scale and nitrate measuring, and fluorometers and spectral radiometers, could also be restricted by bio-fouling, particularly on an extended duration.
- There could be a would like for sturdy, stable sensing elements on a high vary of temperatures since sensor drift of underwater devices could also be a priority. to the present finish, protocols for in place standardisation of sensors to enhance accuracy and preciseness of sampled knowledge should be developed.
- There could be a would like for brand new integrated sensors for synoptic sampling of physical, chemical, and biological parameters to enhance the under-standing of processes in marine systems.

C. Basics of acoustic propagation:

Underwater acoustic communications area unit primarily influenced by path loss, noise, multi-path, Doppler unfold, and high and variable propagation delay. of these factors confirm the temporal and spatial variability of the acoustic channel, and create the obtainable information measure of the Under-Water Acoustic channel (UW-A) restricted and dramatically addicted to each vary and frequency. Long-range systems that operate over many tens of kilometers might have a information measure of solely a couple of kHz, whereas a short-range system operative over many tens of meters might have quite 100 kHz of information measure. In each cases these factors cause low bit rate, within the order of tens of kbit/s for existing devices.

Underwater acoustic communication links will be classified in step with their vary as terribly long, long, medium, short, and extremely short links. Table one shows typical bandwidths of the underwater channel for various ranges. Acoustic links also are roughly classified as vertical and horizontal, in step with the direction of the sound ray with relevance the seabed. As are going to be shown later, their propagation characteristics take issue consider-ably, particularly with relevance time dispersion, multi-path spreads, and delay variance. within the fol-low, as typically drained oceanic
literature, shallow water refers to water with depth not up to one hundred m, whereas problem is employed for deeper oceans. Hereafter we have a tendency to analyze the factors that influence acoustic communications so as to state the Table one obtainable information measure for various ranges in UW-A channels

<table>
<thead>
<tr>
<th>Type</th>
<th>Range[km]</th>
<th>Bandwidth[kHz]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very long</td>
<td>1000</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Long</td>
<td>10–100</td>
<td>2–5</td>
</tr>
<tr>
<td>Medium</td>
<td>1–10</td>
<td>10</td>
</tr>
<tr>
<td>Short</td>
<td>0.1–1</td>
<td>20–50</td>
</tr>
<tr>
<td>Very short</td>
<td>&lt;0.1</td>
<td>&gt;100</td>
</tr>
</tbody>
</table>

Challenges posed by the underwater channel for underwater sensor networking. These include:

- **Path loss:**
  Attenuation. Is mainly provoked by absorption due to conversion of acoustic energy into heat. The attenuation increases with distance and frequency. Shows the acoustic attenuation with varying frequency and distance for a short range shallow water UW-A channel, according to the propagation model in . The attenuation is also caused by scattering and reverberation (on rough ocean surface and bottom), refraction, and dispersion (due to the displacement of the reflection point caused by wind on the surface). Water depth plays a key role in determining the attenuation. Geometric spreading. This refers to the spreading of sound energy as a result of the expansion of the wave fronts. It increases with the propagation distance and is independent of frequency. There are two common kinds of geometric spreading: spherical (omnidirectional point source), which characterizes deep water communications and cylindrical (horizontal radiation only), which characterizes shallow water communications.

- **Noise:**
  Man made noise. This is mainly caused by machinery noise (pumps, reduction gears, power plants), and shipping activity (hull fouling, animal life on hull, cavitation), especially in areas encumbered with heavy vessel traffic. Ambient noise. Is related to hydrodynamics (movement of water including tides, current, storms, wind, and rain), and to seismic and biological phenomena. In, boat noise and snapping shrimps have been found to be the primary sources of noise in shallow water by means of measurement experiments on the ocean bottom.

- **Multipath:**
  Multi-path propagation may be responsible for severe degradation of the acoustic communication signal, since it generates inter-symbol interference (ISI). The multi-path geometry depends on the link configuration. Vertical channels are characterized by little time dispersion, whereas horizontal channels may have extremely long multi-path spreads. The extent of the spreading is a strong function of depth and the distance between transmitter and receiver.

  - **High delay and delay variance:**
    The propagation speed in the UW-A channel is five orders of magnitude lower than in the radio channel. This large propagation delay (0.67 s/km) can reduce the throughput of the system considerably. The very high delay variance is even more harmful for efficient protocol design, as it pre-vents from accurately estimating the round trip time (RTT), which is the key parameter for many common communication protocols.

  - **Doppler spread:**
    The Doppler frequency unfold will be important in UW-A channels, therefore inflicting a degradation within the performance of digital communications: high rate transmissions cause adjacent symbols to interfere at the receiver. this needs refined signal process to wear down the generated international intelligence agency. The Doppler spreading generates a straightforward frequency translation, that is comparatively straightforward for a receiver to compensate for; and endless spreading of frequencies that constitutes a non-shifted signal, that is tougher to complete.

    If a channel incorporates a Doppler unfold with information measure B and a sign|a proof|a indication} has symbol period T, then there area unit around BT unrelated samples of its complicated envelope. once BT is far but unity, the channel is claimed to be underspread and therefore the effects of the Doppler weakening will be unnoticed, while, if bigger than unity, it's same to be extend.

V. APPLICATION of UASN:

Wireless sensor network in aqueous medium also known as underwater sensor network has enabled a broad range of applications including:

- **Environmental Monitoring:**
  Underwater sensor network can be used to monitor pollution like chemical, biological such as tracking of fish or micro-
organisms, nuclear and oil leakage pollutions in bays, lakes or rivers [1]. Underwater sensor network can also be used to improve weather forecast, detect climate change, predict the effect of human activities on marine ecosystems, ocean currents and temperature change e.g. the global warming effect to ocean.

- **Under Ocean Exploration:**
  Exploring minerals, oilfields or reservoir, determine routes for laying undersea cables and exploration valuable minerals can be done with such underwater sensor network.

- **Disaster Prevention:**
  Sensor network that measure seismic activity from remote locations can provide tsunami warning to coastal areas, or study the effects of submarine earthquakes (seaquakes)

- **Equipment Monitoring:**
  Long-term equipment monitoring may be done with pre-installed infrastructure. Short-term equipment monitoring shares many requirements of long-term seismic monitoring, including the need for wireless (acoustic) communication, automatic configuration into a multihop network, localization (and hence time synchronization), and energy efficient operation

- **Mine Reconnaissance:**
  By using acoustic sensors and optical sensors together, mine detection can be accomplished quickly and effectively.

- **Assisted Monitoring:**
  Sensor can be used to discover danger on the seabed, locate dangerous rocks or shoals in shallow waters, mooring position, submerged wrecks and to perform bathymetry profiling.

- **Information collection:**
  The main goal of communication network is the exchange of information inside the network and outside the network via a gateway or switch center. This application is used to share information among nodes and autonomous underwater vehicles.

VI. CONCLUSIONS

In this paper, we presented an overview of the state of the art in underwater acoustic sensor net-work. We described the challenges posed by the peculiarities of the underwater channel with particular reference to monitoring applications for the ocean environment. We discussed characteristics of the underwater channel and outlined future re-search directions for the development of efficient and reliable underwater acoustic sensor networks.

The ultimate objective of this paper is to encourage research efforts to lay down fundamental basis for the development of new advanced communication techniques for efficient underwater communication and networking for enhanced ocean monitoring and exploration applications. We strongly advocated the use of a cross-layer approach to jointly optimize the main networking functionalities in order to design communication suites that are adaptable to the variability of the characteristics of the underwater channel and optimally exploit the extremely scarce resources.

VII. REFERENCES


Simulink Model Implementation of Open Loop & Closed Loop IFOG

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ABSTRACT: Fiber optic gyroscope is an angular rate sensor which plays a crucial role in inertial navigation system. It can be designed in two approaches namely open loop and closed loop. In open loop, the photo detector output which is proportional to sagnac effect directly measures the rotation rate. In closed loop approach, the ramp function is given as feedback to the system through a phase modulator to nullify the rotation induced sagnac phase error. This paper presents the modeling and simulation of Open loop & Closed loop Fiber optic gyroscope using Simulink model [1]. This model is used for designing the gyroscope with each optical component is treated as a black box having M input and N output ports that are represented mathematically with its transfer function by connecting output with its input. Experimental setup shows that an excellent result is obtained in determining the accuracy of the proposed model.

Keywords - Fiber Optic Gyroscope, Open loop, Closed loop, Sagnac effect, Transfer function, Simulink Model

INTRODUCTION

Many exciting developments have taken place especially in the area of inertial navigation sensors [2]. Measurement of angular velocity is useful in many different applications, from missile navigation to motion control [3]. There are mainly three broad categories of possible sensors for determining the angular velocity such as Ring Laser Gyrosopes (RLG), Fiber Optic Gyroscopes (FOG) and MEMs based gyroscopes. Sensitivity, resolution, and stability, time are the primary performance measures of gyroscopes. Micro electro mechanical system (MEMS) gyroscopes [4] which was used earlier in inertial navigation system (INS) was less reliable, sensitivity, less dynamic range, large moving parts, complexity, large bandwidth and takes more reaction time. Recent advances in technology motivated researchers for the development of optical gyros such as ring laser gyroscope (RLG) and fiber optics gyroscope (FOG) whose became the conventional counterparts to MEMS gyros. Optical fibers have been intensively investigated at various sensor fields because of their unique characteristics such as multiplexing, remote sensing, high flexibility, low propagating loss, high sensitivity, low fabrication cost, small form factor, high accuracy, simultaneous sensing ability, and immunity to electromagnetic interference. Moreover RLG technology [5] is also complex because of its large size, weight, cost, less accuracy and consumption of large power. Fiber optic technology has a great support from two growing field’s namely optical communication and silicon technology plays a vital role for the development of fiber optic gyroscope. Fiber optic gyroscope (FOG) has been used for measuring the rotation angle. FOGs were developed in the 1980s as a more compact, albeit less sensitive, alternative to RLGs.

Fiber optic gyroscope uses two beams of light which propagate simultaneously around a path of optical fiber to measure angular velocity. The rotation of the plane in which the optical fiber lies induces a phase difference between the two waves which is proportional to the angular velocity of the rotation. This phenomenon is known as Sagnac effect [6]. The optical waves fall onto a photoelectric sensor which produces a current dependent on the intensity of the light waves.

One important advantage of the FOG is its ruggedness. It contains no moving parts unlike other competitors such as mechanical gyroscopes and ring laser gyroscopes (dithering is involved in ring laser gyroscopes). Due to these unique advantages, it seems likely that the FOG will play a significant role in both military and commercial markets [7]. Recently, FOG is being widely used in defence applications, due to its small size, low cost, light weight, large dynamic range, low power consumption, and possible batch fabrication.

FOG is configured in two ways as resonator fiber optic gyrooscope (RFOG) [8] and interferometric fiber optic gyroscope (IFOG). RFOG is similar to RLG, and its usage is less in applications because of limited performance. The signal processing of FOG is carried out in two approaches such as open loop and closed loop. Open loop approach is less sensitive because of
amplitude [9] and returning optical power variations at the phase modulator which in turn causes non-linearity behavior and scale factor instability in the FOG output. Improvements in sensitivity, linearity and dynamic range can be realized by using a ‘‘closed-loop’’ configuration. In closed loop approach, the non-reciprocal phase shift between two counter propagating light beams is induced to counterbalance the rotation induced sagnac phase shift error [10]. These fiber gyro have the wide dynamic range and high linearity needed to support stringent navigation requirements.

Implementation of open loop FOG in simulink model is yet simple, provides a good accuracy and improves a dynamic range which almost meets the closed loop specifications. Designing in simulink software takes less time to operate, low cost and provides good results. The implementation of Open loop and closed loop configurations in simulink model is different and results are compared with each other.

I. LITERATURE REVIEW

1. Open Loop Configuration:

The scheme of open loop approach is similar to sagnac interferometer. The block diagram is shown in figure1.

F OG is configured with a light source, such as a super luminescent diode (SLD), is projected into a 3-dB fiber optic coupler that splits the light into two waves. After traversing the coupler, the two light waves pass through a polarizer and reaches the 2nd coupler. The problem of reciprocity is overcome by the introduction of 2nd coupler. Later the two waves propagate through a medium equally in opposite directions around the fiber optic coil. The light waves interfere upon return to coupler and project a fringe pattern onto a photo-detector.

In accordance with any two-wave interferometer, the intensity on the photo detector, which represents a mixture of the two light waves, varies as a function of Sagnac phase with its maximum value at zero as shown in Figure. This intensity is expressed as,

\[ I = I_0 (1 + \cos(\Delta \phi_s)) \]

Where, \( I_0 \) is the mean value of the intensity.

The detected intensity is used to calculate the rotation rate. In the case of no rotation \( \Delta \phi_s = 0 \), the light waves will combine in phase, which results in maximum intensity.

2. Limitations of Open Loop FOG

* If \( \Delta \phi_s = 0 \), signal vanishes.
* For \( \Delta \phi_s \ll 1 \), signal \( \approx \Delta \phi_s \)
* Signal polarity reverses when rotation direction switches. \( \Delta \phi_s \) and \( -\Delta \phi_s \) Comparing to un-modulated signal;
* Un-modulated signal \( \approx (1 + \cos \Delta \phi_s) = \Delta \phi_s^2 \) for \( \Delta \phi_s \ll 1 \).
* Sign of un-modulated signal independent of rotation direction.

3. Closed Loop Configuration

The basic configuration of closed loop approach is shown in figure2.

A feedback loop is added to the open loop configuration. The amplifier output is given to A/D converter which samples and quantizes the output and performs a synchronous demodulation and is given to the controller to extract the phase error. The corresponding sampling frequency is inverse of the radiation transit time \( \tau \), for the required synchronization of the ramp and the biasing signal.

The filtering and amplification process is done in controller. If the filtering and amplification are properly adjusted then the feedback loop will provides a non-reciprocal phase shift that is always nearly equal and opposite in sign to the Sagnac phase for all constant input rotation rates.

\[ \phi_f = -\Delta \phi_f \]
The feedback loop generates a staircase ramp signal whose slope is proportional to the rotation rate ‘Ω’. The duration of each digital step is normally equal to coil transit time τ and step height is equal to sagnac phase. This modulation technique is called a digital serrodyne technique. The amplitude of the ramp signal is equal to the $2\pi$ voltage of the IOC (Integrated Optic Chip). The amplitude of the square wave is $V \pi/2$ of IOC.

III. PROPOSED MODEL

1. Simulink Model Of Open Loop

The open loop configuration of FOG is designed in simulink is as follows. Among the considerations of simplicity, low cost, flexibility, durability, less execution time, high accuracy, and stability the open loop and closed loop configurations are designed in simulink model.

The implementation of open loop structure in simulink model is similar to the basic configuration but slightly different in design. The configuration consists of several modules, each treated as a block box, with its corresponding inputs and outputs. The design of such model in simulink is simple, reliable and low cost. The model of this system also acts as checking tool to extract the required rotation rate information.

\[ I = I_c \left[ \left( 1 + \cos(\Delta \phi_s(t) + \Delta \varphi) \right) \right] \]

The result is also known as square wave modulated co-sinusoidal signal which is also known as phase error signal. The output of the photo detector is synchronously demodulated by using a reference square wave signal in order to extract the sagnac phase error present in the system.

The sagnac phase error contains the rotation rate information and it is extracted using the formula,

\[ \phi_s = \frac{2\pi LD\Omega}{\lambda C} \]

Where
- \( L \) = Length of fiber.
- \( \lambda \) = Wavelength of light.
- \( C \) = Velocity of light.
- \( \Omega \) = Rotation rate.
D = Diameter of fiber coil.

The process of extracting the rotation rate from sagnac phase error is done in rotation recovery process. The output is the amount of rotation that a designed model can sense.

2. Closed loop design using simulink model:
The design of closed loop configuration is shown in figure.

![Simulink model of closed loop fiber optic gyroscope](image)

In closed loop configuration, feedback unit is added to the open loop approach. The feedback control unit provides a non-reciprocal phase shift which is equal in magnitude but opposite in sign to nullify the rotation induced sagnac error.

The feedback loop acts as data acquisition and signal processing unit to achieve the closed loop operation. It generates a phase nullifying signal and bias to the phase modulator of the FOG. It accepts the modulated sagnac phase error signal from photo detector of gyro and demodulated synchronously with the help of reference square wave whose amplitude is $\pi/2$ volts of optic chip. This is used to get maximum sensitivity at lower rotation rates.

The demodulator output is given to the integrator module. The integrator integrates the signal with respect to coil transit time and generates a dc value. The dc value must be adjusted equally to the sagnac phase value with some gain ‘k’. The output of integrator is used to generate the stair case feedback phase nullifying signal i.e. ramp signal by using upper and lower threshold limits.

As the gyro detector current is a ‘cosine’ dependent function, the amplitude of ramp is resetted to $2\pi$. The reset step corresponds to a phase variation of $2\pi$ radian, in order to get always the correct Sagnac phase shift. The ramp signal and delayed ramp signal are differentiated to get the differential pulse signal. That differential pulse represents is the phase nullifying signal given as feedback to the phase modulator. Therefore the detector current can be expressed as:

$$I = I_0\left[1 + \cos(\Delta\phi(t) + \Delta\phi_m(t) - \Delta\phi_{fb})\right]$$

Where $\Delta\phi_{fb}$ is the feedback phase used to counteract the phase error.

Again the output of the detector is demodulated and integrates the signal to extract the rotation rate information. The integrated output is converted into rotation rate through sagnac formula.
IV. RESULTS

Figure 5: Open loop FOG output when input rotation is 10°/sec

Figure 6: The amount of sagnac phase present in Open loop FOG when input rotation is 10°/sec

Figure 7: Simulink model of closed loop fiber optic gyroscope when input rotation rate is 10°/sec
Figure 8: positive going ramp when the given input rotation rate is positive

Figure 9: negative going ramp when the given input rotation rate is negative

Figure 10: differential pulse when the given input rotation Rate is positive.
In the differential pulse, the constant indicates the given input rotation rate while the pulse peak end represents the reset value of ramp.

![Figure 11: differential pulse when the given input rotation rate is negative](image)

V. CONCLUSION

In this paper, a simple and fast simulation tool using simulink model has been developed for designing the open loop and closed loop fiber optic gyroscope. The proposed method works well for easily understanding the operation, designing of FOG unit, and its functionality & rotation rate recovery. This model requires a minimum number of essential optical components for designing the FOG. Further developments are needed to implement this model in real time under different environmental conditions.

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NV RAM Disk to reduce Embedded Linux system Startup latency using Execute In Place(XIP) Method

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Abstract — Booting is the first step to load OS into main memory to initialize the system and it is time taking process. NVRAM Disk is a new emerging memory technology used to store binary image of kernel in uncompressed form and Kernel executes from it. This method eliminates the kernel loading from secondary storage, Kernel decompressing and relocating in the embedded Linux system main memory. Execute in place(XIP) and explicit module initialization methods are employed to reduce the device startup latency. The important aspect to be considered while using this method is how to reinitialize the OS modules that are modified during OS execution. So, Main task is identifying the address locations of modules to be initialized explicitly and reinitialize them using specialized boot loader. After modifying modules to be initialized explicitly, Kernel starts without delay. Finally, we use NVRAM as both main memory and secondary memory to reduce boot up time.

Keywords — NVRAM Disk, Execute in place(XIP), Explicit Module Initialization, Boot loader.

I. INTRODUCTION

Boot loader is a program is placed in starting address to which processor points to start execution where the processor reads that memory. The value it finds it uses as an address to code and starts executing code at that address. So, the first code a program runs is often called as boot loader. Boot loader is responsible for hardware initialization and loading kernel into main memory then control is transferred to kernel. We can specify hardware modules that we want to execute in boot loader. We have different boot loaders like grub, uboot etc. Now a day’s boot loader plays important role in device startup time in applications like Smartphone’s[1], Digital TV(DTV)[2], so, we should optimize the boot loader to reduce the device startup time. Booting of system is referred as loading the binary image of OS from secondary device to main memory and to execute OS to initialize from initial state of the system, so it is ready to use its resources.

Similar to main memory like DRAM, SRAM a new memory type NVRAM is being used and is emerging memory technology to replace existing memories. Non volatile ram(NVRAM) persists the data even power goes off. A new memory preserving way is by using nonvolatile memory like phase change ram PRAM, magneto resistive Ram(MRAM) and Ferro electric RAM(FERAM)[3]. These Memory technologies have more chip density and very fast compared to NAND Flash, NOR Flash.

In this paper we Propose new Booting Technique using NVRAM Disk which can be Employed as both main memory and secondary memory. NVRAM disk persists the kernel image in uncompressed form as Binary Image. As NVRAM persists the operating system then the kernel reboots with previous initialized values the device may goes to unknown state causes deadlock. A Specialized Boot loader holds the address of variables to be initialized explicitly using Pointers. In Kernel, .data section is modified using Specialized Boot loader which contains all Global and static variables with initial values points to modified variables to reinitialize those variables using Pointers, whenever booting starts boot loader executes first and modifies the kernel data section and control is transferred to Kernel. This booting method is very fast and less complexity.

II. BACKGROUND WORK

II.1 Legacy Booting

Booting sequence Booting succession is a methodology which installs CPU, memory furthermore, other fringe gadgets to make a flawless condition to execute the operation system. While the system boots up, such fills in as initializing Hardware Resources, and stacking up the OS to the fundamental memory are completed to work the Operating system.

In general purpose computers Basic Input Output System (BIOS) is located in Read only Memory (ROM) starts execution to initialize the memory, CPU and other components as shown in Fig 1. It composes three stages – a start-up step, a system initializing step, and a boot loader loading step. The BIOS is a sort of firmware to initialize and to test the essential components. In the start-up step, the BIOS tests the essential equipment by the Power-on Self Test (POST). Kernel Binary loading task is taken by BIOS in general purpose computing devices. Where as in embedded systems Uboot is used as BIOS to initialize the hardware resources. In the final stage kernel is loaded from secondary storage to a main memory. So, all resources are initialized with boot loader without any delay and errors in loading process. These boot loaders helps in loading operating system successfully.
II. II Booting methods

There are various methodologies for decreasing the startup time of general purpose computing devices. They include Execute in place (XIP), Snapshot Binary Image, Demand Paged, Balanced execute in place (BXIP) and Kexec. We can use this booting methods depends on startup time for booting we require and memory resource constraints. Execute in Place (XIP) method[4] diminishes the loading of kernel from secondary to primary memory. This method runs operating system directly from memory where it is resided. So, by utilizing this method startup time is more due to NOR flash and NAND flash memory. Snapshot Binary image method[5] loads the binary image in uncompressed form to primary memory requires larger Ram size. But it eliminates process of decompressing kernel image in primary memory. So, it takes less time to booting the system. Balanced execute in place method is similar to execute in place method where it executes only few basic modules in primary memory RAM and remaining in secondary memories like NAND flash and NOR flash. But it needs huge task to divide the modules to be executed in primary memory and secondary memory. Demand paged method loads the modules into primary memory whenever it requires to process particular task. But this method requires larger memory refreshment rate as page faults increases. Kexec is another booting technique where kernel is reinitialized on top of another kernel. It is applicable only when kernel is in primary memory. It is mostly used for kernel rebooting.

III. RELATED WORK

III. I Optimizing booting procedure

There are Two types of techniques to enhance the boot up speed: the primary technique is improvement of every step in the boot method, where as the second technique bypasses some steps of the boot method. The primary technique of those techniques modifies every step within the boot method to execute solely essential works or eliminate some modules of kernel. They particularly optimize the init method intensively as a result init method accounts for the foremost of the boot up time. The techniques like init and upstart are well-known techniques. In those techniques second is hibernation or snapshot.

III. II Linux kernel image

Linux kernel image is loaded into primary memory after hardware components initialization phase finishes. Zimage is a Linux kernel binary image usually stored in compressed form. Fig. 2 shows the arrangement of compressed kernel contains three format files piggy.gz, misc.o and head.o in those files piggy.gz is kernel in compressed form; misc.o is a object file to decompress the kernel image piggy.gz; and head.o contains boot up codes for initializing system safely. For booting the system first and foremost task is loading compressed kernel image into primary memory with boot loader.

Then it directs control to head.o for initializing CPU. Kernel image piggy.gz is decompressed and reallocated to particular predefined memory locations as shown in fig.3 is done by misc.o. After this reallocation phase complete authority is given to kernel to load objects, device drivers and other peripherals to start the user applications.

III. III Non-volatile Random Access Memory Disk

NVRAM is an emerging memory technology to store information ineradicable manner without any Battery backup unlike DRAM and SRAM. In this paper NVRAM plays a prominent role to store program permanently. NVRAM disk acts as both primary memory and as well as secondary memory device. PRAM, FeRAM, STT-MRAM, CBRAM and Resistive RAM (ReRAM), ZRAM[6] are non-volatile memories in recent times found by researchers. We can see differences in Technologies of NVRAM in Table.1. NVRAM reading and writing speeds are similar to DRAM, SRAM. But main pitfall occurs in NVRAM is Chip density is less and cost is more. It may be overcome in next few decades to reduce power consumption and for high speed operations. Different technologies are being developed for NVRAM’s such magnetic memory, Resistive memory with simple structure and high longevity.
In NVRAM Disk booting method, main object is to remove the usage of secondary storage device to store kernel image and diminishing the kernel decompression in primary memory by employing Execute in Place(XIP) method[4] and NVRAM Disk. Execute in place(XIP) uses snapshot image[5] of Linux kernel image to run operating system from primary memory. NVRAM disk contains uncompressed kernel binary image to directly run the operating System.NVRAM disk booting performs the booting as legacy booting as shown in fig 4.

IV.I Object Initialization

Eliminating kernel loading process form conventional booting process leads to new challenges to be faced and need to be solved. In those main problem is reinitializing objects which are modified during first booting process and also prevent the memory clear functions to erase the contents of main memory before system goes to switch off mode. So, inorder to reinitialize objects explicitly we have to identify those modules and keep the address locations along with boot up codes then system starts safely. But it is impossible to re-initialize all the objects in the kernel. Therefore, To decrease the overhead on the boot loader to identify the objects we can maintain pointer to access the address of the objects to be initialized explicitly.

The kernel objects are divided into three object modules (i) Logical objects (ii)Initialized Global objects (iii)Uninitialized Global objects. The objects which are allocated in memory areas known as stack and heap to relate them logically for space effectiveness. Objects which are in .text section are not necessary to re-initialize them again. Because they are initialized at re-execution time. The uninitialized global objects are batched into the which are not required to initialize them to zero because they are automatically initialized to initial state on every boot up time.

In model program, Global objects with addresses are referenced through variables named as globalvariable1 and globalvariable2. These global variable addresses are stored in pointer variables declared with variable name i and j are declared in function modelfunction(). Variables with addresses are passed with call by reference programming method to initialize the variables to its initial state say first booting state.

Initialization codes in the head.o initializes the objects to zero while booting the OS in the .data section as shown in sample program fig.5.

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Initialization codes in the head.o initializes the objects to zero while booting the OS in the .data section as shown in sample program fig.5.
IV.II Eliminating Loading to Primary memory and storing in secondary memory

By employing this method, we can eliminate the process of loading operating system into primary memory and it saves time to load the kernel and decompress the kernel. We use uncompressed kernel to execute the operating system by placing kernel directly in memory acts as both main memory and secondary memory known as Non Volatile Random access memory (NVRAM) with Execute in place (XIP) method [4]. Misc.o module is removed from binary image where it is not needed to decompress the kernel image in main memory. Boot loader directly points to head.o section which contains Global objects to be initialized explicitly. After Re-initialization process head.o points to kernel starting location, from which kernel starts its execution safely.

IV.III Explicit Module initialization

Explicit module initialization[7] attained through Specialized boot loader where it contains the address of the global objects to be initialized explicitly in .data section. Each object has particular address in NVRAM. Boot loader contains the address of global objects to be initialized and it successfully initialized those objects with address known to boot loader is accessed through pointers. Boot loader points to head.o section as shown in figure 6. Every object is reinitialized to initial state without any errors so operating system loads successfully to the known state otherwise deadlock may occurs.

V. CONCLUSION

In this paper we have proposed a new technique to boot the embedded Linux system using NVRAM Disk and Execute in place method. So, this method improves the boot up time and also exploits Non volatile RAM without effecting conventional booting procedure. In future we can replace RAM’s with NVRAM’s and improves the boot up desperately.

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Hardware Implementation of Digital WM Technique with Xilinx EDK

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Abstract:
This paper proposed LSB Information Hiding algorithm which can Lift wavelet transform image. The idea behind the LSB algorithm is to insert the bits of the hidden message into the least significant bits of the pixels. Achieving the purpose of information hiding with the secret bits of information to replace the random noise, using the lowest plane embedding secret information to avoid noise and attacks, making use of redundancy to enhance the sound embedded in the way nature to be addressed. The results showed that the proposed algorithm has a very good hidden invisibility, good security and robustness for a lot of hidden attacks. However, the limitation of capacity has led us to think about an improved approach which can be achieved through hardware implementation systems with the help of a programmable gate array (FPGA) board.

It is the process of embedding data within the domain of another data, this data can be text, image, video contents. The embedded watermark can be invisible (hidden in such a way that it cannot be retrieved without knowing the extraction algorithm) to the human eye.

Keywords: FPGA, LSB, Invisible Watermarking, Lifting.

Introduction:
The last decade has witnessed the fast development in data technologies and therefore the wide convenience of digital client device like digital cameras, scanners etc. But at an equivalent time this results in the hacking vulnerability and duplicity of the initial data. the foremost trendy answer technique to the present downside is digital watermarking scheme. Digital watermarking algorithms might be thought-about as data communication scheme wherever auxiliary message is embedded in digital transmission signal and are obtainable wherever the later signals move.

Each of the on top of watermarking schemes is equally vital owing to its distinctive applications. During this work, we have a tendency to concentrate on VLSI implementation of associate invisible-robust associated an invisible-fragile spatial domain watermarking algorithmic rule. The VLSI chip will insert anyone or each the watermarks reckoning on the necessities of the user. The projected watermarking chip may be simply incorporated as a module in any existing JPEG encoder and a secured JPEG encoder may be developed. We offer a top level view of such a secure JPEG encoder. It should be noted that the corresponding watermark extraction module needs to be intrinsically during a secure JPEG decoder. The secure JPEG codec may be of a scanner or a camera in order that the digitized pictures are watermarked right at the origin.

The planning of this method is predicated on intensive analysis of the data-hiding method.

To hide the secret image in the cover image we are using the LSB encryption. In this we are taken the pixels from the cover image and binary values from the secret image for combining we are using 64 bit logical operations in between the both images to form watermarked image.

Watermarking techniques may be applied without fear of image destruction due to lossy compression because they are more integrated into the image. Most of the work in this category has been concentrated on making use of redundancies in the DCT (discrete cosine Transform) domain, which is used in JPEG compression. But there have been other algorithms which make use of other transform domains such as the frequency domain.

The major problem with many of these watermarking schemas is that they are not very robust against different types of image manipulations or attacks. Moreover, some of these techniques are quite complicated to implement in real-time.
Proposed Invisible Watermarking Method:

The Block diagram of Invisible watermarking method using lifting method is shown in the figure. First create a header file for cover image by using the mat lab software. Cover Image header file is imputed to the Least Significant Bit LSB technique to embed the data in that cover image. After getting the watermarked image apply the Lifting based DWT to compress the image. The above process will repeat in reverse process means getting decompression and LSB reverse method to get original image.

Headerfile Creation:

By using Mat lab software to create the header file for Cover image and secret software.

Least Significant Bit (LSB) Technique:

Fig. shows the 1-bit LSB. In Fig. 1, the picture element price of the duvet image is 141(10001101)2 and also the secret knowledge is zero. It applies to LSB-1 that the modified picture element price of the duvet is 140(10001100)2. LSB will store 1-bit in every picture element. If the duvet image size is 64x64 picture element image, it will store a complete quantity of bytes of embedded knowledge.

Fig: Example of LSB

Proposed methodology supported LSB technique; we have a tendency to propose a brand new watermarking algorithmic rule. Most of researchers have projected the primary LSB and also the third and forth LSB for concealing the information however our projected watermarking algorithmic rule is using the third and fourth LSB for concealing the information. And using the RGB watermark image embedding in blue element of original image thanks to less sensitivity. This can be thanks to the protection reason. So, nobody can expect that the hidden knowledge within the third and also the forth LSB. Fig. a pair of shows the framework of the projected methodology. First, we have a tendency to choose the image that may be a color image and that we can transfer the information to binary price once writing it. Then, we have a tendency to hide the information within the image using the projected algorithmic rule. Fig. three shows the embedding algorithmic rule in VLSI.

Lifting Scheme:

Fig. shows the classical implementation and therefore the lifting primarily based implementation of DWT. Classical implementation is complete by the convolution of the input signals with the low pass filter (h0) and therefore the high pass filter (h1). The lifting scheme could be a new methodology to construct ruffle basis, which was initial introduced by Sweden’s. The lifting scheme entirely depends on the spatial domain, has several blessings compared to filter bank structure, like lower space, power consumption and procedure complexity. The 3 basic steps in lifting primarily based DWT are:
Split step: wherever the signal is split into even and odd points, as a result of the utmost correlation between adjacent pixels are often used for following
predict step. For every combine of given input samples $x(n)$ split into even $x(2n)$ and odd
coefficients $x(2n+1)$.

Predict step: The even samples area unit increased by the predict issue so the results area unit side to the odd samples to come up with the careful
coefficients. Detailed coefficients leads to high pass filtering.

Update step: The careful coefficients computed by the predict step area unit increased by the update factors so the results area unit side to the even
samples to urge the coarse coefficients. The coarser coefficients provides low pass filtered output.

Xilinx Platform Studio (XPS):
The Xilinx Platform Studio (XPS) is that the development surroundings or user interface used for planning the hardware portion of your embedded
processor system. Xilinx Embedded Development Kit (EDK) is an integrated software package tool suite for developing embedded systems with Xilinx
small Blaze and Power PC CPUs. EDK includes a range of tools Associate in Micro Blaze applications to help the designer to develop an embedded system right from the hardware creation to final implementation of the system on an FPGA. System
style consists of the creation of the hardware and software package elements of the embedded processor system and therefore the creation of a
verification part is elective. A typical embedded system latest project involves: hardware platform creation, hardware platform verification, software
package platform creation, software package application creation, and software package verification.

Figure 4: Embedded Development Kit Design Flow
The creation of the verification platform is elective and depends on the hardware platform. The MHS file is taken as Micro Blaze input by the shred tool to
form simulation files for a particular machine. Three forms of simulation models is generated by the shred tool: activity, structural and temporal arrangement
models. Another useful tool accessible in EDK unit of measurement Platform Studio that gives the programme for creating the MHS and MSS files.

Results:

Headerfile creation
Conclusion:
This paper planned a brand new LSB based mostly digital watermarking scheme the color image. Scramble on watermarked image once we've embedded the key knowledge within the third and fourth LSB within the image in verify coordinates, we have a tendency to got watermarked image while not noticeable distortion on that. Descramble on embedding image extraction knowledge this is often original image. And this digital Watermarking algorithmic rule may be wont to hide knowledge within image future works using planned methodology on secure massage in cyber and banking. Result’s terribly extremely compared than Ying’s and Lee’s methodology.

References:
Comparative Assessment on Ramp and Bias Voltage Variations of Closed Loop Interferometric Fiber Optic Gyroscope

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Abstract—Fiber optic gyroscope is a rotation sensor working on the principle of Sagnac effect. Fibre optic gyroscopes are used in inertial navigation system, aircraft, guidance, control, etc. Implementation of fibre optic gyro can be done by ‘open loop configuration’ but the open loop gyro suffers with non-linearity behaviour and scale factor instability in the output due to poor sensitivity, low accuracy and limited dynamic range. These problems can be overcome by implementing ‘closed-loop configuration’. The output rotation is again fed back into the phase modulator which generates phase shift and compensates the sagnac phase shift error. It has advantages like output is independent of light source intensity variations, system gain, introduction of controlled phase bias is possible, bias stability, scale factor linearity and stability is maintained.

In order to achieve the inertial grade performance fibre optic gyroscope has to be operated in closed loop approach. The closed loop interferometric system is depends upon the ramp voltage (V2π of IOC) and frequency of biasing signal (fB). The digital phase ramp function is used as feedback to the system and makes gyro to null condition. The biasing signal voltage (Vπ/2) is 1/4th of the ramp voltage (V2π). If there are any variations in the ramp and biasing signal voltages, then it introduces variations in the gyro performance. In this paper, a comparative discussion in the gyro parameters for (i) V2π (vary) & Vπ/2 (constant), (ii) Vπ/2 (vary) & V2π (constant) and (iii) both V2π and Vπ/2 are varying simultaneously. These effects are described with the derived values in terms of bias and scale-factor. The experimental results describes that system requires a proper resetting of the ramp voltage (V2π) in order to avoid scale factor instabilities.

Keywords—Fiber optic gyroscope, IFOG, open loop configuration, closed loop approach, ramp voltage (V2π) and bias voltage (Vπ/2).

I. INTRODUCTION

During the middle of 1970s, the advent of the fiber optic gyroscope (FOG) was developed and demonstrated the optical fiber rotation sensor by Vali and Shorthill. Later, in 1968, R.B. Brown from the Navy Laboratory, revolutionized about the concept behind FOG and proposed a fiber optic coil as a rotation sensor. By using the low-loss single mode fiber an optical fiber ring interferometer was demonstrated by Fringes in 1975 [1]. Investigation of FOG was made by a number of researchers, developers, universities, industrial laboratories such as McDonnell Douglas, Northrop-Grumman (Litton), Honeywell, Northrop, Singer, Lear Siegler, Martin Marietta, others etc., and this makes the concept of FOG becomes a reality in worldwide development. In the early 1980s, Gyroscope bias errors reduce to 0.01°/hr succeeded in the laboratory.

The development of FOG has flourished during the past 30 years. There is a gradual improvement in the performance of FOG and is now quite mature and capable of succeeding the most accurate requirements of gyroscopes. This tends to a laboratory experiment evolved into the production floors and practical applications such as in navigation, guidance, and control of aircraft, missiles, automobiles, robots, and spacecraft. The competing technologies of FOG from mechanical gyroscopes and ring laser gyroscopes [3] are as shown in Fig. 1.1.

During the 1980s, RLGs started replacing the mechanical gyroscopes which are still the most widely used navigation grade instruments. However RLG is a complex technology challenge as it needs very good quality optical components. It also has a problem of dead zone because of coupling between backscattered light with counter rotating beams [2].

Fiber optic gyro technology has support from the growing fields namely, fiber optic communication and silicon technology. In modern telecommunications, there is a growing importance of fiber optic technology with a significant advances in some specialized areas such as light sources, low loss couplers, fiber polarizer’s and integrated optics, which results in miniaturization, better performance and higher reliability [7].
ARM9 BASED CAR SECURITY SYSTEM

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Abstract—In general security places a vital role in our society. In this paper we proposed an embedded car security system. As this system contains FDS (facial detection system), which identifies the image of the driver and compare it with predefined images which are already loaded in the system. Let us consider an example that if the owner is travelling in the car at night time and the owner park the car at a place when he finish the work and comeback then he find that some one is stealing the car. The FDS in the system compares the obtained image with the predefined image which are already loaded by the owner if the images doesn’t match then the system captures the images and send it to the authorized person or to owner of the car through MMS. By seeing that images in the mobile at same time through GPS the owner can identify the location of the car. So that by acquiring image of the thief and by tracing the area where the car was the owner can easily identify the car without others help. As in this system we also have continuous wireless video monitoring system based on GPS/GPRS. When the received message is replied with a code then the functioning of the car wills stops automatically.

Key Terms: Face detection, ARM (Advanced RISC Machine,), GSM, GPS, Video Monitoring system, special code.

1. Introduction

Now-A-days security plays a vital role in our society. And the theft of the cars and robbery on the highways has become a major issue. a person can’t survive with car alone in unknown places and many bad things are happening with women’s when they are travelling alone. We can avoid these situations using this system.

In this system we have face detection system which identifies face using some sensors which measure dimension of our face based on that dimensions and some calculations sensors identify the face. As the face detection system compares the obtained facial image with the predefined image. And in our system we are using continuous wireless video monitoring by using this we have live of car i.e. what is happening in our car without our presence in the car .

So by implanting this system we can have reduced the crime rate, and also so many robberies. We also have time to time update of our car.

Fig 1: bLock diagram of smart car system

2. FACE DETECTION SUBSYSTEM

A human face detection and recognition system for color image series is presented in this paper. The system is composed of two subsystems: human face detection subsystem and human face recognition subsystem. The face detection subsystem includes two modules: face finding and face verification. The human face finding module determines the face regions of a number of subjects from color image series using skin color analysis and motion analysis. Human face detection accuracy of the system is 97.2% under controllable lightning condition. Human face recognition accuracy of the system for 70 persons is 96.5% (with 20 eigenvectors) and 98.3% (with 30 eigenvectors).

2.1 Images from the Camera

In this system prototype, one USB camera is used to catch images in car, and the data are transmitted to FDS module by USB channel, and the data are transferred into jpeg format files by a chip embedded camera before the transmission. Every image is set to be 320*240 pixels in resolution ratio to remain small in size and could be detected fast.
3. EMBEDDED CONTROL PLATFORM
The embedded control platform is built on one SoC (system on chip), and there are one 8KB data/instruction cache, one MMU, 64KB ESRAM and many functional modules in it. One is a low-power SoC, which is suitable for the industry control systems especially with TFT displays. All the face detection codes are realized by standard C language for achieving better portability to be ported from one chip to another without any change. Since this face detection process is also done in the chip by pure software method without any other hardware accelerator, we need some ways to optimize this process because a low-end ARM chip is not good enough at computing.

4. GPS MODULE
GPS means global positioning system which identifies the location of the car by providing longitude and latitude of the place where the car is. GPS have one or more receivers to transmit the information or to identify the current location of the car. In the GPS module we have many types but here we are using Jupiter TU 30 to identify the location of the car. This Jupiter TU 30 consists of UART which is used to communicate with the embedded devices. This type of GPS module can trace location of vehicle with the speed 9600 bps.

5. GSM MODULE
GSM stands for global system for mobile communication. 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.

An external GSM module is connected through serial port. Through this the extended AT commands for writing the SMS message can be controlled. Whenever the sensed values exceed the predefined values a signal is sent to GSM Module through transceiver and a serial port.

6. VIDEO MONITORING SYSTEM
In a image monitoring system, we realize the mutual information through the transmission line and multimedia equipment, to achieve a timely and interactive communication and complete the purpose of monitoring, control and intercommunication.

6.1 Design of Hardware System
An hardware system includes processor, video-capture devices, and user’s mobile phone to receive video information. In this study, ARM9 processor is chosen to complete a core control, Linux environment can make this task successful; CMOS camera is used as the video-capture device; and a ARM9 is connected to a Internet to receive video information to achieve real-time monitoring. As shown in the following it is a block diagram for overall design of a hardware system. A Video is obtained by the CMOS camera and it is uploaded through an ARM9 itself acting as web server with the IP address we can continuously monitor who is driving a car, after the owner receives an alert form ARM7 processor. When the continuous updating of information is not possible, owner can see the image of driver with the help of ARM9 which is acting as an web server by having the IP address. It can be accessible through an 3G phone also.

7. CONCLUSION
By implementing this technique we can reduce crime rate in our cities. and also this system is safer especially while we are travelling alone at dangers areas. Here we are implementing this system with the latest technology of ARM9 and through face detection process image is captured and sent to the police with location of the car through GPS/GSM modules.
REFERENCES


[3] BioID Face Database


Analysis on Improving the Performance of Network on Chip in System on Chip

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ABSTRACT

There is an apparently interminable scaling down of electronic components, which has empowered designers to assemble sophisticated computing structure on silicon chips. In this technological era, modern SOC designs consist of various heterogeneous components integrated onto a single chip. Usually the Advanced microcontroller bus architecture is used for the connection and management of functional blocks in system on chip designs. As the number of semiconductor intellectual property blocks in a single SOC is exponentially increasing, the communication management becomes critical. Usually bus based architectures are used for driving SOC, but they cannot adapt to the changes in the system architecture. As the bus performance can determine the system performance, to improve the system performance the buses are replaced with Network on chip architecture.

NOC architecture can be described by it’s strategy for routing, flow control, switching, arbitration, buffering and the topology used in this architecture. Although NOC provides effective communication between the PE’s, with wormhole flow control deadlocks can occur during system operation. To avoid the problem of deadlocks in NOC and to improve the performance different methodologies are proposed. In this paper Wormhole Flow Control (To avoid deadlock) and Hybrid Topology Mechanism are discussed and a methodology that would ensure the deadlock free path routing for improving the performance of NOC is proposed.

Keywords: SOC, NOC, Deadlocks, Hybrid methodology, PE, Wormhole Flow Control, Hybrid Topology

1. INTRODUCTION

The exponential scaling of Moore’s law enables higher transistor densities, the design complexity issue and power limitations of superscalar processors have made the researchers to consider new applications for large transistor budgets in future. As the leading substitute to complex monolithic uni

Processors the single-chip multiprocessors, or CMPs, have emerged. Single or multiple layers of shared buses are used to interconnect large number of computing and storage cores in Systems-on-Chip (SoCs).

The commonly used communication mechanisms in SoCs buses are such as ARM’s AMBA bus and IBM’s Core Connect.[] A modular design approach that uses standard interfaces and allows for IP re-use is supported, but the bus is often the performance blockage in a large system. The advantages of the shared bus architecture are:

- Less complex
- Small area
- Low cost
- Extensibility.

However, using such approach has several disadvantages which will limit its use in future SOCs, such as:

- Non-scalability
- Non-predictable wire delay
- Power consumption
- Complication of the design process.

There are inconsistent tradeoffs between compatibility requirements in SoC bus architecture, driven by IP blocks reuse strategies, and the necessary bus evolutions driven by technology changes. In many cases, introducing new features has required many changes in the bus implementation but more importantly in the bus interfaces, with major impacts on IP reusability and new IP design. With advancement in technology, ICs with billions of transistors, with improved feature size and clock frequencies are developed. In order to solve the problem of scalability, researchers turned to wide area networks. Communication between the on-chip routers and the packets to send data to each other packets is done using the cores connected through switched communication. The on chip communication infrastructure is reusable across systems. Replication and design reuse manages the complexity obtained by placing multiple cores on a single chip.
Network-on-chip (NoCs) was the outcome due to the following reasons:
- Energy efficiency
- Reliability
- Scalability of bandwidth
- Reusability
- Distributed routing decisions

Researchers and designers have turned to interconnection networks as a replacement to conventional shared buses and ad-hoc wiring solutions to interconnect such a high number of elements on a die. These interconnection networks are called Network on chip connections. This network on chip connections is considered to be very advantageous compared to the shares buses. Rings or two-dimensional meshes – topologies that have low design complexity and are a good fit to planar silicon substrates and are used in the most existing networks-on-chip (NOCs). As the core count increases toward hundreds or thousands these topologies, results in serious scalability challenges, especially as two-dimensional substrates restrict the space of implementable networks.

The vital interconnect issue of Systems on Chips is solved using the Network on-Chip (NoC). Most NoCs use wormhole flow control to accomplish high throughput and low latency. With wormhole flow control, it is conceivable for an arrangement of packets to have a cyclic dependency of resources, Where each of them attends to a port held by another and none of them can advance. Such a situation is called as routing level deadlock. Deadlocks in a network can block communication between cores and can even lead to a complete network failure. For avoiding such deadlock conditions and improving the performance of NOC different methodologies are proposed.

2. LITERATURE SURVEY

Many mechanisms are already proposed for improving the performance of Network on chip. They are
- Heterogeneous methodology for power delivery system
- Worm hole flow control to avoid deadlock condition in NOC.

The paper describes about the mechanisms that are involved to implement the methodologies to improve the performance of NOC.

2.1 WORMHOLE FLOW CONTROL (TO AVOID DEADLOCK)

NOC routes packets instead of wires. For communication between the source processing element to the destination processing element routers are used which route packets to various PE’s. Under such conditions the packets may not reach the destination due to occurrence of deadlock. To tackle this condition wormhole flow control method is generally used. Buffers and physical channels (PCs) are allocated to flits instead of packets in wormhole switching. A packet is divided into one or more flits. Once buffering in the next switch is available to hold the flit, the flit on which flow control is performed, can be advanced. As a result the flits of a packet are delivered in a pipeline fashion. A packet is segmented into four flits, with:
- one head flit leading two body flits
- one tail flit

![Fig 2: Flits delivered in a pipeline](image)

then the four flits are transmitted in pipeline via switches. For the same amount of storage, it achieves lower latency and greater throughput. However, Wormhole switching uses physical channels (PCs) inefficiently because a PC is held for the duration of a packet. If a packet is blocked, all PCs held by this packet are left idle.
Wormhole-switching procedure is helpless to deadlock although it is effective in reducing buffer requirements. In wormhole switching, the assets are:

- Virtual channel
- Their corresponding buffers.

The system is blocked with packets without making any progress because the cyclic dependency on flit buffers occurs among a few packets. So basically deadlock-avoidance policy is adopted in NoC to keep this disastrous issue.

The important thing is to have systems to handle them. As in many SoCs, the cores are heterogeneous in nature with well defined communication patterns. The NoC topologies and directing capacities are specially crafted to match the application particulars, prompting high power-execution effective outlines. Notwithstanding, the strategies must be utilized along with the development of the NoC topology, generally integration between centers can't be ensured. It is not generally possible to make the connections bidirectional. Resource requesting is a straightforward system to counteract halts in custom topologies. In this system, the correspondence channels are allocated to diverse classes that are requested.

Virtual channels are used to reduce the problem of wormhole and make efficient use of PC’s. Each flit buffer queue share a PC with several lanes. As a result if a packet is blocked, other packets can still pass through the PC via other lanes, resulting in higher throughput. The use of wormhole switching provides the following advantages:

- Better performance
- Smaller buffering requirements
- Greater throughput

### 2.2 HETEROGENEOUS POWER DELIVERY SYSTEM (POWER OPTIMIZATION)

In order to improve the power efficiency on chip a methodology called Heterogeneous power Delivery system is proposed. To provide a high quality power system, the power is regulated using very small distributed power efficient converters. [1]

Historically, power economical switching converters need massive physical space, whereas compact linear power provides exhibit high power conversion losses, which are not ideal for on-chip integration. To use the benefits of existing power provides, a heterogeneous power delivery system is projected. On thoroughly examining the ability potency for all attainable power supply topologies an optimum power distribution system with minimum power losses is determined.[1]

### 3. PROPOSED METHODOLOGY

This paper proposes a synthesis approach for making hybrid, application-specific NoCs. The method considers:

- Latency
- Port count
- Link length constraints.

It presents a hybrid topology that utilizes both NoC routers and shared buses. Additionally, the proposed approach can insert intermediate relay routers that act as bridges or repeaters and aid to reduce the cost further. Finally, the approach creates a deadlock-free routing of the communication flows by either finding deadlock-free paths or by embedding virtual channels. The advantages of the proposed methods are demonstrated by comparing it to modern approaches on a generic and an industrial SoC examples.

The fundamental commitments of this paper are as per the following:

1) An intelligent SoC partitioning based on spectral clustering (SC) and accord generation for SoC specifications with multiple use cases, floorplan, and voltage and frequency domain information.
2) A system for developing Hybrid NoCs that use both routers and shared buses.
3) An algorithm for inserting relay routers to enable the construction of topologies under tight constraints.
4) A flow routing algorithm that works with port count, link length, and latency constraints.

### 4. CONCLUSION

With the advent of all the proposed methodologies in this paper we mentioned various mechanisms which can optimize the performance of NOC by reducing the deadlock problem and improving the power. we successfully proposed a methodology for optimizing performance by the use of a Hybrid topology. This method offers a novel approach to partition the system, a ranking algorithm to identify which clusters
have to be implemented as routers, and a deadlock-free, latency-constrained flow routing algorithm and thereby NOC can be optimized.

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FAULT FINDING IN WIRELESS DATA TRANSMISSION IN MONITORING AND CONTROL OF HEAVY INDUSTRIAL MACHINERY

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ABSTRACT: In recent days the wireless communications technology has become the integral part of several types of communication devices which allows users to operate in the remote areas. Many of the wireless technologies are come in to picture where mostly used in the industrial areas, home area networks and many other monitoring applications. Wi-Fi, Wimax, Bluetooth, and Zigbee are the most famous wireless technologies which are suitable for above mentioned areas. Wi-Fi technology works on high frequency radio signals that means applicable only for high data rate applications where as wimax also comes under same group. Therefore the remaining two technologies are suitable for the low data rate applications like monitoring and control. One possible alternative way for WSN implementation is Bluetooth. However, due to its high complexity and inadequate power characteristics for sensors, the interest towards Bluetooth-based WSN applications has decreased. So zigbee is the promising wireless technology that satisfies the Industrial needs. Zigbee technology is the software layer based on IEEE 802.15.4 standard which was developed by Zigbee Alliance. To improve the accuracy of monitoring and control usually Zigbee protocol is introduced. In this particular paper an extension to XBee XBee-pro is proposed which is more accurate in speed, power than the existing protocol.

Keywords: Wi-Fi, Wimax, Bluetooth, Zigbee, XBee, WSN (wireless sensor networks).

I.INTRODUCTION:

One of the very important aspects required in the manufacturing process in present day is the demand on high flexibility of production, fast implementation of manufacturing process to the new requirements, relocation of production units, innovation and reconfiguration of production and other changes affecting monitoring and control systems are needed.

A currently becoming popular and widely used technology based on wireless sensor network is extensively used in this project as it is able to provide flexibility, low cost implementation and reliability. A high power transmission with a relatively low power consumption XBee PRO based wireless sensor network technology is applied in this work. XBee PRO is a communication standard for use in the wireless sensor network defined by the XBee PRO that adopting the Digi international standard for its reliable communication. It is preferred due to its features that fulfill the requirement for a inexpensive, easy to use, low power consumption and reliable data communication between sensor nodes.
The development of graphical user interface (GUI) for the monitoring purpose at the base monitoring station is another main component in the project. The GUI should be able to display the various parameters being monitored continuously in real time. Several measurement and performance analysis to evaluate the reliability, feasibility and effectiveness of the proposed monitoring system are also presented.

II. LITERATURE SURVEY:

One of the foremost transformative technologies of the past decades is the availability and growing expectation of ubiquitous connectivity. Email checking, carrying a voice information, web browsing, or in any other cases, we expect to access these online services irrespective of location, time, or circumstances like running, standing in a line, at the office, on a subway, in flight, and everywhere in between. Today, we are still often forced to find the connectivity but without having any doubt, the future is about ubiquitous connectivity where access to the Internet is everywhere.

Wireless networks are at the epicenter of this trend. A wireless network refers to the network which if not connected by cables, which enables the desired convenience and mobility for the user. We should also expect to see a lot of different wireless technologies to meet our needs, each with its own performance individuality and each optimized for a specific job and situation. Today, we already had widespread wireless technologies in use: WiFi, Bluetooth, ZigBee, Near Field Communication, WiMAX, LTE, HSPA, EV-DO, earlier 3G standards, satellite services, and more. However, the good news is that most wireless technologies operate on common principles, have regular trade-offs, and are subject to common performance criteria and constraints. Once we have tendency to uncover and understand these fundamental principles of wireless performance, most of the other things will begin to automatically fall into place.

Industrial plants have applied WSN technology, that has been used for the control and monitoring of management, indoor temperature and humidity, and so on, in their facilities. However, the appliance of current WSN technology in giant, complicated industries still lacks reliability and security. Currently WSN suffers from its practical application, because of a limitation of standard technology for ability to exchange information between present equipment and related communication devices. For many problems, WSN haven't been the well-liked choice for offshore monitoring within the industrial space. But with the recent development of extremely reliable wireless communication standards, industrial plants have tried to construct a WSN based monitoring system whereas reducing overall administrative and operative prices. Industrial WSN technology uses IEEE 802.15.4 standards has been the focus of attention because the next generation of WSN technology applicable to the sector of commercial plants requiring high reliability and security. In addition, using the WSN-based monitoring system, we will perpetually monitor and measure the conditions of facilities and provide additional economical risk management with sample reliable and correct field information.

2.1 Wireless sensor networks

Wireless sensor network is the wide range platform due to its low cost, small size, low power consumption, flexibility, portability, scalability features. WSN’s (wireless sensor network) with advantages arrangements, collection of variety of parameters high detection accuracy and high accountability of the monitoring network etc. A WSN’s is a Ad-hoc network composed of great number of tiny low cost and low power consumption sensing nodes which are capable of sensing, calculating and communicating data. This paper develops a monitoring system based on wireless sensor network which is applied to industrial areas to realize remote and automatic online monitoring of temperature.
III. DESIGN OVERVIEW:

The hardware model developed can communicate wirelessly with personal computer through Zigbee Protocol to receive instruction and send sensor data. Temperature sensor is interfaced with PIC Micro controller. PIC Controller will get the input from the Temperature Sensor LM 35. The change in temperature will be sensed by temperature sensor and the Process temperature will be displayed in the 2 X 16 LCD Alpha numeric Display. The displayed value will be compared with the elector XBee Terminal output. The Zigbee technology enabled Temperature Sensor has been designed by interfacing the PIC Micro Controller with the XBee Module, which acts as a Zigbee enabled Temperature Sensor because the PIC Micro Controller is also interfaced with the Temperature Sensor. The Zigbee enabled sensor transmits the measured value to the Zigbee receiver module which is interfaced with Personal Computer through RS232 serial port. The executable program needed to display the temperature value measured by the temperature sensor in elector XBee Terminal is installed in personal computer.

3.1 Sensor Unit:

A sensor unit is basically consists of several sensors used to detect the predetermined parameters that indicate the temperature. In this work we have used LM35 for measuring the temperature. All the sensors use battery for its operation. The information being sensed by the sensors are then converted into electrical signal and go through the signal conditioning circuit that functions to make sure the voltage or current produced by the sensors is proportional to the actual values of parameters being sensed. Then it is passed to a PIC microcontroller or microprocessor that processes it to the value understandable by human.

The sensor node consists of various sensors to measure the water quantity parameters like flow, velocity, pressure. These parameters which are crucial to determine the quantity & quality of potable water are logged in a central server through a gateway node.

3.2 XBee PRO Unit:

The XBee and XBee-PRO RF Modules were engineered to meet IEEE 802.15.4 standards and support the unique needs of inexpensive, low-power wireless sensor networks. The modules require less power and provide reliable delivery of data between devices. In this paper, the fundamental design and implementation of wireless sensor network featuring a high power consumption of the XBee based technology is used for transmission & reception. XBee based communication technology is the latest version for zigbee. XBee used the zigbee protocol the only difference is lower cost, high power and easy to use. Here different sensors are used for the sensing different parameters like temperature, humidity, pressure.
Fig: XBee-PRO 900 RF module

The XBee-PRO900 RF module is ideally suited for low-latency point-to-multipoint networking applications. Capable of point-to-point, peer-to-peer and point-to-multipoint networking, the XBee-900 is best solutions where RF saturation and absolute transmission distance are dominant to the application.

IV SOFTWARE DESIGN:

GUI (graphical user interface) software is employed to get the stable remote access to observance the real time control and monitoring the variable rate irrigation controller. GUI is the most developed software is a kind of interface that enables the user to interact with electronic device through graphical icons and visual indicators. It’s accustomed develop to interface the hardware and software modules to the wireless sensor nodes. It’s associate to interface for logging data from the different sensor nodes.

The actions in a GUI are usually performed through direct manipulation of the graphical parts. Additionally to computers, GUIs are often found in hand-held devices like MP3 players, media players, gaming devices office and industry devices. The term "GUI" tends to not be alternative low-resolution kinds of interfaces with slow resolutions, such as video games (where HUD is preferred), it is with in the tradition of the pc science research at the PARC (Palo Alto Research Center). Here, for monitoring the water quality and quantity while taking the different inputs from sensors nodes.

V. CONCLUSION

Overall, proposed in this paper is to confirm that Zigbee is the most suitable wireless technology for replacing conventional module bus method to get the advantages such as reduction in wiring cost, labor cost and maintenance expenditure. The freedom to place wireless sensors anywhere in the factory provide healthy and safe working environment and helps to avoid Electrical burnouts due the mixing of power and signal cables. Transmission range of Zigbee technology using Xbee was improved in this paper. By using this XBee-pro increasing the throughput by two times and power consumption was reduced by 20 times than the existing implementation.

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A novel robust localization algorithm based on K-means clustering in WSN

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ABSTRACT—Wireless sensor networks attracting a great deal of research interest. Accurate localization of sensor nodes is a strong requirement in a wide area of applications. In recent years, several techniques have been proposed for localization in wireless sensor networks. To reduce the impact of distance information errors, an improved location algorithm in WSN based on fuzzy clustering is proposed. It is explored that clustering methodology is employed to wireless sensor network localization schemes. By cluster analysis, the novel algorithm can figure out the distance data which are far more beyond their true value, and then removes those data from the measured distance data. Simulation experiments indicate that the improved algorithm can reduce location errors effectively and has more stable location results in a variety of error environment.

Keywords—wsn; multilateration; clustering; location

I. Introduction
A sensor network consists of a large number of sensor nodes which are placed within an area in an extensive and distributive manner to gather data and information about that place; location of these sensor nodes may not be known in advance and this characteristic makes it possible to use sensor nodes in inaccessible and very dangerous environments. Manually configuring each node or equipping each node with a GPS (global positioning system) is not cost-effective at all due to low scalability, low energy and high costs. Location information is an important source of context for ubiquitous computing system. After entering the Inter of things era, the 80% of the information in IOT is concerned with position, the relative position between things is the basis of implementing things connected. The basis of the target location problem in the IOT has become one of research hotspot. Multilateral positioning method is the basic algorithm which is widely used in wireless location. This method requires to obtain at least three distance information between the nodes to be located and anchor nodes. The distance information can be obtained by ranging technology such as TOA, RSSI, also can be estimated by DV-Hop, DV-distance. However, in practical applications, due to various factors such as hardware, environment, propagation model, measured or estimated distance often has some errors. And NLOS cause a greater impact on the positioning accuracy. The distance deviated from the true will affect the positioning accuracy. These methods have advantages such as low cost and not requiring additional hardware. Overall, the above methods are studied separately for the ranging error and positioning solution method, which mainly study how to reduce the impact of ranging error on positioning results. But for measurements with larger errors, the above method cannot completely remove the impact on the results of the positioning. Therefore, we propose multilateral localization algorithm based K-means clustering. Cluster analysis excludes some large error distance information, solving error distance affect the positioning results.

II. Literature survey
Wireless Sensor Network has been considered widely as one of the most important scenario. A wireless sensor network consists of autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure etc. Wireless sensor network is the wide range platform due to its low cost, small size, low power consumption, flexibility, portability, scalability features. WSN’s (wireless sensor network) with advantages arrangements, collection of variety of parameters high detection accuracy and high accountability of the monitoring network etc. A WSN’s is a Ad-hoc network composed of great number of tiny low cost and low power consumption sensing nodes which are capable of sensing, calculating and communicating data.
One of the most crucial issues in wireless sensor network is to determine the location and orientation of sensor nodes. In many wireless sensor network applications sensor nodes are required to know their locations. Most of these applications require localization which involves determining the location of the sensor node based on the other sensor nodes with known locations. Existing localization algorithms can be classified as centralized and distributed localization techniques. In centralized techniques, data are transmitted to a central node which is responsible for calculating the locations of the sensor nodes. Main drawbacks of this technique are expensiveness, time delays and energy consumption. Distributed localization techniques rely on determining the node’s location by communicating nearby sensor nodes. These techniques can be classified as range-based and range-free techniques. In order to calculate locations of the sensor nodes, range-based techniques benefit from the information such as time of arrival, received signal strength and angle of arrival that are obtained by special hardware. The requirement for expensive hardware makes the range-based approach less preferable than the range-free approaches. Range-free approaches depend only on the contents of the received messages and do not require any additional hardware. Indoor localization technique attracts much attention because of its expectation to be applied in various fields. For example, by obtaining the accurate position of products and workers in factory, the work efficiency and the reliability can be improved.

Global positioning system (GPS) is the most famous localization system in which a location of the terminal can be detected by receiving the beacon from satellites. The outdoor location can be detected with high accuracy by the GPS. However, the GPS cannot be used indoors since the direct wave from satellites is blocked. Thus, other technologies need to be used for the indoor localization. The most popular one is that a few sensor nodes whose location is known receive the beacon from a target node whose location is unknown, and by more than three distance or two angle information of them, the target location is calculated by triangulation.

III. Improved K-means clustering algorithm

Clustering based on k-means is closely related to a number of other clustering and location problems. These include the Euclidean k-medians (or the multisource Weber problem) in which the objective is to minimize the sum of distances to the nearest center and the geometric k-center problem in which the objective is to minimize the maximum distance from every point to its closest center. There are no efficient solutions known to any of these problems and some formulations are NP-hard. An asymptotically efficient approximation for the k-means clustering problem has been presented by Matousek, but the large constant factors suggest that it is not a good candidate for practical implementation. One of the most popular heuristics for solving the k-means problem is based on a simple iterative scheme for finding a locally minimal solution. This algorithm is often called the k-means algorithm. There are a number of variant to this algorithm, so, to clarify which version we are using, we will refer to it as Lloyd's algorithm. (More accurately, it should be called the generalized Lloyd's algorithm since Lloyd's original result was for scalar data.

Using three distance information to location in two-dimensional space, that is trilateral measurement method. In the presence of the ranging error, the distance information which has a small ranging error has less little effect on the trilateral, thus positioning results are closer to the true value. In the case of some distance information relatively accurate, the obtained results using the trilateral measurement method by three distance information will be more close to the real value, which densely distributed in an unknown true value of the node position as the center of a region.

Based on this, we propose improving location algorithm based on fuzzy cluster. It randomly selects 3 from n distance information, and obtains sample collections using trilateral measurement method. By cluster analysis, the novel algorithm can figure out the distance data which are far more beyond their true value, and then removes those data from the measured distance data. Then multilateration is adopted with the rest distance data, obtaining the final results.

Firstly, improving location algorithm based on fuzzy cluster selects a group of 3 from n distance information \{d_1, d_2, \ldots, d_n\}. It obtains \(C_{n3}\) positioning results \(X=\{x_i,y_i\}_{i=1,2,\ldots,C_{n3}}\) using trilateral measurement method to every group. Then it filters distance information of big error and do k-means cluster in sample points. \(C_{n3}\) sample points are divided into k clusters, as shown in step A; Then according to the result of clustering, it performs step B to find distance information of big error.

- **Step A** k-means cluster of initial sample
  1. Input \(C_{n3}\) sample to be cluster \(X=\{x_i,y_i\}_{i=1,2,\ldots,C_{n3}}\) and cluster number k. Choose the number of k points from the sample of \(C_{n3}\) as the initial clustering center.
  2. For the rest of \((C_{n3}-k)\) points, it calculates the distance \(D=\{d_{j|i=1,2,\ldots,(C_{n3}-k)}; j=1,2,\ldots,k\}\) between each sample and the center of each cluster \((c_{ix},c_{iy})\). Di denotes
the distance between the point i and cluster center j. Find
the nearest cluster center \(j(1 \leq j \leq k)\) to the point i.
3) All points join clustering and form the k cluster
\(W_1, W_2, \ldots, W_k\), each clustering \(W_i\) includes clustering
center \(C_i\), the points belong to the cluster and the number
of cluster points.
4) According to the formula
\[c_{ix^*} = \frac{1}{n_i} \sum x_i, \quad c_{iy^*} = \frac{1}{n_i} \sum y_i\]
it computes center of each cluster, until find new cluster
center \(C^* = \{(c_{ix^*}, c_{iy^*}) | i = 1, 2, \ldots, k\}\). \(x, y \in W_i\), \(n_i\) denotes
the number of clustering \(W_i\).
5) If \(C^* = C\), that is, no change of two adjacent clustering
center, end of the algorithm, at this time
\(W_1, W_2, \ldots, W_k\) are ultimately clusters. Otherwise make
\(C^* = C\), turn to step 2.

■ Step B: To find the distance information of big error
according to the cluster results
1) According to the final output of the K-means clustering
algorithm \(W_1, W_2, \ldots, W_k\) and \(n_1, n_2, \ldots, n_k\), it finds
\(t(2 \leq t \leq k-1)\) clusters of minimum number of points.
2) To find out points be contained by \(t\) clusters, supposing
\(h\) points. Each point contains 3 distance
information. Then we can find the top number of \(m\) distance information, supposing they are \(d_1, d_2, \ldots, d_m\).
This are distance of big error.

IV. Existing algorithm simulation
All the simulations are conducted under such a model that
15 anchor nodes are deployed with uniform distribution in
an object field with 100m\(\times\)100m square meters. The to-be
located node is standing in the center of this field with
coordinate (50, 50). We experiment between
Multilateration and improved algorithm. Each group of
positioning error of the experimental results are the
average of 100 times of experiments. The parameters of
improved algorithm set \(k = 5, \ t = 2\).

![Fig.1 comparison of location error in the ranging error of normal distribution](image1)

![Fig.2 comparison of location error in the ranging error of uniform distribution](image2)

V. Conclusion
In the view of the influence of error ranging information
contained on the multilateral localization algorithm, an
improved location algorithm in WSN based on fuzzy
clustering is proposed. It is explored that clustering
methodology is employed to wireless sensor network
localization schemes. By cluster analysis, the novel
algorithm can figure out the distance data which are far
more beyond their true value, and then removes those data
from the measured distance data. Simulations show that
the improved algorithm can effectively avoid the influence
of error ranging information, and the improved algorithm
has a good localization robustness to the multilateral
positioning algorithm.
VI. Future work

In the future, selection of nodes method can be changed as we are using random as if now. In future static nodes can be used to determine their location. Also in this algorithm grouping is done based on clusters by means of k-means clustering and in future there are further clustering algorithms. In addition, we can incorporate methods to improve the performance with respect to size.

References


ANALYSIS ON PERFORMANCE OF MULTI CORE EMBEDDED WIRELESS SENSOR NETWORKS

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ABSTRACT

With the increasing advancements in technology and by the Moore’s law the number of on-chip peripherals is predominantly increasing and there is a need for more advanced techniques. Embedded wireless sensor networks consists of sensor nodes with embedded sensors to sense data about a phenomenon and these sensor nodes communicate with neighboring sensor nodes over wireless link. Embedded wires less sensor networks have various applications in various domains including observation, environment monitoring, traffic monitoring, volcano monitoring and health care. The embedded wireless sensor nodes have single core embedded sensor nodes, multi core embedded sensor nodes which are important in selected application domain that are required for complex in-network processing of the sensed data. The architectures proposed in this paper are a heterogeneous hierarchical multi core embedded wireless sensor networks and multi core embedded sensor networks used in multi core embedded wireless sensor networks. Also this paper includes two more multi-core architectures. They are symmetric multi-processor (SMPs) and tiled many core architectures (TMAs). These two architectures are compared and analyzed based on a parallelized information fusion application for various performance metrics. Symmetric multi-processor is the most pervasive and prevalent type of multi core architecture. TMAs consists of files (a processor core with a switch) which are connected which are connected with an interconnection networks (connect files on a chip). We use different cores in multicore embedded wireless sensor networks. Using such different cores thee is a disadvantage regarding speed i.e., slow speed. To overcome this problem we can use bulk-synchronous parallel and cache-efficient algorithms. Bulk synchronous programming style does not exploit the available support for run time schedulers that can be used to minimize idling processors.

1. INTRODUCTION

Embedded wireless sensor networks (EWSNs) consist of different sensor nodes with embedded sensors to sense data about a phenomenon and these sensor nodes communicate with neighboring sensor nodes over wireless links. Many developing EWSN applications require a excess of sensors embedded in the sensor nodes. For example, consider a military EWSN Organized in a battle field, which requires various sensors, such as imaging, audio, and
electromagnetic sensors. This application presents various challenges for existing EWSNs since transmission of high resolution image and video streams over bandwidth limited wireless links from sensor nodes to the sink node is infeasible. This paper investigates the possibility of two multi-core architectures that can be used in processing units of embedded sensor nodes for multi-core embedded wireless sensor networks (MCEWSNs): symmetric multiprocessors (SMPs) and tiled many-core architectures (TMAs). We consider SMPs because SMPs are universal and prevalent, which provides a standard/fair basis for comparing with other novel architectures. We consider Tiera’s TILEPro64 for TMAs because of Tiera’s innovative architectural features (e.g., three-way issue superscalar tiles, on-chip mesh interconnect, and dynamic distributed cache (DDC) technology). Technological advancements in multi-core architectures have made multi-core processors a viable and cost-effective choice for increasing the computational ability of embedded sensor nodes. Multi-core embedded sensor nodes can extract the desired information from the sensed data and communicate only this processed information, which reduces the data transmission volume to the sink node. By replacing a large percentage of communication with in-network computation, multi-core embedded sensor nodes could realize large energy savings that would increase the sensor network’s overall lifetime.

The figure shows the architecture of a heterogeneous multi-core embedded wireless sensor network. In this a hierarchical network is well suited for large EWSNs which consist of only a few sensor nodes, which can send the sensed data directly to the base station or sink node. Each cluster consists of several leaf sensor nodes and a cluster head. Multi-core embedded sensor nodes enable energy savings over traditional single-core embedded sensor nodes in two ways. First, reducing the energy used in communication by execution in-situ addition of sensed data and transmitting only handled information. Second, a multi-core embedded sensor node allows the computations to be divided across multiple cores while running each core at a lower processor voltage and frequency, as compared to a single-core system, which results in energy saving core embedded sensor nodes. Additionally, reasons and application domains for MCEWSNs have not yet been characterized. Our main Contributions are as follows:

- Proposal of a heterogeneous hierarchical MCEWSN and related multi-core embedded sensor node architecture.
- Explanation on several computation-intensive tasks performed by sensor networks that would especially benefit from multi-core embedded sensor nodes.
- Characterization and discussion of various application domains for MCEWSNs.
- Discussion of several state-of-the-art multi-core embedded sensor node prototypes developed in academe and industry.
- Parallelization of an information fusion application for two multi-core architectures (SMPs and TMAs) that
can be used in embedded sensor nodes’ processing units.

- Comparison and analysis of the performance and performance per watt of SMPs and TMAs based on our parallelized information fusion application. This analysis determines performance and performance per watt advantages attained by multicore embedded sensor nodes as compared to single core embedded sensor nodes.

2. LITERATURE SURVEY

The obtainability of inexpensive hardware is permitting the event of wireless transmission device networks (WMSNs), i.e., networks of resource-constrained wireless devices that may retrieve transmission content like video and audio brooks, still metaphors, and scalar device information from the setting. During this paper, constant analysis on samples of transmission sensors and their integration into take a look at beds for experimental analysis of algorithms and protocols for WMSNs square measure represented. Also, open analysis problems and future analysis directions, each at the device level and at the work level, square measure mentioned. This paper is planned to be a resource for analyzers inquisitive about advancing the progressive in experimental research on wireless transmission device networks. This study presents single-core and multi-core processor design for health observation systems wherever slows bio signal events and extremely parallel computations exist. The single-core design consists of a process core (PC), AN instruction memory (IM) and a knowledge memory (DM), whereas the multi-core design consists of PCs, individual IMs for every core, a shared DM and an interconnection crossbar between the cores and also the DM. These architectures square measure compared with reference to power vs performance trade-offs for a multi-lead cardiogram signalcoaching application operational close to threshold totaling. The results show that the multi-core resolution consumes sixty six less power for prime totaling needs (50.1 Mops/s), whereas 10.4% a lot of power for low computation wants (681 knops/s). Motes square measure inexpensive COTS (commercial off-the-shelf) microchips that integrate a processor, aboard device, RF communications link, and an influence unit. High levels of power potency are often achieved with the service of the IEEE 802.15.4 protocol for communication between the particles, permitting long periods of operation for particles and reducing the ability needs of a craft. The article observes the chance of victimization sensors for attach reduction between satellite subsystems, and for inter-satellite cooperating skills between satellite teams.

We can describe the concept of sensor networks which has been made feasible by the meeting of micro electro-mechanical systems technology, wireless infrastructures and digital electronics. First, the sensing tasks and the potential sensor networks applications are traveled, and an evaluation of factors swaying the design of sensor networks is provided. Then, the communication architecture for sensor networks is drawn, and the algorithms and protocols developed for each layer in the works are explored.

Open research issues for the understanding of sensor networks are also discussed. Motes are low-cost COTS (commercial off-the-shelf) microchips, which integrate a processor, onboard sensor, RF
communications link, and a power unit. High levels of power efficiency can be achieved with the use of the IEEE 802.15.4 protocol for communication between the motes, allowing long-term periods of operation for motes and reducing the power requirements of a spacecraft. The article examines the feasibility of using sensors for harness reduction between satellite subsystems, and for inter-satellite networking capabilities.

Sensor webs are a promising technology for future earth science research because of its capability of adaptive observation from a network of in-situ and remote sensors. As important components of sensor webs, in-situ sensor networks have attracted strong attention in recent years. In-situ sensors observe the phenomena being investigated at close proximity, and can be used to calibrate remote sensors. However, despite great technology advancements, there are still many challenges to make sensor networks a turn-key solution for various science applications. We address some of the major challenges by developing flexible sensor network architecture with a long term goal to evolve into a sensor web. In this paper, we describe our system architecture and its major components. Our first prototype has been deployed to support an ecological study, and initial results have verified our design principles.

3. PROPOSED METHODOLOGY

In this paper we proposed architecture of Bulk-Synchronous parallel & Cache-efficient algorithms. This algorithm is used to increase the speed using different parallel pipelines. Bulk-Synchronous programming style does not exploit the available support for run time schedulers that can be used to minimize idling processors. (Use multi-threaded algorithms instead).

We describe a method for making parallel algorithms that are movable among parallel computers having different numbers of processors, with different bandwidths of the interprocessor communication and the different periodicity of worldwide organization. We do this for the bulk-synchronous parallel (BSP) model, which extracts the features of a parallel mechanism into three statically parameters p, g, and L, reliable to mainframes, bandwidth, and periodicity respectively. The model separates memory that is local to a processor from that which is not, for the sake of universality, does not separate network nearness. The advantages of this model in secondary shared memory or PRAM grace programming have been preserved away.

In this paper we can also proposed Multi core with multi-level cache hierarchy. This is used to reduce the average time and to stores the memory fast.

![Multi core with multi-level cache hierarchy](image)

Fig: multi core with multi-level cache hierarchy:

4. Conclusion:

This paper evaluated two multi-core architectures, symmetric multiprocessors (SMPs) and tiled many-core architectures (TMAs), for multi-core embedded sensor nodes in an MCEWSN based on a parallelized information fusion application. This also established an algorithm of that the Bulky-synchronous programming style which does not exploit the available support to increase the speed.
5. REFERENCE PAPERS

Unflinching Gloves For Self Security Measures

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ABSTRACT: Present days, it is most important to provide Security for a woman in case of violence. There is high chance of abducting the woman who is going on roads in odd hours. It is necessary to have a protecting system in order to reduce the crime rate in this issue. In the Proposed system the gloves accommodates the Controller, GSM, GPS, Switch, Pepper spray, shock circuit and a heartbeat sensor. Here the emergency is divided into two categories one is heartbeat based emergency other is personal safety. The location of the woman can be tracked via sms by using GSM and GPS. Heart rate supervising device is incorporated with the presented application to sense the heartbeat of a person if there is any unnaturally in the heart beat, and then our application exhibits a twofold role. The desired application here uses GPS to trace the location information of the current user and sends that location information/data as a message via SMS and the pepper spray is used to protect her in case of violence and also the project contains the shock circuit so that she can give shock to the person harassing her.

Keywords - woman security, gloves. Heart Beat sensor, GSM and GPS.

I. INTRODUCTION

In Today life, girl security is an important challenging to every Nation in the World. In our Country Woman Has a very Respect, but at Present Women is facing Too many Problems like Harassment’s, Getting Abused by men, Acid attacks etc. In order to provide a safe and security to women by using latest technology. Especially professional woman have to face lot of challenges while working for a company. In accordance with the report of world health organization 35% of women worldwide have experienced violence. In India as per the national crime record bureau’s there is one crime committed every 15 minutes and also one unethical harassment case in every 53 minutes. One kidnapping and abduction case in every in 23 minutes and one rape case every 29 minutes. So there are three questions have become fixture in national agenda as they are safety, more precise and freedom from violence. There is no such system which can provide assurance to girls and therefore they cannot move freely. There are various residuals for girls such as sprays, shoes, gloves, scarfs. But these are not useful in unfavorable condition. We are designing a module to protect her. The module can be fitted anywhere like in girls gloves.

The rest of the paper presented as proposed system contains of microcontroller and discussed about several modules. In next section experimental approach has been discussed and then presented results for the proposed design. Finally concluded the paper with necessary notations.

II. PROPOSED MODEL

![Figure 1: Block Diagram](image)

a. LPC1768

![Figure 1.1: Pin Diagram of LPC1768](image)
LPC1768 is also known as Cortex-M3 which is ARM based Family. It is manufactured by NXP Semiconductors Company which is formerly known as Phillips. Cortex – M3 is a 32-bit Microcontroller which is used an Harvard Architecture. Harvard Architecture is also known as Princeton architecture which has a Separate Memory and Bus line for both Program and Data. In Harvard architecture the data accessing will be fast and at a time we can access the both program memory and data memory.

It is a Low Power Consumption based which has four power modes which is used to reduce the usage of power when it is Ideal mode with an Operating Voltage of 3.3v. The crystal Operating frequency varies from 1MHZ to 25MHZ as it consists of PLL (Phased Lock Loop). It has 512kb of on-chip flash programmable memory. LPC1768 consists of Four ports and has a 100-pin Low Profile Quad Flack Package (LQFP).It has a lower in power Real Time Clock with individual battery supply.

b. HEART BEAT SENSOR
Heart Beat sensor is also known as finger clip sensor.

The sensor contains of an Infrared light expelling diode transmitter and an Infrared photo sensing element working as the receiver. The Infrared light communicates through the tissues. Fluctuations in the amount of blood within the finger regulate the quantity of light incidental on the Infrared detector. Two pragmatic constellations could be enforced to accomplish this functionality. In the foremost constellation, the finger can be positioned between the transmitter and the receiver as presented in Fig.1.3. In the next design, both the Infrared transmitter as well as receiver could be positioned on the actual plane and the finger would serve as a reflector of the incident light alternatively. The Infrared receiver observes the reflected signal in the presented case.

![Figure 1.3: Fingertip sensor circuit](image3)

Fig 1.3 represents the sensor comprises of an Infrared light expelling diode transmitter and an Infrared photo sensing element acting as the receiver. In this, the Infrared light passes through the tissues (weaves). The IR receiver supervises the reflected signal in this case. The Infrared filter of the photo transistor can dismiss interference from the mains 50Hz noise (randomness).

GSM:

![Figure 1.4: GSM900A module](image4)

The GSM based communication for mobile and Telecommunications Standard Institute (ETSI) to describe protocols at the time of second
generation (2G) digital cellular networks (or meshwork’s) utilized by mobile phones. The GSM standard has been build-up as an interchange for foremost generation (1G) analog cellular networks, and originally estimated a digital, circuit switched network optimized for fully duplex voice telephony. This was extensive over a time to cover data communications, initially by circuit switched transport, and then it has been moved to packet data transport via General Packet Radio Services (GPRS) and Enhanced (intensified) Data (information) rates for GSM Evolution or EGPRS (or EDGE). There after improvements were developed when the 3G made third generation (3G) UMTS standards continued by fourth generation (4G) LTE Advanced standards. "GSM" is a trademark fessed by the GSM Association. GSM is a cellular network, which signifies that mobile phones connect to it by explore for cells in the bordering area.

GPS

![GPS Module](image1)

Figure 1.6: GPS Module

GPS, formally called as NAVSTAR, is satellite navigation/routing system utilized for influencing one accurate location at the most anyplace on Earth. A GPS unit takes time signal transmissions from individual satellites, and measures its place by triangulating this information. The GPS was modeled by and is authorized by the United States Department of Defence and it can be used by anybody for free of cost. The cost of managing the system is nearly 400 million dollar per year.

Evaluation uncertainty of the bulk of commercial GPS recipients changes from $10^{-11}$ to $10^{-13}$ by the frequency scale, and from 100 ns to 50 ns by the time scale, being dependent on the recipients design. The major sources of dubiety in GPS measurements are the GPS recipient position fault, the orbital fault, the satellite and receiver clock faults, the ionosphere and the troposphere retard, the receiver internal retard, the satellite antenna and cable retard, the receiver noise, and the multipath fault. The frequency dubiety for a GPS recipient is higher than that for Cs-standard by 2-3 arrange within a small-time interval.

III. EXPERIMENTAL APPROACH

When the Power supply is ON, the modules get starts working. When the Men or any Person tries to Harassment to the women she Press the Switch button which is Present at Hand Glove. Hand Glove system consists of total setup like Gsm, Gps Module and switch. When the Switch is pressed it automatically provides Shock to the person who tries to harass women and transmits the Location Latitude and Longitude Values which are given by GPS using GSM to the given numbers. After getting the Text at Receivers end they plan to save the women as early as possible by the people who are staying behind or nearer to the incident place.

![Hand Gloove](image2)

Figure 3.1: Hand Gloove

IV. RESULTS

![Hardware Kit](image3)

Figure 4.1: Hardware Kit

The above Figure 4.1 Shown is an Hardware Kit Module of this Project. GSM Module, GPS Module, Fingertip Sensor and Switch are interfaced with LPC1768. Here we mentioned a Relay to provide shock and transmit the information using GSM Module.
generating the alert. Alerts and the text information about the vehicle position area sends to the police station numbers and other necessary numbers. Also e-mail alerts are sends to predefined e-mail addresses. On pressing an emergency button by employee in emergency situation, the android device inside the company bus can takes the images and sends to the e-mail addresses and to the specified contact numbers.

V. CONCLUSION
In this paper, a low cost women tracking system using GPS and GPRS of GSM network, suitable for wide range of applications all over the world. The combination of the GPS and GPRS provides continuous and real time tracking. The cost is much lower compared to SMS based tracking systems. Free Google map and the use of HTTP protocol as data sending method reduces the monthly bundle cost for the individual user and also for the small business owner. It is expected that the full implementation of the proposed system would ultimately replace the traditional and costly SMS based tracking systems.

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Agriculture Automation using GSM and Zigbee Technology

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ABSTRACT: Agriculture automation is quiet necessary to meet food needs the increasing population. In this paper we are aiming for proper use of water resources for crop at remote place from home using GSM and Zigbee technology. The designed system monitors to makes use of available water from rain harvesting tank then only it looks for bore well water. The signals from Soil moisture sensors and humidity sensors in the system are coordinated by microcontroller LPC 2148 and transmitted to ICC Irrigation Control Centre with Zigbee technology. ICC helps for optimized use of water for agriculture crops. The growth status of the crop monitored using IR transceiver. Transmission of data from agricultural land to cultivator is effectively done through GSM.

The system can ON/OFF the AC Motor anywhere in the World by just sending the SMS. This Project has two extra-ordinary options:

1. We can get the acknowledgement whether the Motor is ON/OFF
2. We can know the water percentage on the agriculture field by sending the SMS. According to the Percentage of the water we can ON/OFF the Motor.

Microcontroller is the heart of this Embedded Project. Microcontroller control the AC motor, Sensing the Water percentage of the soil and Sending commands to the GSM Modem

Key Words: LPC2148, Soil, moisture and Temperature Sensors, Zigbee, GSM.

I. INTRODUCTION

Now a days Mobile is the essential device in our daily life. Why don’t we ON/OFF any device by just Sending the SMS? We can do it in Embedded System. GSM modem has one slot to insert the SIM. Whenever we want to ON/OFF AC motor we can just send SMS to the GSM modem. The Microcontroller reads the message from GSM Modem and Stored in to the RAM and verify the mobile number whether the message is coming from Owner mobile or not. After that we have to know whether is message was ON or OFF the motor. If the message is ON the Microcontroller just make High one of the port pin. The AC motor connected to Microcontroller pin through relay. After ON/OFF the motor Microcontroller send commands to GSM modem so that GSM Modem sends acknowledgement to the owner mobile. This project has one extra ordinary option is we can know the water percentage on the agriculture field through Moisture Sensors. If we want to know the water percentage we can send the SMS and get the message. According to the message we can ON/OFF the Motor by sending the message.
II. PROPOSED METHOD

The LPC2148 microcontrollers is based on a 16-bit-32 bit ARM7TDMI-S CPU with evolved real-time technique and embedded track support, that added the microcontroller with flash memory starting from 32 Kilo Byte to 512 Kilo Byte. A 128 bit broad memory interfacing and unite accelerator structure enable 32 bit code compile/execution at the highest clock rate. For crucial code size apps, the relative 16 bit thumb mode dismisses code by higher than 30 % with minimal performance penalization. Due to their small in size and lower in power consumption, LPC2148 are unique for apps where highly scaled is a key essential, such as access control and sale of Point.

Serial communication interfaces starting from a USB, UART’s, SPI, I²C bus and on chip SRAM of 8 Kilo Byte up to 40 Kilo Byte Various 32 bit timers, single or dual 10-bit ADCs, 10 bit Digital to Analog Converters, Pulse Width Modulation channels and It has 64 Pins and Two Ports(Port0 and Port1). Each Port consists of 32pins, 16 Pins are hidden in Port1. Pins are reserved in Port0 for Future Purpose. There are 45 General Purpose Input Output Pins with up to nine edge or level sensitive external interrupt pins makes these microcontrollers eligible for industrial operate and medical organizations.

GSM(Global System for Mobile):

The GSM based communication for mobile and Telecommunications Standard Institute (ETSI) to describe protocols at the time of second generation (2G) digital cellular networks utilized by mobile phones. The GSM standard has been build-up as an alternate for foremost generation (1G) analog mobile networks/meshes, and originally estimated a digital, circuit switched network optimized for fully duplex
voice telephony. This was extensive over a time to cover data communications, initially by circuit switched transport, and then it has been moved to packet data transport via General Packet Radio Services (GPRS) and increased Data rates for GSM development (EGPRS). There after improvements were developed when the 3G made third generation (3G) UMTS standards continued by 4th Generation LTE Advanced standards. "GSM" is a trademark fessed by the GSM Association. GSM is a cellular network, which signifies that mobile phones connect to it by explore for cells in the bordering area.

The specifications and characteristics for GSM
- Frequency band—the frequency range specialized for GSM is 1,850 to 1,990 MHz.
- Duplex distance—the duplex distance is specified as 80 MHz. Duplex outstrip is the space among the uplink and downlink frequencies. A channel basically consists of two frequencies, 80 MHz apart.
- Channel separation—the separation between next carrier frequencies. In GSM, it is fixed to 200 kHz.
- Modulation—Modulation is the treat of transfer a signal by modifying the features of a carrier frequency. This is expelled in GSM via Gaussian min shift keying (GMSK) process.
- Transmission rate—GSM is a digital system with an over the-air transfer bit rate of 250-270 kbps in the desire order.

RS232:

The most popular serial communication standard for asynchronous communications is RS-232 (recommended standard-232). This specifies the rule of how different connected devices communicate with each other. The connected devices can either be terminals or communication equipment, commonly referred as DTE & DCE.

According to RS232 interface, it requires only 3 lines - i.e. Rx, Tx& Ground when compared to the bunch of connectors required for parallel communication. Even though parallel communication is easier to establish, serial communication is preferred based on the costs for the communication lines. The EIA (Electronics Industry Association) RS 232 Standard specifies & suggests a maximum Baud Rate of 20,000 bps and RS 232 Advanced is a later day version of the same, which allows 1.5 MBps. The connectors specified are d-type 25 pin connector and d-type 9 pin connector.

**Liquid Crystal Display (LCD)**

![Figure 2.6: LCD](Image)

LCD consists of 16Pins. They are Vss, Vcc, Vee, Back Light Anode and Back Light cathode. There are 8 data pins (D0-D7), One Read Select (RS), One Read/Write (R/W) and Enable. LCD is used for only Displaying and as Output device.

**SENSORS:**

a. **Temperature Sensor:**

b. **Humidity Sensor**
c. Soil Moisture Sensor

III. EXPERIMENTAL RESULTS

In this section we are going to express about the implementation results with the hardware kit we are used for the application.

In the presented work the application has been worked as the interfacing zigbee controller with the controller and the gives the quality food corps.

IV. CONCLUSION

In this paper, by using our design one can control remotely from home for usage of water properly. This design has based on the ZIGBEE Technology and GSM and it is a prototype for the implemented design. The coding is done in embedded C language.

REFERENCES

ADVANCED FALL DETECTION SYSTEM FOR ELDERLY PERSON USING 3-AXIS ACCELEROMETER

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\textbf{ABSTRACT:} In the recent years, several fall-detection methods have been presented for obtaining the suitable surveillance system for elderly people in which this design could be considered as highest priority on sensitivity, accuracy and also specificity. In this paper, we are presenting an advanced system than the existing ones for detecting the elderly people falling situations. This is designed and tested by taking the data from an accelerometer. The effect of falls could be considered and also differentiated from daily life activities of people. Here, the proposed system is a prototype and it has been discussed in broad way. The proposed system is able to exhibit better accuracy, less sensitivity and specific to requirements than the existing systems. So, one can say that this system is used as monitoring/detecting elderly people falls in better way.

\textbf{Keywords -} Fall detection, Wireless sensor networks, Sensitivity, Embedded system

\section{INTRODUCTION}

In previous days, several types of consumer devices based on electronics have been designed and developed for the purpose of home appliances. A general home network normally consists different types of electronic devices, mainly actuators, sensors etc. so that the people in home can control on their own in an intellectual and automotive way to increase their standard of life \cite{1}.

In case of elder people the most important consideration is their life security. This has becoming more difficult in the many countries because when anyone neglects the health of elderly people, these people becomes poor in health and lack strength. The facilities available in rural areas are very less so the people who live in these areas are moving towards the urban areas i.e. cities.

These types of people become more risky and get disability quickly. Since, elderly people are unable to move from home to hospitals regularly, they want to stay in home for acquiring comfort and secure life \cite{2}.

To overcome these problems and give the secure life to elder people an automated stand-alone monitoring/surveillance method is developed by considering the home as a model which is completely integrated with this environment. However, in case of the concept of turn around computing technologies and surrounded environments, this can be a solution. Contempo in the sense, it is a place that connects the residents, house based appliances, environment services and sensors, medical care givers, family member and allow them to be remotely monitored or accessed. An automated stand-alone surveillance method, which is completely integrated with environment, provides a mechanism to elderly people who live in their own capabilities. So, monitoring of such people can be driven remotely by health service assists such as doctors, care takers, and finally hospitals. Whenever one has the capability of remotely controlling health care services it reduces human resources and reaction time in severe situations and finally this can enhances the betterment for elderly people \cite{3}.

In this work, we have proposed an extended fall detection system using 3-Axial accelerometers. This system works based on the data collected from accelerometer. The proposed system is a prototype and is tested for about 30 participants who are good in health and it exhibits high accuracy, less sensitivity and more specificity than already presented systems and it will be discussed in detail in the coming sections of this paper.

In the next sections we shall discuss about previous works about the system, system architecture cum block diagram, proposed tri-axial fall detection system followed by conclusion.

\section{PREVIOUS WORKS}

Many related and present research projects considered the networks with medical sensors to recognize and trace human activities in everyday life. For the successful fall detection of elderly people, mainly three types of methods are under discussion i.e. firstly wearable device based methods, second vision based methods and finally ambient based methods. These methods will be discussed in the following sections.

\textbf{i. Wearable Device based methods:}

Wearable based methods often depend on smart sensors with embedded system processing. They can be attached to the human body or worn in their clothing, garments or jewelry. Zhang, Ren
and Shi [4] proposed HONEY (Home healthcare sentinel system), a three-step detection scheme which consisted of an accelerometer, audio, image and video clips. Its innovation was to detect falls by taking a 3-axial accelerometer, speech detection, and on-acquiring video. In HONEY, once the fall event was detected, an alert email will be immediately sent and the fall video was uploaded to the network storage for further investigation. Bagallà et al. [5] presented an accelerometer type fall detection algorithm on real world falls. These people found that the sensitivity and specificity on real life falls are much lower than that in an experiment environment. This created interest to researchers to take more real world topics into consideration. Abbatee et al. [6], [7] proposed a fall detection system based on the android/smartphone with effect of the acceleration signal produced by fall-like activities of daily lives.

Baii, Wu and Tsai [8] illustrated a system based on a 3-Axis accelerometer combined in an android/smart phone which is having a GPS function. However, due to high energy consumption of current smart phones, their system could only be active for 40 hours with foreground execution or at most 44 hours in background execution, which means continuation of this system is the most significant problem.

ii. Vision Based Methods:

These methods are often related to spatiotemporal typical qualities, change of present shape, and posture. Yu et al. [9] proposed a vision based fall detection method by applying background subtraction taken from the foreground people body and then post level processing done to improve the result. To detect a fall, information was given back to a directed acyclic type graph vector machine for posture recognition. This system gives report as a high fall detection rate and as well as low false detection rate. Rougier et al. [10] concluded that human shape which is normally formed during a video sequence which is used to track the person’s outline.

iii. Ambience Free Based Methods:

These methods usually relied on pressure sensors, acoustic sensors or even passive infrared motion sensors, which were usually implemented around caretakers’ houses [11]-[13]. Popesu et al. [11] evolved an acoustic-based fall detection system which used an array of acoustical sensors. The fall detection sensors were linear arrays of electorate condensers put on a built in amplifier board. In edict to acquire the entropy of the sound height, the sensor array was located in the Z-Axis. The drawback of this method was that only single person was permitted in the backyard. Winkley, Jiang and Jiang [12] proposed Verity, a 2-component system which had a base station and a direct monitoring device. In this particular system, ambient/skin temperatures were measured for real time monitoring. Experiments asserted that the proposed classifier outperforms the conventional morpheme in its one pass developing and with higher describing potentiality. Yan et al. [13] addressed the sensed trespassing nature of these habilitmen devices by establishing a system that actually did not inevitably involve the user to be donning a sensor, till now able to detect the user’s localization on reflections of fundamental interaction with the home established sensor network. Video established methods are normally to a greater extent accurate than wearable based and ambient based methods. However, these systems often suffer from high risk of privacy and the prohibitive cost implementing the cameras. Thus, wearable sensor based methods are considered in this research.

III. BLOCK DIAGRAM

REPRESENTATION

Fig-1 represents the typical block diagram of the system which is utilized for automated network for elderly people fall detection. It consists of target device as LPC2148 ARM controller and devices connected based on the requirement are GSM, GPS, LCD display, heart beat sensor, accelerometer etc. here, by using the smart phone one can know the condition of the elderly people.

GSM (Global System for Mobile):

The GSM based communication for mobile and Telecommunications Standard Institute (ETSI) describe protocols at the time of second generation (2G) digital cellular networks utilized by mobile phones. The GSM standard have been built-up as an alternate for first generation (1G) analog cellular networks, and originally estimated a digital, circuit switched network optimized for full duplex voice telephony. This was extensive over a time to cover data communications, initially by circuit switched transport, and then it has been moved to packet data transport via General Packet Radio Services (GPRS) and Enhanced Data rates for GSM Evolution or EGPRS (EDGE). Thereafter improvements were developed when the 3G made third generation (3G) UMTS standards continued by fourth generation (4G) LTE Advanced standards. "GSM" is a trademark fessed by the GSM Association. GSM is a cellular network, which signifies that mobile phones connect to it and explore for cells in the bordering area.
Global Position System (GPS):

GPS, formally called as NAVSTAR, is a satellite navigation/routing system utilized for influencing one accurate location anywhere on the earth. A GPS unit takes time signal transmissions from individual satellites, and measures its place by triangulating this information. The GPS was modeled by and is authorized by the United States Department of Defence and it can be used by anybody for free of cost. The cost of managing the system is nearly 400 million dollar per year.

Evaluation uncertainty of the bulk of commercial GPS recipients changes from $10^{-11}$ to $10^{-13}$ on the frequency scale from 100 ns to 50 ns on the time scale, being dependent on the recipients design. The major sources of ambiguity in GPS measurements are the GPS recipient position fault, the orbital fault, the satellite and receiver clock faults, the ionosphere and the troposphere retard, the receiver internal retard, the satellite antenna and cable retard, the receiver noise, and the multipath fault.

IV. PROPOSED SYSTEM

To design and implement the proposed system the code is written in embedded C language, tools used are KEIL and Proteus for testing purpose. In this section we are presenting the Hardware details regarding to the proposed system and how it works based on the elderly person position condition.

4.1. Tri-axial accelerometer:

Here the tri-axial accelerometer used is MMA7361L which takes lower power, and exhibits lower visibility capacitance micro machined accelerometer boasting signal specifying, a one-pole low pass filter, temperature recompensation, self-test, 0G-detect/notice which identifies linear free-drop, and G-Select which permits for the choice among two predispositions. 0G offset and sensibilities are manufacturing factory set and rather require no other devices. The MMA7361L admits a Sleep Mode that draws it saint for hand-held battery provided electronics.
are at 0G. This characteristic offers the application of linear give up-fall protection if the signal is added to an interrupt pin or a punted I/O pins on a microcontroller, here ARM controller.

b) Self (auto)-test:
The sensor offers a self-test lineament that gives the substantiation of the mechanical and electrical unity of the accelerometer at any time earlier or later to installation. This lineament is vital in applications such as hard disk drive protection where system unity should be controlled over the lifetime of the product.

c) Sleep/Slumber Mode:
The 3 axis accelerometer allows a Slumber Mode that is unique for battery controlled products. When Slumber Mode is alive, the device outputs are turned off, furnishing substantial simplification of controlling current. A lower in voltage signal on pin 7 (Sleep/Slumber Mode) will aim the device in this mode and reduction in current to 3 μA. For lower in power consumption, it is suggested to set G-Select to 1.5G mode. By aiming a high input signal on pin 7, the device will restart to normal mode of operation. As for the Filtrating of the 3-Axis accelerometer, it contains an in built one-pole switched capacitor filter. Because the filter is characterized using switched capacitor techniques, there is no need for external passive components (i.e. resistors and capacitors) to set the break-off frequency.

V. EXPERIMENTAL RESULTS

Figure-2 shows the total hardware which is used for the fall detection for elderly people. In the LCD display we can observe the falling condition of the elderly people.

Figure-3: Normal condition
Figure-4 shows the heart measurement of the elderly person, considered for one person.

Figure-4: Heart rate measurement

Figure-5 depicts when the person is front fallen and the LED will display as front fallen and sends the message to assigned mobile.

Figure-5: Front Fall detection

The figure 2-5 shows how the hardware kit display the message in LCD display based on the elderly person position and accelerometer reading. In figure-6, the message to the mobile from this hardware is shown. When the person heart rate crosses the base line then it will immediately send the message to concerned mobile as heart beat has some value. When the persons are front fallen or back fallen the heart will definitely change to high value so this time also concerned person gets the message as front fallen/back fallen. For these three conditions we have written code in embedded C language and checked using the tools KEIL and Proteus.
VI. CONCLUSION

In this work, a sophisticated fall detection system based on 3-axis accelerometer is presented based on the data collected from accelerometer. This system can enhance the accuracy and specificity and reduce sensitivity than the existing systems. So, we can convey that the proposed system can be a best choice for detecting falling conditions of elderly people.

REFERENCES

BREAK FAILURE CONTROLLING USING GSM MODEM AND ALCOHOLIC DETECTION

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Abstract- nowadays, motor vehicle users are abundantly increasing and also these people are suffers from accidents as well vehicle problems due to lack driving experience. In this paper, for providing safe and secure journey for the people, an application has been implemented names as ITS (Intelligent Transport System). This application mainly focused on V2M communication. Whenever, any vehicle has been caused t any danger or it may get any trouble in the parts it will indicates through GSM modem and the trouble description will be sends through text message to the concerned person, then he will operates through his mobile for controlling vehicle in desired manner. Here, for vehicle tracking GPS modem has been utilized and microcontroller is ARM LPC2148.

Key Words- Vehicle tracking, GPS, GSM, ITS, ARM Processor, safety.

I. INTRODUCTION

Presently, human population has been widely increasing and people are preferred for luxury and peaceful life in easy way. So, the lot of people owns their vehicles and travel in those vehicles in longer places also. Since these people doesn’t have any experience in driving so lot of accidents takes place and also vehicles also gets so many troubles in between the journey [1]. From the past years 50% of the people died in road accidents only [2].

When a safety is provided for the vehicle in a desired manner then we will overcome these situations and prevent people from road accidents, another major problem is that vehicle troubles in their parts and no one knows this until problem persists so we need to provide a system for getting an alert message whenever there is any problem [3].

In this work, an application is developed for travelling people and as well as vehicles to overcome the above discussed issues [4]. This application is embedded in a car for exhibiting the desired application. Whenever the vehicle gets into accident or any problem the text message has been sent to concern person mobile, then this message helps the controlling of a car by his/her mobile [5][6].

The rest of the paper is described as follows: section-2 refers to the block diagram for the proposed design; section-3 refers to the hardware implementation of the proposed design followed by the results. Finally, the entire work is concluding with some necessary points.

III. BLOCK DIAGRAM REPRESENTATION

Fig-1 represents the block diagram for the proposed system with the modules such as GSM, GPS and ARM LPC2148 microcontroller.

The LPC2148 microcontrollers is based on a 16-bit-32 bit ARM7TDMI-S CPU with evolved real-time technique and embedded track support, that added the microcontroller with embedded high
speed flash memory starting from 32 Kilo Byte to 512 Kilo Byte. A 128 bit broad memory interfacing and unite accelerator structure enable 32 bit code compile/execution at the highest clock rate. For crucial code size apps, the relative 16 bit thumb mode dismisses code by higher than 30 % with minimal performance penalization. Due to their small in size and lower in power consumption, LPC2148 are unique for apps where highly scaled is a key essential, such as access control and point-of-sale. Serial communications interfaces starting from a USB 2.0 Full Speed Device, multiple UARTs, SPI, SSP to I²C bus and on chip SRAM of 8 Kilo Byte up to 40 Kilo Byte, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and lower end imaging, exhibiting both higher buffer size and high processing power. Various 32 bit timers, single/dual 10-bit ADCs, 10 bit Digital to Analog Converters, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins makes these microcontrollers eligible for industrial operate and medical organizations.

Main feature of LPC2148:
- 8 to 40 Kilobytes of on chip static RAM and 32 to 512 Kilo Bytes of on chip flash program memory data and also 128 bit wide interface or accelerator starts high speed 60 MHz frequency of operation.
- In System Application Programming (ISP/IAP) through on-chip boot-loading software.Single flash sector or full chip removes in 400 ms and programmed of 256 bytes in 1milli second.
- EmbeddedICE Real Time and Embedded Track interfaces offer real time searching with theon-chip RealMonitor software and high speed tracking of instruction execution/evaluation.
- USB 2.0 Full Speed compatible Device Controller with 2 Kilobyte of endpoint RAM. In addition to this LPC2148/6 gives 8 Kilo Bytes of on chip implemented RAM accessible to USB by Direct Memory Access.
- One or more (LPC2144/6/8VsLPC2141/2) 10-bit Analog to Digital converters exhibits a total of 6/14analog inputs, with conversion times as lower as 2.44µs per channel.
- One 10-bit Digital to Analog converter gives variation in analog output.
- Two 32 bit timers external event counters (with four capture and four compare channels each), Pulse Width Modulation unit having of six outputs and acts as watchdog.
- Low power real time clock without dependent on power and dedicated 32 kHz clock input.
- Multiple serial interfaces having two UARTs (16C550), two quick I²C master buses (400 kbps), SPI and SSP with starting and variable information/data length capabilities.
- Vectored interrupt controller with routed priorities and vector addresses.
- Up to 45-5 V portable speedy general purpose In-Out pins in a typical LQFP64 package.
- Up to nine edge or level sensitive outer interrupt pins are available.
- On chip united oscillator controls with an external crystal in starting from 1 MHz to30 MHz and with an external oscillator up to 50 MHz.
- Power saving modes which are having Idle and Power down.
- Individual enable or disable of peripheral functions as well as peripheral clock reducing for additional power minimization.
• Processor wakes up from Power down mode through USB, Brown-OutDetect (BOD), external interrupt or Real-Time Clock (RTC).

• One time power supply chip added with Power-On Reset (POR) and BOD circuits:
  
  CPU operating voltage range of 3.0 V to 3.6 V(3.3 V ± 10 %) with 5 V tolerant I/O pads.

**Fig-3: Buzzer Device**

A buzzer or beeper is an indication device, generally electronic, typical utilization in automobiles, appliances in which microwave oven, or game related. It most generally contains of a number of switches or sensors connect to a operate unit that exhibits and which button was push or a preset time has divided, and normally combines a light on the appropriate button or control panel, and sounds a warning alarim the form of a continuous or sporadic buzzing or beep sound. Initially this device was based on an electromechanical system which was similar to an electric bell without the metal bell. Often these units were organized to a wall or ceiling and used the ceiling or wall as a blowing board. Another important implementation with some AC connected devices was to develop a circuit to engage the AC current into a noise blow enough to drive a loudspeaker and fix this circuit up to a flash 8-ohm speaker. Present days, it is more familiar to utilize a ceramic typepiezoelectric sounder like a Son alert which acts a highpitched tone. Normally these were fixed up to driver circuits which changed the pitch of the sound or pulse the sound on/off. Foremost devices were treated as an electro-mechanical system similar to an electric bell without the metal bell. Similarly, a relay may be added to interruption its own starting current, causing the contacts to buzz. Often these units were organized to a wall or roof to use it as a sounding board. The word "buzzer" comes from the rasping noise that electronic and mechanical buzzers made.

**ALCOHOLIC SENSOR (MQ3):**

Alcoholic sensor is used to find the alcoholic percentage in the human blood. When the percentage of alcohol contain in the is more than the alcoholic sensor activated and it will show the accurate percentage of alcohol present in the blood.

When the alcoholic person blow air through the machine then the alcohol percentage was shown in machine.

**Fig-4: Alcoholic Sensor**

**GSM (Global System for Mobile):**

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Global Position System (GPS):
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A GPS unit takes time signal transmissions from individual satellites, and measures its place by triangulating this information. The GPS was modeled by and is authorized by the United States Department of Defence and it can be used by anybody for free of cost. The cost of managing the system is nearly 400 million dollar per year.

Evaluation uncertainty of the bulk of commercial GPS recipients changes from \(10^{-11}\) to \(10^{-13}\) by the frequency scale, and from 100 ns to 50 ns by the time scale, being dependent on the recipients design. The major sources of dubiety in GPS measurements are the GPS recipient position fault, the orbital fault, the satellite and receiver clock faults, the ionosphere and the troposphere retard, the receiver internal retard, the satellite antenna and cable retard, the receiver noise, and the multipath fault. The frequency dubiety for a GPS recipient is higher than that for Cs-standard by 2-3 orders within a small-time interval (i.e. 1 – 1000 s), and by one govern within a long term separation of about 6-7 days.

III. PROPOSED SYSTEM
In this section, we are presenting the proposed system with hardware modules such as GPS GSM and ARM processor is shown in Fig-3.
The components involved in vehicle tracking system mainly is a GPS tracking/tracing device (transmitter) which is fixed inside the vehicle where it shouldn’t be easily identified by the vehicle thief and hence can’t be dismissed easily. The GPS transmitter transmits signals continuous manner to the monitoring station. Another important module is the GPS server which takes caution of the information/signal reception, stores it securely and gives the information when asked for. Finally the GPS interface or the controlling system is the one which starts the alarm soundthat the vehicle has been theft and instantly provides the tracking process. This GPS interfacing can be provided through mobile phone technologies like that an SMS or an alert alarm call etc. When one noticed that vehicle has been theft, instantly SMS the required code to the required number. This results in switch on the alarm and there after the security agencies can access details like the location of the vehicle, speed etc through the GPS server and can be easily track the vehicle location.

IV. IMPLEMENTATION RESULTS

The proposed system has been verified using the proteus and Keil computer tools and coding is done in embedded C- language.

Fig-6: registering SMS

Fig-6 represents the how the SMS registered in the application and it has been showed on LED as presented above. Whenever theft or trouble occurs in vehicle then the result will automatically store and send to the respective person mobile.

Fig-7: SMS connectivity

Fig-8: sensor position

Fig-9: sending SMS to concern person
From the figure (8-12) shows that the how the alert message has been sent to the concerned person mobile in such a way that the safety can be provided for the people and reduces the road accidents.

IV. CONCLUSION

In this work, the application which can use as a vehicle tracking and troubles identification in a vehicle has implemented and verified with the prototype kit. If one can embedded this design with any car which is having he GPS facility can easily achieve all the advantages and secure and safe journey can be possible.

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Profile:

S. BharathTeja was born in Guntur District, Andhra Pradesh, India in 1991. He received B.Tech Degree in Electronics and Control Engineering from JNT University, Kakinada. Presently he is pursuing M.Tech (Embedded Systems) degree from K.L. University, Guntur A.P., and India. His research interests include real time application in embedded system
INTERNET OF THINGS: SMART HOME USING RASPBERRY PI

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2 (Professor of ECM Department, KL University, India)

ABSTRACT: This paper presents a minimal effort and pliable home control and monitoring system using raspberry pi with IP integration for getting at and controlling the devices using Smart phone or system with the help of a webpage. The proposed framework needs a wi-Fi connection and provides an efficient communication protocol to control and monitor the devices in home with more than switching functionality. To manifest the feasibility and power of this system, we use some devices like light switches, sensor sensing temperature, garage door and a raspberry Pi camera sited at fundamental entryway coordinated with IR sensor to capture the images and sending security alert to the individual.

Keywords - Internet of Things, Optocoupler, Raspberry Pi, Smart home, Thing Speak,

I.INTRODUCTION
Since the last decade, we are aiding in a liberal jump from a non ubiquitious Internet, where users access Internet using personal computer at their home or at work, to the present situation where we get to the Internet using smart phones, PDAs, tabs, at whatever time and at wherever at. In the same way, now comes the time of the Internet of Things (IoT) where not only individuals but also objects surrounding us, are present in Internet[1]. IoT is for the most part considered as associating things to the Internet and using that connection to provide some kind of useful remote monitoring or control of those things. This definition of IoT is limited, it is usually a rebranding of the existing Machine to Machine (M2M) concept. The IoT creates a level headed, inconspicuous network fabric that can be detected, controlled and programmed [2].

In 1990s’ determined Internet wave connected 1 billion users while in the 2000s’ mobile internet wave connected another 2 billion users. The IoT has the potential to connect up to 10X as many (28 billion) “things” to the Internet by the year 2020, ranging from small wearable’s to large vehicles.[3]

A number of considerable innovation changes have met up to empower the improvement of IoT, among them the prices of sensors have dropped off in past 10 years, cost of transmission capacity had been declined by 40x, processing costs have went down by about 60X over the past decade, Smartphone’s now a day’s becoming the ubiquitous Internet, where users access Internet using personal computer at their home or at work, to the present situation where we get to the Internet using smart phones, PDAs, tabs, at whatever time and at wherever at. In the same way, now comes the time of the Internet of Things (IoT) where not only individuals but also objects surrounding us, are present in Internet[1].

Wi-Fi connectivity is also available at a very low cost or for limited price and another important factor is Big data –as IOT will generate more amount of unstructured data, the accessibility of big data analytics is a key facilitator. The well known internet protocol standard IPV4 which supports 32 bit-addresses is aimed to substitute by IPV6 which supports 128 bit addresses that provides 3.4 x 10^38 addresses that means almost innumorous IOT devices can be handled. The devices and appliances in home such as entertainment, lightening the rooms, home security like video surveillance or capturing images, opening the doors and home safety like temperature monitoring, all can be connected to the internet and we can control and monitor the entire home using smart phones.

This paper is a reference of [4] exhibits a low cost and pliable home control and observing system using raspberry pi with Internet Protocol(IP) connectivity for getting at and to control the devices using Smart phone with the help of a webpage. The proposed system needs wi-Fi and provides an efficient communication protocol to control and monitor the devices in home with more than the flipping functionality. We used Thing Speak and flask framework of web services as an application layer because they had the ability of Interoperability that can be incorporated in other applications like connecting cities, metropolitan areas, industries, transportation etc.

The rest of the document is prepared as follows, section 2 will be the related work, section 3 we suggested system architecture, in 4 system implementation and finally some conclusions are presented.

2. RELATED WORK
There has been a substantial increment in home automation in recent years due to higher affordability and advancement in Smart phones and tablets which allow vast range of connectivity. With the introduction of the Internet of Things, the research on home automation and it’s implementation are getting more popular[5].

To strengthen the research study we referred significant amount of literature on smart home and following is a brief analysis of existing systems. The available wired
and wireless technologies which support remote data transfer, detecting, monitoring and controlling are Insteon, IR remote operation, X10, RFID, Bluetooth, wifi and cellular networks have been used to implant several levels of intelligence in house.X10 is oldest home automation standard which uses either wireless or wired technique where transmission of messages occurs at one command and multiple commands is not possible[6].

Z wave protocol is another RF Signal works at 900Mhz and it has range up to 30 mts to access the devices and it accompanies with Rasberry. Cost and network controller are principle issues.[7]

Insteon is other type RF protocol to communicate with the devices [8].

Zigbee is a radio frequency (RF) communication standard based on IEEE 802.15.4. The low installation and running cost offered by ZigBee solve the lavish and complex architecture problems for existing home automation systems.

The Bluetooth based smart home system uses android smart phones without the internet controllability. In this, the devices are connected physically to a Bluetooth sub controller which is accessed and controlled by smart phone which is having built in Bluetooth connectivity, but the scope of the system (maximum 100m) is restricted to mobility and only controlled within the vicinity [9].

The home automation system can also be done using GSM based communication and control the devices using different AT commands [10].

The primary drawback in this system there is no graphical user interface (GUI) and users have to remember various AT commands to govern the appliances. There is also mobile IP based architecture for smart homes without any preparation and testing.[11].

Recently many researchers have also presented using web services like Simple Object Access Protocol (SOAP) and Representational State Transfer (REST) as a practical application layer to remotely access appliances and to control them[12,13].

The major con of REST is long time for development and that of SOAP is less flexibility in creating services and controlling resources. By using Cloud computing techniques controlling of home appliances can be done which was proposed in[16].

The above mentioned technologies have made prominent contributions to the design and development of home automation. The existing works were mainly focused on switching and controlling home appliances only and by using this system, we can remotely monitor the home environment.

3. PROPOSED SYSTEM ARCHITECTURE

For this system we used an open source framework i.e., ThingSpeak [14] an IOT application and API which stores and retrieve the data from the devices using HTTP protocol using Internet. It enables the origination of sensor devices and tracking the devices. By using this, we can solely build IoT applications. This is capable of real time data collection, delivering the data in the form of graphs and charts, and also creates the plug-ins and cooperates with social networks, web services etc. The core element of this is ThingSpeak channel used for storing data. It comprises about 8fields for storing the data. 3 location fields for tracking a moving device like GPS and 1 status field for a message service. ThingHTTP uses Get, Put, Post and Delete commands to display the graph. The other prominent application software is Flask which is a micro framework because it does not presume or force a developer to use a particular library or tool. It doesn’t contain validation and main database abstraction layer or any other existing libraries which provide common functions.

3.1. FEATURES OF PROPOSED ARCHITECTURE

To overcome the above issues of pliability and practicality from literature survey, we developed and implemented a smart home monitoring system using RESTful based webservises. The proposed system consists of microwavebserver implemented using Flask web framework [15] uses python scripting. The flask software was installed on the sdcard. The architecture can be modified according to our resources, when a new device is to be added ,the web server can be updated and the device can be controlled. By usage of REST, the web page will be automatically updated.

Before that in this we have an authorised login page for house owners to remotely access and control the devices using wifi or 3G/4G supported smart phones. We draw a 5 layered architecture for IoT smart home consists of web page for controlling the devices, ThingSpeak and Flask frameworks for accessing the data. Network layer comprises of TCP/IP and IPv6 protocol, gateway device as Raspberry Pi and finally the devices (sensors and actuators) comes under physical layer. This 5 layered architecture is further divided in to 3 layers as Remote environment, Home gateway and Smart Home environment.

4. SYSTEM IMPLEMENTATION:

The proposed system architecture consists of 3 main modules like software package, micro web server, and hardware interface modules. To demonstrate the effectiveness of the system, the underneath is flow chart.

4.1 Software development for Home gateway: For entire architecture of the system, Software of this system can be described by mainly 2 stages. Server application and microcontroller firmware software. The server application software is nothing but Flask framework which is combination of both server and
firmware application i.e, it is used to create a webpage and to send and receive commands using the software basically it is made up of RESTFUL sources.

Here the FLASK goes about as a middleware between hardware and software. The webpage was created by HTML and can be formed dynamic webpage which is used to control and monitor the devices. Here to get the connectivity for wifi we need to configure the wifi device by using sudo nano /etc/network/interfaces to get the available wifi networks. So by using username and password the wifi will be accessed and a corresponding IP address is generated after the reboot of system occurs.

![Fig-3 Login page](image)

The Home Gateway once started enters the configuration stage. Amid the arrangement organize the Ethernet module secures association with Local Area Network (LAN) using a static IP address. To optimize the process of connection, we have used static IP address rather than acquiring an IP via Dynamic Host Configuration Protocol (DHCP). Once the Home Gateway has been initialized, it enters into an idle state until any command is received from the remote user. Upon successful reception of commands as strings from the Smart phone app, it’s decoded and appropriate control action is taken. These actions can be either actuation or sensing. In other side we need to create a webpage using HTML, a login page will be created to enter the admin details and next the page will be directed to smart home controlling devices page where we can see the list of devices and display of temperature chart. When the functionality of input command is done then the webpage will be updated according to the status of the devices. For example if device 1 is switched on, it will show the device 1 is in on state with the goal that user can comprehend the picture of the entire devices present in the house.

![Fig-4 Flow chart](image)

4.2 HARDWARE IMPLEMENTATION

The raspberry pi was used as a micro web server for the home gateway. First the Raspberry pi should be ported with Rasbian OS [17]and then install the python dev for development. Then setup the wifi configuration .The electronic components used are LM35 [19] for temperature measurement is interfaced with mcp3002 which is used to traverse the data between the lines from sensor to RPi and then upload the data to the webpage for displaying the temperature graph.

![Fig-5 Temperature Graph](image)

A Pi camera is installed on the device and camera python drivers are installed to the sdcard. Now the AC loads are driven using TRIAC board. The purpose of triac board is drive the loads 230 v and of power less than 350 Watts using optocouplers (18).There is an IR circuit which is used for detection of the person, when it recognises an obstruction, the IR circuit is enacted and then it sends the command to the PI camera to capture the images and then the captured pictures are sent to the raspberry pi and will transfer the pictures to the specified persons email. So that he can track the guest who visits their homes as a security alert. In order to open/close the garage door or main door of the house using the open/close in webpage. To close/open the door, a DC motor is required and interfaced with the pi using L293D current driver to run the motor. There is a parallel current divider circuit also to provide the required power supply to the components.
Fig 6-Block diagram

5. Results: Here the loads are controlled using webpage listed as below. The load 2 is controlled by clicking the command.

By using Pi camera, images are captured and are sent to the users e-mail.

6. CONCLUSION

In this paper, a novel architecture and pliable smart home control and monitoring system using Smart phone or pc using webpage is proposed and implemented. The presented architecture uses Flask, a RESTFUL based web services and ThingSpeak which is used for real time data collection and data processing for displaying temperature. Any Smartphone or PC, laptop, Tab with inbuilt wife connectivity used to get to and control the devices at home from any place out of the home environment. The simple, efficient, less complexity, minimum hardware, a smart home is implemented. Future works will concentrate on minimising the hardware complexity and increases the productivity of framework and making reliable and make easy using voice commands to control the devices.

REFERENCES


Hybrid Region-Adaptive Dual Image Watermarking Technique For Color Images

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ABSTRACT: Now-a-days due to the great developments in computer technology, transmission of multimedia data over the internet is gradually increasing. The protection of multimedia information such as audio, video, images and prevention from unauthorized manipulation has become an important issue because of easy editing and perfect recovery. The aim is to protect the copyrights of such publicly exposed or broadcast data. Watermarking is most popular technique for providing the security of multimedia data.

Digital watermarking technique is one of the best solutions to prevent illegal copying, modifying and redistributing multimedia data. Digital watermark hides the information that may be in any form like text, image, audio, and video in an original image without reducing its visual quality. It can be done by embedding the secret data into a host image which is invisible to humans. There are different digital image watermarking techniques [1] like DWT, DCT, and SVD for better embedding and extraction watermark data from host image. These techniques give better robustness but are susceptible to most of attacks.

The main objective of majority of research in this area is the improvement in robustness to attack. In this paper a novel region adaptive dual image watermarking approach is proposed for color images [2] which use discrete wavelet transform (DWT) [3] and singular value decomposition (SVD) [4] techniques (hybrid) techniques. Instead of using entire host image, watermark is embedded on different regions of the host image using a combination of DWT & SVD techniques by which the frequency spectrum of watermarked image is similar to that of host image. This technique provides the improved robustness of watermark data and is more susceptible to image processing attacks.

Keywords - Digital Watermarking, Copyright protection, Region-Adaptive, Discrete Wavelet transform, Singular Value Decomposition.

I. INTRODUCTION

In recent times, the era of communication over internet is growing rapidly. Creation and transmission of digital data from one point to another point is very fast through internet i.e. billions of bits of data is transmitted in every fraction of second. The process of doing illegal operations such as forgery, redistribution, modification and duplication of information is very easy and fast. The major problem for protecting the intellectual property of the ownership became an urgent matter. Digital watermarking is key solution for transferring the data in secure way from illegal interferences and also used to protect copyright laws and authors authentication. Digital watermarking (DWM) is a technique that embeds a necessary unique piece of information within a medium without noticeably altering the medium. It is complementary to encryption process which can be used for many purposes such as broadcast monitoring, identification, data authentication and copyright protection. There are numerous applications in using watermarking technique and its basic properties depends on the type of the application used [5].

Watermarking technology is broadly classified into two main categories. The first category is the type of the domain in which the watermark is embedded. This is further divided into two types namely transform domain and spatial domain watermarking. The most popular transform domain techniques are Discrete Fourier Transform (DFT), Discrete Cosine Transform (DCT), Discrete Wavelet Transform (DWT), and recently Singular Value Decomposition (SVD) [6], whereas, the most popular algorithm in spatial domain is the Least Significant Bit method (LSB) [7]. Watermarking in transform domain is performed by modifying the transformed coefficients of the host image. On the other hand, spatial domain watermarking is done by directly modifying the pixel characteristics or values of the original image.

The second category is based upon type of the information required in the process of extraction. This category is again divided into two type’s namely visible (non-blind) and invisible (blind) watermarking. In order to detect and extract the watermark data in visible watermarking, both the host image and watermarked image are required. On the other side, in-visible watermarking requires only the host image to extract or retrieve the watermark data.
The process of digital image watermarking is done in three phases, namely embedding, transmission and extraction. In the first step, the watermark data is embedded into the original image using an encryption algorithm or a key which is similar to encoding process. The output is the watermarked image and it is transmitted via medium to the recipient in the second step. During transmission, the output is subjected to different types of attacks due to noise or any transmission error and it is not sure that the recipient should receive the correct data. And the third step is extracting the hidden information from the received data using decryption key or any algorithms.

This paper presents a region adaptive novel hybrid watermarking technique which works by adaptively embedding the color watermark data into selected regions of the colored host image. To facilitate this, the technique utilizes dual watermarking technologies like DWT, SVD, thereby robustness has to been improved as more and it can withstand to image processing attacks, geometric attacks etc.

II. LITERATURE REVIEW

Many of the researchers have proposed their views about the development of methods in digital watermarking technology. A brief review about those methods was discussed here.

Chunlin Song et al., [8] conducted an experiment to test the robustness among different techniques and was described in his paper ‘recent advances in classification of digital image watermarking’. The three watermarking techniques such as LSB (Least significant bit) method, DCT (Discrete cosine transform) and DWT (Discrete wavelet transform) are taken to embed the Lena image into Hat image and performance among these are measured using PSNR (Peak signal to Noise Ratio) when the 3 techniques are subjected to 4 attacks like sharpen, blur, histogram equalization and Gaussian noise etc.

SVD based digital watermarking system is found out by S. Ramji Sheriff et al., [9]. Singular value decomposition technique is a mathematical tool widely used in numerous applications such as signal processing and image processing. This is the recently proposed technique that modifies the singular values or pixels values or the transformed coefficients of the data. This technique is used to diagonalizable matrices in numerical analysis. Any matrix under SVD is decomposed into 3 sub-matrices one diagonal and two orthogonal matrices. Diagonal matrix represents the luminance or color intensity of the image, while the orthogonal matrices represent the geometry of an image. Sheriff describes the process in two steps. In the first step, the cover image is divided into smaller blocks and SVD technique is applied to each block to select the regions where the watermarks are embedded. The second step is used to extract the watermark image from watermarked image. The SVD based digital watermarking system is as shown in figure 1.

A novel region based image watermarking is introduced by Athanasios Nikolaidis & Ioannis Pitas [10], for encoding & decoding the giant watermark in large image under spatial domain in DWM system. This is based on segmentation and locating the image in the regions that are more robust to different image processing attacks. He describes that most of the proposed techniques are failed in providing robust behavior because they attempted to face the image, audio, video signal in a global sense, without exploiting their local characteristics. When a watermark is embedded on the entire image several attacks like scaling, cropping effects the watermark data resulting the distorted image because no reference points exists used for finding the scaling, rotation or cropping. He suggested an idea that instead of taking the entire image a robust and desired region is chosen by using segmentation and adaptive clustering technique. This can be approximated by ellipsoids whose bounding rectangles are chosen as embedding area for watermark.
III. PROPOSED METHOD

1. Embedding Process

The hybrid region-adaptive dual image watermarking technique presented in this paper works by embedding the two colored watermark images into a color host image using DWT and SVD techniques. Of those two watermark images, one is the high frequency (HF) image and another one is the low frequency (LF) image. The procedure works as follows; first take the RGB host image and is converted into YCbCr color image, because the latter image has higher imperceptibility and more robust than former image. The YCbCr color image consists of mainly three entities, the first one is the luminance termed as ‘Y’, the second one is blue chrominance which is termed as ‘Cb’ and the third is red chrominance termed as ‘Cr’. After converting into YCbCr, ‘Cb’ component is preferably taken due to its less sensitivity to human visual system (HVS).

Next, apply the canny edge detection technique on the ‘Cb’ component for choosing the quadrant which contains more number of edges. The quadrant which is selected undergoes segmentation and partition using quad tree partition algorithm. This algorithm divides the selected image into four blocks of equal sizes to check whether the blocks meet the homogeneity principle. If the block satisfies the condition, it could not be further divided otherwise it is again subdivided into four blocks.

Before partitioning, segmentation is applied for that selected image. It divides the image into different segments in which the pixel characteristics of the each segment of the selected image should be homogenous. With this segmentation and partitioning process identification of low frequency regions and high frequency regions are yet simple and this information is required for watermark images partition based on that region of interest (ROI) data. High frequency regions have lot of abrupt and tonal transitions whereas for low frequency regions tonal transitions are relatively constant. Discrete wavelet transform is applied to the output of the partitioned home image, produces LL, LH, HL and HH sub-bands. Next, SVD technique is applied to the LH component coefficients of the DWT output.

Secondly, the high frequency and low frequency watermark images are converted into YCbCr color images. Apply partitioned technique for those images. The both watermark images are partitioned into block based squares of different sizes. The size of these watermark images blocks should beequal to the block size of host image and are paired with the ROI of host image. Apply SVD technique to the partitioned watermark images. Both the outputs are then paired and modify the singular values based on ROI. Finally the output which is in YCbCr color image is again converted into RGB image. Therefore the obtained result is the watermarked image. The embedding process of the proposed technique is shown in the below figure 2.
2. Extraction Process

For the extraction of watermark images, the original un-watermarked host image is required to calculate the region of interest of the watermarked image. This process is similar to the first five steps of embedding process discussed earlier. The output of the fifth step is the partitioned image with sizes of blocks corresponding to ROI which will be used watermarked image partition.

Apply DWT technique for the partitioned host image. Then SVD transformation is applied to the LH sub-band of the DWT output of host image and partitioned watermarked image. The watermark images can be obtained by simply subtracting the un-watermarked host image SVD coefficients from those of the SVD coefficients of watermarked image for each region of interest. Therefore the watermark images obtained in the YCbCr color image are converted to the RGB color space.

The output is the original high frequency and low frequency watermark images. The extraction process of region based dual watermarking process is shown in below figure 3.
3. CONCLUSION

In this paper we have presented the novel hybrid watermarking technique with a region adaptive approach. Our technique utilizes the no. of technologies like DWT and SVD, image segmentation and partition algorithms in order to embed and extract the color images from the host image. The proposed methodology may be more robust and gives good results as compared to other existing technologies. We hoped that our proposed method used for ongoing research and will be implemented soon.

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