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Intelligent Safety & Location Tracking Device for Old Age & Women Using Concept of “Internet of Things”

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ABSTRACT: Although much of the work has been done until today to realize the Internet of Things (IoT) into practice, most of the work focuses on resource-constrained nodes, rather than linking the existing embedded systems to the Internet of Things (IoT) network. Recently many cases of missing women between ages 18 and 35 years are reported. In order to enhance women security, a system is proposed to allow tracking of women from origin to destination. This paper is about developing a tracking device using the concept of Internet of Things (IoT); now Internet of Things (IoT) is big support which will give platform to connect every device using the cloud, where different devices can connect with one single device through the channel of internet.

In this work we will use ARM-LPC2138 as microcontroller at virtual level using proteus 8 tool and for GPS (Global Positioning System) we will use S1216R module and GPRS (General Packet Radio Service) module is SIMCOM900A. In this thesis we will create one server which will collect all the data which is generated by our prototype system and send to server by using GPRS (General Packet Radio Service). This server is developed by using filezilla tool; we will also create a web page using ASP. This device can easily do live tracking of any person and save them self by using this concept.

KEYWORDS: IoT, ARM, GSM, GPS, GPRS, Server, SIMCOM, SOS.

I. INTRODUCTION

The Internet of Things (IoT) is a concept which is outcome of the merged field of computer science and electronics. IoT describes how everyday life objects will interact and communicate with other objects over the internet. In IoT objects are equipped with microcontroller and sensor devices and various software application and suitable protocol stack enable them to talk to other objects. The objects in IoT can be any “thing” such as people, devices, animal, building, vehicle or any physical thing which is part of our daily life. IoT is everything-to-everything communication. In general IoT can be described as a combination of Sensors, Connectivity and People & Processes. IoT combines smart devices with smart services to create compound applications for example intelligent transportation, smart cities, smart healthcare, smart home, smart building, digital farm, smart agricultural etc. IoT delivers on demand real-time services and assists in saving time, resources and even manpower. This comprehensive literature review explores the impact of IoT technology in several fields.

The essential idea of the Internet of Things (IoT) has been around for nearly two decades, and has attracted many researchers and industries because of its great estimated impact in improving our daily lives and society. When things like household appliances are connected to a network, they can work together in cooperation to provide the ideal service as a whole, not as a collection of independently working devices. This is useful for many of the real-world applications and services, and one would for example apply it to build a smart residence; windows can be closed automatically when the air conditioner is turned on, or can be opened for oxygen when the gas oven is turned on. The

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idea of IoT is especially valuable for persons with disabilities, as IoT technologies can support human activities at larger scale like building or society, as the devices can mutually cooperate to act as a total system. So far, much work has been done on realizing the IoT into practice [5].

A. INTERNET OF THINGS

We're entering a new era of computing technology that many are calling the Internet of Things (IoT). Machine to machine, machine to infrastructure, machine to environment, the Internet of Everything, the Internet of Intelligent Things, intelligent systems-call it what you want, but it's happening, and its potential is huge. Depending on who you talk to, the Internet of Things (IoT) is defined in different ways, and it encompasses many aspects of life-from connected homes and cities to connected cars and roads (yes, roads) to devices that track an individual's behavior and use the data collected for "push" services. Some mention one trillion Internet-connected devices by 2025 and define mobile phones as the "eyes and ears" of the applications connecting all of those connected "things." Depending on the context, others give examples that are less phone-centric, speak of a class of devices that do not exist today or point to Google's augmented-reality smart glasses as an indication of things to come.

A quick Internet search highlighted the following example use cases/applications under consideration:

- Machine-to-machine communication
- Machine-to-infrastructure communication
- Telehealth: remote or real-time pervasive monitoring of patients, diagnosis and drug delivery
- Continuous monitoring and firmware upgrades for vehicles
- Asset tracking of goods on the move
- Automatic traffic management
- Remote security and control
- Environmental monitoring and control
- Home and industrial building automation
- "Smart" applications, including cities, water, agriculture, buildings, grid, meters, broadband, cars, appliances, tags, animal farming and the environment to name a few[6].

B. THE STRUCTURE OF THE INTERNET OF THINGS

The Internet of Things can be viewed as a gigantic network consisting of sub-networks of devices and computers connected through a series of intermediate technologies where numerous technologies such as RFID, barcodes, and wired and wireless connections may act as enablers of this connectivity. Under the International Telecommunications Union (ITU), the perception of the IoT was structured as 4 dimensions of things, as illustrated in Figure 1 [16, 17].

i. Tagging Things

Real-time item traceability and addressability of RFID is what makes it stand at the forefront in terms of the IoT vision. RFID is gaining strong support from the business community due to its maturity, low cost, and low power. RFID acts as an electronic barcode to help in the automatic identification of anything attached. RFID tags are available in 2 types: active and passive. The active tags embedded within the battery on-board are widely used in retail, healthcare, and facilities management. The passive tags, containing no batteries, are powered by the reader and are more likely to be used in bank cards and road toll tags [18].

ii. Feeling Things

Sensors act as primary devices to collect data from the environment. Necessary data is provided via communications established between the physical and the information worlds [19]. Recent advances in technologies make them consume less power with low cost and high efficiency.

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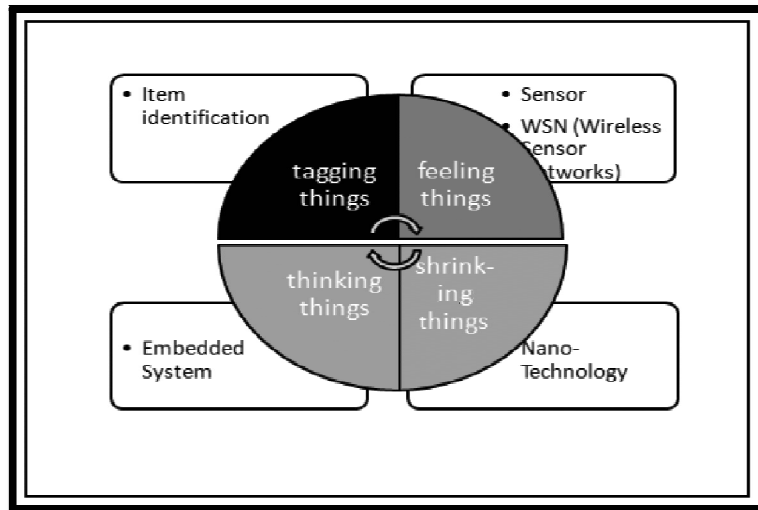


Fig.1 Four dimensions for the IoT (ITU)

iii. Shrinking Things

Miniaturization and nanotechnology has provided the ability for smaller things to interact and connect within the “things” or “smart devices”. A clear advantage is the improvement in the quality of life. For example, the application of nano-sensors for monitoring water quality at reduced cost, and nano-membranes for assisting in the treatment of waste water [19]. In healthcare, its application can be seen in the diagnosis and treatment of diseases, including the diagnosis of HIV and AIDS, and in the prescription of nano-drugs for other diseases [20].

iv. Thinking Things

Embedded intelligence in devices through sensors has formed the network connection to the Internet. It can make domestic electric appliances realize intelligent control, for example refrigerators that can detect the quantities of various items and the freshness of perishable items. Embedded smart sensors may provide the means to communicate with users by sending alerts via the Internet connectivity. The connection can primarily be wireless or any other available communication, such as DSL, GPRS, WiFi, LAN, and 3G [21]. Smart things must not only communicate but must also be able to “...process information, self-configure, self-maintain, self-repair, make independent decisions, or even play an active role in their own disposal...” [19] which will change the way information is communicated from human-human to human-thing and to thing-thing.

II. LITERATURE REVIEW

Real-time tracking and management of vehicles has been a field of interest for many researchers and a lot of research work has been done for tracking system. Recently the various anti-theft modules like steering wheel locked equipment, network tracking system and traditional electronic alarm are developed along with client identification and real time performance monitoring. The paper presented by El-Medany, W.; Al-Omary et al describes a real time tracking system that provides accurate localizations of the tracked vehicle with low cost. GM862 cellular quad band module is used for implementation. A monitoring server and a graphical user interface on a website is also developed using Microsoft SQL Server 2003 and ASP.net to view the proper location of a vehicle on a specific map. The paper also provides information regarding the vehicle status such as speed, mileage [1]. Hu Jian-ming; Li Jie; Li Guang-Hui describes an automobile anti-theft system using GSM and GPS module. The system is developed using high speed mixed type single-chip C8051F120 and stolen automobile is detected by the use of vibration sensor. The system remains in contact with automobile owner through the GSM module, for the safety and reliability of automobile [2]. Fleischer, P.B.; Nelson et al describes development and deployment of GPS (Global Positioning System)/GSM (Global System for Mobile Communications) based Vehicle Tracking and Alert System. This system allows inter-city transport companies to track their vehicles in real-time and provides security from armed robbery and accident occurrences [3]. Le-Tien, T.; Vu Phung describes a system based on the Global Positioning System (GPS) and Global System for Mobile

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Communication (GSM). It describes the practical model for routing and tracking with mobile vehicle in a large area outdoor environment. The system includes the Compass sensor-YAS529 of Yamaha Company and Accelerator sensor-KXSC72050 of Koinix Company to acquire moving direction of a vehicle. The system will acquire positions of the vehicle via GPS receiver and then sends the data to supervised center by the SMS (Short Message Services) or GPRS (General Package Radio Service) service. The supervised center comprises of a development kit that supports GSM techniques-WMP100 of the Wavecom Company. Finally, the position of the mobile vehicle will be displayed on Google Map [4]. Internet of Things (IoT) is a concept and a paradigm that considers pervasive presence in the environment of a variety of things/objects that through wireless and wired connections and unique addressing schemes are able to interact with each other and cooperate with other things/objects to create new applications/services and reach common goals. In this context the research and development challenges to create a smart world are enormous. A world where the real, digital and the virtual are converging to create smart environments that make energy, transport, cities and many other areas more intelligent. The goal of the Internet of Things is to enable things to be connected anytime, anyplace, with anything and anyone ideally using any path/network and any service. Internet of Things is a new revolution of the Internet. Objects make themselves recognizable and they obtain intelligence by making or enabling context related decisions thanks to the fact that they can communicate information about themselves and they can access information that has been aggregated by other things, or they can be components of complex services [7].

In Al-Suwaidi and Zemerl work the problem was solved by proposing an application "Locating Friends and Family Using Mobile Phones with Global Positioning System (GPS)". The architecture of the system is based on clientserver approach. The client phone registers and login into the server. Then, the client periodically sends his coordinate location updates to the server which stores it in a database. Thus, any client wishes to learn the location of another client will have to register and login to the server to request the location. This application was developed to help locate family member and friends. The mobile application was implemented using J2ME. As for the server, it uses MySQLDatabase along with PHP to guarantee that the server would not be overloaded. This proposed solution makes each client has same control and command privileges as the other which is not convenient for use in child tracking application where only the parent should have the control and command privileges. A limitation of this solution is that in order for the system to work there must be internet connectivity in both client and server side [8].

A vehicle tracking is a prerequisite of the most basic function in all fleet management systems. A fleet management is the management of a company's transportation fleet. The fleet management system aims at improving the quality and efficiency of the industry by identifying major obstructions on the road and tracking real-time locations of their fleet on a map. Most of the vehicles tracking systems are designed by using GPS/GSM technology. In vehicle tracking systems, a vehicle location is one of the most important components. The location and time information anywhere on earth is provided by using GPS technology. For wireless data transmission, GSM and SMS technology are commonly used. The SMS technology through GSM network and GSM modem provide a user with vehicle location information. Utilization of SMS technology has become popular because it does not require much cost. It is convenient and accessible way of transferring and receiving data with high reliability. Instead of using SMS, the proposed vehicle tracking system uses the Smartphone application to track and monitor a vehicle location obtained from the in-vehicle tracking device controlled by a microcontroller. The vehicle location is automatically placed on Google maps, which make it easier for tracking a vehicle and provides users with more accurate vehicle location information [9].

Stand-alone GPS units have decreased rapidly in both price and size over the past several years. Recently, new models have dropped to sizes wearable in a wristwatch capacity. This change enables several new interesting use cases. Our proposal is the use of stand-alone GPS chips alongside several other off-the-shelf embedded development components to create a GPS-based statistical wristwatch for runners. Some existing products which aim at a similar use utilize accelerometers to gather data such as velocity. A GPS-based, watch-sized device could deliver more consistent, higher precision velocity data as well as location data. Runners could then potentially view this data to compete with themselves for their best time up a particular hill, or identify new popular routes used by local runners. Several current solutions exist for runners who desire the functionality our proposed device offers. Commercial vendors provide GPS devices marketed to runners which allow for the upload of data via USB to a proprietary system and offer many additional features in a higher price range. Cellular phones are often the bane of specialized devices, and applications exist which provide GPS-based running data. Our proposed system differs from existing commercial solutions by placing an emphasis on the secondary use-case rather than the immediate. Specifically, our device will first and foremost serve to collect data for later upload to be viewed more leisurely, and provide a sparse interface for the

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runner's immediate use. The proposed design integrates social features allowing for the sharing of running routes and comparison of times over specific routes. The wrist device will be constructed in a less proprietary and more modular manner: the user can have direct access to the data or use it in conjunction with any popular existing web solution that provides communal running services, allowing for integration of data with runners who utilize cellular phone services or other hardware, rather than being tethered to a system exclusive to a single hardware solution. Our product could appeal to users who currently use cellular phones as a GPS solution for running. The device would offer a more rugged and task-appropriate solution than cellular phones, which are potentially too large to comfortably wear and too expensive to comfortably risk [10].

III. EXISTING SYSTEM

Various GPS-based tracking systems have been successfully deployed and utilized in various applications such as fleet and vehicle location identification, and in route guidance. Recently, systems that integrate GPS and GSM technologies with Google earth to provide real-time data have also been proposed. However, for indoors and closed environments, GPS systems fall short and it becomes difficult to acquire the necessary satellites for accurate position computation. Some of the alternate techniques that are proposed for indoor location tracking include the integration of Bluetooth technology with 3G networks. The proposed solution suggests that Bluetooth terminals can exchange information with each other and then a Bluetooth. Access point provides the interface to a mobile network. In their solution they presumed that Bluetooth fixed infrastructures are expected to be installed in offices, homes and public areas which are not the case nowadays. The implementation of mobile indoor applications that delivers maps and linked database information to indoor wireless devices such as mobile, phones and PDAs. Users would then interact with the web pages on their phones while viewing floor plans around their current location, searching for an office or a classroom.

A. DRAWBACKS

Many authors developed Tracker device or safety devices. But these devices are too much expensive. Some were fail to choose good MCU. Due to wrong chosen MCU, they got some difficulties in serial communication between MCU and GPS module. So they were getting wrong location from GPS. Also here we are using two antennas for one for GSM and one for GPS. So here impedance matching between GSM/GPS module and Antenna is most important. Otherwise accuracy of GPS may be less. Also communication between server and device is fast and accurate. These critical cases we have to maintain during of make the prototype.

IV. SYSTEM OVERVIEW

A. GPS OVERVIEW

The Global Positioning System (GPS)[25] is a space-based global navigation satellite system (GNSS) that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth when and where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible by anyone with a GPS receiver. The GPS project was started in 1973 to overcome the limitations of previous navigation systems, integrating ideas from several predecessors, including a number of classified engineering design studies from the 1960s. GPS was created and realized by the U.S. Department of Defense (USDOD) and was originally run with 24 satellites. It became fully operational in 1994.

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Fig.2 GPS Module

The S1216 family is state-of-the-art global navigation satellite system receivers capable of using GPS, GPS/Beidou, or GPS/GLONASS signal under the same footprint. User can upgrade from GPS navigation system to GPS/Beidou or GPS/GLONASS dual-satellite navigation systems by choosing appropriate model type without hardware redesign. The –BD12 and –GL12 entry level models offer dual-satellite navigation capability, tracking up to 12 GPS/Beidou or 12 GPS/GLONASS signals combined respectively. Its NMEA output is the same format as GPS receivers, thus users can effortlessly upgrade GPS product to GPS/Beidou or GPS/GLONASS product without needing modification on the application software. The –BD and –GL standard models tracks up to 24 GPS/Beidou or 24 GPS/GLONASS satellite signals combined respectively. Dual-satellite navigation receiver module receives greater number of satellites than available for GPS-only receivers. The increased satellite number offers superior performance in challenging urban canyon and multipath environments. The S1216 module contains SkyTraq Venus 8 positioning engine inside, featuring high sensitivity for indoor fix, low power consumption, and fast TTFF. The superior -148dBm cold start sensitivity allows it to acquire, track, and get position fix autonomously in difficult weak signal environment. The receiver's -165dBm tracking sensitivity allows continuous position coverage in nearly all application environments. The high performance signal parameter search engine is capable of testing 16 million time-frequency hypotheses per second, offering industry-leading signal acquisition and TTFF speed. The S1216 module contains LNA for easy integration with passive antenna and a SAW filter for increased jamming immunity. It works with both passive and active antenna; the self-contained antenna detection and short circuit protection feature enables lowest integration cost for system integrators using active antenna.

B. GSM OVERVIEW

Global System for Mobile Communications or GSM (originally from Group especial Mobile) [26], is the world's most popular standard for mobile telephone systems. The GSM Association estimates that 80% of the global mobile market uses the standard [27]. GSM is used by over 1.5 billion people [28] across more than 212 countries and territories [29]. This ubiquity means that subscribers can use their phones throughout the world, enabled by international roaming arrangements between mobile network operators. GSM differs from its predecessor technologies in that both signaling and speech channels are digital, and thus GSM is considered a second generation (2G) mobile phone system. The GSM standard has been an advantage to both consumers, who may benefit from the ability to roam and switch carriers without replacing phones, and also to network operators, who can choose equipment from many GSM equipment vendors. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz's/GPRS RS232 Modem from rhydoLABZ is built with SIMCOM Make SIM900 Quad-band GSM/GPRS

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engine, works on frequencies 850 MHz, 900 MHz, 1800 MHz and 1900 MHz. It is very compact in size and easy to use as a plug-in GSM Modem. The Modem is designed with RS232 Level converter circuitry, which allows you to directly interface PC Serial port. The baud rate can be configurable from 9600-115200 through AT command. Initially Modem is in Auto baud mode.

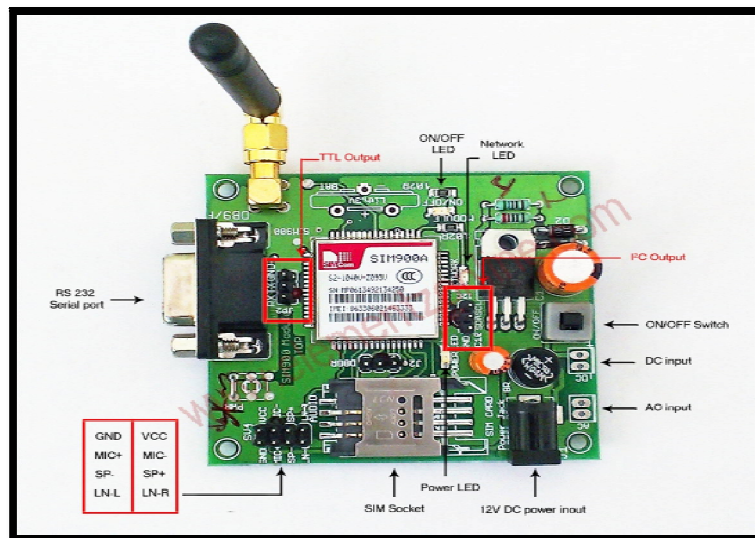


Fig.3 GSM MODULE(SIM900A)

This GSM/GPRS RS232 Modem has an internal TCP/IP stack to enable you to connect with the internet via GPRS. It is suitable for SMS as well as DATA transfer applications in M2M interfaces. The modem needs only 3 wires (TX, RX, and GND) except power supply to interface with a microcontroller/Host PC. The built-in Low Dropout Linear voltage regulator allows you to connect a wide range of unregulated power supply (4.2V -13V). Yes, 5V is in between. Using this modem, you will be able to send & Read SMS, connect to the internet via GPRS through simple AT commands.

C. ARM OVERVIEW

ARM7 is one of the widely used micro-controller families in embedded system applications. This section is a humble effort for explaining basic features of ARM-7. ARM is a family of instruction set architectures for computer processors based on a reduced instruction set computing (RISC) architecture developed by British company ARM Holdings. A RISC-based computer design approach means ARM processors require significantly fewer transistors than typical processors in average computers. This approach reduces costs, heat, and power use. These are desirable traits for light, portable, battery-powered devices including smart phones, laptops, tablets and notepad computers, and other embedded systems. A simpler design facilitates more efficient multi-core CPUs and higher core counts at lower cost, providing higher processing power and improved energy efficiency for servers and supercomputers. In 2005, about 98% of all mobile phones sold used at least one ARM processor. The low power consumption of ARM processors has made them very popular: 37 billion ARM processors have been produced as of 2013, up from 10 billion in 2008. The ARM architecture (32-bit) is the most widely used architecture in mobile devices, and most popular 32-bit one in embedded systems. The LPC2131/32/34/36/38 microcontrollers are based on a 16/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine the microcontroller with 32 kB, 64 kB, 128 kB, 256 kB and 512 kB of embedded high-speed flash memory[30].

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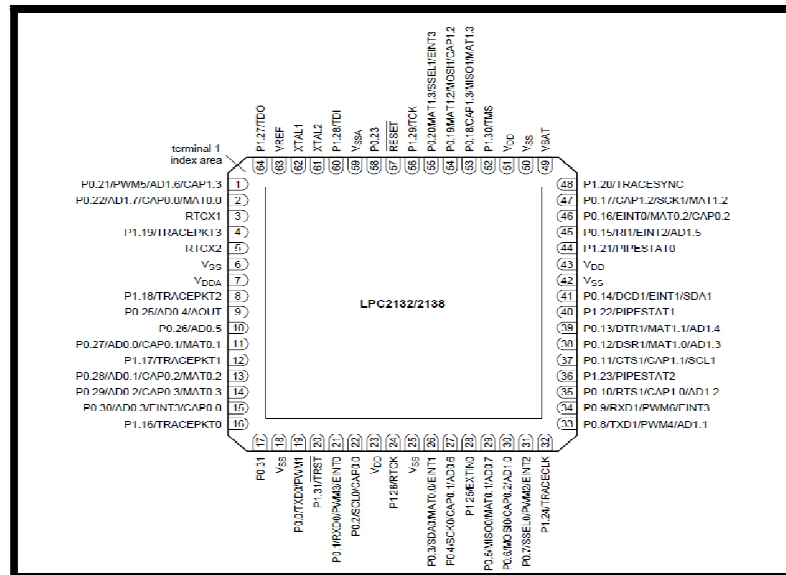


Fig.4 ARM 7 series LPC 2138 MCU Pin Diagram

D. CLOUD COMPUTING

With millions of devices expected to come by 2020 [22], the cloud seems to be the only technology that can analyze and store all the data effectively. It is an intelligent computing technology in which number of servers are converged on one cloud platform to allow sharing of resources between each other which can be accessed at any time and any place [23]. Cloud computing is the most important part of IoT, which not only converges the servers but also processes on an increased processing power and analyzes the useful information obtained from the sensors and even provide good storage capacity [24]. But this is just a beginning of unleashing the true potential of this technology. Cloud computing interfaced with smart objects using potentially millions of sensors can be of enormous benefits and can help IoT for a very large scale development so researches are being carried out since IoT will be totally dependent on the Cloud Computing.

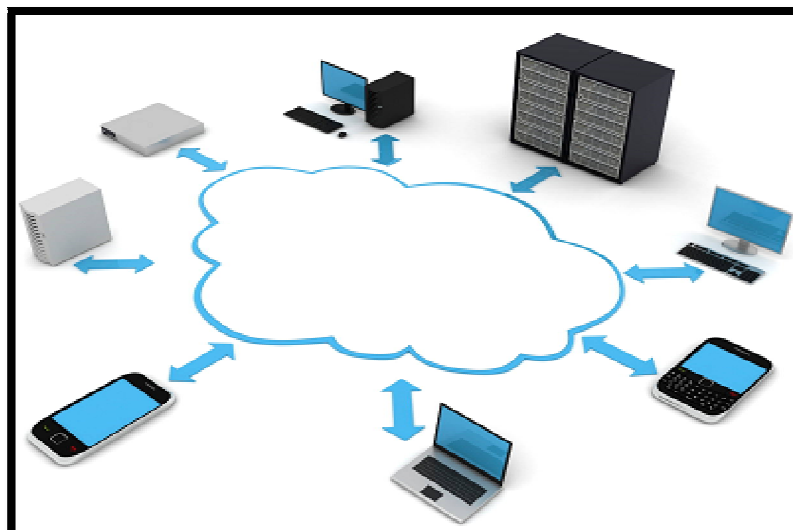


Fig.5 A typical Cloud Computing Scenario

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A server is a computer program or a machine that waits for requests from other machines or software (clients) and responds to them. A server typically processes data. The purpose of a server is to share data or hardware and software resources among clients. This architecture is called the client–server model. The clients may run on the same computer or may connect to the server over a network. Typical computing servers are database servers, file servers, mail servers, print servers, web servers, game servers, and servers. Server machines (which can be either actual or virtual machines) run server programs. In turn, a server program turns the machine on which it runs into a server machine. However, designating a machine as "server-class hardware" implies that it is more powerful and reliable than standard personal computers or is specialized for performing the server's role. Servers may be composed of large clusters of relatively simple, replaceable machines.

E. RACKS VS. TOWER

Entry-level servers are generally available in either a rack-mount or tower form. If this is the first server for the company, you probably won't have a suitable server rack already in place, and for a single server, adding that rack may not be cost effective. Thus, a tower server is likely to be the best option. Many tower servers can later be converted to rack-mount servers with the appropriate conversion kit, so if your infrastructure grows to the point where a rack is required, your existing investment can be modified to fit your needs. A tower server is generally only slightly larger than a regular desktop system, and can be placed under a desk or in an area that has little traffic. Though it's a good idea to also have a monitor, keyboard, and mouse hooked up to the server, doesn't be tempted to use the server as a desktop system.

F. IoT FUNCTIONAL VIEW

The Internet of Things concept refers to uniquely identifiable things with their virtual representations in an Internet-like structure and IoT solutions comprising a number of components such as:

Module for interaction with local IoT devices for example embedded in a mobile phone or located in the immediate vicinity of the user and thus contactable via a short range wireless interface. This module is responsible for acquisition of observations and their forwarding to remote servers for analysis and permanent storage.

Module for local analysis and processing of observation acquired by IoT devices. Module for interaction with remote IoT devices, directly over the Internet or more likely via a proxy. This module is responsible for acquisition of observations and their forwarding to remote servers for analysis and permanent storage.

Module for application specific data analysis and processing. This module is running on an application server serving all clients. It is taking requests from mobile and web clients and relevant IoT observations as input, executes appropriate data processing algorithms and generates output in terms of knowledge that is later presented to users.

Module for integration of IoT-generated information into the business processes of an enterprise. This module will be gaining importance with the increased use of IoT data by enterprises as one of the important factors in day-to-day business or business strategy definition.

User interface (web or mobile): visual representation of measurements in a given context (for example on a map) and interaction with the user, i.e. definition of user queries. It is important to highlight that one of the crucial factors for the success of IoT is stepping away from vertically-oriented, closed systems towards open systems, based on open APIs and standardized protocols at various system levels. In this context innovative architecture and platforms are needed to support highly complex and inter-connected IoT applications. A key consideration is how to enable development and application of comprehensive architectural frameworks that include both the physical and cyber elements based on enabling technologies. In addition considering the technology convergence trend new platforms will be needed for communication and to effectively extract actionable information from vast amounts of raw data, while providing a robust timing and systems framework to support the real-time control and synchronization requirements of complex, networked, engineered physical/cyber/virtual systems. A large number of applications made available through application markets have significantly helped the success of the smart phone industry. The development of such a huge number of smart phone applications is primarily due to involvement of the developers' community at large. Developers leveraged smart phone open platforms and the corresponding development tools, to create a variety of applications and to easily offer them to a growing number of users through the application markets. Similarly, an IoT ecosystem has to be established, defining open APIs for developers and offering appropriate channels for delivery of new applications. Such open APIs are of particular importance on the level of the module for application specific data analysis and

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processing, thus allowing application developers to leverage the underlying communication infrastructure and use and combine information generated by various IoT devices to produce new, added value. Although this might be the most obvious level at which it is important to have open APIs, it is equally important to aim towards having such APIs defined on all levels in the system. At the same time one should have in mind the heterogeneity and diversity of the IoT application space. This will truly30 Internet of Things Strategic Research and Innovation Agenda support the development of an IoT ecosystem that encourages development of new applications and new business models. The complete system will have to include supporting tools providing security and business mechanisms to enable interaction between a numbers of different business entities that might exist [11].

V. RESEARCH CHALLENGES

Design of open APIs on all levels of the IoT ecosystem:

Design of standardized format for description of data generated by IoT devices to allow mashups of data coming from different domains and/or providers. The updated list of IoT applications presented below includes examples of IoT applications in different domains, which is showing why the Internet of Things is one of the strategic technology trends for the next 5 years.

Smart Food/Water Monitoring

Smart Health

Smart Living

Smart Environment Monitoring

Smart Manufacturing

Smart Energy

Smart Buildings

Smart Transport and Mobility

Smart Industry

Smart City

Smart Tourism

VI. PROPOSED METHODOLOGY

Many types of smart devices are available in the world. Some devices for personal safety and some are for vehicle tracking. This project is design to be used by parents and aimed to help locating missing or lost women, girl and children. Propose methodology which we used is getting the child location using GPS and send location to parents using GPRS module. It takes advantage of the fact that many of today's children bring smart phones which is convenient for this kind of situation.

In this work, GPS is combined with one of the basic service of a smart phone which is GSM, more specifically SMS, in one system. An application at the parent side will allow parents to send a location request to a child side then retrieve the location from the request reply and shows it on a map. On the other hand, the application at the child's side gathers the necessary information of the smart phone that will be used to locate the smart phone. Information such as GPS coordinates and time are gathered and sent to the parent smart phone that's preregistered on the application.

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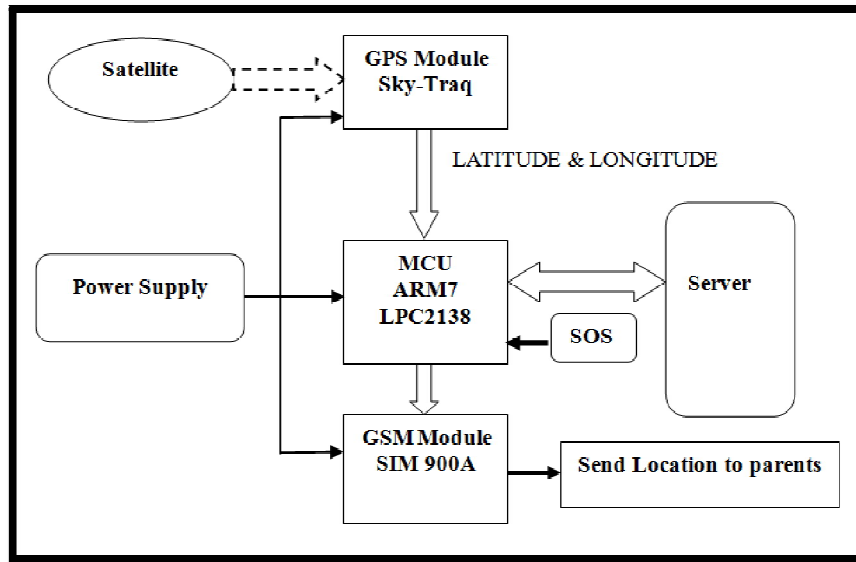


Fig.6 Proposed System

The communication between the parent and the child applications is done using SMS. It will allow the system to work without the need of internet connection thus allows the application to be implemented on smart phones that don't support GPRS, 2G or 3G internet connectivity. The system sends the location of child to parent's smart phone when the parent wishes to check on the child.

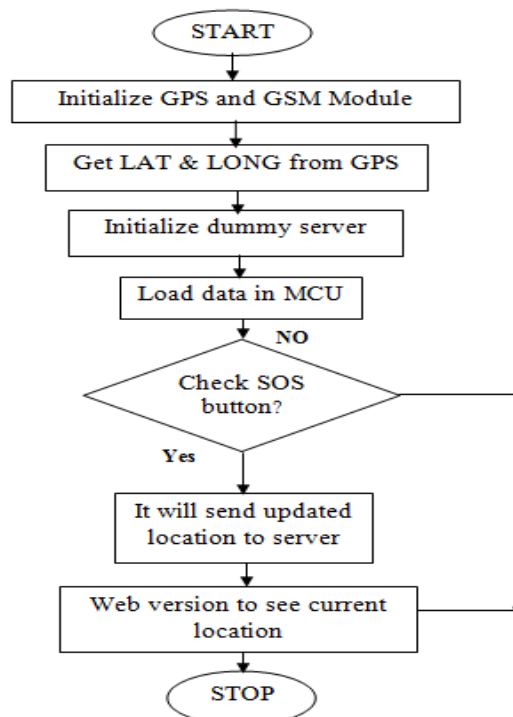


Fig.7 Flowchart

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In this propose system, one advance feature like SOS is available. It means in emergency case child or old women can press one single SOS button and ask for help from parents or person. This feature approach is like when SOS button pressed current location of device send to registered mobile number. So that person can help to their child or woman.

A. GPS NEMA FORMAT

```
$GPGSV,3,1,12,03,06,318.00,05,11,092,27,06,12,310,33,09
$GPGSV,3,2,12,14,00,229,00,15,54,048,28,18,54,301,00,21
$GPGSV,3,3,12,22,21,285,27,24,75,185,00,26,35,229,44,27
$GPRMC,190732,A,4100.6560,N,07510.9526,W,000.4,301.4,26
$GPGGA,190733,4100.6562,N,07510.9539,W,1,04,04.2,00131.
$GPGSA,A,3,06,21,26,29,,,,,,,,,04.6,04.2,01.9*04^M
$GPGSV,3,1,12,03,06,318.00,05,11,092,00,06,12,310,33,09
$GPGSV,3,2,12,14,00,229,00,15,54,048,00,18,54,301,00,21
$GPGSV,3,3,12,22,21,285,28,24,75,185,00,26,35,229,45,27
$GPRMC,190733,A,4100.6562,N,07510.9539,W,000.9,301.4,26
$GPGGA,190734,4100.6562,N,07510.9544,W,1,04,04.2,00130.
$GPGSA,A,3,06,21,26,29,,,,,,,,,04.6,04.2,01.9*04^M
$GPGSV,3,1,12,03,06,318.00,05,11,092,00,06,12,310,32,09
$GPGSV,3,2,12,14,00,229,00,15,54,048,00,18,54,301,00,21
$GPGSV,3,3,12,22,21,285,26,24,75,185,00,26,35,229,43,27
$GPRMC,190734,A,4100.6562,N,07510.9544,W,000.4,301.4,26
$GPGGA,190735,4100.6563,N,07510.9546,W,1,04,04.2,00130.
$GPGSA,A,3,06,21,26,29,,,,,,,,,04.6,04.2,01.9*04^M
```

Fig.8 GPS NEMA flag input

An early investigation was the conversion of GPS NEMA flags into a more user-friendly form of data such as provided by online map services. When observing a stream of incoming NEMA strings, it is not immediately obvious whether or not the GPS chip is even connected with the satellite, let alone the validity of the GPS coordinates [12, 14,15]. To facilitate easier validation of the chips' output and to assess its relative accuracy for several trials, two C programs were developed. The first program parses the set of NEMA [13] strings linearly and maintains a set of most recent values for each data type such as latitude, longitude, and velocity.

The first received 6 characters from GPS module are compared with string \$GPRMC, if matched then will go for further process otherwise repeat the same process again. If string is matched then wait till you will get two 2 **commas**, next character indicates whether the GPS is activated or not. If this character is A then GPS is activated otherwise GPS is not activated. Now again wait till you get comma (.). The next 9 characters indicate the LATITUDE. Wait till you get 2 more commas (,) the next 10 characters indicate the LONGITUDE.

NMEA has its own version of essential gps pvt (position, velocity, time) data. It is called RMC, The Recommended Minimum, which will look similar to:

```
$GPRMC,123519,A,4807.038,N,01131.000,E,022.4,084.4,230394,003.1,W*6A
```

Where,

RMC	Recommended Minimum sentence C
123519	Fix taken at 12:35:19 UTC
A	Status A=active or V=Void.
4807.038,N	Latitude 48 deg 07.038' N
1131.000,E	Longitude 11 deg 31.000' E
022.4	Speed over the ground in knots
084.4	Track angle in degrees True
230394	Date - 23rd of March 1994
003.1,W	Magnetic Variation
*6A	The checksum data, always begins with *

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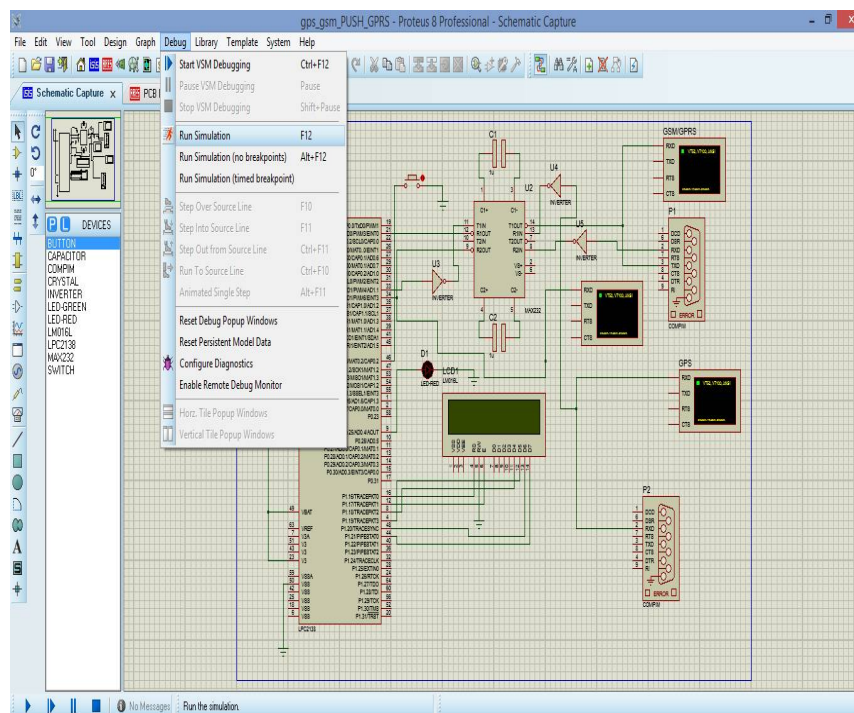
(An ISO 3297: 2007 Certified Organization)

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B. IMPLEMENTATION OF GPS AND GSM BASED TRACKER SYSTEM IN PROTEUS 8.0

Now we will use this hex file to run the simulation in Proteus 8. Next final step we have to insert hex file in controller. Just double click on controller component; it will open below given window.

Here you have to give hex file in **Program file** option. Then click on Ok. Finally to check the output, select Debug > **Run Simulation** in Proteus 8.



After this we will design one dummy server in ASP. For watching location of device, we will design one the http link. It means when you go to this link, it will open one page. There you just click on one button. By pressing this button it will show the current location of device in Google Map.

So we are using software and hardware combination in this project. This project is prototype of tracker including SOS feature. It is mainly implemented for kids and old persons. So parents will easily track their children.

VII. RESULT ANALYSIS

Here we have implemented virtually GSM and GPS based Tracker system in Proteus 8. We inserted final .hex file in compiler of Proteus. So we can easily analyze the result of implemented system.

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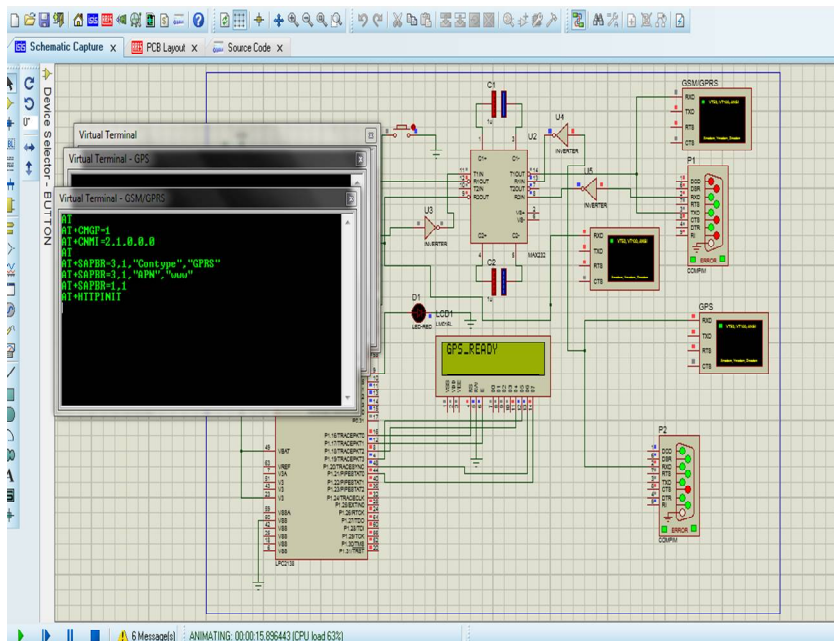
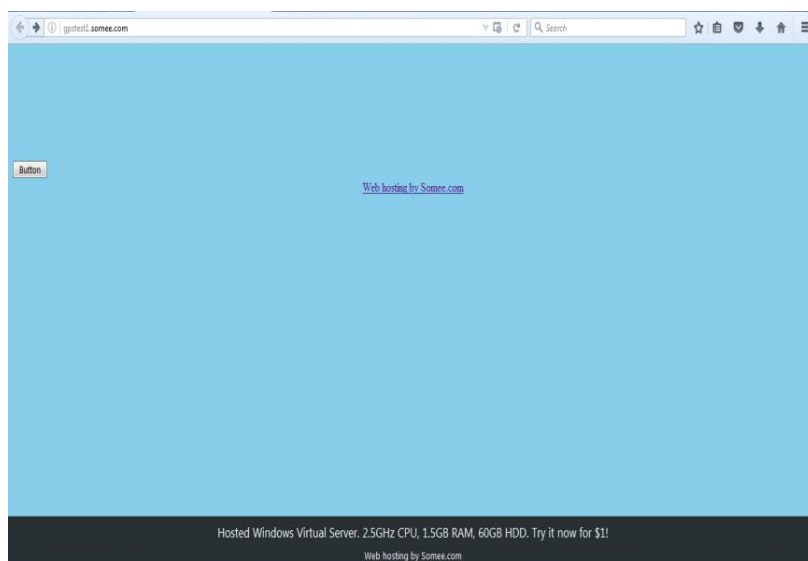


Fig.9 Implementation of Tracker system

For watching location of device, we will design one the http link. : <http://gpstest1.somee.com/>

So using this link user can see the exact current location Latitude and Longitude on LCD display. In below figure you can see how it will work.



Go through above given http link and click on “button”. So it will go to directly google map with your current location.

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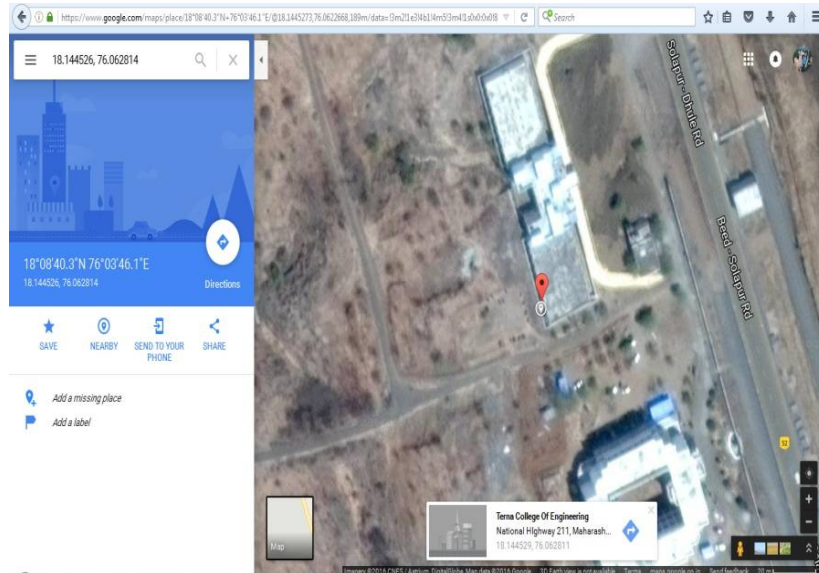


Fig.10 Current Location in Google Map

One of the best features is implemented. Like SOS button. This feature is very useful for old persons and kids also. When user press SOS button, device will send Help message to registered mobile number with current location detail.

A. RESULT ANALYSIS

Features	Base Paper 1	Base Paper 2	Own Paper
Continuous Tracking	Yes	Yes	Yes
It will send updated location to server	No	No	Yes
SOS feature	No	No	Yes
Web version to see current location	No	No	Yes

VIII. APPLICATIONS

Old age person or woman Safety
Tracking our personal things
Vehicle tracking

IX. CONCLUSION

As we know that many tracking devices are available in market. But those are very expensive. Here we are using low cost, high performance and accurate GSM and GPS modules for this project. So final outcome is comparatively low cost solution and performance of device is accurate and reliable. One more advance feature, SOS will work successful and it will very useful in critical or emergency situation. Easily parents can see current location through web version.

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