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Simulation of Health Care Monitoring System in Internet of Things By Using RFID

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Abstract:
Advances in information and communication technologies have led to the emergenceof Internet of Things. In the healthcare environment, the use of IoT technologies brings convenience to physicians and patients as they can be applied to various medical areas such as constant real-time monitoring, patient information management, medical emergency management, blood information management, and health management. The Radio-Frequency Identification technology is one of the core technologies of IOT deployments in the healthcare environment. To satisfy the various security requirements of RFID technology in IOT, many RFID authentication schemes have been proposed in the past decade. Recently, elliptic curve cryptography based RFID authentication schemes have attracted a lot of attention and have been used in the healthcare environment. In this paper, we discuss the security requirements of RFID authentication schemes, and in particular, we present a review of ECC-based RFID authentication schemes in terms of performance and security. Although most of them cannot satisfy all security requirements and have satisfactory performance, we found that there are three recently proposedsystem.

Keywords: Internet of Things, Health care, Smart Hospital, Home Care, RFID,Sensor Network.

1. Introduction

In hospitals, generally the E-healthcare system is used for getting the information of patient . Exceptionally, living e-healthcare approach has been accomplished within cabled conversation among distinguished fields for instance network protocol and database in hospice atmosphere. There has been an increase in healthcare system's use of the mobility characteristics and wireless communication and emergence in technologies has enabled smart appliances and gadgets with mean appraising energy to exploit wireless sensor nodes .In the new epoch of technology and wireless communication, the tremendous rise in electronic devices made smart phones and tablets has become the most popular and fundamental tool of day to day life.

The main favour of loT is to swell the profit of Internet with remote control talent,data sharing, eternal connectivity and many more. The healthcare servers keep electronic medical records of registered users and provide different services to patients, medical consultants and informal caregivers. The patient's consultant can access the data from office via internet and examine the patients' history, current symptoms and patient's response to a given 3treatment. Once WBAN network is con figured, the health care server manages the network, taking care of channel sharing .In rural area most of the peoples does not gets appropriate approach to health monitoring and clinics.

So it is necessary to design the effective health monitoring system. A tiny wireless device is a resolution bound with loT can form a conceivable way to regulate patients distantly rather than dating the actual clinic. The unusual tiny transducers are transplant into the human to aggregate the details through which system get human fitness data security and for analysis for treatment. The collected data is then send to remote station via divergent communication technologies (like as 3G/4G enabled base station or Wi-Fi network with Internet. From data came from internet the medical professionals can seize conclusion and consequently furnish services centrally . Main advantage of this electronic healthcare is it provides a superb leisure to sufferers and healthcare contributors, and also enhances the first-class showing existence. In this electronic healthcare the privacy of the patient is not taken into consideration but it is essential in case of patient and this is the major disadvantage of this system. To avoid this disadvantage the RFID technology is used. It manages the patients documents with its mobility and usability. Also the main advantage of RFID is that it resist all kinds of attacks and threats so less noise are presents in signal. Most of the design the different security systems with privacy protocol and low cost for development of applicability. Therefore, it is necessary to design productive ultra-lightweight cryptographic protocol for costless RFID system [4]. The loT is the best solution for this purpose in recent years. Therefore in this paper the effective healthcare monitoring system is designed by using the loT and RFID tags.

1.1 Objective Of The Study

In this section presents the introduction to loT. The Internet of things is used in different vehicles, mobile phones, physical devices etc. The devices that uses the loT also called as smart devices or connected devices. The loT can be communicate with different devices like as sensors, electronics software, embedded systems, actuators, etc. Apart from these devices the RFID, barcodes, QR codes, Ambient Intelligence and mobile Computing, uses the loT. All of these devices are used for collection of the data and to exchange of the data. The Global Standards Initiative on Internet of Things introduces the loT in 2013 . loT allow things to be sense and prohibited distantly across presented network infrastructure. So it creates the opportunity for more direct combination for real time system into digitized systems, and consequential in enhanced effectiveness, correctness and cost-effective usefulness.to establish the wireless communication.

The health monitoring system with loT plays an important role. Lot many research work is done on this topic, some of these are given below. In the paper presented by Jin et al design the effective system for smart cities by using loT. The loT network presents in this is cloud based structure and it uses the data management. The system architecture presents in this uses the three strategies namely Data-based loT, Cloud-based loT and Network-based loT. These three strategies works under the different standards, protocols and plans. The Crossbow's XMesh, IRIS, Crossbow's iMote, ,QoS mechanism, Jara et al , in this paper has presented a separate formation to central supervised founded on loT. The loT presents in this paper integrates with different systems like Environment Integration Platform, Knowledge Base Systems, Context Management Framework, services provider system and hospital information system. This structural design uses a new protocol called YOAPY, HOP, wireless personal devices, WPAN, embedded systems , Marital hardware and RFID. But the protocol YOAPY manifests hopeful, though, this system not give details treatment of extremity conditions.

An intelligent home-based healthcare loT system is presented by Niranjana. For the home-based healthcare system he uses a Medical Box(iMedBox) which is healthloT system and iGATE way which acts as a home healthcare gateway. Wearable sensors and intelligent medicine packaging (iMedPack) are successfully coupled to the iMedBox via a diverse network, which is well-matched with several presented wireless principles. The iMedPack is joined with the iMedBox via an RFID link to support the users with their arranged prescription. Kiholee presented effective U-healthcare system by using iloT. The loT presents in this paper uses the mobile gateway for the communication purpose. It provides the sensed information to a doctor or home medical station. Yvette and E Galogo proposed the U-healthcare system which uses the mobile devices gateways and mobile devices gateway for the communication devices.

The smart phone will estimate admitted sensing observation to develope keywords and ships to the central system. In Xu et al., the effective construction of different applications of loT and Smart Community are presents. The architecture presents in this paper has three main domains viz. Service Domain, Community Domain and Home Domain. These three domains can handles the critical situation , disaster circumstances and normal circumstances. Contemplated method presents in this paper uses different IEEE standards, Ethernet Technology, different cordless transmission standards like as 3G mobile system, body sensors, piconet and WiFi technology, Ethernet and Home PNA. The proposed system provides the veracity demands while entire transmission method and security.

The Mir et al.proposes effective loT which provides the healthcare information of a patient with the help of Internet and RFID tags. These RFID tags creates communication for the healthcare information system for automating administrative daily tasks like permission care, remove and release details. In Mukhopadhyay S.C. proposes the effective human monitoring system architecture. The main advantage of this system is that this system continuous monitor the physiological parameters particularly of the mature or chronic patient.

2. Existing System

In a smart home or hospital, where the mobility and location of patients are confined to the hospital facilities or the building, gateways can play a key role. Gateways generally act as a hub between body/personal/local area networks (BAN/PAN/LAN) and a remote health center. The stationary nature of such gateways empowers them with the luxury of being non-resource hand, this valuable luxury can be exploited by outsourcing some burden of resource-constrained sensors/actuators to be performed on the gateways, and on the other hand, it can be used to add some levels of intelligence to its basic functionalities and extend its role to an intelligent embedded server.

In this paper, we present the concept of Smart e-Health Gateway capable of enhancing IoT architectures used for healthcare applications in terms of energy-efficiency, performance, reliability, interoperability, just to mention a few. In addition,Smarte-Health Gateway'sfeaturesand its offered services from the viewpoint of cost-benefit analysis. In order to provide a proof of concept implementation, we also demonstrate our prototype of a Smart e-Health Gateway and discuss the design and implementation of our demonstrator. The rest of the paper is organized as follows: In Section II, the related work and the motivation of this paper are discussed. Section III describes the architecture of an e-health platform using Smart e-Health Gateways. The concept and features of a Smart e-Health Gateway are presented in more details in Section IV. Demonstration of our Smart e-Health Gateways and experimental results are provided and discussed in Section V. Finally, Section VI concludes the paper. Kiholee presented effective U-healthcare system by using iloT. The loT presents in this paper uses the mobile gateway for the communication purpose. It provides the sensed information to a doctor or home medical station. Yvette and E Galogo proposed the U-healthcare system which uses the mobile devices gateways and mobile devices gateway for the communication devices.

3. Proposed System

3.1Working Principle

In this project, the RFID tag is used to initialize the bed system as an key. The sensors are used to monitor the patient's condition periodically.The data report are transmitted to the the website through IOT system so that the doctor or any other relatives of the patients can know about the condition of the patient.The movable bed mechanism is used to adjust the bed according to the patient's condition.The buzzer is to indicate the nearby persons that the patient is in critical situations.We can control each port by using an assigned address of specific port, but there is much easier way to control the port. We are allowed to use the names of the ports without considering their addresses. The smart phone will estimate admitted sensing observation to develope keywords and ships to the central system. In Xu et al., the effective construction of different applications of loT and Smart Community are presents

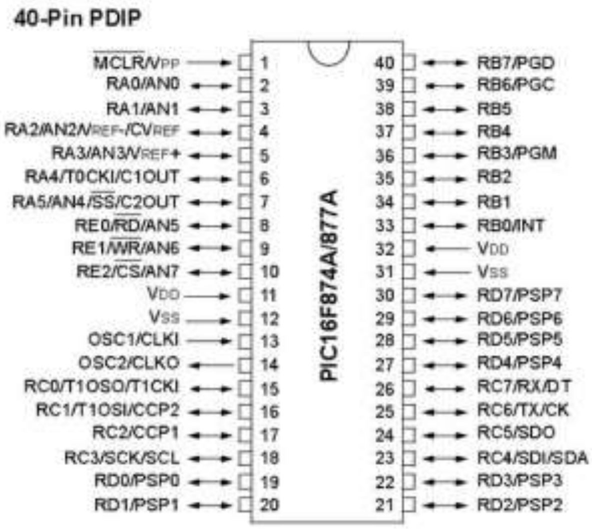
For example:

define SWITCH PORTA, 0

We define a variable named SWITCH, which received a value of bit number 0 of the PORTA.

Usually we define the ports at the beginning of the program, and then we use only the given names.

3.2 Pin Diagram



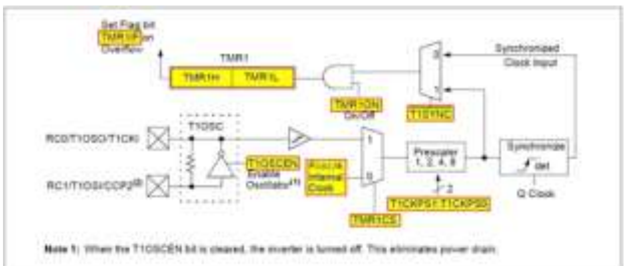
TRIS register

The TRIS register is data direction register which defines if the specific bit or whole port will be an input or an output. Each PORT has its own TRIS register. Here's a map of the locations: The default mode of each TRIS is input. If you want to set a specific port as exit you must change the state of the TRIS to 0.

Keep in mind to change a specific port to an output, one should first move to the BANK1, make the change, and then return to BANK0. The default state of the banks is BANK0. The running program is working only with one bank at all time. If not set otherwise, then as stated, the default bank is BANK0. Part of the registers located inside BANK0, and some are not. When we need to access a register that is not located inside BANK0, we are required to switch between the banks.

For example, the access to PORT registers is done inside BANK0. However, to change port from an input to an output and vice versa, we need to access TRIS register that is located inside BANK1. From the moment we moved to the BANK1, the program will always work with BANK1; at this time, to access registers inside BANK0, we will have to return to the situation in which our program will work wit

3.3PIC TIMER1



Calculating Count, Fout, and Timer1 values:

If using INTERNAL crystal as clock, the division is performed as follow:

$$fout = \frac{fclk}{4*Prescaler*(65536-TMR1)*Count} \quad where \quad Tout = \frac{1}{fout}$$

The number of times in the timer will count based on the register TMR0.

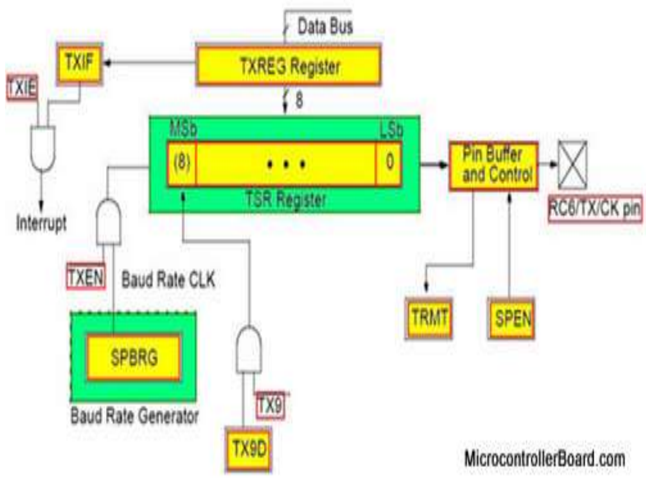
If using EXTERNAL clock source (oscillator), the division is performed

$$fout = \frac{fclk}{4*Prescaler*(65536-TMR1)*Count} \quad where \quad Tout = \frac{1}{fout}$$

PIC TIMER1 formula for external clock

Simple example and calculation of how to use TIMER1:

4. USART Transmit Block Diagram



4.USART Transmit Block Diagram

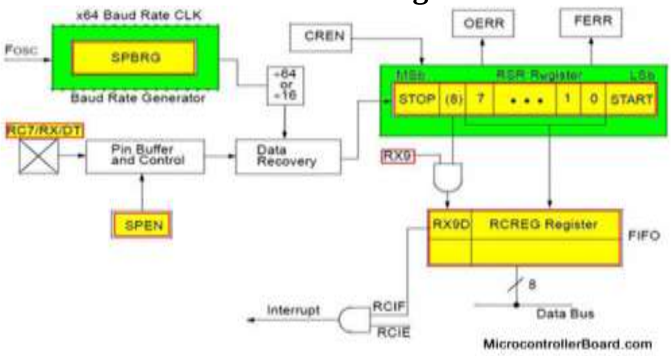
The information we want to transmit is loaded into the 8-bit register - TXREG. If you want to transmit a 9-bit data, the 9th bit is loaded into TX9D. At the same time, the information above is being loaded into the register TSR, which is used as a temporary buffer before that information is transmitted. Of course, using 2 registers allows faster the transmission of the data. Once the TXREG register transfers the data to the TSR register, the TXREG register is empty and flag bit, TXIF is set.

As mentioned earlier:

- the register SPBRG sets the baud rate in the desired transmission

- TXIE – allows interrupts when TXREG is empty and TXIF is set
- TXEN - Enabling SPBRG

5. USART Receiver block diagram



The information is received in the register RSR. If there is a 9-bit transmission, the 9th bit goes into RX9D. After receiving the data in the register RSR, the information is loaded at the same time into the register RCREG. Obviously, using 2 registers allows faster receiving of the data.

While the information that was received being transferred into RCREG, the new information has already been received into the register RSR. Of course, the CREN bit needs to be set. According to the USART TRANSMIT / RECEIVE BLOCK DIAGRAM, that the information that was transmitted via pin RC6 in Port C, is received through the pin RC7 in Port C.

6. SENSORS

6.1 Blood Pressure Sensor

Manual blood pressure monitors are cost effective as compared to digital monitors, but their usage is more difficult. They are also known as aneroid monitors. Sometimes referred to as sphygmomanometer too, the setup includes an arm cuff, squeeze bulb to inflate the cuff, stethoscope and a gauge to measure the blood pressure. Blood pressure is displayed on a dial with a needle. Rising pressure in the cuff makes the needle move clockwise and falling pressure results in anti-clockwise movement. The dial markings indicate the pressure level. It is also difficult for a person with hearing issues to hear the heart beat through the stethoscope.

A pressure sensor measures pressure, typically of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical.

Fig 6.1 Blood Pressure Circuit Diagram

Easy t use for one person or with the assistance of another party from the convenience and comfort of the patient s home Soft cotton D-ring arm cuff allows for easy application.

6.2 Breath sensor

The Respiration Sensor is used to monitor abdominal or thoracical breathing, in biofeedback applications such as stress management and relaxation training. Besides measuring breathing frequency, this sensor also gives you an indication of the relative depth of breathing. The Respiration Sensor for Nexus can be worn over clothing, although for best results we advise that there only be 1 or 2 layers of clothing between the sensor and the skin. The Respiration Sensor is usually placed in the abdominal area, with the central part of the sensor just above the navel. The sensor should be placed tight enough to prevent loss of tension.First Sensor develops and manufactures highly reliable sensors and customized sensor systems as a strategic partner to medical product manufacturers in the area of breathing and respiration. The first step in this process is breathing in air, or inhaling. The taking in of air rich in oxygen into the body is called inhalation and giving out of air rich in carbon dioxide from the body is called exhalation. The second step is gas exchange in the lungs where oxygen is diffused into the blood and the carbon dioxide diffuses out of the blood. The third process is cellular respiration, which produces the chemical energy that the cells in the body need, and carbon dioxide. Finally, the carbon dioxide from cellular respiration is breathed out of body from the lungs.

6.3 Heart beat sensor

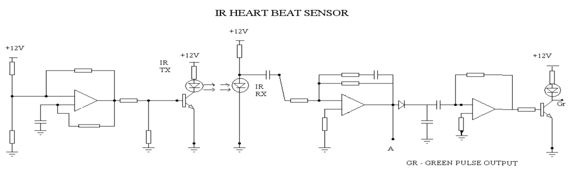


Fig 6.3 Circuit Diagram Of Heart Beat Sensor

Heart beat is sensed by using a high intensity type LED and LDR. The finger is placed between the LED and LDR. As sensors photo diode or a photo transistor can be used. The skin may be illuminated with visible (red) using transmitted or reflected light for detection. The very small changes in reflectivity or in transmittance caused by the varying blood content of human tissue are almost invisible.

Various noise sources may produce disturbance signals with amplitudes equal or even higher than the amplitude of the pulse signal. Valid pulse measurement therefore requires extensive preprocessing of the raw signal.The new signal processing approach presented here combines analog and digital signal processing in a way that both parts can be kept simple but in combination are very effective in suppressing disturbance signals.

The setup described here uses a red LED for transmitted light illumination and a LDR as detector. With only slight changes in the preamplifier circuit the same hardware and software could be used with other illumination and detection concepts. The detectors photo current (AC Part) is converted to voltage and amplified by an operational amplifier (LM358). Output is given to another non-inverting input of the same LM358; here the second amplification is done. The value is preset in the inverting input, the amplified value is compared with preset value if any abnormal condition occurs it will generate an interrupt to the controller.

6.4 Passive Infra-Red Sensor

A Passive Infrared sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. PIR sensors are often used in the construction of PIR-based motion detectors. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall.All objects emit what is known as black body radiation. It is usually infrared radiation that is invisible to the human eye but can be detected by electronic devices designed for such a purpose. The term passive in this instance means that the PIR device does not emit an infrared beam but merely passively accepts incoming infrared radiation. Infra meaning below our ability to detect it visually, and "Red" because this color represents the lowest energy level that our eyes can sense before it becomes invisible. Thus, infrared means below the energy level of the color red, and applies to many sources of invisible energy.Infrared radiation enters through the front of the sensor, known as the sensor face. At the core of a PIR sensor is a solid state *sensor* or set of sensors, made from an approximately 1/4 inch square of natural or artificial pyroelectric materials, usually in the form of a thin film, out of gallium nitride (GaN), caesium nitrate ($CsNO_3$), polyvinyl fluorides, derivatives of phenylpyrazine, and cobaltphthalocyanine. Lithium tantalate ($LiTaO_3$) is a crystal exhibiting both piezoelectric and pyroelectric properties.

The sensor is often manufactured as part of an integrated circuit and may consist of one, two or four pixels of equal areas of the pyroelectric material. Pairs of the sensor pixels may be wired as opposite inputs to a differential amplifier. In such a configuration, the PIR measurements cancel each other so that the average temperature of the field of view is removed from the electrical signal; an increase of IR energy across the entire sensor is self-cancelling and will not trigger the device. This allows the device to resist false indications of change in the event of being exposed to flashes of light or field-wide illumination. (Continuous bright light could still saturate the sensor materials and render the sensor unable to register further information.) At the same time, this differential arrangement minimizes common-mode interference, allowing the device to resist triggering due to nearby electric fields. However, a differential pair of sensors cannot measure temperature in that configuration and therefore this configuration is specialized for motion detectors.This PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared (heat) levels emitted by surrounding objects. This motion can be detected by checking for a sudden change in the surrounding IR patterns. When motion is detected the PIR sensor outputs a high signal on its output pin. This logic signal can be read by a microcontroller or used to drive a transistor to switch a higher current load.

Figure: 6.4 Passive Infra Red Sensor Module

Theory of Operation

Pyroelectric devices, such as the PIR sensor, have elements made of a crystalline material that generates an electric charge when exposed to infrared radiation. The changes in the amount of infrared striking the element change the voltages generated, which are measured by an on-board amplifier. The device contains a special filter called a Fresnel lens, which focuses the infrared signals onto the element. As the ambient infrared signals change rapidly, the on-board amplifier trips the output to indicate motion.

7. Internet of Things

The internet of things (IoT) is the network of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as the infrastructure of the information society. The IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities.

Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure. Experts estimate that the IOT will consist of almost 50 billion objects by 2020.

Internet of Things is an environment in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. IoT board featured with SIM900 GPRS modem to activate internet connection also equipped with a controller to process all input UART data to GPRS based online data. Data may be updated to a specific site or a social network by which the user can able to access the data.

8. Infrastructure

The Internet of Things will become part of the fabric of everyday life. It will become part of our overall infrastructure just like water, electricity, telephone, TV and most recently the Internet. Whereas the current Internet typically connects full-scale computers, the Internet of Things (as part of the Future Internet) will connect everyday objects with a strong integration into the physical world.

8.1 Plug and Play Integration:

If we look at IoT-related technology available today, there is a huge heterogeneity. It is typically deployed for very specific purposes and the configuration requires significant technical knowledge and may be cumbersome. To achieve a true Internet of Things we need to move away from such small-scale, vertical application silos, towards a horizontal infrastructure on which a variety of applications can run simultaneously.

8.2 Infrastructure Functionality:

The infrastructure needs to support applications in finding the things required.An application may run anywhere, including on the things themselves. Findingthings is not limited to the start-up time of an application. Automatic adaptationis needed whenever relevant new things become available, things become unavailable or the status of things changes.The infrastructure has to supportthe monitoring of such changes and the adaptation that is required as a resultof the changes:

1. Physical Location and Position:

As the Internet of Things is strongly rooted in the physical world, the notion ofphysical location and position are very important, especially for finding things,but also for deriving knowledge. Therefore, the infrastructure has to supportfinding things according to location (e.g. geo-location based discovery). Takingmobility into account, localization technologies will play an important role for the Internet of Things and may become embedded into the infrastructureof the Internet of Things.

2. Security and Privacy

In addition, an infrastructure needs to provide support for security and privacy functions including identification, confidentiality, integrity, non-repudiation authentication and authorization. Here the heterogeneity and the need for interoperability among different ICT systems deployed in the infrastructure and the resource limitations of IoT devices (e.g., Nano sensors) have to be taken into account.

3. Data Management

Data management is a crucial aspect in the Internet of Things. When considering a world of objects interconnected and constantly exchanging all types of information, the volume of the generated data and the processes involved in the handling of those data become critical. A long-term opportunity for wireless communications chip makers is the rise of Machine-to-Machine (M2M) computing, which one of the enabling technologies for Internet of Things. This technology spans abroad range of applications.

While there is consensus that M2M is a promising pocket of growth, analyst estimates on the size of the opportunity diverge by a factor of four . Conservative estimates assume roughly 80 million to 90 million M2M units will be sold in 2014, whereas more optimistic projections forecast sales of 300 million units.

Based on historical analyses of adoption curves for similar disruptive technologies, such as portable MP3 players and antilock braking systems for cars, it is believed that unit sales in M2M could rise by as much as a factor of ten over the next five years.There are many technologies and factors involved in the data management within the IoT context. Some of the most relevant concepts which enable us to understand the challenges and opportunities of data management are:

- Data Collection and Analysis
- Big Data
- Semantic Sensor Networking
- Virtual Sensors
- Complex Event Processing.

4. Application Areas

In the last few years the evolution of markets and applications, and therefore their economic potential and their impact in addressing societal trends and challenges for the next decades has changed dramatically. Societal trends are grouped as: health and wellness, transport and mobility, security and safety, energy and environment, communication and e-society, as presented in Figure 2.15. These trends create significant opportunities in the markets of consumer electronics, automotive electronics, medical applications, communication, etc. The applications in these areas benefit directly by the More-Moore and More-than-Moore semiconductor technologies, communications, networks, and software developments.

5. Magnetic Buzzer (Sounder)

Buzzers like the TMB-series are magnetic audible signal devices with built-in oscillating circuits. The construction combines an oscillation circuit unit with a detection coil, a drive coil and a magnetic transducer. Transistors, resistors, diodes and other small devices act as circuit devices for driving sound generators. With the application of voltage, current flows to the drive coil on primary side and to the detection coil on the secondary side.

The amplification circuit, including the transistor and the feedback circuit, causes vibration. The oscillation current excites the coil and the unit generates an AC magnetic field corresponding to an oscillation frequency.

This AC magnetic field magnetizes the yoke comprising the magnetic circuit. The oscillation from the intermittent magnetization prompts the vibration diaphragm to vibrate up and down, generating buzzer sounds through the resonator.Recommended Driving Circuit for Magnetic Transducer Introduction of Magnetic Buzzer (Transducer).

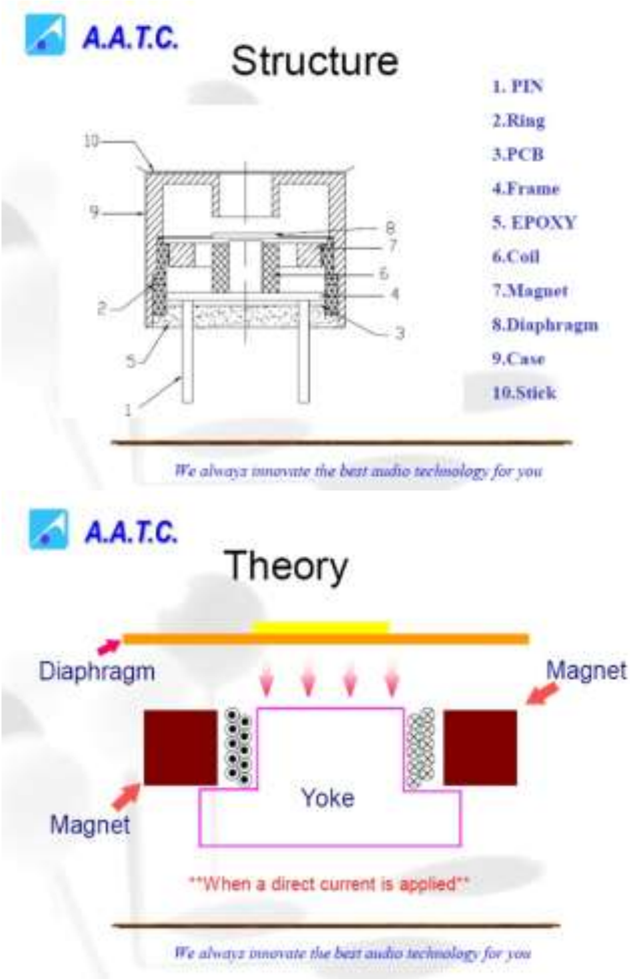


Fig 5.5Circuit,Structure For Buzzer

9. Software

9.1 Software Techniques

- Embedded C
- MPLAB with Hi Tech C Compiler
- Keil compiler

9.1.1 Embedded C

As time progressed, use of microprocessor-specific assembly-only as the programming language reduced and embedded systems moved onto C as the embedded programming language of choice. C is the most widely used programming language for embedded processors/controllers. Assembly is also used but mainly to implement those portions of the code where very high timing accuracy, code size efficiency, etc. are prime requirements.

Initially C was developed by Kernighan and Ritchie to fit into the space of 8K and to write (portable) operating systems. Originally it was implemented on UNIX operating systems. As it was intended for operating systems development, it can manipulate memory addresses. Also, it allowed programmers to write very compact codes. This has given it the reputation as the language of choice for hackers too.As assembly language programs are specific to a processor, assembly language didn't offer portability across systems. To overcome this disadvantage, several high level languages, including C, came up. Some other languages like PLM, Modula-2, Pascal, etc. also came but couldn't find wide acceptance. Amongst those, C got wide acceptance for not only embedded systems, but also for desktop applications. Even though C might have lost its sheen as mainstream language for general purpose applications, it still is having a strong-hold in embedded programming. Due to the wide acceptance of C in the embedded systems, various kinds of support tools like compilers & cross-compilers, ICE, etc. came up and all this facilitated development of embedded systems using C.

9.1.2 MPLAB IDE

Microchip has a large suite of software and hardware development tools integrated within one software package called MPLAB Integrated Development Environment (IDE). MPLAB IDE is a free, integrated toolset for the development of embedded applications on Microchip's PIC and dsPIC microcontrollers. It is called an Integrated Development Environment, or IDE, because it provides a single integrated environment to develop code for embedded microcontrollers.

MPLAB IDE runs as a 32-bit application on MS Windows, is easy to use and includes a host of free software components for fast application development and super-charged debugging. MPLAB IDE also serves as a single, unified graphical user interface for additional Microchip and third party software and hardware development tools. Moving between tools is a snap, and upgrading from the free software simulator to hardware debug and programming tools is done in a flash because MPLAB IDE has the same user interface for all tools.

9.1.3 Components Of MPLAB IDE

The MPLAB IDE has both built-in components and plug-in modules to configure the system for a variety of software and hardware tools.

Project Manager: The project manager provides integration and communication between the IDE and the language tools.

Editor: The editor is a full-featured programmer's text editor that also serves as a window into the debugger.

Assembler/Linker and Language Tools: The assembler can be used stand-alone to assemble a single file, or can be used with the linker to build a project from separate source files, libraries and recompiled objects. The linker is responsible for positioning the compiled code into memory areas of the target microcontroller.

Debugger: The Microchip debugger allows breakpoints, single stepping, watch windows and all the features of a modern debugger for the MPLAB IDE. It works in conjunction with the editor to reference information from the target being debugged back to the source code.

Execution Engines: There are software simulators in MPLAB IDE for all PICmicro MCU and dsPIC DSC devices. These simulators use the PC to simulate the instructions and some peripheral functions of the PICmicro MCU and dsPICDSC devices. Optional in-circuit emulators and in-circuit debuggers are also available to test code as it runs in the applications hardware.

Key Features

MPLAB IDE is a Windows® Operating System (OS) based Integrated Development Environment for the PIC MCU families and the dsPIC Digital Signal Controllers.

The MPLAB IDE provides the ability to:

- Create and edit source code using the built-in editor.
- Assemble, compile and link source code.
- Debug the executable logic by watching program flow with the built-in simulator or in real time with in-circuit emulators or in-circuit debuggers.
- Make timing measurements with the simulator or emulator.
- View variables in Watch windows.
- Program firmware into devices with device programmers

Simulation Result

The SMS alert pass by application scheme to the fIrst fundamental individual human, whose sequence place as a first one in application utility. From the human cases point of view this alert scheme is beneflcial. Patient's risk conditions may be managed or treated competently with this alert scheme and medical team reaches as soon as possible at the patient's location.The android activity screen used to register the user who shall receive the SMS alerts. Shows the settings for threshold for different medical parameters. Once the threshold values are set, any variations detected are communicated via SMS to the registered mobiles in the android activity screen.

Conclusionand Schedule For Phase Ii

For the identification of device and information processing of an equipment the RFID, WSN, etc are used. Body area network (BAN) will contribute a significant responsibility in backing extensive scope of appeals thereby BAN appliances being exercised within the territory or implant in internal body. Though, the present electronics health systems do not use mobile phones, tablets or PC to transmit essential data related to the patients' health. In this proposed system we propose the information of a patient's health to the medical professionals via smart phones using IOT

Vehicle Bus Network

A vehicle bus is a specialized internal communications network that interconnects components inside a vehicle. Special requirements for vehicle control such as assurance of message delivery, of non-conflicting messages, of minimum time of delivery, of low cost, and of emf noise resilience, as well as redundant routing and other characteristics mandate the use of less common networking protocols. Protocols include Controller Area Network, Local Interconnect Network and others.

With stringent emission standards for automobiles, it became impossible to attain the required degree of control without the help of on-board computing devices. On-board electronic devices have also contributed substantially to vehicle performance, occupant comfort, ease of manufacture and cost effectiveness. At one time, a car radio was likely the only electronic device in an automobile, but now almost every component of the vehicle has some electronic feature. Typical electronic modules on today's vehicles include the Engine Control Unit, the Transmission Control Unit, the Anti-lock Braking System and body control modules.

An electronic control module typically gets its input from sensors that it uses in its computation. Various actuators are used to enforce the actions determined by the module. The modules need to exchange data among themselves during the normal operation of the vehicle. For example, the engine needs to tell the transmission what the engine speed is, and the transmission needs to tell other modules when a gear shift occurs. This need to exchange data quickly and reliably led to the development of the vehicle network, as the medium of data exchange.

The automotive industry quickly realized the complexity of wiring each module to every other module. Such a wiring design would not only be complex, it would have to be altered depending on which modules were included in the specific vehicle. For example, a car without the anti-lock brake module would have to be wired differently than one that included anti-lock brakes.

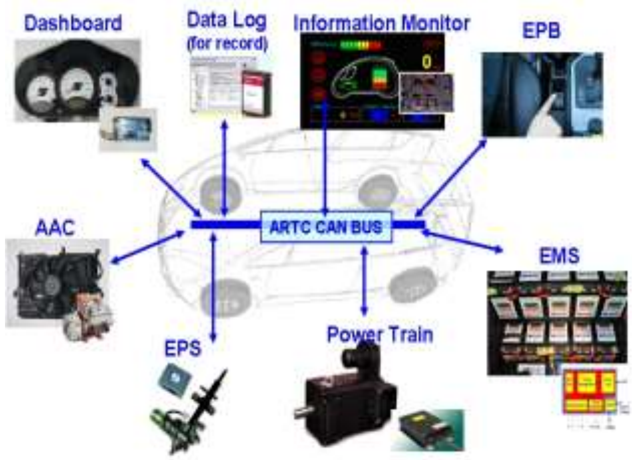


Figure 4: Vehicle Bus Network

The industry's answer to this problem was to create a central network in the vehicle. Modules could be plugged into the network and would be able to communicate with any other module that was installed on the network. This design was easier to manufacture, easier to maintain and provided the flexibility to add and remove options without affecting the entire vehicle's wiring architecture. Each module, a node on the vehicle network, controls specific components related to its function and communicates with the other modules as necessary, using a standard protocol, over the vehicle network.

Although the vehicle network made modest demands on data throughput, the demand for more on-board computing is continuing to drive changes to these networks to provide higher-speed communication between modules. The control area network includes the receiver and transmitter for the host to controller transmission and interlinking between the computers.

10. **Obstacle Detection and Alert System Requirements**

Obstacle detection and alert system is a combined embedded system having algorithms to detect obstacles and also alert the driver with pre-stored obstacle data. ODAS is an additional system that will be fitted in the vehicle.

ODAS in vehicle consists of following components:

- Controller
- CAN Transceiver
- LCD Display
- Buzzer
- GPS Module
- GPRS Module

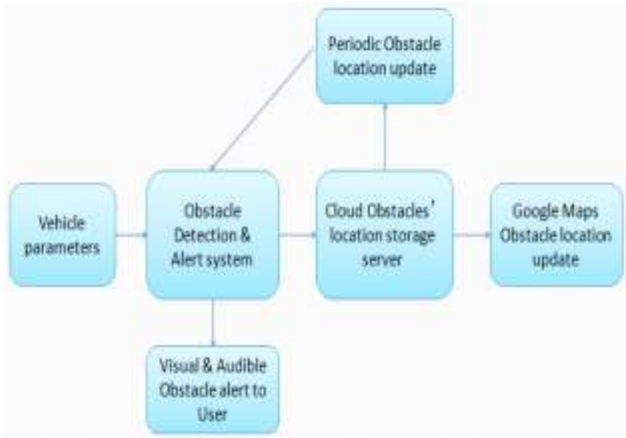


Figure 5: Overview of ODAS

4. ODAS – Detection System

8.1 Probable obstacle detection

ODAS Detection system has the responsibility to detect obstacles such as speed breakers, barricades, and potholes on the road by pre-defined algorithm. It detects probable obstacle locations by using vehicle parameters as input and by using in-built detection algorithm. It uses two vehicle parameters as major inputs

- Vehicle Speed
- Steering Angle

Conditions for Obstacle detection (speed breakers, potholes) are as follows:

- Vehicle speed falls from above 40km/h to below 20km/h within definite time (say 10seconds)
- Vehicle speed rises above 40km/h from below 20km/h within definite time (say 20seconds)

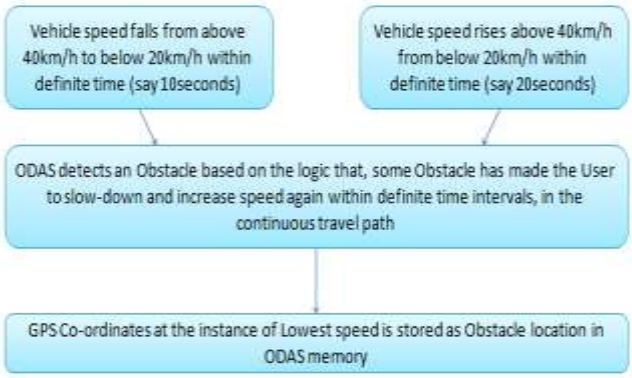


Figure 6: ODAS speed breaker detection method

If the above conditions of detection algorithm satisfy, then ODAS detection system concludes that there was speed breaker/pothole in the path, based on the logic that, speed breaker/pothole has made the user to slow-down and increase speed again within definite time intervals, in the continuous travel path.

GPS Co-ordinates from GPS Module at the instance of lowest speed is stored as speed breaker/pothole location in ODAS memory

Conditions for obstacle detection (Barricades) are as follows:

• Vehicle speed falls from above 40km/h to below 20km/h within definite time (say 10 seconds)

• Steering angle changes from Center -> Positive -> Center -> Negative or vice versa

• Vehicle speed rises above 40km/h from below 20km/h within definite time (say 20 seconds)

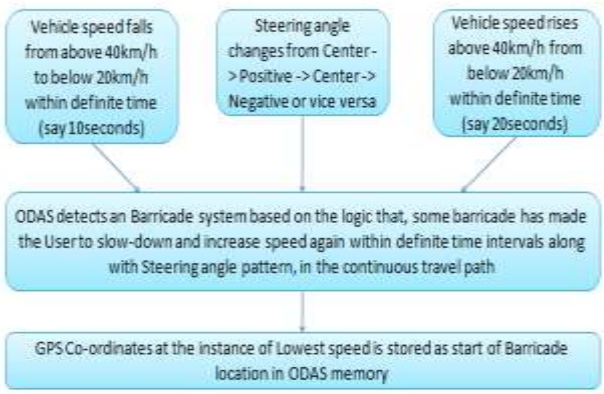


Figure 7: ODAS barricade detection method

If the above conditions of detection algorithm satisfy, then ODAS detection system concludes that there was barricade in the path, based on the logic that, barricade has made the user to slow-down, steer opposite sides and increase speed again within definite time intervals, in the continuous travel path. GPS co-ordinates from GPS Module at the instance of lowest speed is stored as barricade location in ODAS memory.

8.2 Upload to Cloud Server

Obstacle locations that are GPS co-ordinates that are stored in ODAS memory are uploaded to cloud server from time-to-time using IOT infrastructure.

8.3 Obstacle Detection Cloud Server

Obstacle detection cloud server forms a important part of ODAS system. It receives all the obstacles locations that are detected by individual ODAS systems installed in vehicles via IOT infrastructure.

The cloud server has the following functions

• Receive and store obstacles location from individual ODAS

• Consolidate and group closer GPS co-ordinates of obstacles

The cloud server determines that there is actually an obstacle on the road using the GPS co-ordinates with difference of 0.001 differences exceeds 10 instances. If the condition is satisfied, then the average of the 10 GPS co-ordinates is stored as obstacle location in cloud server.

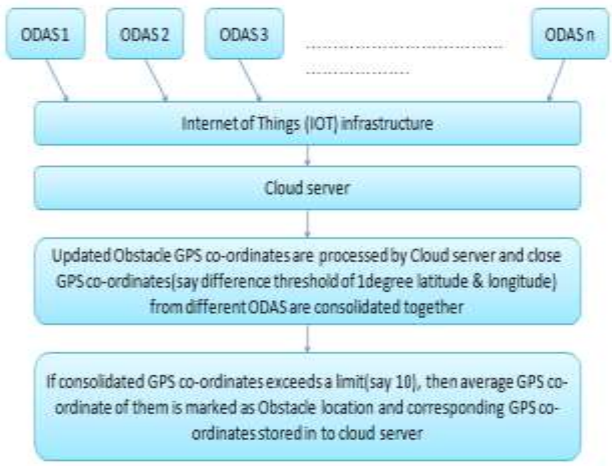


Figure 8: Cloud server

4. **ODAS - Alert System**

9.1 Download from cloud server

Obstacle locations thus consolidated in the cloud server are updated to ODAS in individual vehicles by means of Internet-of-Things (IOT) infrastructure from time-to-time.

Obstacles location GPS co-ordinates are pushed to individual ODAS upon request which happens periodically. GPS co-ordinates thus received are stored in ODAS memory as obstacles locations, which are used to alert the driver about the obstacles.

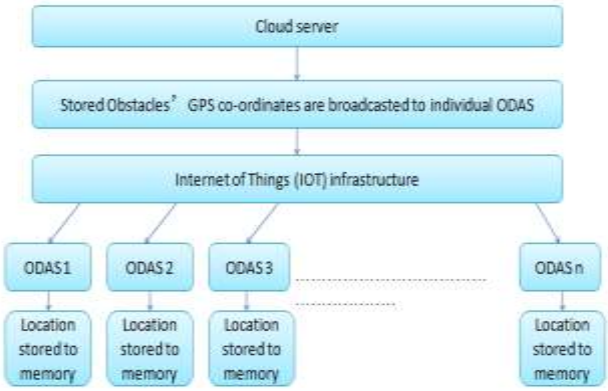


Figure 9: Obstacles location download

9.2 Obstacle Alert

Obstacles locations received from cloud server are used to alert the driver about nearby obstacles on his path. Current GPS co-ordinates from GPS module are compared continuously with obstacles GPS co-ordinates when the vehicle is in travel.

If the current GPS co-ordinates are closer to any of the pre-stored obstacles GPS co-ordinates in ODAS Memory, then an alert is given to the user.

Alert from ODAS is of two types
- Audible alert
- Visual alert

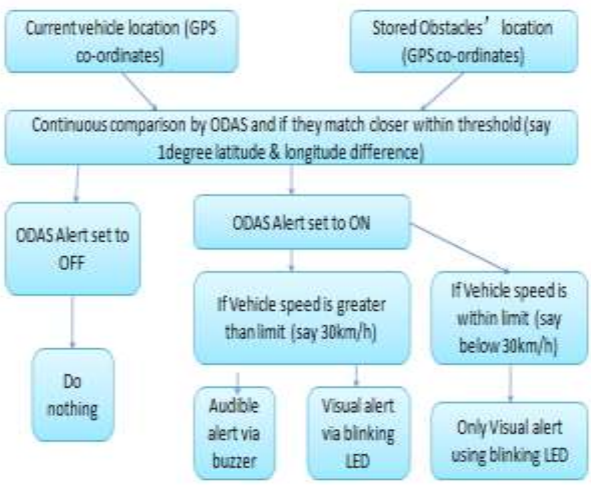


Figure 10: ODAS Alert system

If the vehicle speed is within lowest set limit, then ODAS understands that user has already noticed the obstacle and is going slow. Only visual alert is given to the user in that case. If the vehicle speed is above the lowest limit, then ODAS alert the user about obstacle with audible as well as visual alerts. ODAS can be switched off from giving alerts as and when needed.

9.2.1 Audible Alert

ODAS provides audible alert to the user by means of buzzer connected to ODAS. Buzzer frequency depends upon the current speed of the vehicle above the threshold limit on nearing the obstacle location.

- If the vehicle speed is much higher than the threshold limit, then frequency of buzzer is set high so that user understands that he needs to slow down immediately.
- If the vehicle speed is only slightly higher than threshold limit, then frequency of buzzer is kept less, because user may already be slowing down seeing obstacle.

9.2.2 Visual Alert

ODAS provides visual alert to the user by means blinking LED lights. Similar to audible alert, the frequency of blinking depends upon vehicle speed above threshold limit.

- If the vehicle speed is much higher than the threshold limit, then frequency of blinking LED is set high
- If the vehicle speed is only slightly higher than threshold limit, then frequency of LED blinking is kept less.

11. Obstacles update to Google maps

Obstacles locations, basically GPS co-ordinates available in cloud server are not just sent to individual ODAS in vehicles. They are also used to show the obstacles location on top of Google Maps of the end user. This is achieved by making use of in-built Google Maps feature called "Places List".

10.1 Google Maps Places List

Google Maps has an in-built feature called "Places List". It allows the user to store desired locations (GPS co-ordinates) of the map in to memory as a list. This stored list of Places is available on top of Google Maps for the user, which can be revisited by a single click. User has the option to add, delete, and edit the stored places. In the Google Maps app, you can create a list of places, like your favorite places or places you want to visit.

10.2 Google Maps places list sharing

Google Maps allow the places list to be shared with other users via a link. The other users on receiving the link can follow them and updates in the list will be visible to all users who follow the list. As "Places List" can be shared and followed, we make use of the option to share obstacles locations to users who have installed ODAS in their vehicles. Google Maps "Places list" are associated to a Google account.

Since "Places List" is associated to Google account, cloud server shall have a Google account and "Places List" created for storing obstacles locations on the list. Users who have ODAS installed are shared the "Places List" link. Users can follow the "Places List" that is shared to them to get updates on the obstacles location on top of their Google Maps.

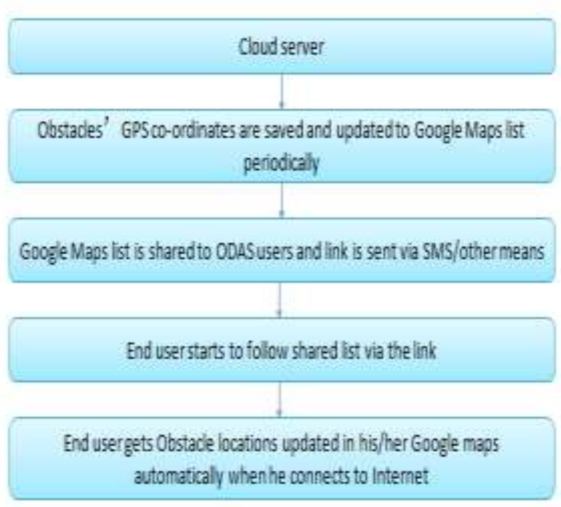


Figure 11: Obstacles location update to Google Maps

Cloud server will update obstacles location list periodically based on the data it receives from individual ODAS. Cloud server can have multiple lists for each obstacle and also separate lists for each region which the user can follow in his own device using his Google account.

12. Conclusion

The Obstacle Detection and Alert System (ODAS) uses readily available Vehicle parameters such as Vehicle Speed, Steering angle along with GPS Module helps to detect the Obstacles on Road. By a centralized Cloud server, the actual Obstacles' GPS locations are marked by making use of data from different ODAS systems, which makes it a reliable system. ODAS alert helps in avoiding Road mishaps by alerting the driver to reduce his speed to safe Vehicle speed before encountering the Obstacles. Update of Obstacles location in End-user Google Maps helps the user to plan his/her efficient route for travel in advance.

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