

WIRELESS ACCIDENT SYSTEM INFORMATION USING GSM AND GPS

A Project Report Phase – II

Submitted in partial fulfilment of the requirements for the award of Bachelor
of Engineering degree in Electronics and Communication Engineering

by

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

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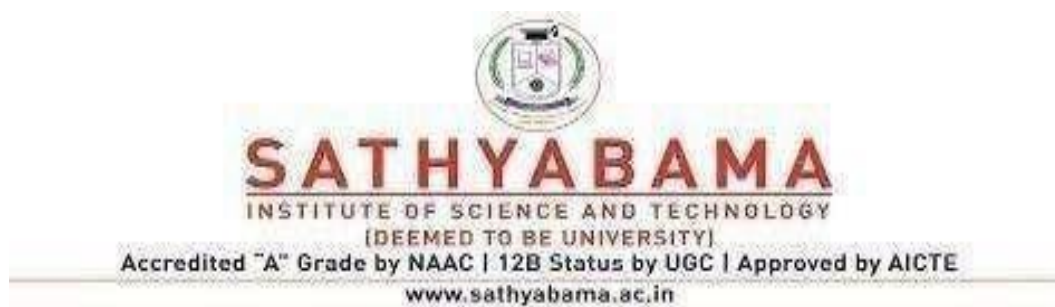
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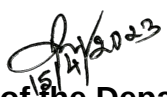
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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Maddela Sree Charan Reddy (39130265)** and **Kolla Phaneendra** who carried out the project entitled "**Wireless Accident System Information Using GSM and GPS**" under our supervision from NOVEMBER 2022 to APRIL 2023.


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We Kolla Phaneendra (Reg No:39130233) and Maddela Sree Charan Reddy (Reg No: 39130265) hereby declare that the Project Report entitled "Wireless accident system information using GSM and GPS" done by us under the guidance of Dr.R.M.JOANY is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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ABSTRACT

This project will provide an optimum solution to this draw back. According to this project when a vehicle meets with an accident immediately Vibration sensor will detect the signal or if a car rolls over, and vibration sensor will detect the signal and sends it to NODE MCU controller.

Alcohol detection, Heart beat monitoring is performed by the NODE MCU controller sends, its alert mail through the IOT including the location to police control room or a rescue team. So, the police can immediately then after conforming the location necessary action will be taken.

If the person meets with a small accident or if there is no serious threat to anyone's life, then the alert message can be terminated by the driver by a switch provided in order to avoid wasting the valuable time of the medical rescue team. This paper is useful in detecting the accident precisely by means of both vibration sensor and Alcohol detection, Heart beat monitoring.

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CHAPTER 1

INTRODUCTION

In today's world as the population increases day by day the numbers of vehicles also increases on the roads and highways. This result in more accident that interns leads to the traffic jams and public get help instantaneously. This module provides information about the accident to the hospital and police station. As a result sudden help level of supervision and management for cargo transport vehicles, especially trucks carrying coal it is important to develop transport vehicles remote monitoring module. A server computer at the (remote) monitoring station that is continuously waiting for data from the system should record the actions of the vehicle into a database. This contains the information regarding Vehicle velocity, position, identity and temperature in two fashions. The information given to monitoring station is in continuous manner and when the accident occurs. The development of vehicular design brings public many convenience in life but also brings many problems at the same time, for example, traffic congestion, difficulty in monitoring dispersive vehicle, theft and other series of problems. We are intended to make this monitoring wireless using RASPBERRY PI hardware platform. In last decade, we observe the drivers fatigue driving and vehicle theft activity which causes social real time problem like accidents and many more hazards conditions. We daily see or read such type of activities which are raising the question of our safety and security in both public and private sectors. So there is a need of real time monitoring and tracking the vehicle also storing and updating its database of certain situations. In the urban areas, human help is somewhat difficult in providing the database of tracked vehicle. In the proposed system, the system provides a fully automated tracking and monitoring of the vehicle which helpful for their owners, and also it provides accurate arrival time of the vehicle at particular location or stop. And hence using accuracy in time, in case of school bus children can spend more time in studying, sleeping, or relaxing rather than waiting for a delayed bus. Spending less time waiting for a bus improves comfortable and effective time management of the student as well. In order to reduce man power and saving of money, here the system provides easy tracking solution using Embedded Linux Board. The proposed system get tracking information of the vehicle like vehicle number (Unique ID), location, Date, Time and store into the database of Raspberry Pi. The system also provides vehicular safety mechanism with the

help of temperature sensor and gas leakage sensor. Hence in the case of raising the temperature inside the vehicle due to some reason or leakage of the LPG gas inside the vehicle, the alert message get send to the driver as well as vehicle owner. For tracking the vehicle uses GPS module. The GSM/GPRS module is used which transmit the updated vehicle database to the server and user access the database using web page in Smartphone. That shows the real time vehicle location in the Smartphone. Thus, users will be able to continuously monitor a moving vehicle on demand using the Smartphone and determine the estimated distance and time for the vehicle to arrive at a given destination. A. Related work N.Watthanawisuth, T.Lomasand and A.Tuantranont proposed wireless vehicle tracking system using the MEMS accelerometer, GSM, and GPS for monitoring accidental vehicles. Designed system can detect accident as small or high from the accelerometer and GPS. After which short message service information will sent via GSM network. The second one detects the change of driver's physiological characteristics such as brain waves, heart rate and pulse rate. In spite of the good accuracy it causes annoyance to the driver as some additional devices must be attached to the driver's body. The Third one detects the fatigue of a driver irrespective of their facial features, Accelerometer sensor is fixed on vehicle, steering abrupt movements are monitored and also the threshold limits of acceleration are compared. If the values exceed the threshold, warning message is displayed on the LCD and audio prompts are generated to warn the driver. In this method drowsiness and rash driving is also detected. An accelerometer measures speed variations of anything that it's mounted on it. The tri-axis accelerometers measures acceleration in three directions perpendicular to each other. The Micro Electro Mechanical Sensor (MEMS) is a high sensitive sensor which is capable of detecting the tilt is used to detect the extreme right and extreme left turns to detect the accident. In India so many traffic accidents are reported and there are no means to monitor or control the speed of vehicles running on road. The proposed system is effective in detection of rash driving and accidents location and is also use to control the vehicle speed. If the driving is reckless the designed system will detect the vibrations from the vehicle and then automatically control the vehicles speed thus keeping people in safe mode and reducing accidents. Some peoples will participate in the races on the road and suddenly at some turning position they may get

confused and it may turn into an accident. This system simply identifies and then passes the information to some predefined numbers thus saving human lives within short time.

CHAPTER 2

LITERATURE SURVEY

R. Ganiga, Rohit Maurya, Archana Nanade,"Accident detection system using Piezo Disk Sensor", International Journal of science, Engineering and Technology Research(IJSETR) volume6,Issue3,March 2017,ISSN 2278-7798.

Arduino Based Vehicle Accident Alert System using GPS, GSM and Accelerometer. Accelerometer detects the sudden change in the axes of vehicle and GSM module send the alert message on your Mobile Phone with the location of the accident. The advancing technology has made our day to day lives easier. Since every coin has two sides similarly technology has its benefits as well as its disadvantages. The rise in technology has increased the rate of road accidents which causes huge loss of life. The poor emergency facilities available in our country just add to this problem. Our project is going to provide a solution to this problem.

[2].Hemjit Sawant, Jindong Tan, Qingyan Yang Qizhi Wang," Using Bluetooth and Sensor networks for intelligent transport systems", In proceeding of Intelligent Transport System; 2004.

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[3].Helia Mamdouhi, Sabira Khatun, Javed Zarrin," Bluetooth Wireless monitoring, Managing and Control for inter vehicle in vehicular adhoc networks", Journal of computer Science, Science Publication; 2009.

Problem statement: The car users expect more and more accessories available in their cars, but the accessories available needed manage by driver manually and not properly manage by smart system. All these accessories are able to control by user manually using different and standalone controllers. Besides, the controller itself uses RF technology which is not existed in mobile devices. So there is lack of a comprehensive and integrated system to manage, control and monitor all the accessories inside the vehicle by using a personal mobile phone. Design and development of an integrated system to manage and control all kind of inter vehicle accessories, improving the efficiency and functionality of inter vehicle communications for the car users. Approach: The proposed system was based on Microcontroller, Bluetooth and Java technology and in order to achieve the idea of an intelligence car with ability to uses personal mobile hand phone as a remote interface. Development strategies for this innovation are includes two phases: (1) java based application platform-designed and developed for smart phones and PDAs (2) hardware design and implementation of the receiver side-compatible smart system to managing and interconnection between all inside accessories based on monitoring and controlling mechanisms by Bluetooth media. Results: The designed system included hardware and software and the completed prototype had tested successfully on the real vehicles. During the testing stage, the components and devices were connected and implemented on the vehicle and the user by installing the system interface on a mobile phone is able to monitor and manage the vehicle accessories, the efficiency, adaptively and range of functionality of the system has proved with the various car accessories. Conclusion: This study involved design a new system to decrease the hot temperature inside a car that affecting the health of the car driver and the car driver is able to control some of the car accessories by using mobile phone. Once the car was equipped with the Bluetooth module and control system, the car accessories is able to connect with microcontroller and control by the mobile application.

[4].Jules White, Brian Dougherty, Adam Albright, Douglas C," Using Smartphone to Detect Car Accidents and Provide Situational awareness to emergency

responders chirs Thompson", Mobile Wireless Middleware, Operating system and Application;2010.

Accident detection systems help reduce fatalities stemming from car accidents by decreasing the response time of emergency responders. Smartphones and their onboard sensors (such as GPS receivers and accelerometers) are promising platforms for constructing such systems. This paper provides three contributions to the study of using smartphone-based accident detection systems. First, we describe solutions to key issues associated with detecting traffic accidents, such as preventing false positives by utilizing mobile context information and polling onboard sensors to detect large accelerations. Second, we present the architecture of our prototype smartphonebased accident detection system and empirically analyze its ability to resist false positives as well as its capabilities for accident reconstruction. Third, we discuss how smartphone-based accident detection can reduce overall traffic congestion and increase the preparedness of emergency responde

CHAPTER- 3

SCOPE OF THE PROJECT

Scope of the project

Integration with other technologies: Wireless accident information systems could be integrated with other technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and Cloud Computing to enhance their capabilities. AI could be used to analyze accident data and provide recommendations for improving safety, while IoT could be used to connect different devices and sensors for improved communication and data collection.

Real-time data collection: Future systems could use advanced sensors and algorithms to collect real-time data on road conditions, traffic flow, and weather patterns. This could improve the accuracy of accident prediction and prevention, as well as provide emergency responders with more detailed information about the accident scene.

Improved accuracy: Advancements in GPS technology could lead to improved accuracy in locating accident victims, even in areas with poor satellite coverage or signal interference.

Wireless charging: Future systems could use wireless charging technology to ensure that GPS devices remain powered and functional, even in remote or difficult-to-reach areas.

Automated emergency response: The use of AI and machine learning could enable future systems to automatically alert emergency responders and dispatch the appropriate resources to the accident scene.

Personalized safety recommendations: Wireless accident information systems could provide personalized safety recommendations to drivers based on their driving behavior and accident history, using data analytics and machine learning algorithms.

Overall, the future of wireless accident information systems using GSM and GPS technology is promising, as technological advancements continue to improve their capabilities and effectiveness in preventing and responding to accidents.

CHAPTER 4

METHODOLOGY

EXISTING SYSTEM:

Human life is more valuable than anything else, timely help is more important than lending a helping hand. This project is one among those which is designed in a way to save human lives in a timely manner. There are three main modules discussed in the project. When a car meets with an accident, immediately the car's number and the GPS co-ordinates of the location are messaged to the nearby hospitals, thereby ensuring timely help to the needy. When the car is tried to crank, a text message is sent to the owner thereby intimating the status of the car. Acknowledging the text message allows the driver to proceed further to move else the car is immobilized. While during a long drive, if the car's engine goes faulty. The error signals from the dash board of the car and the GPS coordinates are captured and sent to the nearby service center, thereby saving time. Here the GSM is used to send the text message and the GPS is used to track the exact coordinates of the car. The serial communication interface UART is used for the communication between the Microcontroller (PIC 16F877A), GSM and GPS module. The RS232 communication standard is used for the following purposes. Electrical signal characteristics such as voltage levels, signaling rate, timing and slew-rate of signals, voltage withstand level, short-circuit behavior. The microcontroller that meets the requirements for the usage of serial data communication and Analog inputs is preferably the PIC 16F877A series, which provides good interrupt capabilities and reliability.

PROBLEM STATEMENT

Cannot be heard in buildings

Cannot identify exact accident locations during accidents

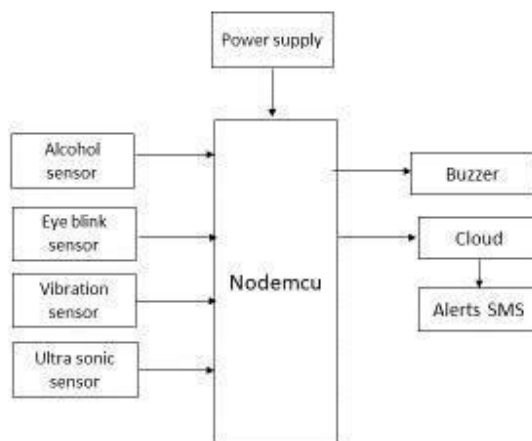
Communication speed is very less

We can't locate the vehicle

Proposed system

The proposed System is the system which track vehicle accident current location using raspberry pi. This product gives the live updates of accidental vehicle with their location details. The system also monitor the vehicle internal security by ultrasonic sensors, vibration sensor is used to monitoring any vibration like glass brake or accidents. And ultrasonic sensor are placed on front one and back one to easily monitor and if any object is detected buzzer should be ON. Tracking System is working same as follows. When the accident will occurred, then the system will direct send the accident alert message along with location details of the accidental vehicle to emergency dispatch sever further it will send that alert message to the nearby ambulance so that it will go to that location. By using system like this we can decrease the mortality rate which is lead by accident. And also here we used camera for captures the pics and these values should be stored in cloud here we used Ubidots explorer. It will send the mail or SMS to higher authorities

BLOCK DIAGRAM



4.0 block diagram

Design

Given widespread recognition of the evolving nature of the design and management of the Internet of things, sustainable and secure deployment of IoT solutions must design for "anarchic scalability." Application of the concept of anarchic scalability can be extended to physical systems (i.e. controlled real-world objects), by virtue of those systems being designed to account for uncertain management futures. This "hard anarchic scalability" thus provides a pathway forward to fully realize the potential of Internet of things solutions by selectively constraining physical systems to allow for all management regimes without risking physical failure. Brown University computer scientist Michael Littman has argued that successful execution of the Internet of things requires consideration of the interface's usability as well as the technology itself. These interfaces need to be not only more user-friendly but also better integrated: "If users need to learn different interfaces for their vacuums, their locks, their sprinklers, their lights, and their coffeemakers, it's tough to say that their lives have been made any easier."

Difference Between Existing System and Proposed System

The difference between an existing system and a proposed system typically refers to changes made to an existing system to improve it or to create a new system altogether.

The existing system is the current system or process that is currently in use, while the proposed system is a new or improved version of that system. The proposed system is usually designed to address the limitations of the existing system or to add new features that are not available in the existing system.

The proposed system may involve changes to the hardware, software, or both. It may also involve changes to the business processes, procedures, or workflows. The proposed system is usually designed to improve the efficiency, effectiveness, and/or quality of the existing system.

For example, let's say a company has an existing manual inventory management system. The proposed system could be a new computer-based inventory management system

that automates the inventory tracking process. The new system could include features such as barcode scanning, automatic reordering of stock, and real-time inventory tracking.

Overall, the proposed system is an improvement or a new creation that is designed to solve problems or to provide additional benefits that the existing system does not provide.

Hardware required
Software required

1. Node mcu
2. Eye blink sensor
3. Ultrasonic sensor
4. Vibration sensor
5. Buzzer
6. Power supply

1. Arduino IDE

SYSTEM DESIGN INTERNET OF THINGS

The Internet of things (IoT) is the inter-networking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to collect and exchange data. In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as "a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies" and for these purposes a "thing" is "an object of the physical world (physical things) or the information world (virtual things), which is capable of being identified and integrated into communication networks". The IoT allows objects to be sensed or 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 in addition to reduced human intervention. 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, virtual power plants, 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 about 30 billion objects by 2020. Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) communications and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid, and expanding to areas such as smart cities. "Things", in the IoT sense, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, electric clams in coastal waters, automobiles with built-in sensors, DNA analysis devices for environmental/food/pathogen monitoring, or field operation devices that assist firefighters in search and rescue operations. Legal scholars suggest regarding "Things" as an "inextricable mixture of hardware, software, data and service". These devices collect useful data with the help of various existing technologies and then autonomously flow the data between other devices. Current market examples include home automation (also known as smart home devices) such as the control and automation of lighting, heating (like smart thermostat), ventilation, air conditioning (HVAC) systems, and appliances such as washer/dryers, robotic vacuums, air purifiers, ovens, or refrigerators/freezers that use Wi-Fi for remote monitoring. As well as the expansion of Internet-connected automation into a plethora of new application areas, IoT is also expected to generate large amounts of data from diverse locations, with the consequent necessity for quick aggregation of the data, and an increase in the need to index, store, and process such data more effectively. IoT is one of the platforms of today's Smart City, and Smart Energy Management Systems.

History

As of 2016, the vision of the Internet of things has evolved due to a convergence of multiple technologies, including ubiquitous wireless communication, real-time

analytics, machine learning, commodity sensors, and embedded systems. This means that the traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things (IoT). The concept of a network of smart devices was discussed as early as 1982, with a modified Coke machine at Carnegie Mellon University becoming the first Internet-connected appliance, able to report its inventory and whether newly loaded drinks were cold. Mark Weiser's seminal 1991 paper on ubiquitous computing, "The Computer of the 21st Century", as well as academic venues such as UbiComp and PerCom produced the contemporary vision of IoT. In 1994 Reza Raji described the concept in IEEE Spectrum as "[moving] small packets of data to a large set of nodes, so as to integrate and automate everything from home appliances to entire factories". Between 1993 and 1996 several companies proposed solutions like Microsoft's at Work or Novell's NEST. However, only in 1999 did the field start gathering momentum. Bill Joy envisioned Device to Device (D2D) communication as part of his "Six Webs" framework, presented at the World Economic Forum at Davos in 1999. The concept of the Internet of things became popular in 1999, through the Auto-ID Centre at MIT and related market-analysis publications. Radiofrequency identification (RFID) was seen by Kevin Ashton (one of the founders of the original Auto-ID Centre) as a prerequisite for the Internet of things at that point. Ashton prefers the phrase "Internet for Things. "If all objects and people in daily life were equipped with identifiers, computers could manage and inventory them. Besides using RFID, the tagging of things may be achieved through such technologies as near field communication, barcodes, QR codes and digital watermarking. In its original interpretation, one of the first consequences of implementing the Internet of things by equipping all objects in the world with minuscule identifying devices or machinereadable identifiers would be to transform daily life. For instance, instant and ceaseless inventory control would become ubiquitous. A person's ability to interact with objects could be altered remotely based on immediate or present needs, in accordance with existing end-user agreements. For example, such technology could grant motion-picture publishers much more control over end-user private devices by remotely enforcing copyright restrictions and digital rights management, so the ability of a

customer who bought a Blu-ray disc to watch the movie could become dependent on the copyright holder's decision, similar to Circuit City's failed DIVX.

Applications

According to Gartner, Inc. (a technology research and advisory corporation), there will be nearly 20.8 billion devices on the Internet of things by 2020. ABI Research estimates that more than 30 billion devices will be wirelessly connected to the Internet of things by 2020. As per a 2014 survey and study done by Pew Research Internet Project, a large majority of the technology experts and engaged Internet users who responded—83 percent—agreed with the notion that the Internet/Cloud of Things, embedded and wearable computing (and the corresponding dynamic systems) will have widespread and beneficial effects by 2025. As such, it is clear that the IoT will consist of a very large number of devices being connected to the Internet. In an active move to accommodate new and emerging technological innovation, the UK Government, in their 2015 budget, allocated £40,000,000 towards research into the Internet of things. The former British Chancellor of the Exchequer George Osborne, posited that the Internet of things is the next stage of the information revolution and referenced the inter-connectivity of everything from urban transport to medical devices to household appliances. The ability to network embedded devices with limited CPU, memory and power resources means that IoT finds applications in nearly every field. Such systems could be in charge of collecting information in settings ranging from natural ecosystems to buildings and factories, thereby finding applications in fields of environmental sensing and urban planning. On the other hand, IoT systems could also be responsible for performing actions, not just sensing things. Intelligent shopping systems, for example, could monitor specific users' purchasing habits in a store by tracking their specific mobile phones. These users could then be provided with special offers on their favourite products, or even location of items that they need, which their fridge has automatically conveyed to the phone. Additional examples of sensing and actuating are reflected in applications that deal with heat, water, electricity and energy management, as well as cruise-assisting transportation systems. Other applications that the Internet of things can provide is enabling extended home security features and home automation. The concept of an

"Internet of living things" has been proposed to describe networks of biological sensors that could use cloud-based analyses to allow users to study DNA or other molecules. However, the application of the IoT is not only restricted to these areas. Other specialized use cases of the IoT may also exist. An overview of some of the most prominent application areas is provided here.

Architecture

The system will likely be an example of event-driven architecture, bottom-up made (based on the context of processes and operations, in real-time) and will consider any subsidiary level. Therefore, model driven and functional approaches will coexist with new ones able to treat exceptions and unusual evolution of processes (multi-agent systems, B-ADSc, etc.). In an Internet of things, the meaning of an event will not necessarily be based on a deterministic or syntactic model but would instead be based on the context of the event itself: this will also be a semantic web. Consequently, it will not necessarily need common standards that would not be able to address every context or use: some actors (services, components, avatars) will accordingly be self-referenced and, if ever needed, adaptive to existing common standards (predicting everything would be no more than defining a "global finality" for everything that is just not possible with any of the current top-down approaches and standardizations). Building on top of the Internet of things, the web of things is an architecture for the application layer of the Internet of things looking at the convergence of data from IoT devices into Web applications to create innovative use-cases. In order to program and control the flow of information in the Internet of things, a predicted architectural direction is being called BPM Everywhere which is a blending of traditional process management with process mining and special capabilities to automate the control of large numbers of coordinated devices.

Network Architecture

The Internet of things requires huge scalability in the network space to handle the surge of devices. IETF 6LoWPAN would be used to connect devices to IP networks. With billions of devices being added to the Internet space, IPv6 will play a major role in handling the network layer scalability. IETF's Constrained Application Protocol, ZeroMQ, and MQTT would provide lightweight data transport. "MQ" in "MQTT" came

from IBM's MQ Series message queuing product line. Fog computing is a viable alternative to prevent such large burst of data flow through Internet. The edge devices' computation power can be used to analyse and process data, thus providing easy real time scalability.

CHAPTER 5

REQUIREMENT ANALYSIS

Node MCU

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module.^{[6][7]} The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson^[8] and SPIFFS

NodeMCU was created shortly after the ESP8266 came out. On December 30, 2013, Espressif Systems^[6] began production of the ESP8266.^[10] The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core,^[citation needed] widely used in IoT applications (see related projects). NodeMCU started on 13 Oct 2014, when Hong committed the first file of nodemcu-firmware to GitHub.^[11] Two months later, the project expanded to include an open-hardware platform when developer Huang R committed the gerber file of an ESP8266 board, named devkit v0.9.^[12] Later that month, Tuan PM ported MQTT client library from Contiki to the ESP8266 SoC platform,^[13] and committed to NodeMCU project, then NodeMCU was able to support the MQTT IoT protocol, using Lua to access the MQTT broker. Another important update was made on 30 Jan 2015, when Devsaurus ported the u8glib^[14] to NodeMCU project,^[15] enabling NodeMCU to easily drive LCD, Screen, OLED, even VGA displays.

In summer 2015 the creators abandoned the firmware project and a group of independent contributors took over. By summer 2016 the NodeMCU included more than 40 different modules. Due to resource constraints users need to select the modules relevant for their project and build a firmware tailored to their needs.

s Arduino.cc began developing new MCU boards based on non-AVR processors like the ARM/SAM MCU and used in the Arduino Due, they needed to modify the Arduino IDE so that it would be relatively easy to change

the IDE to support alternate toolchains to allow Arduino C/C++ to be compiled for these new processors. They did this with the introduction of the Board Manager and the SAM Core. A "core" is the collection of software components required by the Board Manager and the Arduino IDE to compile an Arduino C/C++ source file for the target MCU's machine language. Some ESP8266 enthusiasts developed an Arduino core for the ESP8266 WiFi SoC, popularly called the "ESP8266 Core for the Arduino IDE".^[16] This has become a leading software development platform for the various ESP8266-based modules and development boards, including NodeMCUs.

IoT platform node MCU is open source . Language used in it is lua scripting language. It is based on the eLua project, and built on the ESP8266 SDK 0.9.5. It uses many open source projects, such as lua-cjson, and spiffs. It includes firmware which runs on the ESP8266 Wi-Fi SoC, and hardware which is based on the ESP-12 module. NodeMCU was created shortly after the ESP8266 came out. In December 30, 2013, Espressif systems began production of the ESP8266. The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core, widely used in IoT applications. NodeMCU started in 13 Oct 2014, when Hong committed the first file of NodeMCU - firmware to GitHub. Two months later, the project expanded to include an open-hardware platform when developer Huang R committed the gerber file of an ESP8266 board, named devkit 1.0. Later that month, Tuan PM ported MQTT client library from Contiki to the ESP8266 SoC platform, and committed to Node MCU project, then Node MCU was able to support the MQTT IoT protocol, using Lua to access the MQTT IoT protocol, using Lua to access the MQTT broker. Another important update was made on 30 Jan 2015, when Devsaurus ported the u8glib to NodeMCU project, enabling NodeMCU to easily drive LCD, Screen, OLED, even VGA displays.

The main objective of this project is to develop a home automation system using an Node MCU board with Internet being remotely controlled by any Android OS smart phone. As technology is advancing so houses are also getting smarter. Modern houses are gradually shifting from conventional switches to centralized control system, involving remote controlled switches. Presently, conventional wall switches located in different parts of the house makes it difficult for the user to go near them to operate. Even more it becomes

more difficult for the elderly or physically handicapped people to do so. Remote controlled home automation system provides a most modern solution with smart phones.

In order to achieve this, a relay module is interfaced to the Node MCU board at the receiver end while on the transmitter end, a GUI application on the cell phone sends ON/OFF commands to the receiver where loads are connected. By touching the specified location on the GUI, the loads can be turned ON/OFF remotely through this technology. The loads are operated by IOT board through Relay Module.

NODEMCU (esp8266) has been selected as the controller for this system due to its compact size, compatibility, easy interfacing over several other type of controller including Programmable Integrated Circuit (PIC), Programmable Logic Controller (PLC) and others. ESP8266 is an open source firmware that is built on top of the chip manufacturer's proprietary SDK. The firmware provides a simple programming environment, which is a very simple and fast scripting language. The ESP8266 chip incorporates on a standard circuit board. The board has a built-in USB port that is already wired up with the chip, a hardware reset button, Wi-Fi antenna, LED lights, and standard-sized GPIO (General Purpose Input Output) pins that can plug into a bread board..Figure-3 shows the diagram of NODEMCU (ESP8266).It has Processor called L106 32bit RISC microprocessor core based on the Tensilica Xtensa Diamond Standard 106Micro running at 80 MHz and has a memory of 32 Kbit instruction RAM ,32 Kbit instruction cache RAM, 80 Kbit user data RAM&16 KbitETS system data RAM. It has inbuilt Wi-Fi module of IEEE 802.11 b/g/n Wi-Fi.

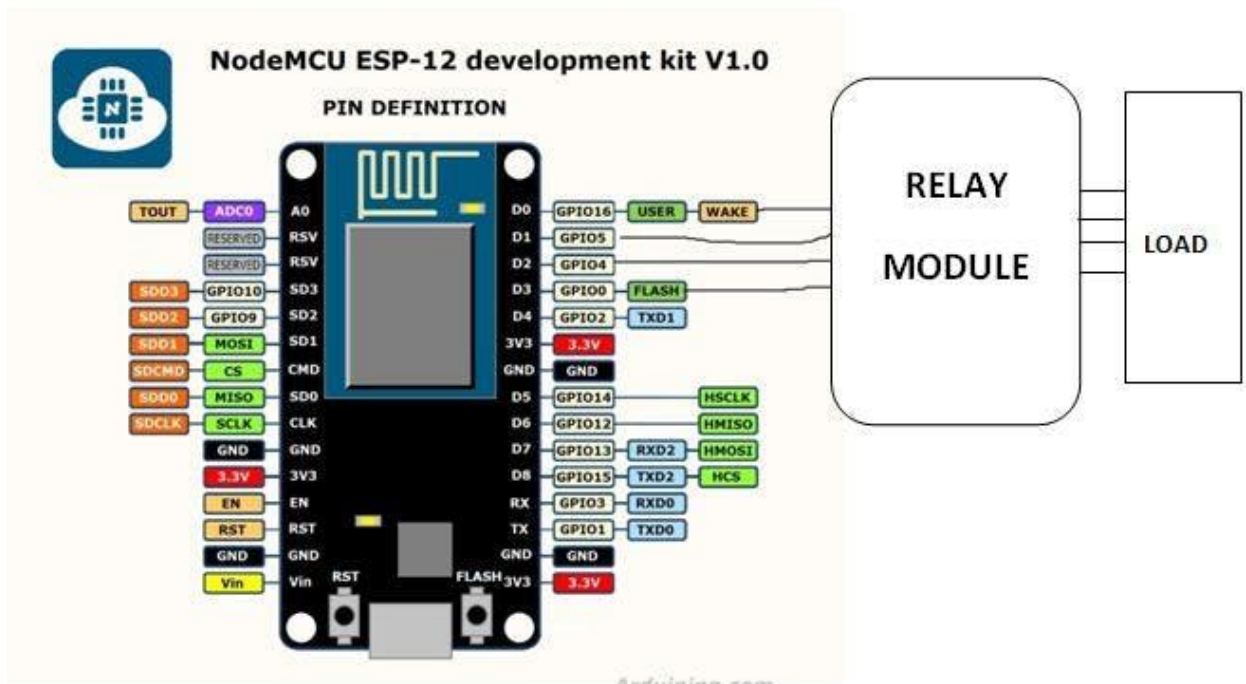


fig 5.1 Node MCU

Eyblink Sensor

Using a phototransistor and a separator circuit, the blink sensor illuminates the eye area and eyelid with infrared light and detects changes in the reflected light. This study includes measuring and monitoring the blink of an eye with the help of an IR sensor. Closed eye indicates that the output of the IR receiver is high except that the output from the IR receiver is low. Figure 4 shows an instant blink sensor with an IR attached to it

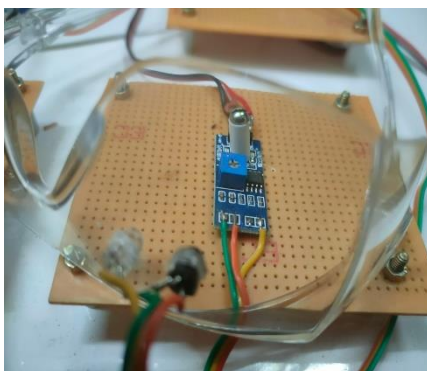


Fig 5.2 Eyeblick sensor

Ultrasonic Sensor

Bats are wonderful creatures. Blind from the eyes and yet a vision so precise that could distinguish between a moth and a broken leaf even when flying at full speed. No doubt the vision is sharper than ours and is much beyond human capabilities of seeing, but is certainly not beyond our understanding. **Ultrasonic ranging** is the technique used by bats and many other creatures of the animal kingdom for navigational purposes. In a bid to imitate the ways of nature to obtain an edge over everything, we humans have not only understood it but have successfully imitated some of these manifestations and harnessed their potential to the greatest extent.

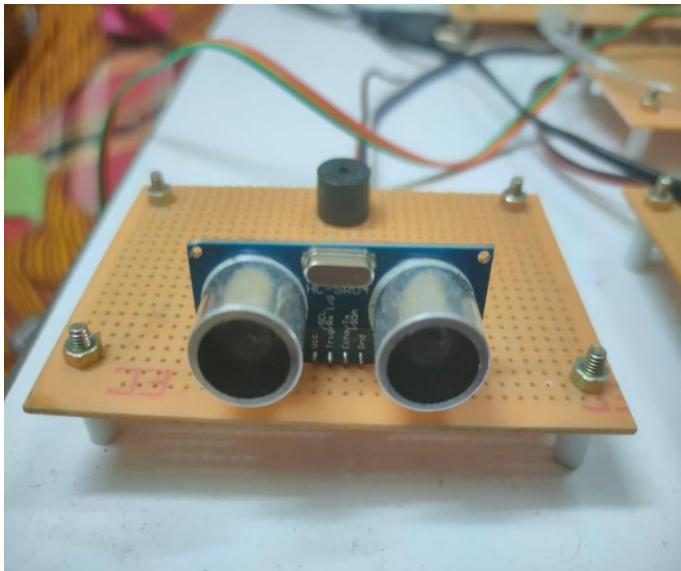


Fig 5.3 Ultrasonic sensor

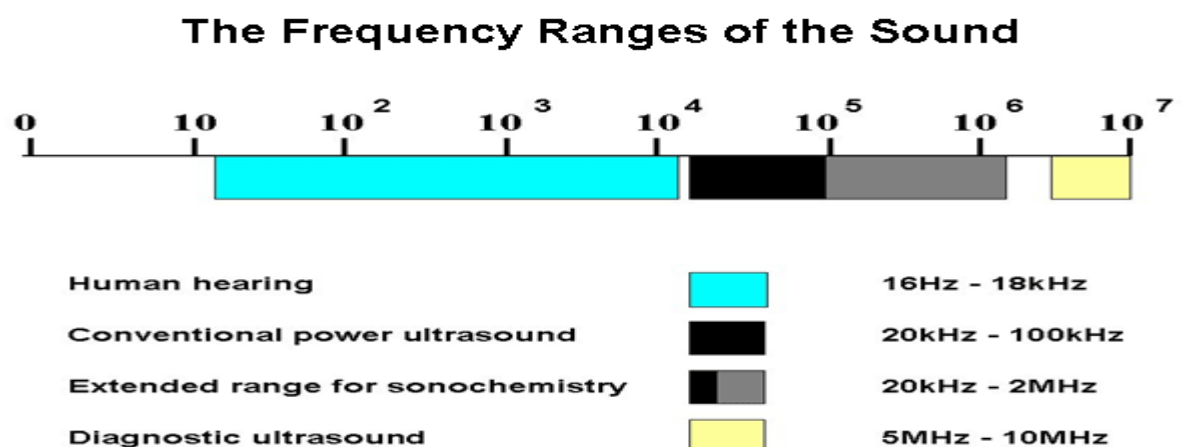


Fig 5.4 Frequency Ranges

When ultrasonic waves are incident on an object, diffused reflection of the energy takes place over a wide solid angle which might be as high as 180 degrees. Thus some fraction of the incident energy is reflected back to the transducer in the form of echoes and is detected. The distance to the object (L) can then be calculated through the speed of ultrasonic waves (v) in the medium by the relation

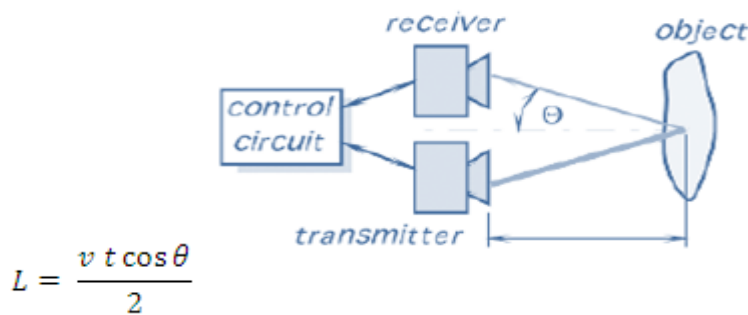


Fig 5.5 ultrasonic wave

Where 't' is the time taken by the wave to reach back to the sensor and 'θ' is the angle between the horizontal and the path taken as shown in the figure. If the object is in motion, instruments based on Doppler shift are used. Get all the details about internal structure and working of an ultrasound sensor at [Insight-How Ultrasonic Sensors Work](#).

Generating Ultrasonic Waves

For the generation of such mechanical waves, movement of some surface like a diaphragm is required which can then induce the motion to the medium in front of it in the form of compression and rarefaction. Piezoelectric materials operating in the motor mode and magnetostrictive materials have been widely employed in the generation of ultrasonic waves at frequency ranges of 1-20 MHz and 20-40 kHz respectively. The sensors employ piezoelectric ceramic transducers which flex when an electric signal is applied to them. These are connected to an electronic oscillator whose output generates the oscillating voltages at the required frequency. Materials like Lead Zirconate Titanate are popular piezoelectric materials used in medical ultrasound imaging. For best results, the frequency of the applied oscillations must be equal to the natural frequency of the ceramic, which produces oscillations readily through

resonance. It offers maximum sensitivity and efficiency when operated at resonance.

Piezoelectricity being a reversible phenomenon produces electrical voltages when ultrasonic waves reflect back from the target and impinge upon the ceramic structure. In this way, a transducer may work both as a transmitter and a receiver in pulsed mode. When continuous measurement of distances is required, separate transducers may be used for transmission and reception. The sensors when used in industry are generally employed in arrays which may be mechanical arrays consisting of oscillating or rotating sensors, or electronic arrays which may be linear, curved or phased. To visualize the output of an ultrasonic sensor, displays of different kind are used whose shape depends on the type of transducer array used and the function. A sectorized Field of View is produced by mechanical arrays and curved and phased electronic arrays, while a linear field is generated by linear arrays. The display modes may be linear graphical plotting with amplitude on y-axis and time on x-axis called Amplitude mode or A-mode, or intensity modulated B-scans where the brightness of a spot indicates the amplitude of reflected waves. Other modes include M-mode, Doppler (D) Mode etc.

Vibration sensor

Accelerometers detect sudden changes in the axles of the car. The vibration sensor detects strong vibrations inside the vehicle. The ultrasonic sensor reduces every vehicle's speed when approaching every vehicle . Every GSM module sends every accident situation to every warning message on every mobile phone.

The vibration sensor is also called a piezoelectric sensor. These sensors are flexible devices which are used for measuring various processes. This sensor uses the piezoelectric effects while measuring the changes within acceleration, pressure, temperature, force otherwise strain by changing to an electrical charge. This sensor is also used for deciding fragrances within the air by immediately measuring capacitance as well as quality.

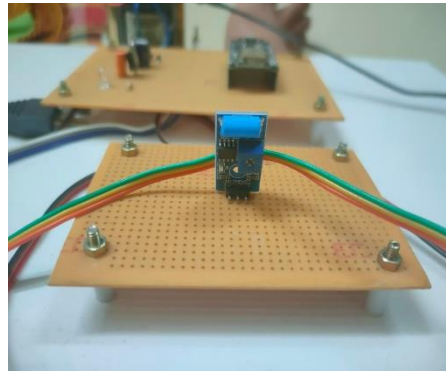


Fig 5.6 Vibration sensor

Alcoholic sensor

An alcohol sensor detects the attentiveness of alcohol gas in the air and an analog voltage is an output reading. The sensor can activate at temperatures ranging from -10 to 50° C with a power supply is less than 150 Ma to 5V. The sensing range is from 0.04 mg/L to 4 mg/L, which is suitable for breathalyzers. MQ3 is a heater-driven sensor. That's why it is enclosed in two layers of fine stainless steel mesh called an Anti-explosion network. It ensures that heater element inside the sensor will not cause an explosion, as we are sensing flammable gas (alcohol).

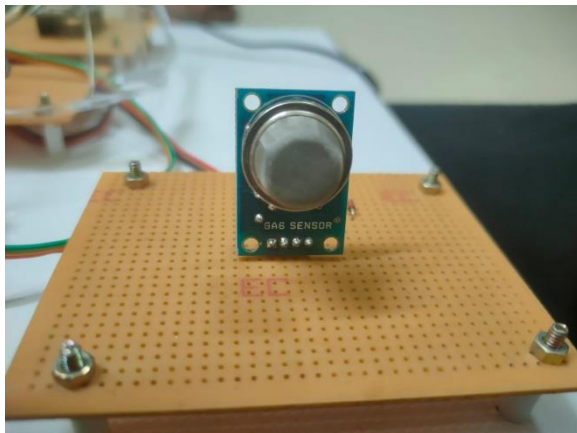


Fig 5.7 Alcoholic sensor

Arduino IDE

Arduino IDE (Integrated Development Environment) is an open-source software platform used to program Arduino boards. Arduino boards are microcontroller-based circuit boards that are used for creating interactive electronic projects. The Arduino IDE is designed to simplify the process of programming Arduino boards by providing a user-friendly interface and a set of libraries that can be easily accessed and used to control the various components connected to the board.

The Arduino IDE is available for free download on the Arduino website, and it is compatible with multiple operating systems, including Windows, Mac OS X, and Linux. The IDE is built on the Java programming language and is designed to be easy to use, even for beginners. The IDE includes a code editor, a compiler, and a serial monitor, which allows users to communicate with the Arduino board and monitor the output of their code.

The Arduino IDE supports a wide range of programming languages, including C++, which is the primary language used to program Arduino boards. The IDE also includes a number of libraries and example code that can be used as a starting point for building your own projects. Overall, the Arduino IDE is a powerful tool for anyone interested in exploring the world of electronics and programming.

Power supply

All electronic circuits work only in low DC voltage, so we need a power supply unit to provide the appropriate voltage supply for their proper functioning. This unit consists of transformer, rectifier, filter & regulator. AC voltage of typically 230volts rms is connected to a transformer voltage down to the level to the desired ac voltage. A diode rectifier that provides the full wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit can use this dc input to provide dc voltage that not only has much less ripple voltage but also remains the same dc value even the dc voltage varies somewhat, or the load connected to the output dc voltages changes.

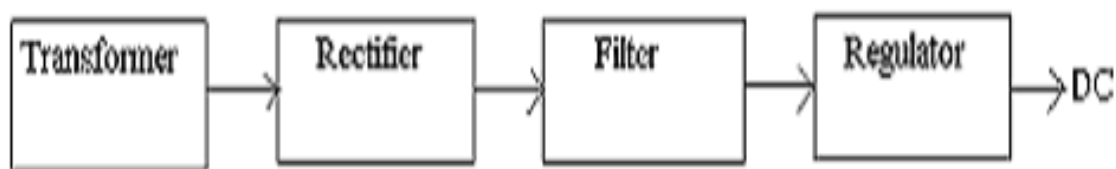


Fig.5.8 block diagram for power supply

TRANSFORMER:

A transformer is a static piece of which electric power in one circuit is transformed into electric power of same frequency in another circuit. It can raise or lower the voltage in the circuit, but with a corresponding decrease or increase in current. It works with the principle of mutual induction. In our project we are using a step down transformer to providing a necessary supply for the electronic circuits. Here we step down a 230volts ac into 12volts ac.

RECTIFIER:

A dc level obtained from a sinusoidal input can be improved 100% using a process called full wave rectification. Here in our project for full wave rectification we use bridge rectifier. From the basic bridge configuration we see that two diodes(say D2 & D3) are conducting while the other two diodes (D1 & D4) are in off state during the period $t = 0$ to $T/2$. Accordingly for the negative cycle of the input the conducting diodes are D1 & D4. Thus the polarity across the load is the same.

In the bridge rectifier the diodes may be of variable types like 1N4001, 1N4003, 1N4004, 1N4005, 1N4007 etc... can be used. But here we use 1N4007, because it can withstand up to 1000v.

FILTERS:

In order to obtain a dc voltage of 0 Hz, we have to use a low pass filter. So that a capacitive filter circuit is used where a capacitor is connected at the rectifier output & a dc is obtained across it. The filtered waveform is essentially a dc voltage with negligible ripples & it is ultimately fed to the load.

REGULATORS

The output voltage from the capacitor is more filtered & finally regulated. The voltage regulator is a device, which maintains the output voltage constant irrespective of the change in supply variations, load variations & temperature changes. Here we use fixed voltage regulator namely LM7805. The IC LM7805 is a +5v regulator which is used for microcontroller.

CHAPTER 6

RESULTS AND DISCUSSION

Results

In this system, the vibration sensor, GPS and GSM is placed in the vehicle. If an accident occurred the vibration sensor senses the vibration level and if exceeds the threshold limit, the system will consider that there is an occurrence of accident in that particular location.

Accurate location tracking: The integration of GPS with the accident information system enables the precise tracking of the vehicle's location at the time of the accident. This information can be used to dispatch emergency services to the accident location quickly.

Fast response time: By using GSM communication technology, the system can transmit accident information in real-time to emergency services. This allows for a rapid response time, which can help reduce fatalities and injuries.

Improved accident investigation: The system can provide important information such as the speed of the vehicle, the direction of travel, and the time of the accident. This data can be used in accident investigation to help determine the cause of the accident.

Effective communication: The system allows for effective communication between the vehicle occupants and the emergency services. This is achieved through the integration of a two-way communication system, which allows for real-time communication.

Discussion

Privacy concerns: The use of GPS technology in the accident information system raises privacy concerns, as the system can track the location of the vehicle at all times. This issue should be addressed by implementing appropriate privacy policies and security measures.

Cost: The implementation of the system may require a significant initial investment, which could be a barrier to its adoption.

Reliability: The reliability of the system is critical in ensuring that emergency services are dispatched to the accident location promptly. Therefore, it is essential to ensure that the system is tested thoroughly to avoid any technical glitches.

Integration with existing emergency services: The accident information system must be integrated with existing emergency services to ensure that the information is received and acted upon promptly.

The implementation of WAIS can help reduce response time and improve the effectiveness of emergency services in managing accidents. This technology can provide vital information about the location of the accident, the number of vehicles involved, and the severity of the accident. This information can help emergency services to mobilize resources and respond to the accident promptly.

However, the implementation of WAIS also raises some concerns, such as privacy and security issues. The system needs to ensure the protection of personal information and prevent unauthorized access to the system.

Advantages

Real-time information: WAIS using GSM and GPS technology can provide real-time information about accidents or emergencies. This helps emergency services to quickly respond to accidents and provide timely assistance to victims.

Location tracking: GPS technology can accurately track the location of the accident, making it easier for emergency services to locate and reach the site of the accident.

Quick response: WAIS can help reduce response time and improve the effectiveness of emergency services in managing accidents. This can help save lives and reduce the severity of injuries sustained in accidents.

Automatic notification: WAIS can automatically send an emergency message to relevant authorities as soon as an accident is detected, reducing the need for manual intervention and ensuring that help is dispatched as quickly as possible.

Efficient resource allocation: WAIS can provide vital information about the location of the accident, the number of vehicles involved, and the severity of the accident. This information can help emergency services to mobilize resources and respond to the accident promptly, ensuring that resources are allocated efficiently.

Improved road safety: WAIS can help improve road safety by providing information about accident-prone areas and helping to identify and address potential hazards.

Overall, WAIS using GSM and GPS technology can help improve the efficiency and effectiveness of emergency services in managing accidents, reduce response time, and ultimately help save lives.

Limitations

Limited coverage: The coverage area of GSM networks may be limited, especially in rural or remote areas. This can affect the effectiveness of the accident information system, as it may not be able to transmit data or receive signals from accident-prone areas.

Network congestion: In areas where there are many users accessing the GSM network, there may be network congestion, which could cause delays or failures in transmitting accident information.

Battery life: GPS devices require a battery to function, and their battery life can be limited. If the battery runs out, the device will not be able to transmit accident information.

Accuracy: GPS is dependent on satellite signals and can be affected by atmospheric conditions and other factors. This may affect the accuracy of the accident location information transmitted by the system.

Cost: The cost of implementing and maintaining a wireless accident information system using GSM and GPS technology can be high. This may limit the availability of the system in certain areas or for certain users.

Security: There may be concerns about the security of the data transmitted by the system, including the location information of accident victims. This data could be intercepted or used for malicious purposes if appropriate security measures are not in place.

Implementation Issues

Implementing a wireless accident information system using GSM and GPS technology can present a number of challenges, including:

Infrastructure: The system requires the installation of GPS and GSM infrastructure to receive and transmit information. This may require permits and permissions from local authorities and could be time-consuming.

Integration: The system must be integrated with existing emergency services systems to ensure a seamless flow of information. This may require modifications to existing systems and protocols.

Compatibility: The system must be compatible with different types of devices and networks to ensure that it is accessible to a wide range of users. This may require the development of specific software or applications for different devices.

Training: Users of the system, such as emergency responders and accident victims, will require training on how to use the system effectively. This may require the development of training materials and the provision of training sessions.

Maintenance: The system requires regular maintenance to ensure that it is functioning correctly. This may require trained personnel and resources, which could be expensive.

Privacy and Security: The system must ensure the privacy and security of user data, including location information. This may require the development of appropriate security protocols and measures to protect user data from unauthorized access.

Cost: Implementing and maintaining a wireless accident information system using GSM and GPS technology can be costly, which may limit its availability in certain areas or for certain users. The cost may also affect the level of investment in the system, leading to potential limitations in its functionality and scope.

CHAPTER 7

CONCLUSION

The idea is used to detect accident and automate emergency assistance services. As a result, system is sending SMS to the nearest Emergency assistance service provider from accident location. The high demand of automobiles has also increased the traffic hazards and the road accidents. Life of the people is under high risk. This is because of the lack of best emergency facilities available in our country. An automatic alarm device for vehicle accidents. This design is a system which can detect accidents in significantly less time and sends the basic information. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. A Switch is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the medical rescue team. When the accident occurs the alert message is sent automatically to the rescue team and to the police station and the message is sent through the GSM module.

OUTPUT



Fig 7.1 output

Future Sope

Wireless accident information systems using GSM and GPS technology have a bright future scope, as advancements in technology continue to enhance their capabilities. Some of the potential future developments for these systems include:

Integration with other technologies: Wireless accident information systems could be integrated with other technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and Cloud Computing to enhance their capabilities. AI could be used to analyze accident data and provide recommendations for improving safety, while IoT could be used to connect different devices and sensors for improved communication and data collection.

Real-time data collection: Future systems could use advanced sensors and algorithms to collect real-time data on road conditions, traffic flow, and weather patterns. This could improve the accuracy of accident prediction and prevention, as well as provide emergency responders with more detailed information about the accident scene.

Improved accuracy: Advancements in GPS technology could lead to improved accuracy in locating accident victims, even in areas with poor satellite coverage or signal interference.

Wireless charging: Future systems could use wireless charging technology to ensure that GPS devices remain powered and functional, even in remote or difficult-to-reach areas.

Automated emergency response: The use of AI and machine learning could enable future systems to automatically alert emergency responders and dispatch the appropriate resources to the accident scene.

Personalized safety recommendations: Wireless accident information systems could provide personalized safety recommendations to drivers based on their driving behavior and accident history, using data analytics and machine learning algorithms.

Overall, the future of wireless accident information systems using GSM and GPS technology is promising, as technological advancements continue to improve their capabilities and effectiveness in preventing and responding to accidents.

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