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IoT Based Accident Detection and Rescue System

M Pavan Manikanta
Ece, Griet
Hyderabad, India
Pavanmuthyala45@Gmail.Com

Mamatha Samson
Ece, Griet
Hyderabad, India
mamata2001@gmail.com

Malaka Akash
Ece, Griet
Hyderabad, India
Akashchinna1291@Gmail.Com

Arnab Chakrabortty
Ece, Griet
Hyderabad, India
Arnabchakrabortty72@Gmail.Com

T Rohit
Ece, Griet
Hyderabad, India
trohith89@gmail.com

Abstract

The rapid-fire rise in technology and structure has made our lives easier. The high demand for motorcars has also increased the business hazards and road accidents. Life of the people is under high threat. The detention in reaching the ambulance to the accident position and the business traffic in between the accident position and sanatorium increases the chances of death of the victim. To overcome this problem our automatic ambulance deliverance system comes to the deliverance. This proposed IOT grounded accident discovery system helps to reduce the loss of life due to accidents, and it also cuts down on the time it takes for the ambulance to arrive sanatorium. To descry the accident there's an accelerometer detector present in this deliverance system and the Wi-Fi module included sends information about the position to the separate guardian and deliverance platoon. With the help of the accelerometer detector signal, a severe accident due to a handicap can be honored. The microcontroller used sends the alert communication through the Wi-Fi module including the position to guardian or a deliverance platoon. So, the exigency help platoon can forthwith trace the position through the GPS module, after entering the accident position information, action can be taken incontinently. This accelerometer grounded accident discovery system is powered by at mega 328 microcontroller it consists of a display, accelerometer detector, Wi-Fi module, and alarm. This automatic ambulance deliverance system design is useful in detecting accidents.

Index Terms— Accident detection, Rescue system, GSM, Internet of Things (IoT), RF signal, Vehicular ADHOC Network (VANET), Sensor Systems.

I. INTRODUCTION

Everything will be based on the Internet of Things (IoT), which is a network of physical items that can be connected and exchange messages without the need for human contact. Because it has been employed in a variety of mediums such as Home Automation System, IOT home security model, raspberry pi, home automation, and smart water metering, it has been formally classified as an "Infrastructure of Information community." Thus, by installing electronic hardware such as sensors, ARDUINO software, and networking gear, a physical object can be given an IP address to facilitate data transmission through an IoT system. Internet differs from IoT in that it goes beyond Internet connectivity by allowing any object with embedded circuits to communicate with one another using existing Internet infrastructure. Since the scope of IOT has risen exponentially, everything will be based on, IOT by the end of 2020, the technology will have reached

possibilities thanks to the Internet of Things.

Consumers, on the other hand, have the power to integrate and manage devices for a more customized experience. Manufacturers have a significant impact on how their goods are utilized and performed in the real world, and they are also economically

developed. We can clean the dustbin utilizing IOT in this article. Because accidents are one of the leading causes of death in emerging cities, it is critical to have an accident detection and monitoring system in place. Ultrasonic sensors will be used in this system.

This paper presents how to reduce/avoid accidents using IoT devices. This is accomplished by placing IoT sensors in high-risk zones that detect traffic and collect information from the surrounding, a sensor placed on the road identifies a car that is overspeeding, any other abnormalities determine the car's position and interacts

with the car's IoT device, alerting the driver. In the event of an accident, the gadget alerts the appropriate authorities for rapid assistance.

The remainder of this work is arranged in the following manner. The second section looks at some of the relevant studies on this topic. Section III introduces the recommended technique. The system design and architecture are presented in Section IV. In Section V, the results and findings are discussed. Section VI presents the acknowledgment. Finally, Section VII presents the concluding remarks and future direction of this research.

II. LITERATURE SURVEY

[1].As the population is increasing at an exponential level this simultaneously increases the vehicle requirements. Considering the VANET, transferring the emergency message becomes a major challenge of packet losses. The paper discusses Intelligent Transportation System (ITS), IoT and also tried to develop emergency issues by using 5G technology.

By M U Ghazi et al., 2020.

[2].Road accidents cause major fatalities in this world because of a lack of on-time support. The proposed system uses the GSM and GPS module, this is properly complemented with an RF module at traffic signals for the minimum time delay. The dedicated vibration sensors are used to detect any mishappening. In case of any incident, the ambulance receives a message and the traffic signals are controlled by RF communication. This helps the patient to get treated as soon as possible.

By R. N. Nayan Kumar et al., 2019.

[3] The paper gives an idea about the feasibility of installing a vehicle with the technology that detects accidents and immediately signals the emergency personnel. IoT can be used to alert the police, family, ambulance. And further, the GPS location is known and treatment is done.

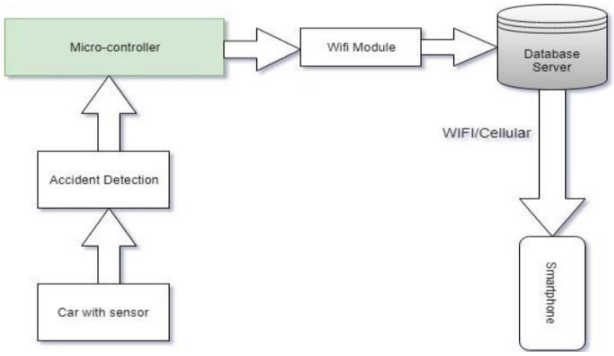


Fig 1.1 PROPOSED SYSTEM ARCHITECTURE

Fig 1.1 visualizes the entire framework of the proposed system's working, from sensors in the vehicular unit

By A. Shaik et al., 2019.[4] The system is based on IoT, which helps in detecting vehicle accidents and alerts them immediately. This is done by using smart sensors with a microcontroller installed in the car itself. Other modules like GSM and GPS are used to locate the person.

By Shivani Sharma et al., 2019.

III. PROPOSED SYSTEM

We are coming up with an integrated system that helps to detect
any mishappening like accidents, fire outbreaks and also develop a rescue system. The system with the help of smart sensors senses the data and messages are sent with the help of IoT.
RF communication is also available for no network areas. The alert
message is sent to a dedicated health center and fire station to
rescue the person. The GSM and GPS modules are used to locate the vehicle.

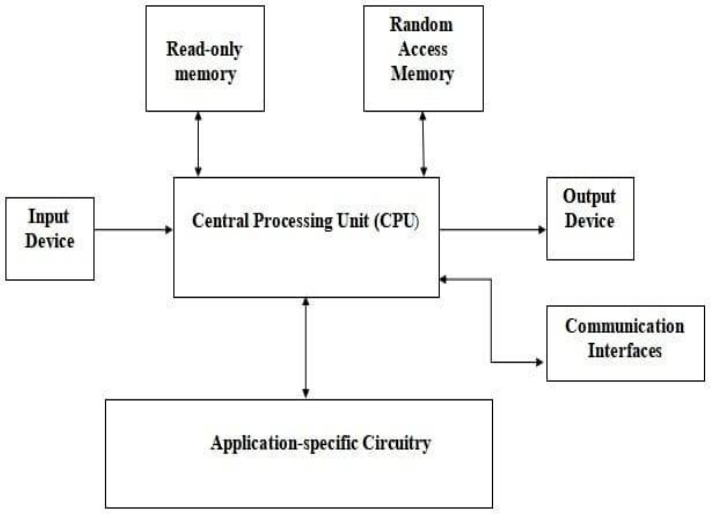


Fig 1.2 BLOCK DIAGRAM OF HARDWARE EMBEDDED SYSTEM

detecting the abnormalities to sending the distress signals to the smartphone through a database server which gets its data through a micro-controller and wifi module.

IV. SYSTEM DESIGN AND ARCHITECTURE

System Hardware & Functioning:

The Central Processing Unit(In brief, a processor) might be a microcontroller, a microprocessor, or a DSP (Digital Signal Processor). A low-cost processor is referred to as a microcontroller. Its key selling point is that it will have several additional components like memory, a serial connection interface, and an analog-to-digital converter on the chip itself. As a result, a microcontroller is the best solution for tiny applications since the number of external

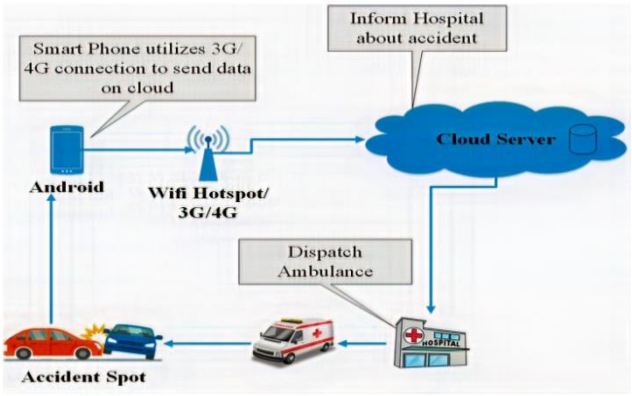
components required is minimal. Microprocessors, on the other hand, are more powerful, but they require a lot of extra components. D5P is mostly utilized in applications that entail signal processing, such as audio and video processing.

Memory Random Access Memory (RAM) and Read-Only Memory (ROM) are two types of memory (ROM). If the chip's power is turned off, the contents of the RAM are deleted, however, the contents of the ROM are retained even if the power is turned off. As a result, the firmware is kept in the ROM. When the power is turned on, the CPU reads the ROM and executes the software.

Input devices: Unlike desktop computers, an embedded system's input devices have relatively restricted capabilities. Because there will be no keyboard or mouse, connecting with the embedded system will be difficult. Many embedded systems will include a tiny keypad where you may deliver a specific command by pressing one key. Only the digits may be entered using a keypad. Many embedded systems used in process control lack an input device for human interaction; instead, they collect input from sensors or transducers and generate electrical signals that are then sent to other systems.

Output devices of the Embedded systems have fairly restricted capabilities as well. A few Light Emitting Diodes (LEDs) will be included in certain embedded systems to display the health condition of system components or to visually signal alerts. Some critical parameters may also be displayed on a tiny Liquid Crystal Display (LCD)...

Communication interfaces: The embedded systems may need to, interact with other embedded systems at they may have to transmit data to a desktop. To facilitate this, the embedded systems are provided with one or a few communication interfaces such as RS232, RS422, RS485, Universal Serial Bus (USB), IEEE 1394, Ethernet, etc.



System Components:

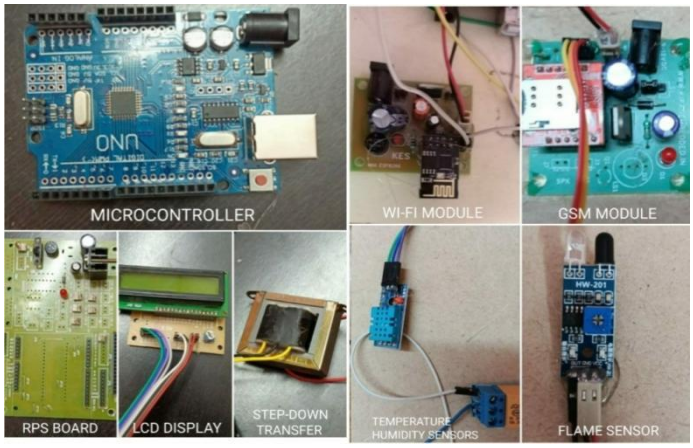


Fig 1.3 Hardware Components & Sensors

Microcontroller: ARDUINO board that is based on the ATmega328 microcontroller (datasheet). It features 14 digital input/ affair legs (six of which can be used as PWM labors), a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP title, and a reset button It comes with everything you need to get started with the microcontroller, simply plugs it into a computer via USB or power it with an AC-to-DC adapter or battery. The Uno is unique among all previous boards in that it does not have the FIDI USB-to-periodical motorist chip rather, it uses an Atmega16U2 (or an Atmega8U2 up to interpretation R2) as a USB-to-periodic motor. Modification 2 of the Uno board has a resistor pulling the 8U2 HWB line to base, making it easier to put into DFU mode: Modification 3 of the board has the following new features, allowing the securities to acclimate to the voltage supplied by the board. Securities will be compatible in the future with both AVR-based boards that run at 5V and ARDUINO Due boards that operate at 3.3 V. The alternate bone is a non-connected limb that will be used in the future.

A piezoelectric sensor is a device that converts pressure, acceleration, temperature, strain, or force into an electric charge via the piezoelectric effect**.**

A flame sensor is a type of detector that is primarily used to detect and respond to the existence of a fire or flame. The flame is recognized at 433 MHz beneath this range the flame isn't detected. When the flame is identified the alert is sounded and the recognition message is sent to the flame station.

Temperature Sensor: DHT11 is a low-cost digital sensor for sensing temperature and humidity.

This sensor can be easily interfaced with any microcontroller such as ARDUINO, Raspberry Pi, etc. to measure humidity and temperature instantaneously.

MEMS is a chip-based technology, MEMS is an acronym for Micro-Electro-Mechanical System. A suspended mass is sandwiched between two capacitive plates in sensors. When the sensor is tilted, the hanging mass causes an electric potential difference. The difference is measured as a change in capacitance, Also known as TILT SENSOR. These are a group of biases, and their magnitude and design mode can be used to characterize them. Factors ranging from 1-100 micrometers can be used to create these detectors. These biases can range from simple structures to extremely delicate electromechanical systems with numerous moving parts controlled by in-house micro- electronics.

Liquid Crystal Display (LCD) also called TV is veritably helpful in furnishing stoner interface as well as for remedying purposes. Utmost of us would have come across these displays in our day-to-day life, either at PCOs or calculators. The most generally used Character grounded LCDs are grounded on Hitachi's HD44780 regulator or others that are compatible with HD44580. The most generally used LCDs plant in the request moment is 1 Line, 2 Line, or 4 Line LCDs which have only 1 regulator and support at the utmost of 80 characters, whereas LCDs supporting further than 80 characters make use of 2 HD44780 regulators.

V. RESULT

This project shows how to use IoT to create an automatic automobile accident detection and alerting system. This concept is a system that can identify accidents in a short amount of time and communicate the information to a first-aid facility. This project is simple to use and dependable. The automotive industry will benefit greatly from the proposed strategy. Data logging and analysis will be used in the future to monitor traffic conditions in various places. This approach gives the best answer to substandard emergency services supplied to road accident victims in the most efficient manner feasible. This project presents the automatic vehicle accident identification and alerting system using IoT

Vehicle Unit:

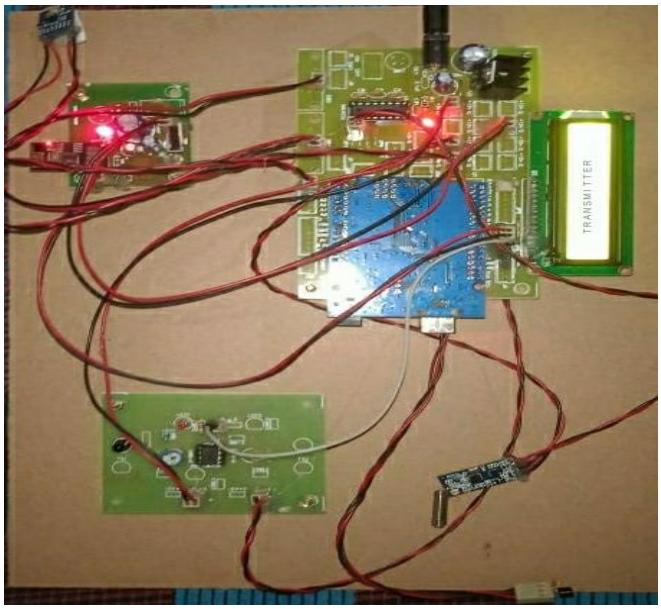


Fig 1.4 Transmitter module

Road Side Unit:

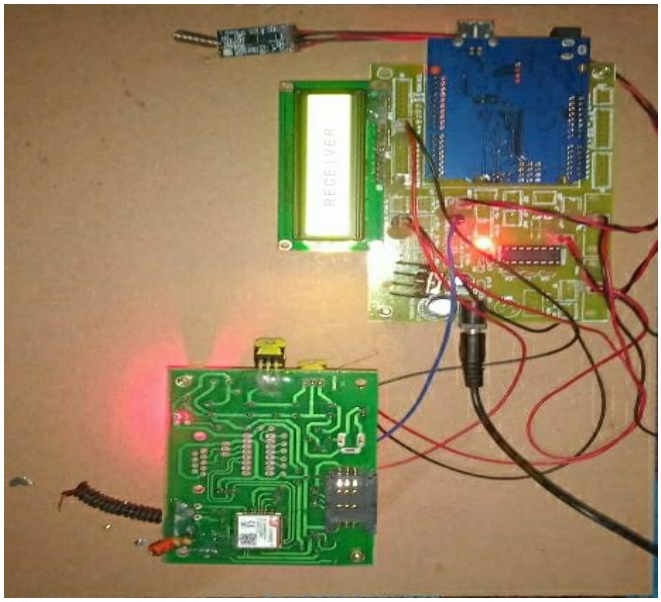


Fig 1.5 Receiver module

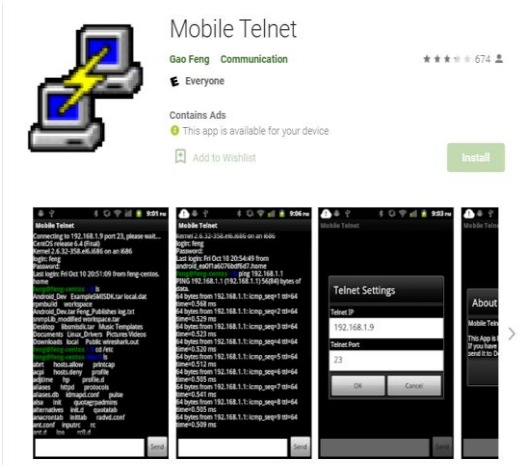
Test Case	Expected Result	Observed Result	Test Result
Users should be able to successfully receive SMS from this system.	SMS need to arrive	SMS received	Pass
The user should be able to see where the accident occurred.	The location of the accident should be seen.	The location of the accident may be seen.	Pass
Ambulances should be able to acquire directions to accident locations.	Ambulances should be notified in a timely manner.	Obtains the necessary notification.	Pass
The authority should be able to make changes to the server data.	Data on the server can be updated.	The server's data can be updated.	Pass

Table I System Test

Test Case	Existing System	Proposed System
Detection Mechanism	Most other systems do not use the functionality of Detection type Sensors.	Here in the proposed system different sensors are used for the detection mechanism. Such as Flame,MEMS,piezoelectric etc..
Providing immediate directions to the accident Site	This feature is not available in current systems.	As in this proposed system there are GSM ,GPS and Wi-Fi modules. So providing the directions is much easier.
Cost Effectiveness	The majority of commonly used frameworks make use of costly mechanisms such as Bluetooth.	The use of low-cost GSM and WiFi chips has resulted in a significant cost savings in terms of development.
Radio Frequency(RF) module	This feature is not available in current systems.	Our Proposed System consists RF module which will work in network less areas within the range of 50m.

Table II Comparison between Existing System and Proposed System

Mobile app:



- This is a free Android Telnet app that is based on open source Putty Telnet as its backend library.
- Inspired by the open-source community and in the hope of extending the usage of Putty Telnet on Android devices, the Mobile Telnet was created.

VI. ACKNOWLEDGMENT

Many people helped us, directly and indirectly, to complete our project successfully. We would like to take this opportunity to thank one and all. Firstly, we would like to express our deep gratitude towards my internal guide Mamatha Samson, Professor, Department of ECE for her support in the completion of my dissertation. We wish to express our sincere thanks to Dr. V Hima Bindu, HOD, Dept of ECE, and our principal Dr. J Praveen for providing the facilities to complete the dissertation. We would like to thank all our faculty and friends for their help and constructive criticism during the project period.

VII. CONCLUSION & FUTURE

The number of casualties associated with road collisions is growing rapidly. If victims are rescued in due time, several lives may be saved. We discussed various strategies which focused not only on accident detection but also on its prevention. These strategies utilized various sensors such as accelerometer sensors, shock sensors, pressure sensors, etc., and various machine learning techniques such as neural networks, support vector machines, representation learning, etc. for accident detection. Various strategies for accident prevention were also addressed, which include detection of a drunk and drowsy driver, regulating vehicle speed, maintaining a safe distance from obstacles, etc. Once the accident is detected, the collisions, identifying precise accident locations and facilitating overall rescue operations. The integration of these systems with vehicles would be somehow expensive yet will give information is communicated to emergency services to provide timely aid. Such systems provide many advantages such as mitigating road various advantages. However, the systems we discussed were all reliant on some kind of hardware or software-based technology and there is a possibility that those sensors or devices can themselves be destroyed in the accident and can generate erroneous readings and results. So such frameworks are required which are less reliant on some kind of hardware or software.

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