Accident Detection System

B.E. IOE Lab mini-project report submitted in partial fulfilment of the

requirements of the degree of

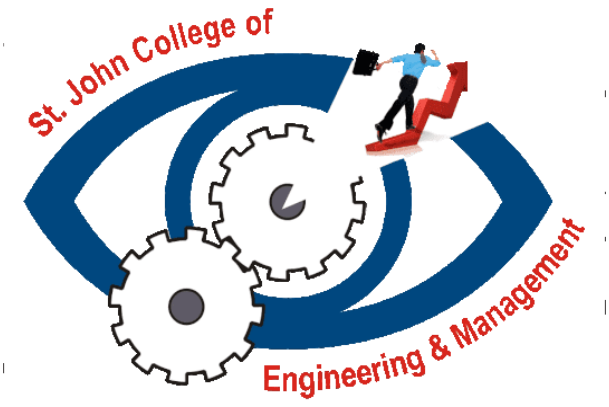
Bachelor of Engineering
in
Information Technology

by

Dodamani Ankita Mallikarjun	**EU1184012**	**(19)**
Dsouza Samson	**EU1164014**	**(21)**
Gupta Rahul kumar	**EU1184001**	**(26)**

Under the guidance of

Mrs. Anita Chaudhari
(Assistant Professor)



Department of Information Technology

St. John College of Engineering and Management, Palghar

University of Mumbai

2021–2022

CERTIFICATE

This is to certify that the B.E. mini-project entitled "**Accident Detection System** " is a bonafide work of

Dodamani Ankita Mallikarjun	**EU1184012**	**(19)**
Samson Dsouza	**EU1164014**	**(21)**
Gupta Rahul Kumar	**EU1184001**	**(26)**

Submitted to University of Mumbai in partial fulfilment of the requirement for the award of the degree of "**Bachelors of Engineering in Information Technology**" during the academic year 2021-2022.

Mrs. Anita Chaudhari

Guide

Dr. Arun Saxena

Head of Department

Dr. G.V. Mulgund

Principal

B.E. Mini-Project Report Approval

This mini-project synopsis entitled ***Accident Detection System*** by ***Dodamani Ankita Mallikarjun, Dsouza Samson, Gupta Rahul Kumar*** is approved for the degree of ***Information Technology Engineering*** from ***University of Mumbai***.

Examiners

1.----------

2.----------

Date:

Place:

Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Signature
Ankita Mallikarjun Dodamani (EU1184012)

Signature
Dsouza Samson (EU1164014)

Signature
Gupta Rahulkumar (EU1184001)

Date:

ABSTRACT

According to Statistics, Road accidents kills almost around 1.5 lakh people annually in India. Lack of medical facilities provided to the victim at right time has a big role to play in order to reduce the Road Accident mortality rate. Looking at the Present-day scenario, there is no such system which automatically detects road accidents and immediately inform the concerned authorities like the police station, hospitals, and the Family members of the victims. The Main intention behind Accident Detection System Project is to detect the Real-time Accidents and notify the same so as to decrease the time gap between accident and the medical help given to the victim. In this system, Alcohol sensors can sense the Alcohol if present and seat belt sensor senses if the seat belt is present. Vibration Sensors sense the accident, GPS Capture the location and the details are intimated. The system can have its applications in domains like theft detection as well.

Keywords: *Accident detection; Proteus; GPS; GSM; intimation to medical infrastructure; Microcontroller(Arduino); vibration sensors.*

TABLE OF CONTENTS

LIST OF FIGURES

Abbreviation

IOT	Internet-of-Things
IOE	Internet-of-Everything
GPS	Global Positioning System
GSM	Global System for Mobile Communications
SMS	Short Message Service

CHAPTER 1

INTRODUCTION

1.1 **Motivation**

Road transport is the dominant mode of transport in India, in terms of traffic share and in terms of contribution to the national economy. Road traffic injuries are one of the leading causes of death, disabilities and hospitalization in the country imposing huge socio-economic costs. According to the report on Road Accidents in India by The Ministry of Road Transport and Highways, Road accidents kills almost around 1.5 lakh people annually in India. Over-speeding is a major cause, accounting for 64.4% of the persons killed. As the maximum number of road accidents occurred on straight roads. Government of India has although taken various steps like Motor Vehicles Amendment Act 2019, wherein It hikes the penalties for traffic violations, defective vehicles, juvenile driving, etc. It also provides a Motor Vehicle Accident Fund, which would provide compulsory insurance cover to all road users in India for certain types of accidents. But still Accidents are bound to happen in a country of 139 crore people. In this scenario, a nationwide system to ensure no death is caused due to lack of Immediate medical facility provided to the victim can help the statistics improve.

1.2 Problem System

To build a system which will help reduce the time gap between the accident happened and the medical help provided to the victim. Here we Created an integrated system which detects the accident and intimates to the hospitals, Rescue team, Control center and the family members.

1.3 Objective

The Objective of the project are as follows;

To develop an Internet-of-Things (IOT) based system that is able

- to Detect the happening of an Accident.
- to fetch the Global Positioning System(GPS) location of the Accident Spot
- to send Emergency Alert Message to the Hospitals, Police Station, Control Room, Rescue-Team and Immediate Family Members using short message service(SMS)

1.4 Scope:

The System Scope is as follows:

- The system will be able to detect the accident of a 4-wheeler Vehicle
- The system will fetch the GPS location of the system and the details can be used for further applications

CHAPTER 2

LITERATURE SURVEY

2.1 Accident Detection and Alert System

In this paper Authors have used vibration sensors which acts as an accident detection module which senses the vibration above the threshold value(15mA) that is caused and sends an interrupt to the microcontroller (Arduino). The GPS receives the location of the vehicle that met with an accident and gives the information to the respective person. This information is sent to a mobile number through SMS using GSM. The message received gives longitude and latitude values

Conclusion:

Vibration sensors will be activated whenever there is an accident or any cause of vibration which shares the Accident Details to the concerned people through SMS

Gap:

Vibration Sensors can sense Vibrations caused through various other reasons like Wobbly Tyres, Engine Issues, worn out brakes etc. causing False Predictions in real time**.**

2.2 Automatic Road Accident Detection using Ultrasonic Sensors

In this paper Authors have used two Ultrasonic Sensors. One sensor module is located on the front windscreen of the car and the other module is placed on the back windscreen of the car. Then the distance between the sensor modules is measured and named as threshold distance. Whenever any object moving away from the car, the distance between them, is always greater than the preset threshold distances. When any object collides with the car, the ultrasonic sensors detect the collision by the threshold value. The GPS receives the location of the vehicle that met with an accident and gives the information to the rescue team through SMS using GSM. The message received gives longitude and latitude values

Conclusion:

ultrasonic sensors will detect whenever there is an accident or any cause of collision which shares the Accident Details to the rescue team through SMS

Gap: Ultrasonic Sensors can sense collisions caused through various other reasons like the one shown in the figure. This can detect Fake Accident and share the details which can waste the precious time of rescue team

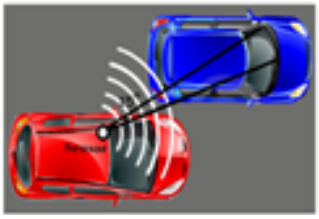


Figure 2.2.1: Ultrasonic Sensor in two cars causing Fake Collision

2.3 IOT based automatic vehicle accident and theft detection system

In this paper Authors have used Vibration Sensors which senses any vibration above the threshold range (15mA), they send interrupt to microcontroller (Arduino).The GPS receives the location of the vehicle that met with an accident and gives the information to the respective person. This information is sent to a mobile number through SMS using GSM. The message received gives longitude and latitude values Also in addition. An intimation message is sent to the owner, when the vehicle is started. It is also helpful to find the stolen vehicles along with the location.

Conclusion:

An intimation message is sent to the owner, when the vehicle is started. It is also helpful to find the stolen vehicles along with the location. The SMS Vibration sensors will be activated whenever there is an accident or any cause of vibration which shares the Accident Details to the concerned people through SMS

Gap:

Vibration Sensors can sense Vibrations caused through various other reasons like Wobbly Tyres, Engine Issues, worn out brakes etc. causing False Predictions in real time**.**

CHAPTER 3

PROPOSED SYSTEM

3.1 Block Diagram of the Proposed System

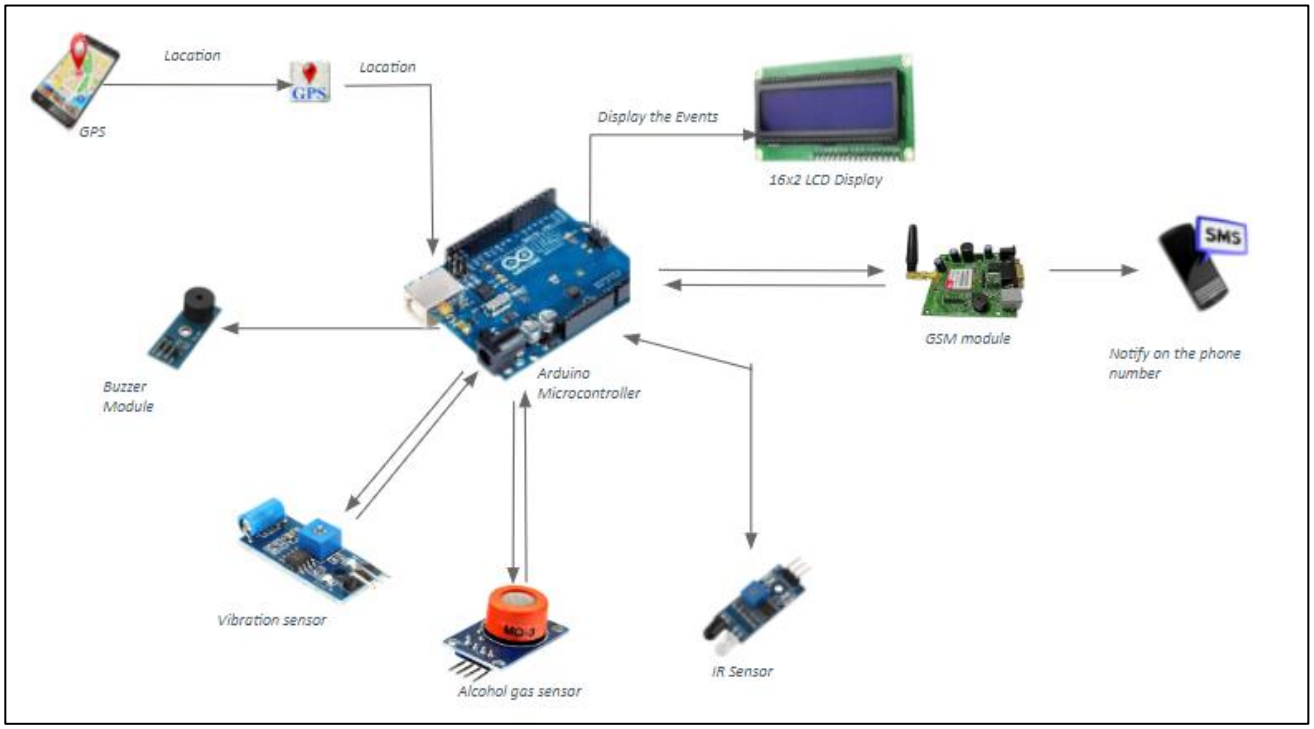


Figure 3. 1: Block Diagram

3.2 Simulation of the System

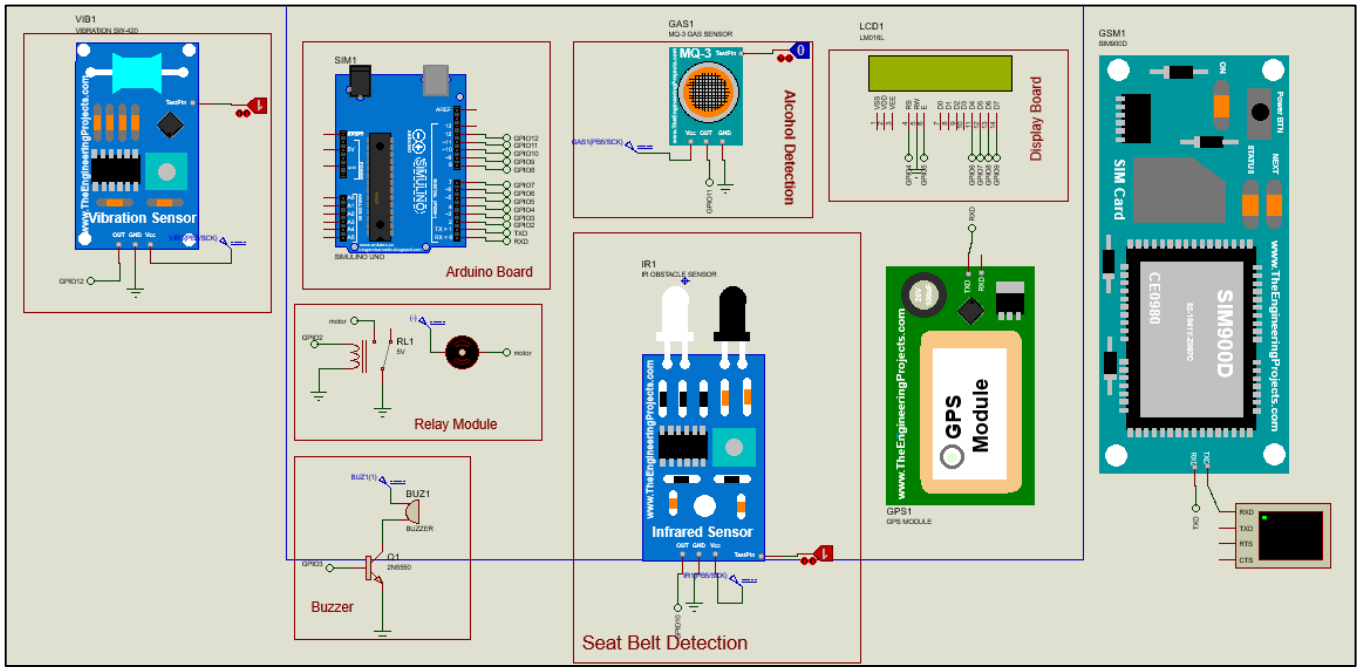


Figure 3. 2: Simulation

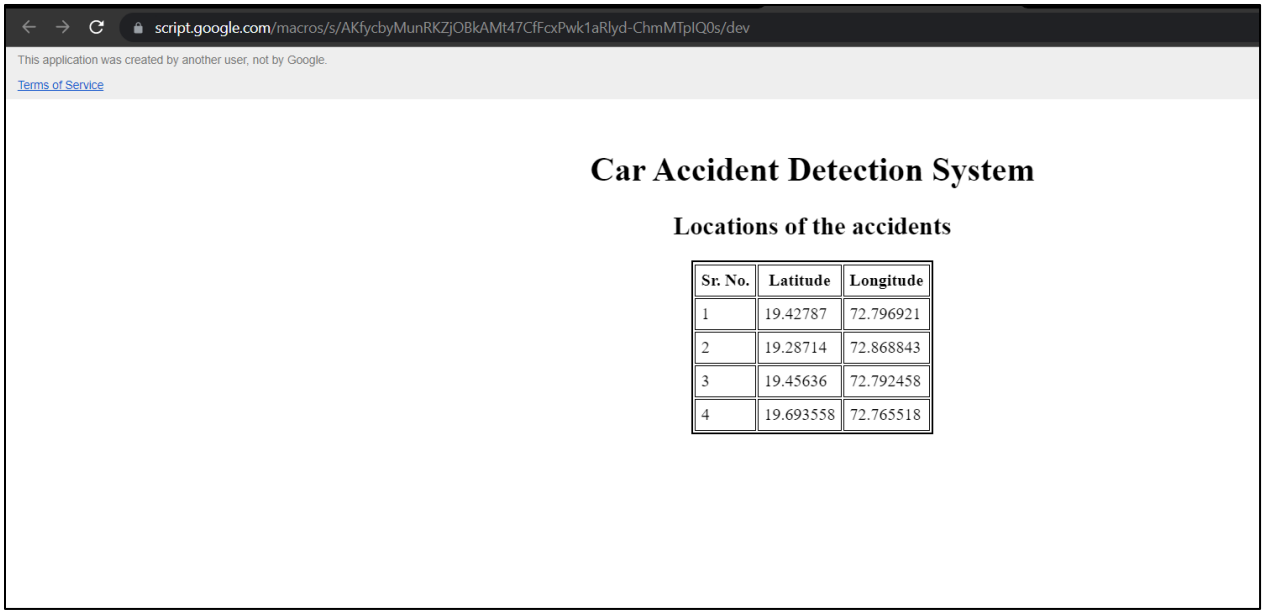


Figure 3. 3 Online Output

3.3 Methodology

1. When the system is switched on by clicking the Run Button, LCD will be ON indicating that the power is supplied to the circuit. The LCD display shows the Message "Accident Detection System".
2. The first part of the System is the Seat Belt Detection Module. The IR Sensor is used to detect the Seat Belt. Values 0 denotes Seat Belt Not Detected. If Seat Belt is not detected "Seat Belt Not detected" msg gets printed on the screen and the Buzzer rings
3. The next part of the System is the Alcohol Detection Module. The Alcohol Sensor is used to detect the presence of Alcohol smell. Value 1 denotes Alcohol Detected. If Alcohol is detected (1), "Alcohol detected" msg gets printed on the screen and the Buzzer rings
4. Combination of Alcohol sensor and IR sensor and corresponding values
   a. Alcohol Sensor (0) and IR Sensor (0) : Alcohol Not detected , Seat belt not detected : Buzzer Rings and Motor doesn't Start.
   b. Alcohol Sensor (1) and IR Sensor (0) : Alcohol detected , Seat belt not detected : Buzzer Rings and Motor doesn't Start.
   c. Alcohol Sensor (1) and IR Sensor (1) : Alcohol detected , Seat belt detected : Buzzer Rings and Motor doesn't Start.

d. Alcohol Sensor (0) and IR Sensor (1) : Alcohol not detected , Seat belt detected : Motor Starts. "Vehicle Started Message gets displayed on LED.

5. The next part of the System is the Accident Detection Module. The Vibration Sensor is used to detect the Accident. If Accident is detected (1), "Accident detected" msg gets printed on the screen and the GSM Module starts sending the message.
6. The GPS sensor can detect the current location of the vehicle and the coordinates of the Accident Location and the location is sent over the terminal.

CHAPTER 4

COMPONENT DETAILS

Components Used:

1. Arduino Microcontroller {SIMULINO UNO}

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed To support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter

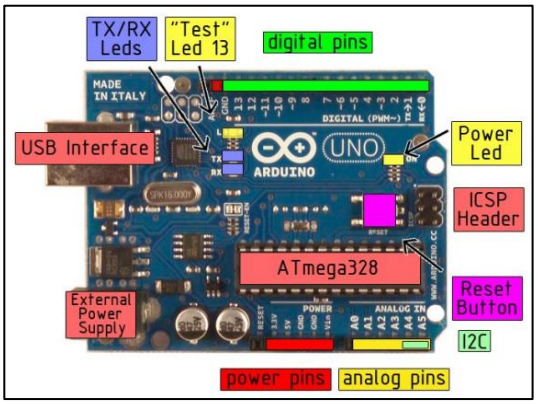


Figure 4. 1: Arduino Microcontroller

Specifications of Microcontroller ATmega328

- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins :14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3V Pin :50 mA
- Flash Memory :32 KB of which 0.5 KB used by bootloader
- SRAM : 2 KB
- EEPROM:1 KB
- Clock Speed: 16 MHz

2. Vibration Sensor {VIBRATION SW-420}

A vibration sensor is a device that measures the amount and frequency of vibration in a given system, machine, or piece of equipment. Those measurements can be used to detect imbalances or

other issues in the asset and predict future breakdowns. Examples of applications where the vibration sensors are used: process control systems, aerial navigation and underwater-applications. Frequency range from 0.2 up to 2500 Hz. The operating temperature of these sensors is between -50°C and +85°C. The different types of sensors to monitor vibration are

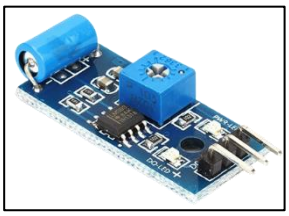


Figure 4. 2: Vibration Sensor

1. Accelerometer

Accelerometers are devices that measure the vibration, or acceleration of motion of a structure. They have a transducer that converts mechanical force caused by vibration or a change in motion, into an electrical current using the piezoelectric effect. There are two types of piezoelectric accelerometers: High Impedance and Low Impedance

1.1. High Impedance Accelerometer

High impedance accelerometers produce an electrical charge which is connected directly to the measurement instruments. They require special accommodations and instrumentation so they are found in research facilities or high-temperature applications.

1.2. Low Impedance Accelerometer

Low impedance accelerometers have a charge accelerometer as its front end as well as a built-in micro-circuit and transistor that converts that charge into a low impedance voltage. This type of accelerometer easily interfaces with standard instrumentation which makes it commonly used in the industry.

2. Strain Gauge

Next, let's talk about a strain gauge type of vibration sensor. Just like it sounds a strain gauge measures the strain on a machine component. A strain gauge is a sensor whose resistance varies with applied force; It converts force, pressure, tension, weight, etc., into a change in electrical resistance which can then be measured. When external forces are applied to a stationary object, stress and strain are the results. When there is a strain applied to any metallic wire, the length of that wire increases and the diameter decrease. This increase in length and decrease in diameter will change the resistance of the wire which will give us our measurement of strain on our machine component.

3. Eddy-Current

The last type of vibration sensor we will discuss is an Eddy-Current or Capacitive Displacement sensor. Eddy-Current sensors are non-contact devices that measure the position and/or change of

position of a conductive component. These sensors operate with magnetic fields. The sensor has a probe which creates an alternating current at the tip of the probe. The alternating current creates small currents in the component we are monitoring called eddy currents. The sensor monitors the interaction of these two magnetic fields. As the field interaction changes the sensor will produce a voltage proportional to the change in the interaction of the two fields. When using Eddy-Current sensors it is important for the component to be at least three times larger than the sensor diameter for normal operation; otherwise, advanced calibration would be required.

How to Choose a Vibration Sensor

When choosing a vibration sensor for your application it is important to look at factors such as;

– Range and accuracy

– Environment conditions

– The shape of the measuring surface

Out of the three sensors that we have discussed the accelerometer is the most common because it has a good range of frequency, meaning it can sense slow and fast applications. Along with the frequency, accelerometers are priced affordably and are durable. They do have to be mounted directly to the machine which is common for vibration sensors. Eddy current or capacitive sensors have medium accuracy and are not optimal for high-resolution applications. They are very durable making them a good option for dirty environments. Just like the accelerometers, they have to be directly mounted to the machine being monitored. Lastly, strain gauges are both versatile and accurate while still suitable for hazardous environments. Unfortunately, they can be hard to install correctly and to get proper data your application will need amplifiers which can drive up the price.

3. **Alcohol Sensor** {MQ-3 GAS SENSOR}

MQ3 is one of the most commonly used sensors in the MQ sensor series. It is a Metal Oxide Semiconductor (MOS) type of sensor. Metal oxide sensors are also known as Chemiresistors, because sensing is based on the change of resistance of the sensing material when exposed to alcohol. So by placing it in a simple voltage divider network, alcohol concentrations can be detected.

Specifications:

- Operating voltage 5V
- Load resistance 200 KΩ
- Heater resistance 33Ω ± 5%

- Heating consumption <800mw
- Sensing Resistance 1 MΩ – 8 MΩ
- Concentration Scope 25 – 500 ppm
- Preheat Time Over 24 hour

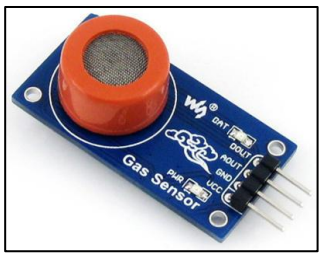


Figure 4. 3: Alcohol Sensor

4. IR Obstacle Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.

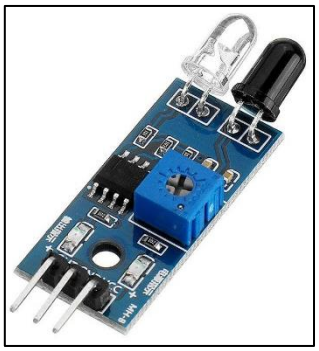


Figure 4. 4:IR Obstacle Sensor

There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection systems (such as in robots). Passive infrared (PIR) sensors only detect infrared radiation and do not emit it from an LED. Passive infrared sensors are comprised of: Two strips of pyroelectric material (a pyroelectric sensor), An infrared filter (that blocks out all other wavelengths of light), A fresnel lens (which collects light from many angles into a single point), A housing unit (to protect the sensor from other environmental variables, such as humidity). PIR sensors are most commonly used in motion-based detection, such as in-home security systems. When a moving object that generates infrared radiation enters the sensing range of the detector, the difference in IR levels between the two pyroelectric elements is measured. The sensor then sends an electronic signal to an embedded computer, which in turn triggers an alarm.

5. LCD Display {LM016L}

LCD stands for Liquid crystal display. 16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD. So, it will have 16×2 = 32 characters in total and each character will be made of 5×8 Pixel Dots.

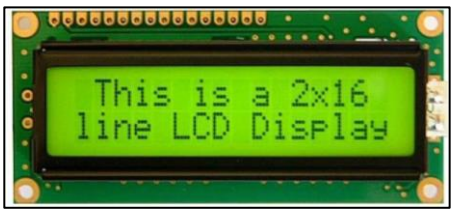


Figure 4. 5: LCD Display

Features of the 16×2 LCD module

- Operating Voltage of the 16X2 LCD is 4.7V to 5.3V
- Current consumption is 1mA without backlight
- This is an Alphanumeric LCD display module, which means you can display alphabets and numbers
- Consists of two rows and each row can print 16 characters.
- Each character is built by a 5×8 pixel box
- Can work on both 8-bit and 4-bit mode. "we will be using this LCD in 4-bit mode".
- It can also display any custom generated characters. I will explain this in my upcoming tutorial.
- Available in Green and Blue Backlight

6. GPS Module

Considered as one of the more popular GPS modules in the market, the NEO-6M module is a family of stand-alone GPS receivers from the NEO-6 module series.

Based on the list of considerations:

Power Supply Voltage: 3V – 5V

Baud Rate: 9600

Sensitivity: -161dBm

Number of Channels: 50

Time to first start:

- Cold Start: 27s
- Warm Start: 27s
- Hot Start: 1s
- Aided Starts: <3s

Figure 4. 6: GPS Module

7. **GSM** {SIM900D}

A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. From the view of the mobile phone network, they are essentially identical to an ordinary mobile phone, including the need for a SIM to identify themselves to the network.We can use this module to accomplish almost anything a normal cell phone can; SMS text messages, Make or receive phone calls, connecting to internet through GPRS, TCP/IP, and more

Figure 4. 7:GSM Module

8. **BUZZER**

The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.

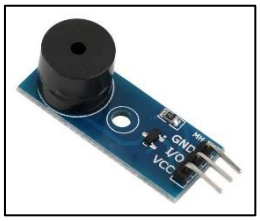


Figure 4. 8: Buzzer

CHAPTER 5

CONCLUSION AND FUTURE WORK

4.1 Limitations

This system is not applicable for poor network connection places.

4.2 Conclusion

In our country, many people have lost their life by accidents, because of causalities or improper communication. With the advent of science and technology in every walk of life, the importance of vehicle safety has received the highest priority. We design a low cost, portable vehicle accident detection system to resolve the problem of lack of an automated system for accident detection and location tracking. Consequently, the time for searching the location is reduced and therefore, the injured person can get help rapidly which will save many lives The proposed system provides a feasible solution to traffic hazards and saves time and reduces the loss of lives.

4.3 Future Scope

This system can be made more intelligent using various Machine Learning and Artificial Intelligence Algorithms wherein the Nearest Hospitals and Rescue Teams can be identified and The One with least Distance to be travelled to provide the medical help at the earliest can be framed.

The Major Accident locations can also be updated on the Google maps for better commutation of the passengers.

CHAPTER 6

REFFERANCES

References:

[1] T Kalyani, S Monika, B Naresh, Mahendra Vucha, "Accident Detection and Alert System",International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-4S2 March, 2019

[2] Usman Khalil, Adnan Nasir, S.M. Khan, T. Javid, S.A. Raza, A. Siddiqui," Automatic RoadAccident Detection usingUltrasonic Sensor", 2018 IEEE 21st International Multi-TopicConference (INMIC), DOI:10.1109/INMIC.2018.8595541 November 2018

[3] Ms. Kavitha V.Kakade, Mahalakshmi K, Manju K, Manjula Devi S, Nivetha S," IOT basedautomatic vehicle accident and theft Detection system", International Research Journal ofEngineering and Technology (IRJET), Volume: 06 Issue: 02 | Feb 2019.

ACKNOWLEDGEMENT

We would like to express our deepest gratitude to all those who provided us the possibility to complete this report. We have taken efforts in this project, but it would not have been possible without the kind support and help of many individuals. We would like to extend our sincere thanks to all of them.

We take this opportunity to express our profound gratitude and deep regards to our teacher **Mrs. Anita Chaudhari** for her exemplary guidance, monitoring and constant encouragement throughout the course of this project. The blessing, help and guidance given by him, time to time shall carry us a long way in the journey of life on which we are about to embark.

We also take this opportunity to express a deep sense of gratitude to our Head of Information Technology Department, **Dr. Arun Saxena** along with all the Teaching & Non-Teaching Staff for their cordial support, valuable information and guidance, which helped us in completing this task through various stages.

We express our sincere gratitude to our respected principal **Dr. G. V. Mulgund** for encouragement and facilities provided to us. We would also like to acknowledge the patience that our ever-beloved parents have shown during our efforts and the encouragement we have received from them.

Last but not least we would also like to thank to our Friends and Family who directly and indirectly helped and supported us during the whole course of the Project.

Ankita Mallikarjun Dodamani

Samson Dsouza

Rahul kumar Gupta