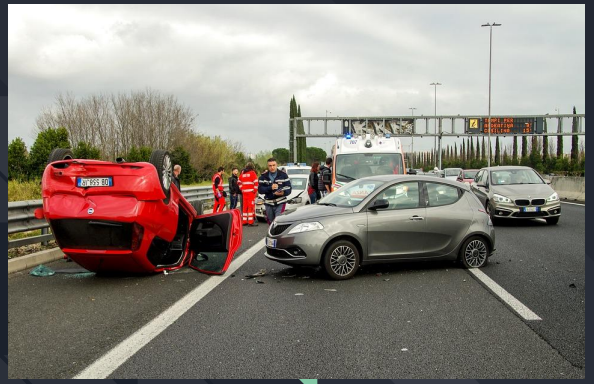
Automatic Ambulance Signalling System

Engineering Design I

Problem Statement:

The rapid rise of technology and infrastructure has made our lives easier. The high demand of automobiles has also increased the traffic hazards and road accidents. Life of the people is under high risk. The delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of death of the victim.



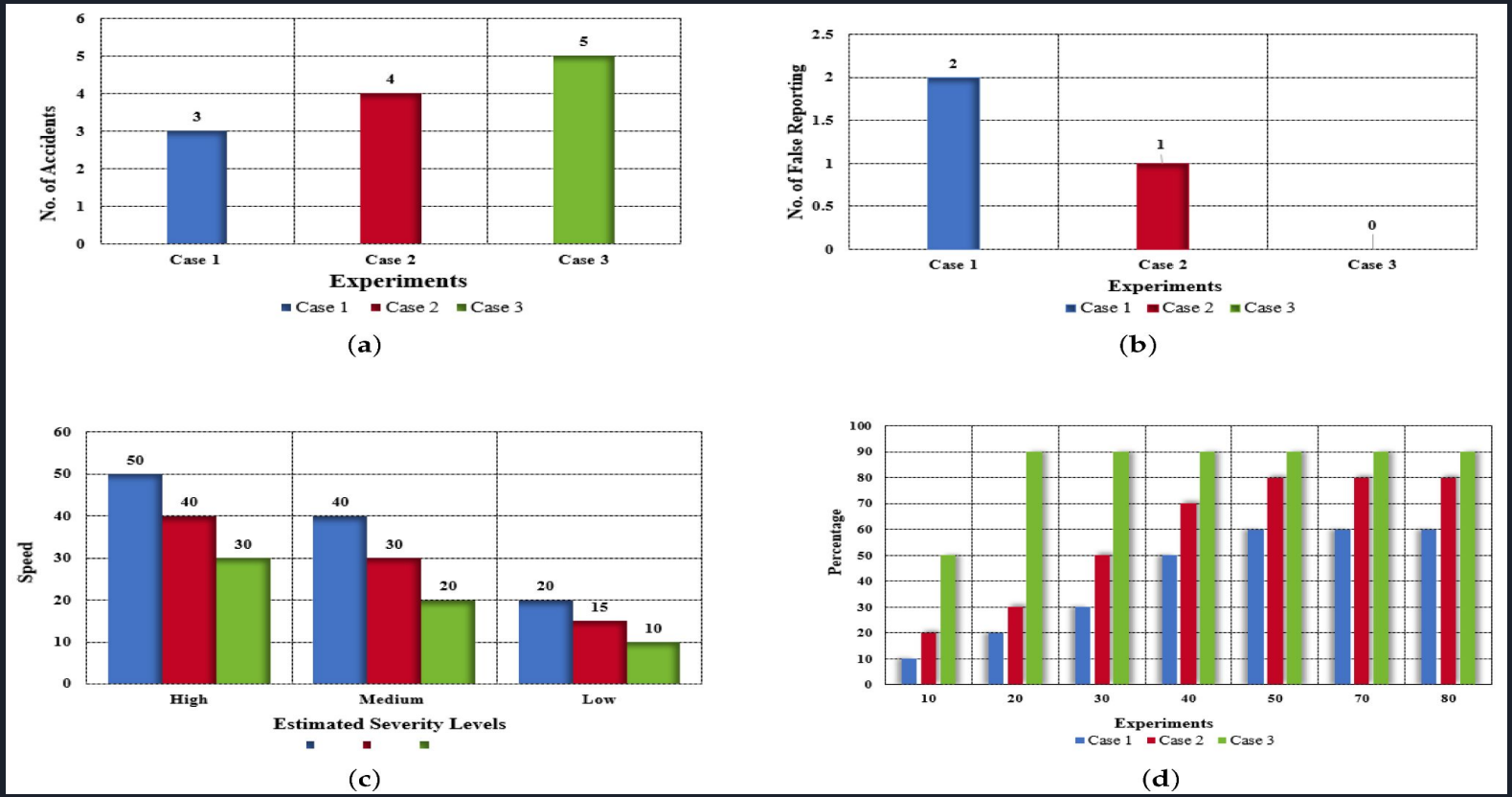
MOTIVATION

According to the National Crime Records Bureau, nearly 24,012 people die each day due to delay in getting medical assistance. Accidents are 10th on the list - nearly 3 lac cases are reported across the country each year.Factors such as delayed ambulance dispatch, incorrect prehospital treatments, incomplete and inaccurate clinical handover, emergency department overcrowding and ambulance diversion can delay and impact on effective outcomes of care.Technology allows the world's most state-of-the-art hospitals to catch and treat diseases faster and more efficiently than ever. So we decided to make the use of these technologies and incorporated them into our model of ambulance.

Solution: A system which can call the ambulance as soon as accident takes place.
-As soon as accident occurs, our system should be able to detect it and send the nearby hospital its location and intensity of the accident.
-Until the ambulance reaches the victim it will start creating a beep sound and blink some lights so that the passerby come to know about the accident.
-It will send a short message ‘Accident’ on the phone number inputted by the user in the system to alert the family members.

How to detect an accident ?

The crash sensor is the classic application found in automotive systems for accident detection. It mainly consists of MEMS (Micro-electro-mechanical systems) inertial sensors (accelerometers and gyroscopes). The accelerometer continuously measures the acceleration of the car. When this parameter exceeds a predetermined threshold, a microcontroller unit (MCU) calculates the integral of the acceleration to establish if a considerable speed variation has occurred. Single/dual-axis acceleration sensors are commonly used in airbags. Alternatively, angular speed sensors can be implemented into the design.



Experiment done to prove that accident detection accuracy is maximum when we use a combination of speed,noise, accelerometer and pressure sensor.

Materials

- 1. Microcontroller boards(Arduino board)
- 2. Accelerometer(Robotiy GY - 521MPU-6050)
- 3. Gyroscopic sensor(MPU6050)
- 4. Vibrational sensor(Piezo Vibration Sensor)
- 5. GPS module (Mikroe GPS 4 click - L70)
- 6. GSM Transmitter(SIM800C)
- 7. LED Lights ,
- 8. Buzzer
- 9. RF Transmitter(DHRUV _ PRO 433Hz)
- 10 .GSM receiver(SIM800L)
- 11. IR Fire Sensor
- 12. Wi-fi Development Board (ESP8266)
- 13.Digital LCD Board (MIKEROE - 55)
- 14.MCU sensor-crash sensor

Working Of Components:

1)Accelerometer: It measures the acceleration of the vehicle. This will check for the impulse of vehicle.

2)Gyroscopic sensor: This sensor measures the orientation of the vehicle.

3)Vibration sensor: This sensor measures the amount and frequency of vibration produced.

4)GSM Module: It provides a data link to a remote network. In this device we will input a sim card which will basically send a sms on the emergency number 100.

5)GPS Sensor: It provides the location of vehicle. This information will be sent along with the sms to the ambulance and your homies.

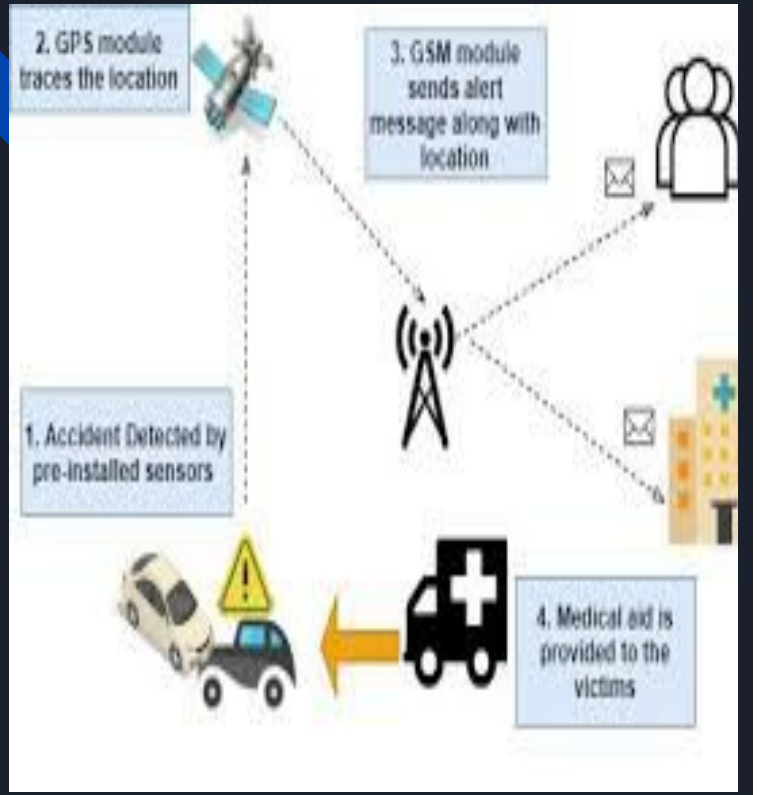
6)Fire Sensor: It detects if the vehicle is caught on fire.

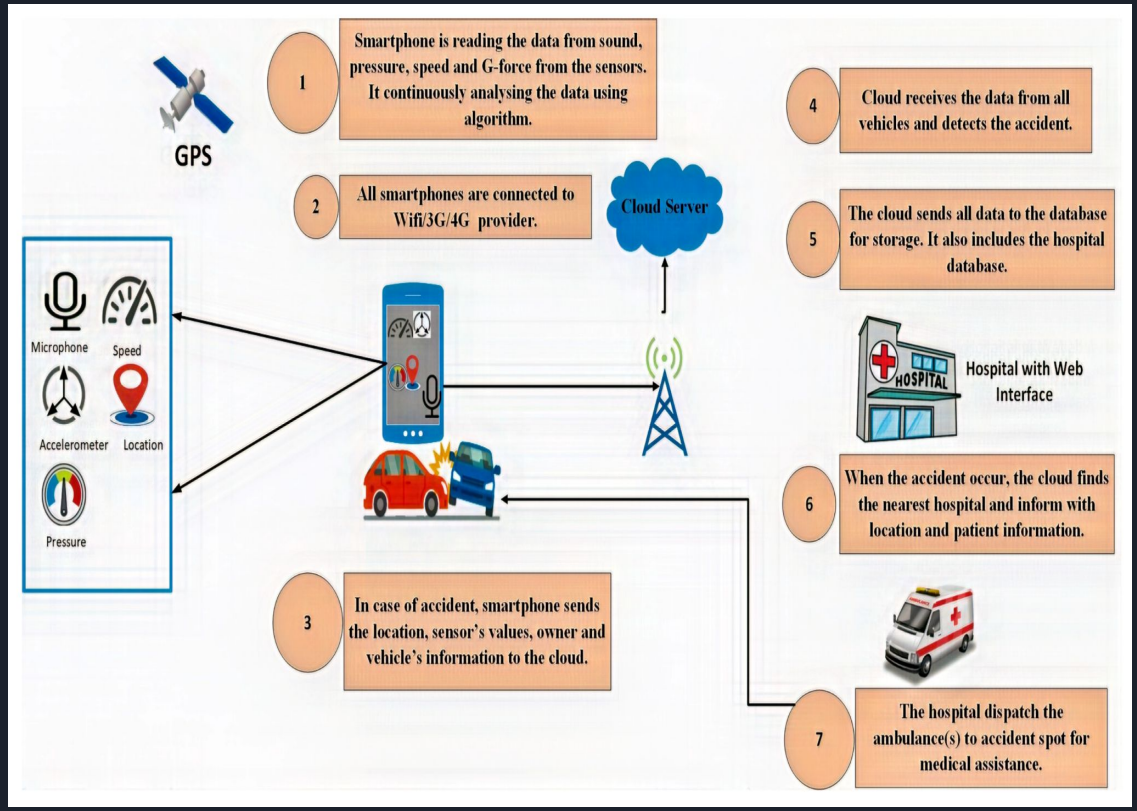
Procedure,Various Disadvantages solved during continuous discussion

1. Vehicle unit
2. Sensors (accelerometer, gyroscopic sensors, vibration sensors, gps sensor)
3. Alert message(10sec)
4. GSM module
5. Hospital unit
6. Fire sensors
7. System location in the car.

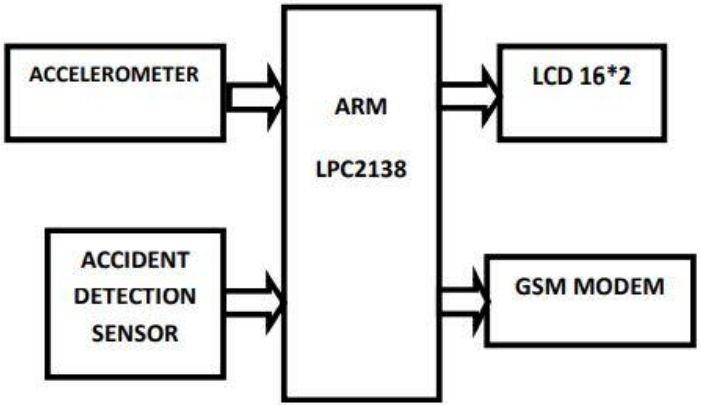
Function of Application

- If the ambulance system of a particular hospital is not working then our system will divert the call to some other nearby hospital.
- An application will have access to the system and it can switch on off and can do many others functions .
- The sensors will measure temperature and other information which is useful for insurance companies.
- We are using a health-tracking band to be worn by vehicle driver to monitor health conditions. So that help will be sent likewise.

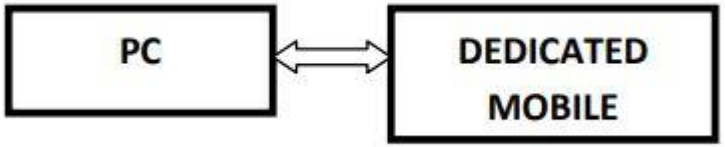

2. GPS module traces the location
3. GSM module sends alert message along with location
1. Accident Detected by pre-installed sensors
4. Medical aid is provided to the victims


GPS
1
Smartphone is reading the data from sound, pressure, speed and G-force from the sensors. It continuously analysing the data using algorithm.
2
All smartphones are connected to Wifi/3G/4G provider.
Cloud Server
Microphone
Speed
Accelerometer
Location
Pressure
3
In case of accident, smartphone sends the location, sensor's values, owner and vehicle's information to the cloud.
4
Cloud receives the data from all vehicles and detects the accident.
5
The cloud sends all data to the database for storage. It also includes the hospital database.
HOSPITAL
Hospital with Web Interface
6
When the accident occur, the cloud finds the nearest hospital and inform with location and patient information.
7
The hospital dispatch the ambulance(s) to accident spot for medical assistance.

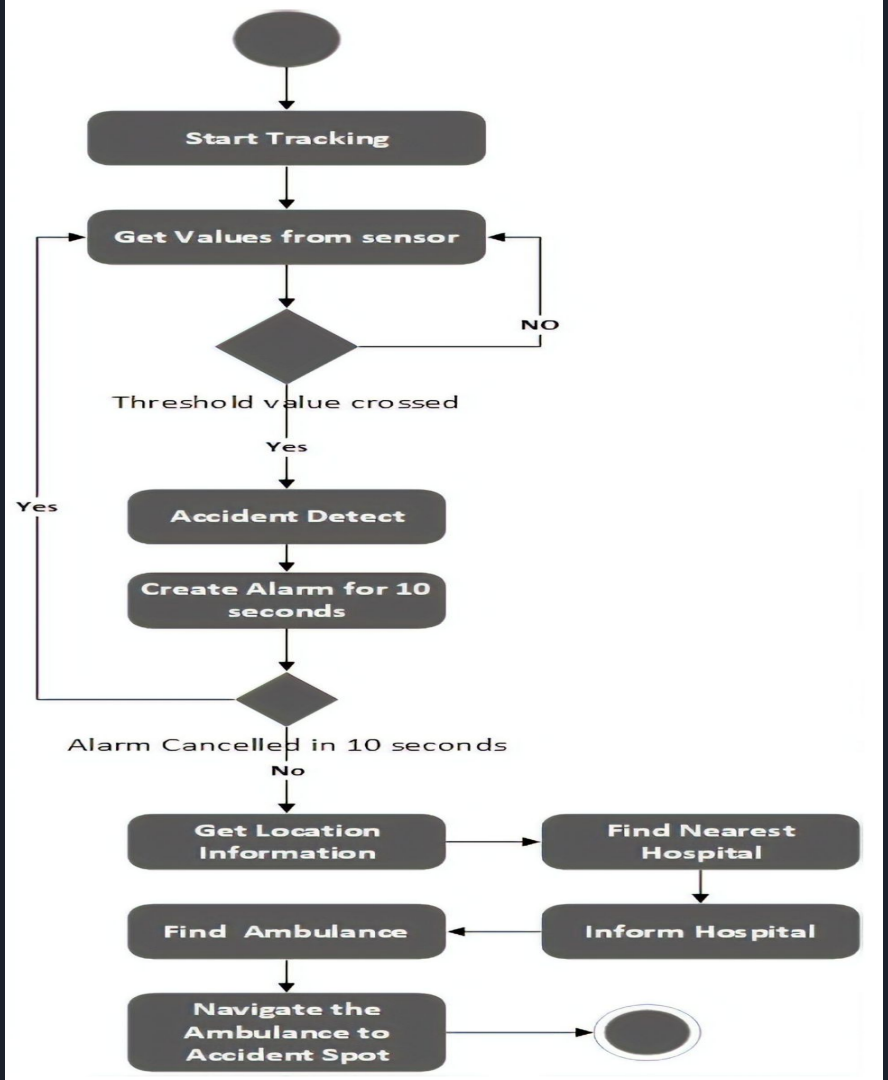
The Handband



Vehicle Unit



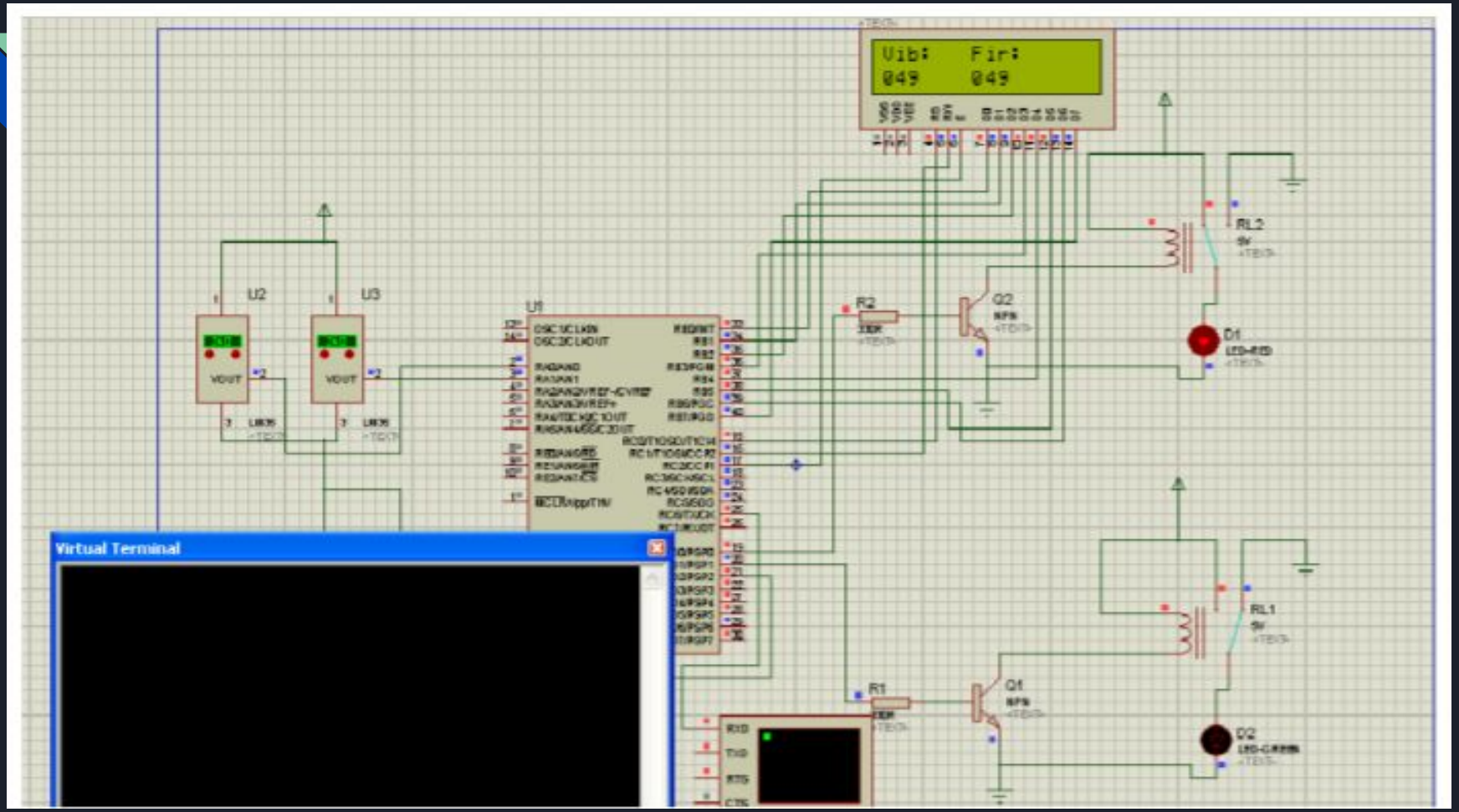
Control Unit


Start Tracking
Get Values from sensor
NO
Threshold value crossed
Yes
Yes
Accident Detect
Create Alarm for 10 seconds
Alarm Cancelled in 10 seconds
No
Get Location Information
Find Nearest Hospital
Find Ambulance
Inform Hospital
Navigate the Ambulance to Accident Spot

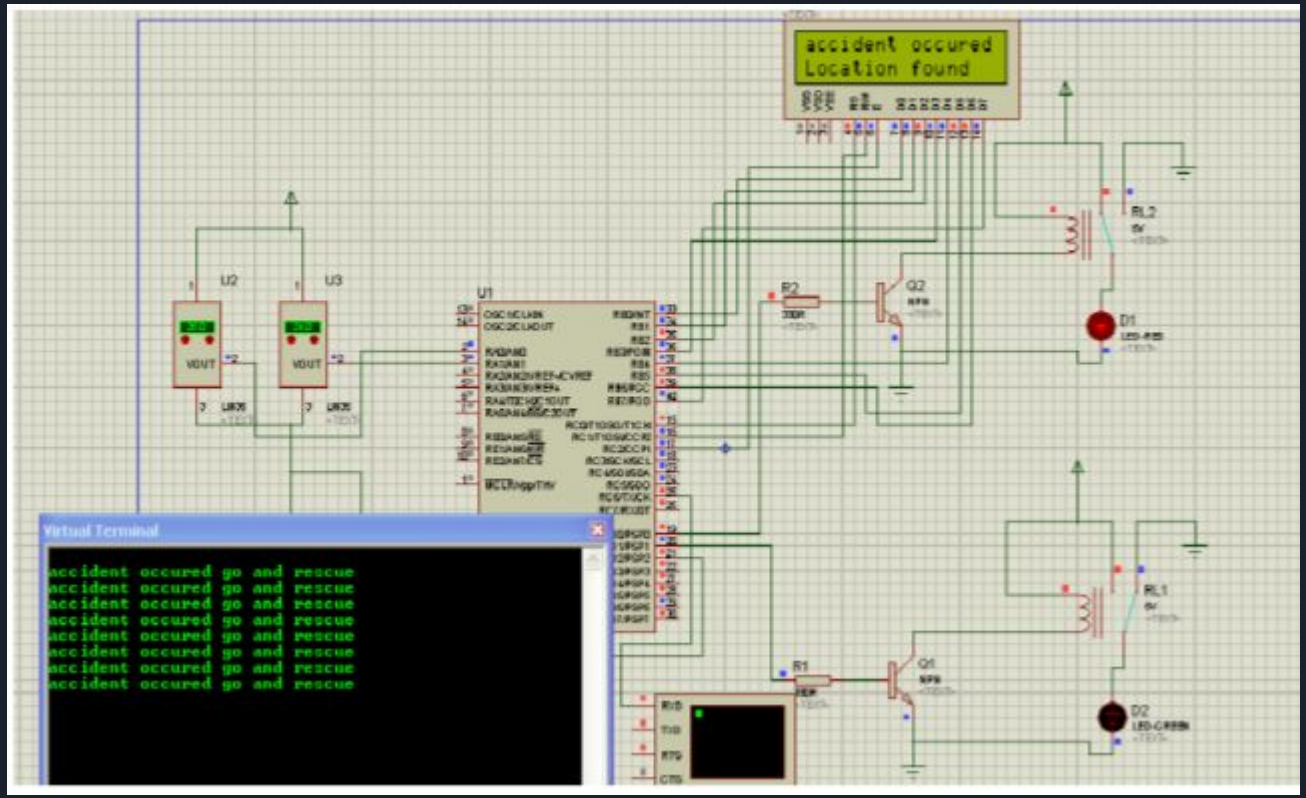
Simulation Result :

Automatic Accident Detection and sensor signalling Traffic Light System is simulated here using PROTEUS SOFTWARE .

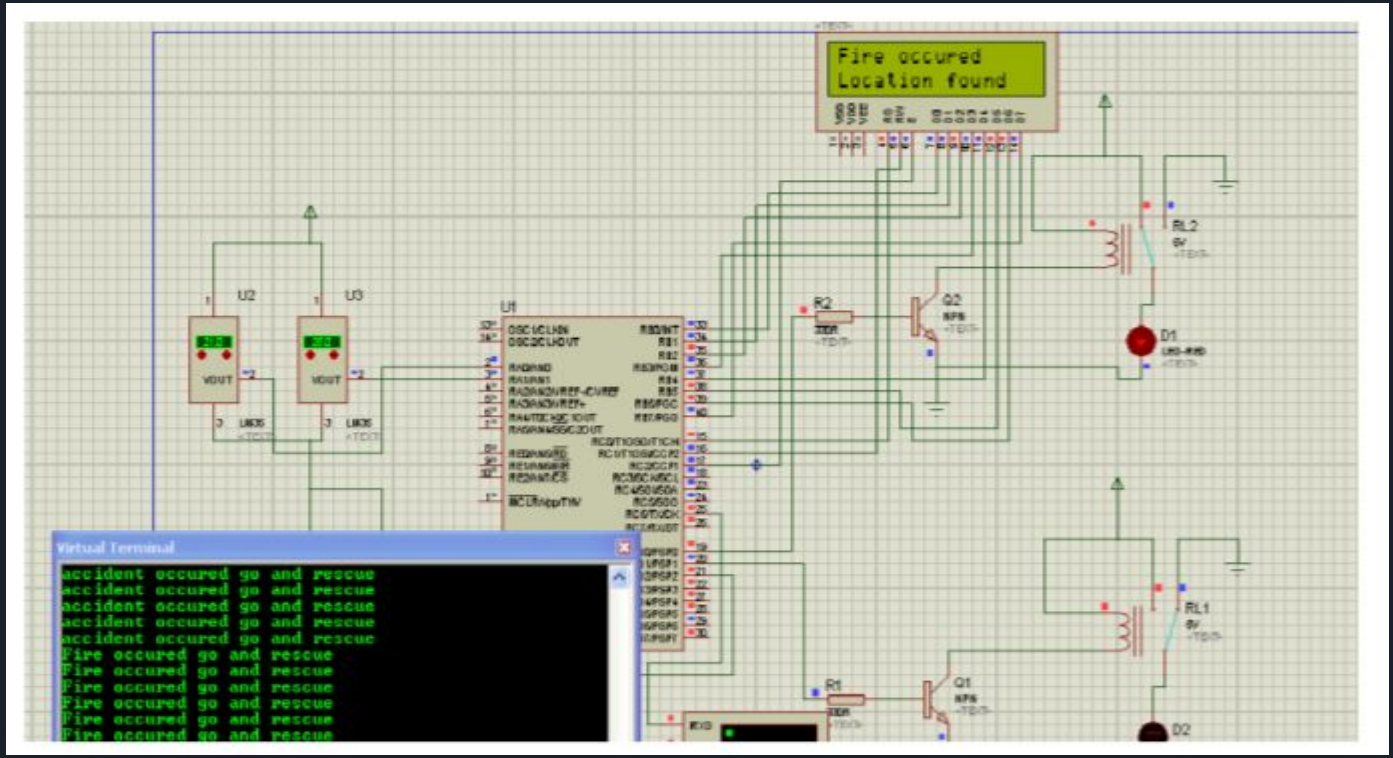
NORMAL CONDITION:



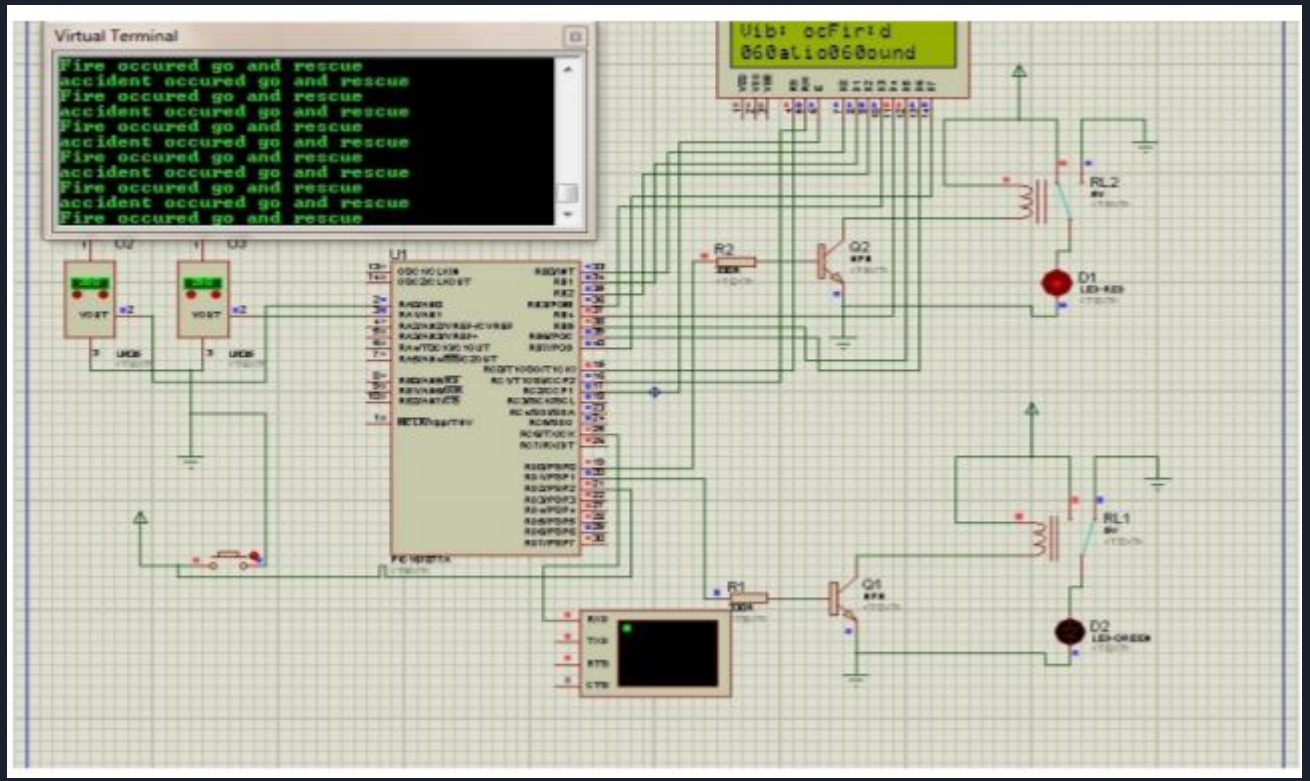
ACCIDENT CONDITION



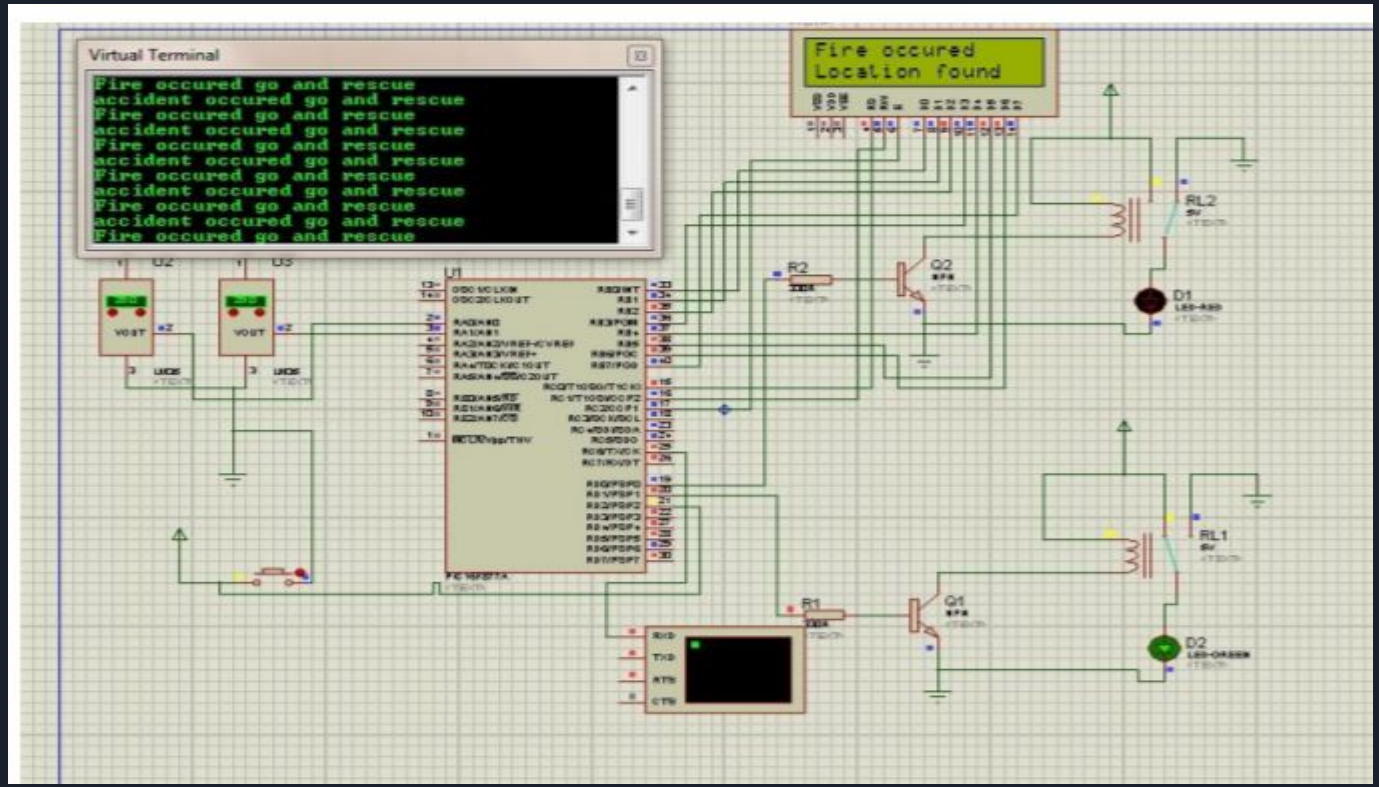
Fired condition



Before ambulance reaching accident place

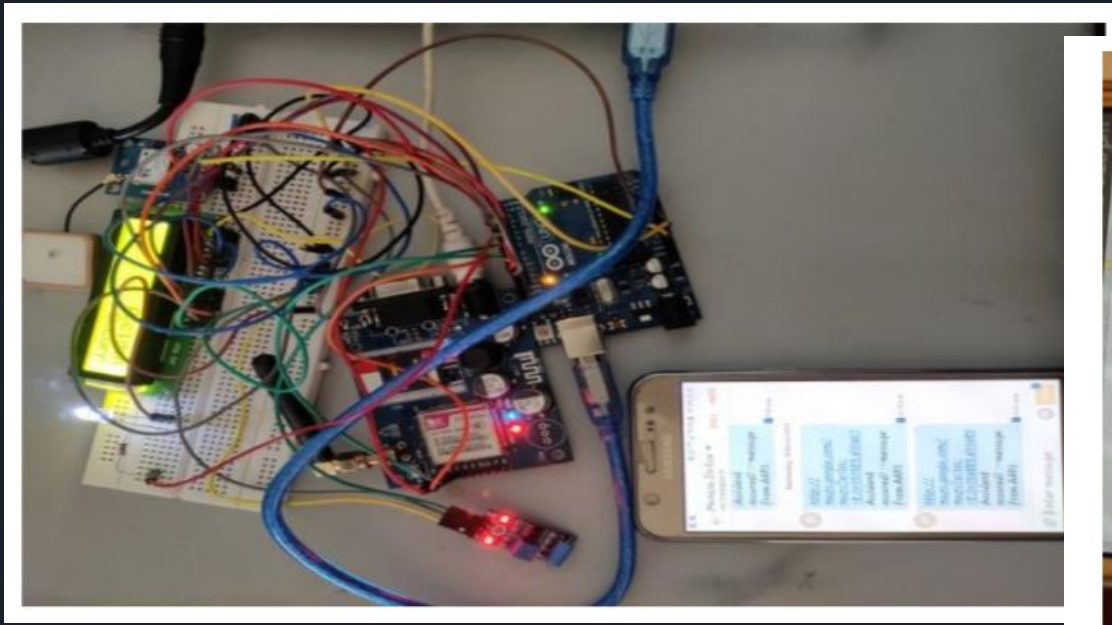


After ambulance reaching accident place

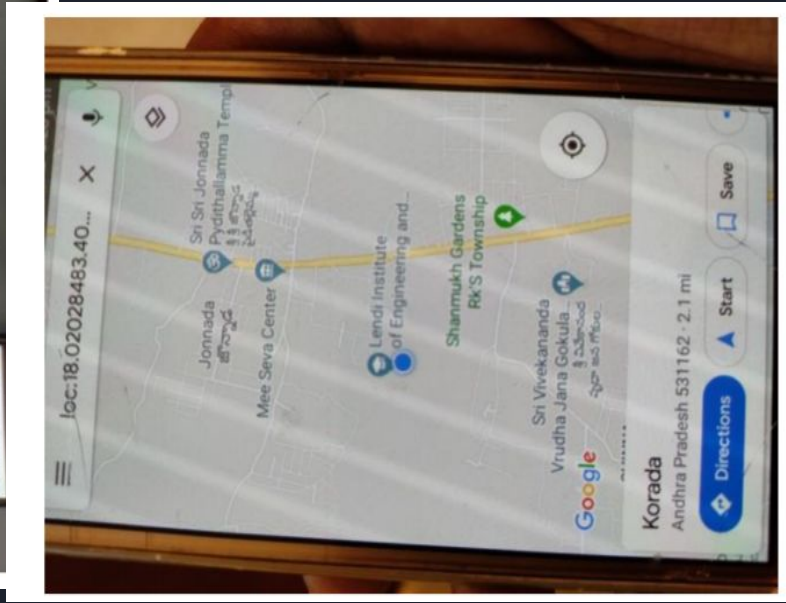


Accident alert message

Accident alert message



Accident location tracking through GPS



ADVANTAGES:

>>Totally Advanced version of Ambulance system.

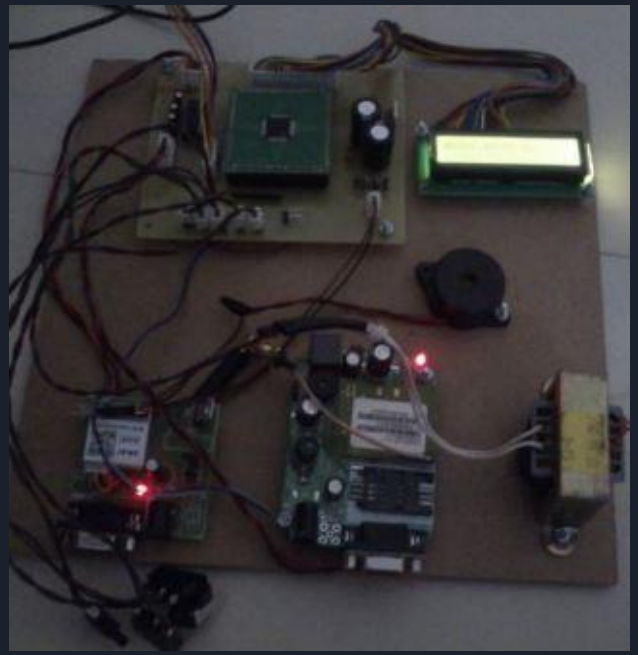
>>With the help of GPS we get the latitude and longitude of the detected position.

>>The GSM helps in informing about the victim to the family members.

>>Direct connection between ambulance system and the victim which will reduce any malfunctioning due to its automatic nature.'

>>Very Cost efficient system.

>>It is compatible even for two wheeler systems.



Rough idea of Circuit

Display board

Budget (Final Billing):-

Billing :-

1. Microcontroller boards(Arrdurino board)):- 283.20 Rs
2. Accelerometer(Robotiy GY - 521MPU-6050) = 214 Rs
3. Gyroscopic Sensor(MPU6050) = 125 Rs
4. Vibrational sensor(Piezo Vibration Sensor) = 293Rs
5. GPS module (Mikroe GPS 4 click - L70):- 3,089 Rs
6. GSM Transmitter(SIM800C):- 450 Rs
7. LED :- 89 RS
8. Buzzer :- 199 Rs
9. RF Transmitter(DHRUV _ PRO 433Hz) : - 399Rs
10. GSM Receiver(SIM800L) : - 290 Rs
11. IR Fire Sensor :- 105.00 Rs

12. Digital LCD Board (MIKEROE - 55) : - 1028 Rs
13. Wi-fi Development Board (ESP8266) :- 275 Rs
14. Other Expenses (Wire , Connecter Pin , Holder , Board , Holder Etc.) =1235 Rs

Total = 8179.2 Rs

Group Members :-

- Devyani Gorkar (B20ME027)
- Shrutayu Aggarwal (B20ME073)
- Nitya Anand Shah (B20CS039)
- Rohit Doriya (B20AI034)
- Abhishek Kumar (B20ME003)
- Tanisha Jain (B20EE072)
- Sukhman Preet Singh Sandhu (B20CS073)
- Nitesh Meena (B20CH025)
- Saurav Kumar (B20BB037)
- Mohit Mathuria (B20BB022)

Thank You