# SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

## A PROJECT REPORT

*Submitted by*


| | |
|---|---|
| **MURUGAN K** | **19L125** |
| **NITHESH K S** | **19L230** |
| **RAAM KUMAR V S** | **19L237** |
| **ROHITH SUBRAMONIAM R** | **19L236** |


in partial fulfilment for the award of the degree of

**BACHELOR OF ENGINEERING**

**IN**

**ELECTRONICS AND COMMUNICATION ENGINEERING**


**NOVEMBER -2022**

# KARPAGAM COLLEGE OF ENGINEERING

(Autonomous)

**COIMBATORE – 641 032**

## SIGNS WITH SMART CONNECTIVITY FOR BETTER ROAD SAFETY

Bonafide record of work done by


**MURUGAN K 19L227**
**NITHESH K S 19L230**
**RAAM KUMAR V S 19L237**
**ROHITH SUBRAMONIAM R 19L236**


Dissertation submitted in partial fulfilment of the requirements for the degree of

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...…… ……..…….

**MR.G.ARUN FRANCIS M.E.,(Ph.D)**
Faculty guide

**Dr.P.KARTHIGAIKUMAR M.E., Ph.D.**
Head of the Department

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Certified that the candidate was examined in the viva-voce examination held on

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…….. ……..

(Internal Examiner) (External Examiner)

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# ABSTRACT

In this digital era, technology has made its mark in almost every field. With the invention of prosthetic limbs and artificial organs among others have given people a better opportunity. The urbanization also has its downfalls. Traffic accidents can be considered as one. The initial stage treatment to a patient is very critical. The first hour is referred as the Golden Hour for this reason. Es pecially in the case of accidents the golden hour becomes very important. As per the Report on Road accidents in India 2019, the accident related deaths in India in 2019 were 1,51,113 in number [1]. The average time for an ambulance to reach hospital is going up each year due to increasing. So, it is imperative to find the possible ways to reduce the time. To achieve this, various measures are explored. In rescue times of greater than a half-hour, in half of the cases at least 21 min was required to communicate a need for an ambulance.[2] This article aims to reduce the time taken for the information to reach the ambulance services through a model which detects accidents and informs the ambulance service of the location of accidents.Every year 1.2 million people die in traffic accidents worldwide, 50 million are injured which are likely to increase by 65% over the next 20 years. Traffic accidents have become one of world's largest public health problem [5]. So, it has become necessity for us to take the necessary measures to provide the required assistance to people when an accident does occur.In this paper, a model is proposed to detect an accident by the correlation of the accelerometer, vibration and heart pulse sensors which then prompts the system to find the nearby ambulance service and intimate the occurrence and the position of an accident, found using GPS present in the model, so they can act accordingly.

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# CHAPTER 1

# INTRODUCTION

## 1.1 Introduction to the project:

In today's world there is a severe increase in the use of vehicles. Such heavy automobile usage has increased traffic and thus resulting in a rise in road accidents. This takes a toll on the property as well as causes human life loss because of unavailability of immediate preventive and safety facilities. Complete accident prevention is unavoidable but at least repercussions can be reduced. This embedded system can prevent the accident to occur and proper preventive measures are taken in this system. The ambulance service and the police station can easily find the location as the location along with the google map link was sent to their smart devices with mobile network accessibility.The system consists of eye blink sensor, temperature sensor, alcohol sensor, motor, buzzer, led etc. and all these devices are interfaced with the central micro controller unit. We are going to use eye blink sensor for detecting sleep by setting the certain time limit, if the driver gets sleepy,we can warn him. Temperature sensor helps us in detecting the heat of the engine and if the engine is overheated then that of a normal condition, we can warn the driver. Alcohol sensor helps us in detecting if the driver is drunk or not. If he/she is over drunk the vehicle provides warning and the engine stops functioning.Accelerometer detects the occurrence of accident and sends signal to the micro controller for further functioning. GPS module provides us the location, speed, time and date of the certain place where the vehicle is in the real time.If accident occurs, the location of accident that we get from the GPS is send to the ambulance service and police by the help of GSM module. Everything might be all right after a simple accident so the driver can re-inform the ambulance service and police station in this case.

# CHAPTER 2

# CAUSES OF ROAD ACCIDENTS

If everyone follows the traffic rule, the roads will be a safer place to be. The rules are simple, yet few people tend to break them often. Red signal always means stop. Even if you see no other vehicles coming, running a red light and breaking the law might cause a severe accident. Understand that life is more important than all excuses combined, and it's best to be safe than sorry.

## 2.1.Over Speeding:

Most of the fatal accidents occur due to over speeding. It is a natural psyche of humans to excel. If given a chance man is sure to achieve infinity in speed. But when we are sharing the road with other users we will always remain behind some or other vehicle. Increase in speed multiplies the risk of accident and severity of injury during accident.

Figure 2.1 Over Speeding

## 2.2.Drunken Driving:

Consumption of alcohol to celebrate any occasion is common. Remember, do not refuse to take the test, as there will be serious consequences. If the police suspect drunkenness, they can suspend one's license and place them under arrest without a warrant. The driver might even be taken to the closest hospital or police station for a blood test. This is because the person who has done this has put their own life and the life of others at risk on the road.


Figure 2.2 Drunken drivin

**2.3.Distraction to Driver:**

Driver distraction occurs when a secondary task, such as tuning a radio, eating a pizza, entering data for an in-vehicle navigation system, or talking on a cell phone, interferes with the primary task of maintaining safe control of a vehicle in motion.Talking on a cell phone is a prime example of a secondary task that reduces the driver's ability to control a vehicle safely.

**2.4.Avoiding Safety Gears like seat belts and helmets:**

Overspeeding and dozing off: The driver was driving at around 120kmph when 80 kmph is the allowed speed on the expressway. Since he was driving overnight, he is said to have dozed off and the blinking of eyes could not spot the container due to hazy wee hours. Mete was reportedly sleeping at the time of mishap.The multi axle container truck, which has not been identified yet, was in the extreme right lane when it is the extreme left lane that is meant for heavy vehicles.

Figure 2.4 Avoiding Safety Gears like seat belts and helmets

**2.5.Red Light jumping:**

It is a common sight at road intersections that vehicles cross without caring for the light. The main motive behind Red light jumping is saving time. The common conception is that stopping at red signal is wastage of time and fuel. Studies have shown that traffic signals followed properly by all drivers saves time and commuters reach destination safely and timely. A red light jumper not only jeopardizes his life but also the safety of other road users.Most of the fatal accidents occur due to over speeding. It is a natural psyche of humans to excel. If given a chance man is sure to achieve infinity in speed. But when we are sharing the road with other users we will always remain behind some or other vehicle. Increase in speed multiplies the risk of accident and severity of injury during accident. Faster vehicles are more prone to accident than the slower one and the severity of accident will also be more in case of faster

# CHAPTER 3

# SYSTEM COMPONENTS

**3.1 .ALCOHOL SENSOR:**

MQ-3 module is suitable for detecting Alcohol, Benzine, CH4, Hexane, LPG, CO. Sensitive material of MQ-3 gas sensor is SnO2, which with lower conductivity in clean air. When the target alcohol gas exists, the sensor's conductivity is more higher along with the gas concentration rising. MQ-3 gas sensor has high sensitivity to Alcohol, and has good resistance to disturb of gasoline, smoke and vapor. This sensor provides an analog resistive output based on alcohol concentration. When the alcohol gas exists, the sensor's conductivity gets higher along

with the gas concentration rising. The alcohol sensor is technically referred to as **a MQ3 sensor which detects ethanol in the air**. When a drunk person breathes near the alcohol sensor it detects the ethanol in his breathe and provides an output based on alcohol concentration. If there is more alcohol concentration more LED's would lit. The MQ3 alcohol gas sensor consists of an AL2O3 micro-ceramic tube, a sensitive layer of tin dioxide (SnO2), a measuring electrode, and a heater attached to a grid made of stainless steel and plastic. The heater is necessary for providing the required conditions for the operation of sensitive components. The MQ-3 alcohol gas sensor has 6-pin, of which 4-pins are used to extract the signal and 2-pins are used to provide the heating current.

Figure 3.1 Alcoholic sensor

## 3.2 .ULTRASONIC SENSOR:

An ultrasonic sensor is **an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal**. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the

receiver. The formula for this calculation is D = ½ T x C (where D is the distance, T is the time, and C is the speed of sound ~ 343 meters/second). For example, if a scientist set up an ultrasonic sensor aimed at a box and it took 0.025 seconds for the sound to bounce back, the distance between the ultrasonic sensor and the box would be: Ultrasonic sensors are used primarily as proximity sensors. They can be found in automobile self-parking technology and anti-collision safety systems. Ultrasonic sensors are also used in robotic obstacle detection systems, as well as manufacturing technology. In comparison to infrared (IR) sensors in proximity sensing applications, ultrasonic sensors are not as susceptible to interference of smoke, gas, and other airborne particles (though the physical components are still affected by variables such as heat). Ultrasonic sensors are also used as level sensors to detect, monitor, and regulate liquid levels in closed containers (such as vats in chemical factories).

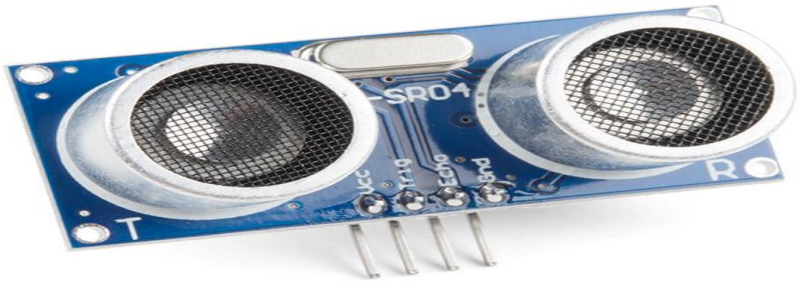


Figure 3.2 Ultrasonic sensor

## 3.3.KEY FEATURES OF ARDUINO UNO:

The board contains the USB interface support that enables the board to act as a serial device and provide the functionality to connect the board to other interfaces. The USB interface is also used to provide power supply to the board. In the Arduino UNO board, there is a chip placed that is directly plugged to the USB port and acts as a virtual type serial port for the computer system. By this, communication becomes very smooth and helps the board to connect to various

types of computer system. The microcontroller used in the Arduino UNO board ATMega328 is easy to available and can be used easily. The board contains other components like PWM pins, timers, external interrupts or internal interrupts, and other types of sleep modes. The board is provided as an open-source tool that has its own advantage as a large number of users use this board and help to troubleshoot other problems related to the board. By this, the debugging activities related to the project become easy steps. The pins used in the board act as an oscillator that has a frequency of around 16 MHz that is beneficial for most of the applications. By this the speed of the microcontroller does not change. The board has another feature of voltage regulation that helps to regulate the power supply on the board. The board can be provided power supply directly without using external power and USB port can be used for this purpose. The 12V power supply can be used as an external power supply for the board.

### 3.3.1 .Features of Arduino Uno:

• Microcontroller: ATmega328P

• Operating Voltage: 5V

• Input Voltage (recommended): 7-12V

• Input Voltage (limit): 6-20V

• Digital I/O Pins: 14 (of which 6 provide PWM output)

• DC current for 3.3V Pin: 50 mA

• Flash Memory: 32 KB (ATmega328P) of which 0.5 KB used by bootloader

• SRAM: 2 KB (ATmega328P)

• EEPROM: 1 KB (ATmega328P)

• Clock Speed: 16 MHz

• LED_BUILTIN: 13

### 3.3.2 .ARDUINO UNO:

The Arduino Uno is a type of Arduino board that is provided as an open-source board that uses an ATmega328p microcontroller in the board. The Arduino Uno contains a set of analog and digital pins that are input and output pins which are used to connect the board to other components. There are a total of fourteen I/O pins placed inboard in which six are analog input pins. The board has a USB connection that can be used to a power supply to the board. The board is used for electronics projects and used to design the circuit.The Arduino UNO is categorized as a microcontroller that uses the ATmega328 as a controller in it. The Arduino UNO board is used for an electronics project and mostly preferred by the beginners. The Arduino UNO board I type of Arduino board only. The Arduino board is the most used board of all Arduino boards. The board contains 14 digital input/ output pins in which 6 are analog input pin, one power jack, USB connector, one reset button, ICSP header, and other components. All these components are attached in the Arduino UNO board to make it functioning and can be used in the project

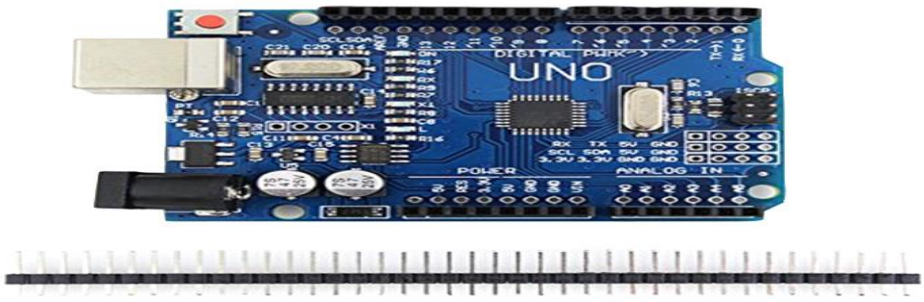


Figure 3.3 Arduino UNO

## 3.4.BUZZER:

These buzzers were invented by manufacturers of Japanese & fixed into a broad range of devices during the period of 1970s – 1980s. So, this development primarily came due to cooperative efforts through the manufacturing companies of Japanese. In the year 1951, they

recognized the Application Research Committee of Barium Titanate that allows the corporations to be cooperative competitively & bring about numerous piezoelectric creations. A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

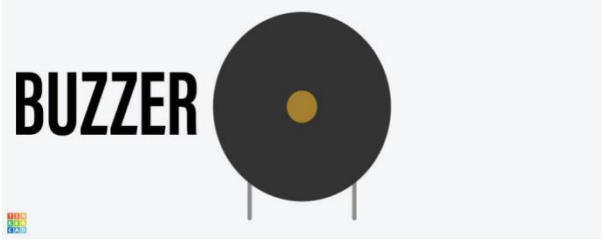


Figure 3.4 Buzzer

## 3.5.LED:

LED is a semiconductor device that emits_light when current flows through it. Electrons in the semiconductor recombine with electron_holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band_gap of the semiconductor.[5] White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device. LEDs have many advantages over incandescent light sources, including lower power consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. In exchange for these generally favorable attributes, disadvantages of LEDs include electrical limitations to low voltage and generally to DC (not AC) power, inability to provide steady illumination from a pulsing DC or an AC electrical supply source, and lesser maximum operating temperature and storage temperature. In contrast to LEDs, incandescent lamps can be made to intrinsically run at virtually any supply voltage, can utilize either AC or DC current interchangeably, and will provide steady illumination when powered by AC or pulsing DC even at a frequency as low as 50 Hz. LEDs usually need electronic support components to function, while an incandescent bulb can and usually does operate directly from an unregulated DC or AC power source

Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared (IR) light.[7] Infrared LEDs are used in remote-control circuits, such as those used with a wide variety of consumer electronics. The first visible-light LEDs were of low intensity and limited to red. Early LEDs were often used as indicator lamps, replacing small incandescent bulbs, and in seven-segment displays. Later developments produced LEDs available in visible, ultraviolet (UV), and infrared wavelengths, with high, low, or intermediate light output, for instance white LEDs suitable for room and outdoor area lighting.

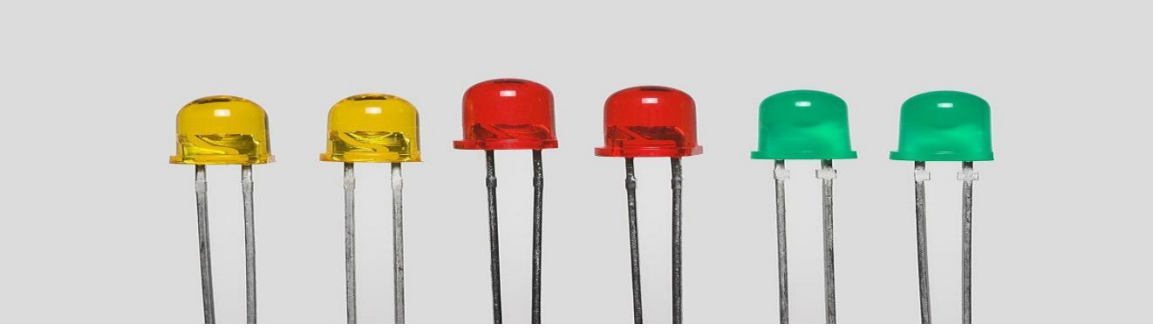

Figure 3.5 LED

The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor.[5] White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device. LEDs have many advantages over incandescent light sources, including lower power consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. In exchange for these generally favorable attributes, disadvantages of LEDs include electrical limitations to low voltage and generally to DC (not AC) power, inability to provide steady illumination from a pulsing DC or an AC electrical supply source, and lesser maximum operating temperature and storage temperature.

## 3.6. RESISTOR:

Resistors are electronic components which have a specific, never changing electrical resistance. The resistor's resistance **limits the flow of electrons** through a circuit. They are **passive** components, meaning they only consume power. Resistors are usually added to circuits where they complement **active** components like op-amps, microcontrollers, and other integrated circuits. Commonly resistors are used to limit current, divide voltages, and pull-up I/O lines.

Figure 3.6 Resistor

Power resistors are required to dissipate substantial amounts of power and are typically used in power supplies, power conversion circuits, and power amplifiers; this designation is loosely applied to resistors with power ratings of 1 watt or greater. Power resistors are physically larger and may not use the preferred values, color codes, and external packages described below.

If the average power dissipated by a resistor is more than its power rating, damage to the resistor may occur, permanently altering its resistance; this is distinct from the reversible change in resistance due to its temperature coefficient when it warms. Excessive power dissipation may raise the temperature of the resistor to a point where it can burn the circuit board or adjacent components, or even cause a fire. There are flameproof resistors that will not produce flames with any overload of any duration.

Resistors may be specified with higher rated dissipation than is experienced in service to account for poor air circulation, high altitude, or high operating temperature.

# CHAPTER 4

# DESIGN AND IMPLEMENTATION

## 4.1 BLOCK DIAGRAM:

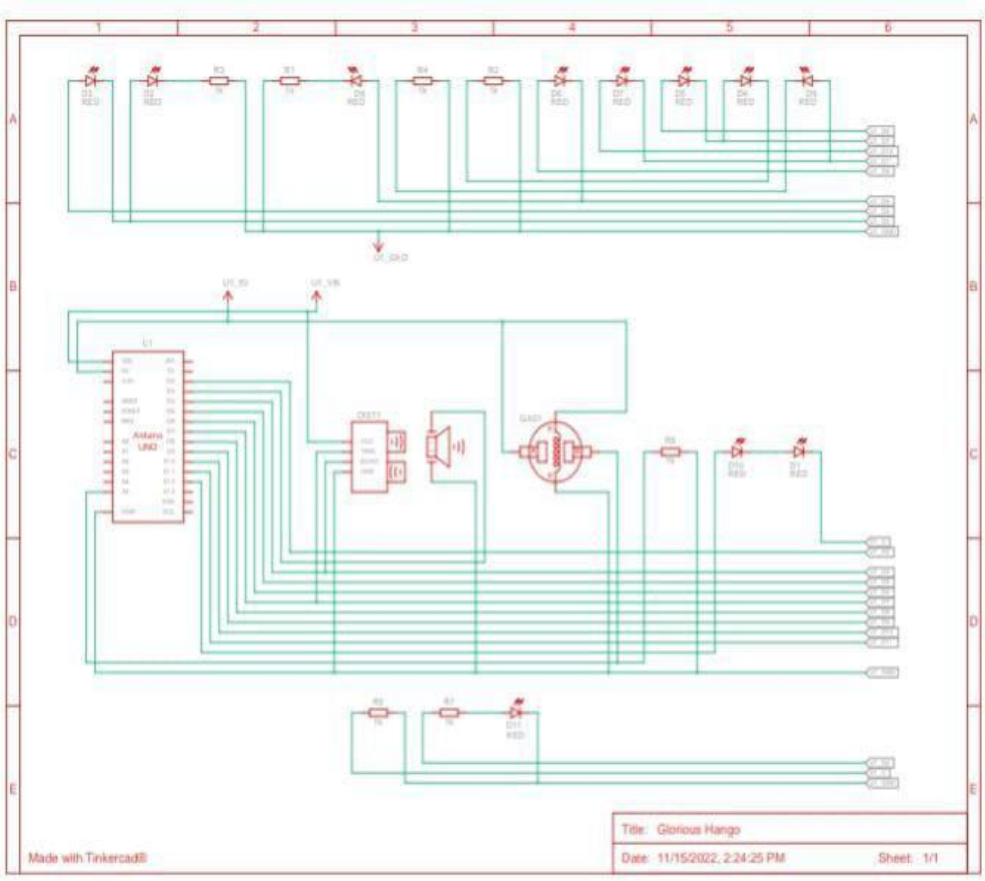


Figure:4.1. Block Diagram

## 4.2 Program:

```
int S = 0;

void setup(){

  pinMode(A5, INPUT);
```

```
 Serial.begin(9600);
 pinMode(13, OUTPUT);
 pinMode(12, OUTPUT);
 pinMode(11, OUTPUT);
 pinMode(10, OUTPUT);
 pinMode(9, OUTPUT);
 pinMode(8, OUTPUT);
 pinMode(7, OUTPUT);
 pinMode(6, OUTPUT);
 pinMode(5, OUTPUT);
 pinMode(4, OUTPUT);
}void loop()
{
S = analogRead(A5);
 Serial.println(S);
 if (S <= 20) {
    digitalWrite(13,LOW);
    digitalWrite(12,LOW);
    digitalWrite(11,LOW);
    digitalWrite(10,LOW);
    digitalWrite(9,LOW);
    digitalWrite(8,LOW);
    digitalWrite(7,LOW);
    digitalWrite(6,LOW);
    digitalWrite(5,LOW);
    digitalWrite(4,LOW);}
 else{
   if(S>20 && S<25){
    digitalWrite(13,HIGH);
    digitalWrite(12,LOW);
    digitalWrite(11,LOW);
```

```
    digitalWrite(10,LOW);
    digitalWrite(9,LOW);
    digitalWrite(8,LOW);
    digitalWrite(7,LOW);
    digitalWrite(6,LOW);
    digitalWrite(5,LOW);
    digitalWrite(4,LOW);
  } else{
    if (S > 25 && S <= 30) {
    digitalWrite(13, HIGH);
    digitalWrite(12, HIGH);
    digitalWrite(11,LOW);
    digitalWrite(10,LOW);
    digitalWrite(9,LOW);
    digitalWrite(8,LOW);
    digitalWrite(7,LOW);
    digitalWrite(6,LOW);
    digitalWrite(5,LOW);
    digitalWrite(4,LOW);}
   else{
    if (S > 30 && S <= 40) {
    digitalWrite(13, HIGH);
    digitalWrite(12, HIGH);
    digitalWrite(11, HIGH);
    digitalWrite(10,LOW);
    digitalWrite(9,LOW);
    digitalWrite(8,LOW);
    digitalWrite(7,LOW);
    digitalWrite(6,LOW);
    digitalWrite(5,LOW);
    digitalWrite(4,LOW);}
```

```
else{
  if (S > 40 && S <= 50){
  digitalWrite(13, HIGH);
  digitalWrite(12, HIGH);
  digitalWrite(11, HIGH);
  digitalWrite(10, HIGH);
  digitalWrite(9,LOW);
  digitalWrite(8,LOW);
  digitalWrite(7,LOW);
  digitalWrite(6,LOW);
  digitalWrite(5,LOW);
  digitalWrite(4,LOW);}
else{
  if (S >50 && S <= 60){
  digitalWrite(13, HIGH);
  digitalWrite(12, HIGH);
  digitalWrite(11, HIGH);
  digitalWrite(10, HIGH);
  digitalWrite(9, HIGH);
  digitalWrite(8,LOW);
  digitalWrite(7,LOW);
  digitalWrite(6,LOW);
  digitalWrite(5,LOW);
  digitalWrite(4,LOW);}
else{
  if (S >60 && S <= 70){
  digitalWrite(13, HIGH);
  digitalWrite(12, HIGH);
  digitalWrite(11, HIGH);
  digitalWrite(10, HIGH);
  digitalWrite(9, HIGH);
```

```
    digitalWrite(8,HIGH);
    digitalWrite(7,LOW);
    digitalWrite(6,LOW);
    digitalWrite(5,LOW);
    digitalWrite(4,LOW);}
  else{
    if (S >70 && S <= 80){
    digitalWrite(13,HIGH);
    digitalWrite(12,HIGH);
    digitalWrite(11,HIGH);
    digitalWrite(10,HIGH);
    digitalWrite(9,HIGH);
    digitalWrite(8,HIGH);
    digitalWrite(7,HIGH);
    digitalWrite(6,LOW);
    digitalWrite(5,LOW);
    digitalWrite(4,LOW);}
  else{
    if (S >80 && S <= 90){
    digitalWrite(13,HIGH);
    digitalWrite(12,HIGH);
    digitalWrite(11,HIGH);
    digitalWrite(10,HIGH);
    digitalWrite(9,HIGH);
    digitalWrite(8,HIGH);
    digitalWrite(7,HIGH);
    digitalWrite(6,HIGH);
    digitalWrite(5,LOW);
    digitalWrite(4,LOW);}
 else{
    if (S >90 && S <= 100){
```

```
    digitalWrite(13,HIGH);
    digitalWrite(12,HIGH);
    digitalWrite(11,HIGH);
    digitalWrite(10,HIGH);
    digitalWrite(9,HIGH);
    digitalWrite(8,HIGH);
    digitalWrite(7,HIGH);
    digitalWrite(6,HIGH);
    digitalWrite(5,HIGH);
    digitalWrite(4,LOW);}
 else {
    if(S>100){
    digitalWrite(13,HIGH);
    digitalWrite(12,HIGH);
    digitalWrite(11,HIGH);
    digitalWrite(10,HIGH);
    digitalWrite(9,HIGH);
    digitalWrite(8,HIGH);
    digitalWrite(7,HIGH);
    digitalWrite(6,HIGH);
    digitalWrite(5,HIGH);
    digitalWrite(4,HIGH);}
else{
    digitalWrite(13,LOW);
    digitalWrite(12,LOW);
    digitalWrite(11,LOW);
    digitalWrite(10,LOW);
    digitalWrite(9,LOW);
    digitalWrite(8,LOW);
    digitalWrite(7,LOW);
    digitalWrite(6,LOW);
```

```
      digitalWrite(5,LOW);

      digitalWrite(4,LOW);}

          }

} }

        }

       }

      }

     }

    }

   }

  }  delay(10); // Delay a little bit to improve simulation performance

}

constinttrigPin=7;
constintechoPin=4;
intbuzz=10;
longduration;
intdistance;
voidsetup()
{
  pinMode(trigPin,OUTPUT);
  pinMode(echoPin,INPUT);
  pinMode(13,OUTPUT);
  pinMode(2,OUTPUT);
  Serial.begin(9600);
}

voidloop()
{
  digitalWrite(trigPin,LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin,HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin,LOW);
  duration=pulseIn(echoPin,HIGH);
  distance=duration*0.034/2;
  if(distance<=50&&distance>=20)
  {
    digitalWrite(13,HIGH);
  }
  else
  {
     digitalWrite(13,LOW);
  }

  if(distance<=20)
  {
    digitalWrite(2,HIGH);
```

```
   tone(buzz,2000);
   delay(100);
   noTone(buzz);
   delay(100);

   tone(buzz,2000);
   delay(100);
   noTone(buzz);
   delay(100);

   tone(buzz,2000);
   delay(100);
   noTone(buzz);
   delay(100);

   tone(buzz,2000);
   delay(100);
   noTone(buzz);
   delay(100);
  }

  else
  {
   digitalWrite(2,LOW);
  }
}
```

## 4.3 Output Image:

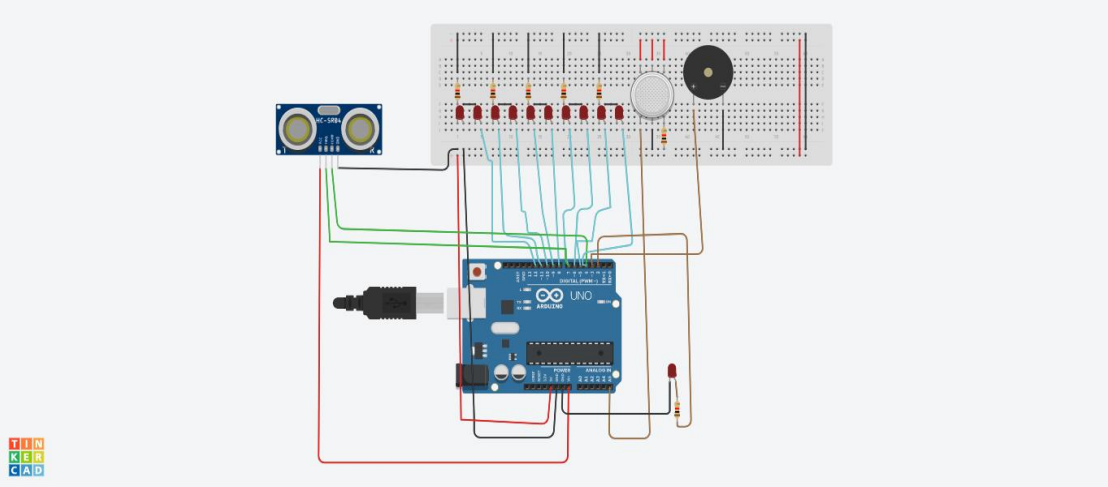

Figure:4.2.Output image

# CHAPTER 5

# CONCLUSION

The proposed programmed accident detection system can be a rescuer of life for the people who met with accidents. The proposed system is exceptionally easy to understand and even a non-

specialized Person can use it without any problem. The system consists of equipment and programming segments. The equipment unit includes accident detection sensors that are constrained by an Arduino board and is fitted in the vehicle. Then again, the programming part is an Android application introduced in drivers Smartphones which is used to get the point by point map. In general, the benefits of this system are low cost, secure and simple to use. The system introduced in this work reduces the casualties due to accidents. The proposed system deals with the detection of the accidents. But this can be extended by providing medication to the victims at the accident spot. By increasing the technology we can also avoid accidents by providing alerts systems that can stop the vehicle to overcome the accidents.Road Safety in today's context is the most significant issue which relates to the safety of public on road. Millions of lives are lost annually throughout the world due to road accidents, resulting in huge loss of finance and resources for individuals as well as for the nation. Every year governments throughout the world spend billions on the treatment and welfare of accident victims and their rescue, if they are lucky enough to make it alive. There is an urgent need to make people more aware about road safety precautions and why they matter so much. Strict laws must also be implemented to enforce road safety norms.

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