ACCIDENT DETECTION AND ALERT SYSTEM FOR VEHICLES

Minor Project Report

Submitted for the partial fulfilment of the degree of

Bachelor of Technology

In

Internet of Things

Submitted By

ASHISH PATEL

0901IO211012

UNDER THE SUPERVISION AND GUIDANCE OF

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA

माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत

Deemed to be university

NAAC ACCREDITED WITH A++ GRADEA

May 2024

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I hereby declare that the work entitled **ACCIDENT DETECTION AND ALERT SYSTEM FOR VEHICLES** is my work, conducted under the supervision of **Dr. Aditya Dubey, Assistant Professor, Centre for IoT** during the session Jan-May 2024. The report submitted by me is a record of Bonafede work carried out by me. I further declare that the work reported in this report has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

ASHISH PATEL

0901IO211012

Date: 25-04-2024
Place: Gwalior

This is to certify that the above statement made by the candidates is correct to the best of my knowledge and belief.

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This is to certify that I/we, a student of B.Tech. in **Centre for IoT** have checked my complete report entitled **ACCIDENT DETECTION AND ALERT SYSTEM FOR VEHICLES** for similarity/plagiarism using the "Turnitin" software available in the institute. This is to certify that the similarity in my report is found to be …… which is within the specified limit (30%). The full plagiarism report along with the summary is enclosed.

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ABSTRACT

The rapid advancement in transportation systems has undeniably accelerated the pace of our lives. However, alongside this progress, road traffic accidents have emerged as a pressing global concern, leading to significant loss of life, property, and time. The escalating death toll resulting from road accidents underscores the urgent need for effective accident prevention and response measures. This article addresses this imperative by introducing an intelligent accident detection system designed to swiftly identify and respond to accidents on the road.

The system incorporates sophisticated location tracking and notification mechanisms to promptly detect accidents and alert relevant authorities and individuals. The core functionality of the intelligent accident detection system revolves around its ability to leverage GPS technology for real-time location tracking. When an accident occurs, sensors embedded within the vehicle are triggered, initiating the detection process. Upon activation, the system immediately transmits distress signals containing precise GPS coordinates to designated recipients. The notification mechanism of the system plays a pivotal role in facilitating rapid response to accidents.

Through the GSM, the system automatically initiates phone calls and sends notification messages to emergency contacts of the individuals involved in the accident. This swift and automated communication ensures that appropriate emergency services are promptly dispatched to the Accident Site, potentially saves life’s and minimizing injuries.

ACKNOWLEDGEMENT

The full semester project has proved to be pivotal to my career. I am thankful to my institute, **Madhav Institute of Technology & Science** to allow me to continue my disciplinary/interdisciplinary project as a curriculum requirement, under the provisions of the Flexible Curriculum Scheme approved by the Academic Council of the institute. I extend my gratitude to the Director of the institute, **Dr. R. K. Pandit** and Dean Academics, **Dr. Manjaree Pandit** for this.

I would sincerely like to thank my department, **Centre for Internet of Things,** for allowing me to explore this project. I humbly thank **Dr. Praveen Bansal**, Assistant Professor and Coordinator, Centre for Internet of Things, for his continued support during the course of this engagement, which eased the process and formalities involved.

I am sincerely thankful to my faculty mentors. I am grateful to the guidance of **Dr. Aditya dubey**, Assistant Professor, Centre of IOT, for his continued support and guidance throughout the project. I am also very thankful to the faculty and staff of the department.

ASHISH PATEL

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1.1 Introduction

In contemporary society, road traffic accidents stand as a pervasive and pressing issue, causing significant loss of life, injury, and economic damage worldwide. Despite ongoing efforts to improve road safety through advancements in vehicle technology and infrastructure, the frequency and severity of accidents remain a formidable challenge. According to statistics from the World Health

Organization (WHO), road traffic injuries are a leading cause of death and disability globally, with millions of lives lost and countless individuals sustaining life-altering injuries each year. The repercussions of road accidents extend beyond immediate casualties, impacting families, communities, and economies on a profound level. Beyond the loss of human life, accidents result in substantial financial burdens, strain healthcare systems, and disrupt social and economic activities. Moreover, the emotional toll on survivors and their loved ones is immeasurable, with long-lasting psychological trauma often accompanying physical injuries.

In response to the ongoing threat posed by road accidents, researchers and engineers have turned to technology-driven solutions to enhance road safety and minimize the impact of accidents. Intelligent accident detection and alert systems represent a promising avenue for addressing the challenges associated with road safety. These systems leverage a combination of sensors, microcontrollers, and wireless communication technologies to detect accidents in real-time and facilitate prompt response and assistance. The proposed accident detection and alert system integrates various components, including the Arduino UNO microcontroller, GPS Module, GSM Module, ADXL335 sensor, and Power Supply, to create a comprehensive monitoring and notification system. The Arduino UNO serves as the central processing unit, coordinating the operation of the system and interfacing with the various sensors and communication modules.

The GPS Module provides precise location data, allowing the system to pinpoint the exact location of an accident and transmit this information to emergency responders and relevant authorities. the GSM Module enables communication by sending automated alerts and notifications to predefined contacts, including emergency services, law enforcement agencies, and designated family members or caregivers. By leveraging GSM technology, the system ensures that critical information reaches the appropriate parties in a timely manner, facilitating rapid intervention and assistance in the event of an accident. Through the integration of advanced technology and innovative design, intelligent accident detection and alert systems offer a proactive approach to road safety, empowering individuals, communities, and governments to mitigate the impact of accidents and save lives. By harnessing the potential of technology-driven solutions, we can work towards a safer and more secure transportation environment for all road users.

1.2 Objectives

The objective of an accident detection and alert system is to enhance road safety by promptly detecting accidents and alerting relevant parties. By facilitating rapid emergency response, the system aims to minimize injuries and property damage, potentially saving lives. Key objectives include preventing false alarms, increasing user awareness, and integrating with existing infrastructure for efficient communication and coordination during emergencies. Additionally, the system should be adaptable, scalable, and accessible to maximize its effectiveness across different vehicle types, communication networks, and geographical regions. Continuous data collection and analysis help identify trends and inform improvements, ensuring the system evolves to meet evolving road safety needs effectively.

1.3 Problem Statement

The primary goal of the project is to detect accidents promptly and notify the rescue team in a timely manner. The existing gap lies in the reliance on manual intervention post-accident occurrence, which may result in delays in alerting emergency services. An automated system is required to swiftly provide the latitude and longitude coordinates of the accident location without any delay, thereby maximizing the potential to save human lives. Therefore, the challenge is to develop a robust accident detection and alert system that seamlessly integrates with existing infrastructure to ensure rapid response and efficient deployment of rescue resources, ultimately minimizing the impact of accidents on human life

1.4 Existing System

Numerous researchers have explored accident detection systems, with traditional approaches relying on long-term traffic data for accident prediction, including factors like annual average daily traffic and hourly volume. However, real-time traffic accident prediction has gained traction, correlating accidents with real-time traffic data obtained from various detectors such as induction loops, infrared detectors, and cameras. While real-time prediction focuses on pre-accident traffic conditions, incident detection studies concentrate on post-incident traffic changes. Nevertheless, the efficacy of these systems is limited by factors like sensor availability, funding constraints, algorithm effectiveness, weather, and traffic flow variability. In addition to automatic detection, manual incident detection methods rely on motorist reports, transportation department inputs, aerial or closed-circuit camera surveillance, but suffer from delays and inaccuracies. Conversely, driver-initiated incident detection systems offer advantages in quick reaction and more detailed incident information, but are subject to limitations such as driver incapacitation in severe accidents. Conventional built-in automatic accident detection systems typically use impact sensors or car airbag sensors for accident detection, coupled with GPS for location tracking.

CHAPTER 2: LITERATURE SURVEY

In today's world, road traffic accidents remain a significant and urgent problem, causing immense loss of life, injury, and economic damage globally. Despite continuous efforts to enhance road safety through advancements in vehicle technology and infrastructure, accidents continue to occur frequently and with serious consequences. According to data from the World Health Organization (WHO), road traffic injuries are a leading cause of death and disability worldwide, affecting millions of people annually. The impact of these accidents goes beyond just the immediate casualties, affecting families, communities, and economies profoundly. Apart from the loss of human life, accidents also impose substantial financial burdens, strain healthcare systems, and disrupt daily life. Additionally, survivors and their families often suffer from lasting emotional trauma alongside physical injuries.

In response to the persistent challenge of road accidents, researchers and engineers are turning to technology-driven solutions to improve road safety and minimize accident impacts. One promising approach is the development of intelligent accident detection and alert systems. These systems utilize a combination of sensors, microcontrollers, and wireless communication technologies to detect accidents in real-time and facilitate prompt responses. For instance, a proposed system integrates components like the Arduino UNO microcontroller, GPS Module, GSM Module, ADXL335 sensor, and Power Supply to create a comprehensive monitoring and notification system.

The Arduino UNO acts as the brain of the system, managing its operations and connecting with various sensors and communication modules. The GPS Module provides accurate location data, enabling the system to identify the exact accident location and relay this information to emergency responders and relevant authorities. Meanwhile, the GSM Module enables communication by sending automated alerts and notifications to predefined contacts, including emergency services and family members. By leveraging GSM technology, the system ensures that critical information reaches the right people promptly, facilitating swift intervention and assistance in case of an accident.

Intelligent accident detection and alert systems offer a proactive approach to road safety, empowering individuals, communities, and governments to mitigate accident impacts and save lives. By harnessing the potential of technology-driven solutions, we can strive towards creating a safer transportation environment for all road users In contemporary society, road traffic accidents persist as a pervasive and pressing issue, causing significant loss of life, injury, and economic damage worldwide. Despite continuous efforts to enhance road safety through advancements in vehicle technology and infrastructure, the frequency and severity of accidents remain a formidable challenge. According to statistics from the World Health Organization (WHO), road traffic injuries stand as a leading cause of death and disability globally, with millions of lives lost and countless individuals sustaining life-altering injuries each year.

The repercussions of road accidents extend beyond immediate casualties, profoundly impacting families, communities, and economies. Beyond the loss of human life, accidents result in substantial financial burdens, strain healthcare systems, and disrupt social and economic activities. Moreover, the emotional toll on survivors and their loved ones is immeasurable, often accompanied by long-lasting psychological trauma alongside physical injuries.

In response to the ongoing threat posed by road accidents, researchers and engineers are increasingly turning to technology-driven solutions to enhance road safety and minimize the impact of accidents. Intelligent accident detection and alert systems represent a promising avenue for addressing the challenges associated with road safety. These systems leverage a combination of sensors, microcontrollers, and wireless communication technologies to detect accidents in real-time and facilitate prompt response and assistance.

One such proposed solution integrates various components, including the Arduino UNO microcontroller, GPS Module, GSM Module, ADXL335 sensor, and Power Supply, to create a comprehensive monitoring and notification system. The Arduino UNO serves as the central processing unit, coordinating the operation of the system and interfacing with the various sensors and communication modules. The GPS Module provides precise location data, allowing the system to pinpoint the exact location of an accident and transmit this information to emergency responders and relevant authorities.The GSM Module enables communication by sending automated alerts and notifications to predefined contacts, including emergency services, law enforcement agencies, and designated family members or caregivers. By leveraging GSM technology, the system ensures that critical information reaches the appropriate parties in a timely manner, facilitating rapid intervention and assistance in the event of an accident.

Through the integration of advanced technology and innovative design, intelligent accident detection and alert systems offer a proactive approach to road safety, empowering individuals, communities, and governments to mitigate the impact of accidents and save lives. By harnessing the potential of technology-driven solutions, we can work towards creating a safer and more secure transportation environment for all road users.

CHAPTER 3: MATERIALS AND METHODS

3.1 Hardware Requirements:

In the proposed system, various components including the Arduino NANO, GPS Module, GSM Module, and ADXL335 Accelerometer are utilized to create a comprehensive solution for location tracking and monitoring. The Arduino platform serves as the central controller for integrating these components and executing the necessary functions, leveraging its versatility and open-source nature.

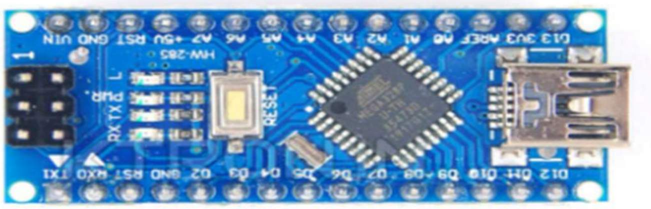


Figure 1: **Aurdino NANO**

The GPS Module is essential for determining the precise location of the tracked object or device. By receiving signals from satellites orbiting the Earth, the GPS receiver calculates latitude, longitude, and altitude, enabling applications like navigation, asset tracking, and geofencing. Additionally, supplementary data such as speed, distance travelled, and time of sunrise and sunset enhances its utility in various scenarios.

Figure 2: GPS (NEO-6m) Receiver Module

Similarly, the GSM Module facilitates communication with external devices and networks using cellular technology. By interfacing with mobile networks, the system can transmit data, receive commands, and send alerts or notifications to designated recipients. This capability is particularly useful for remote monitoring and control applications, allowing users to stay informed and take timely actions based on real-time information.

Figure 3: GSM (sim900A) Module

The ADXL335 Accelerometer complements the GPS and GSM modules by providing orientation and motion sensing capabilities. By detecting acceleration along three axes, the accelerometer enables the system to monitor movement and detect sudden changes or impacts. This information can be utilized in applications such as motion tracking, gesture recognition, and vehicle stabilization, enhancing the overall functionality of the system.

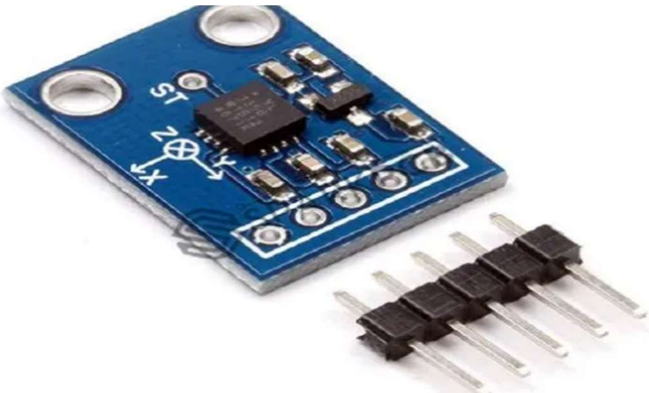


Figure 4: ADXL335 Sensor

the buzzer and push button plays a crucial role in alerting nearby individuals or authorities when an accident occurs. Once the system detects a significant event, such as a sudden impact or change in vehicle speed, it triggers the buzzer to emit a loud sound till the 20 second after that the system will send the message to the verified phone number if it is a false detection then user can press the push button and stop the buzzer.

Figure 5: Buzzer &   Push Button

Overall, the integration of these components creates a versatile and powerful system for location tracking, monitoring, and communication. Whether deployed for asset tracking, vehicle navigation, or personal safety applications, the proposed system offers a reliable and efficient solution for various real-world scenarios. Moreover, the modular design of the system allows for scalability and customization to meet specific requirements and preferences'

3.3 Methods:

The block diagram and pin diagram given below demonstrates a simple overview of the system's process flow.

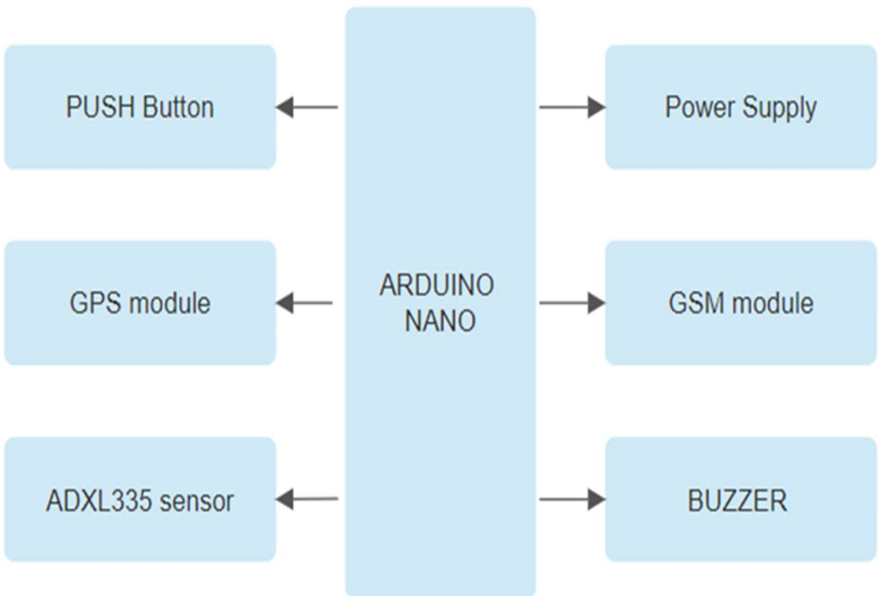


Figure 6: Block Diagram

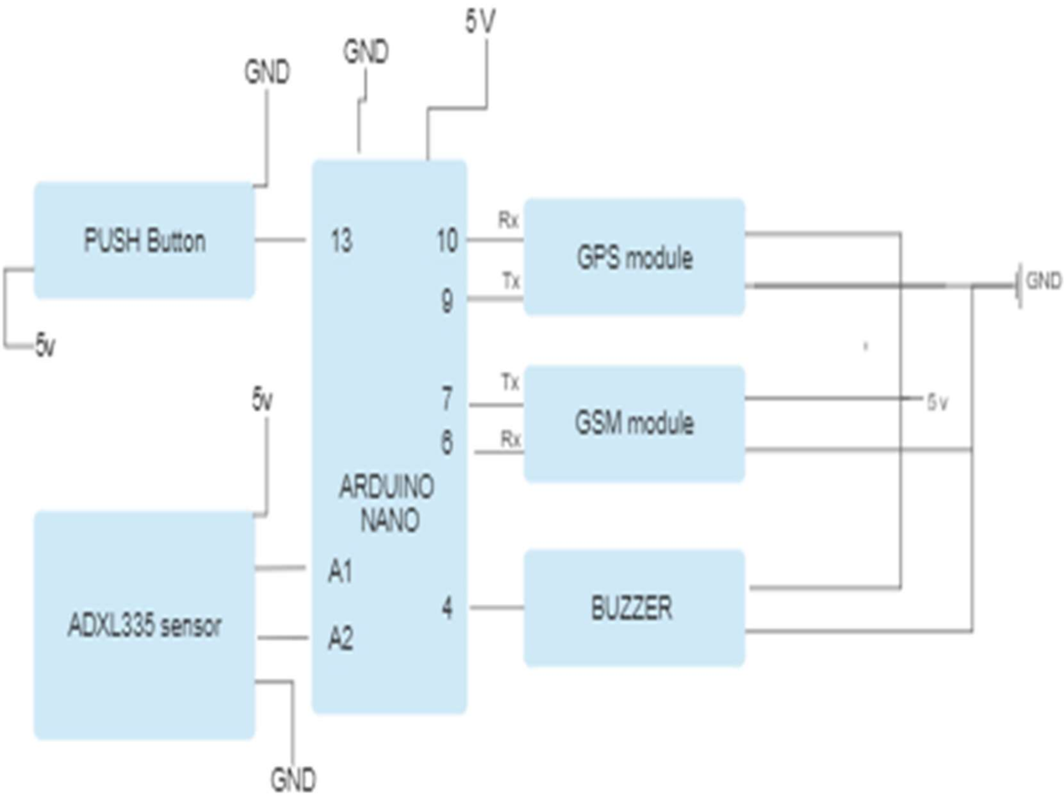


Figure 7: PIN Diagram

CHAPTER 4: WORKING METHODOLOGY

The accident detection and alert system utilizes an Arduino UNO as the controlling unit, interfacing with various sensors and modules to ensure passenger safety. The system employs an accelerometer to detect any sudden falls or changes in vehicle speed. Upon detecting a significant change, the Arduino reads the current GPS location and utilizes a GSM module to send an SMS alert to a designated mobile number, providing the precise location details.

Additionally, the system activates a buzzer to audibly signal the alert. To prevent false alarms, passengers have the option to press an "IAM OKAY" button. This action signals to the Arduino that there is no immediate danger, thereby preventing unnecessary alerts. In case of an actual emergency, after thirty seconds of the buzzer sounding, it automatically stops, and the SMS alert is sent out.

This ensures that genuine emergencies are promptly addressed while minimizing the likelihood of false alarms. Overall, the system offers a comprehensive approach to accident detection and alerting, combining sensor data, communication modules, and user input to enhance passenger safety during travel.

CHAPTER 5: WORKFLOW

The accelerometer sensor will activate after the accident has occurred. The accelerometer operates on the principle of measuring changes in acceleration. Once activated, the accelerometer triggers the GPS sensor to determine the current location. GPS receivers are widely used in various applications such as cell phones, fleet management systems, and military applications

For accurate location tracking, a GPS receiver must receive data from at least four satellites. These satellites transmit signals in the radio frequency range of 1.1 to 1.5 GHz, and the GPS receiver calculates the travel time difference between the signals to determine the location. The GPS receiver module generates output signals in NMEA string format, providing longitude, latitude, altitude, time, and other parameters.

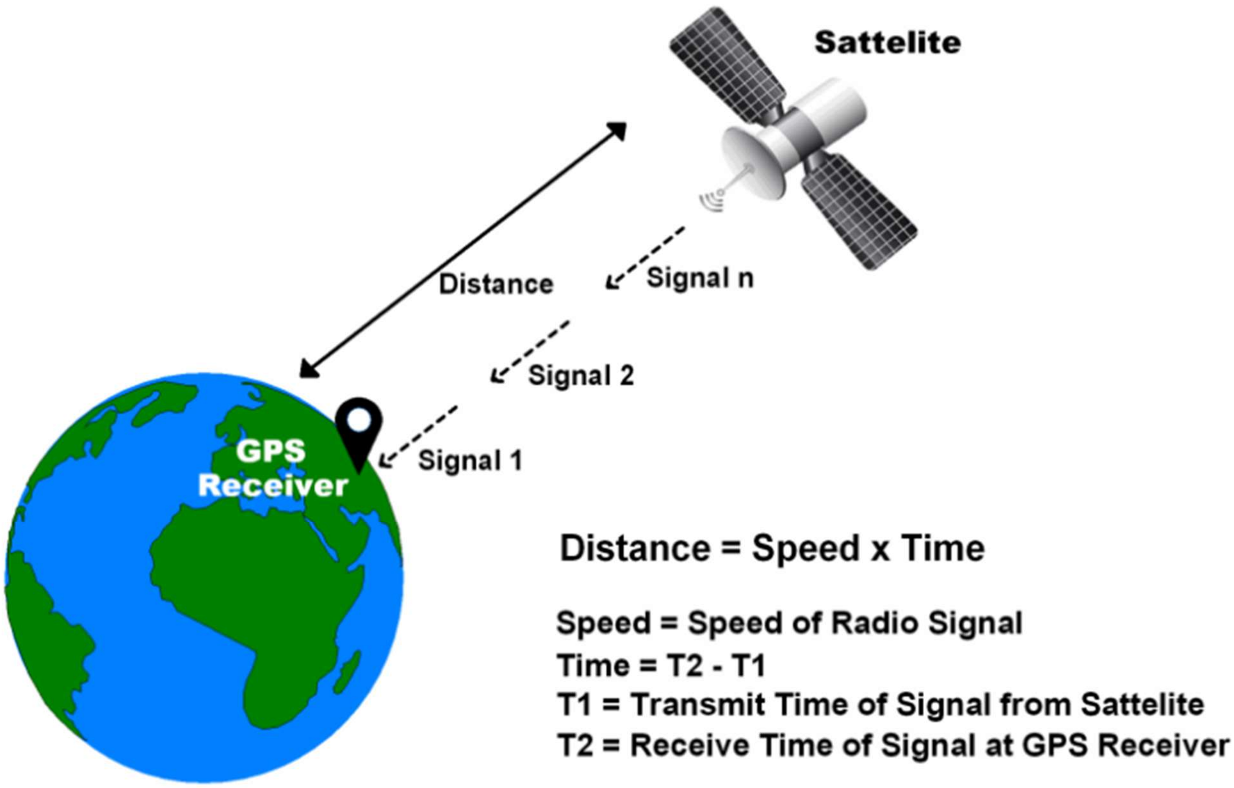


Figure 8: GPS Distance Calculation

Once the victim's exact geographical coordinates are obtained, the GSM module is activated. GSM technology is widely used, with around 800 million users across 190 countries, covering over 70% of the global digital wireless communication market. GSM divides geographical areas into hexagonal cells, with transmitter power and load determining each cell's coverage and capacity.

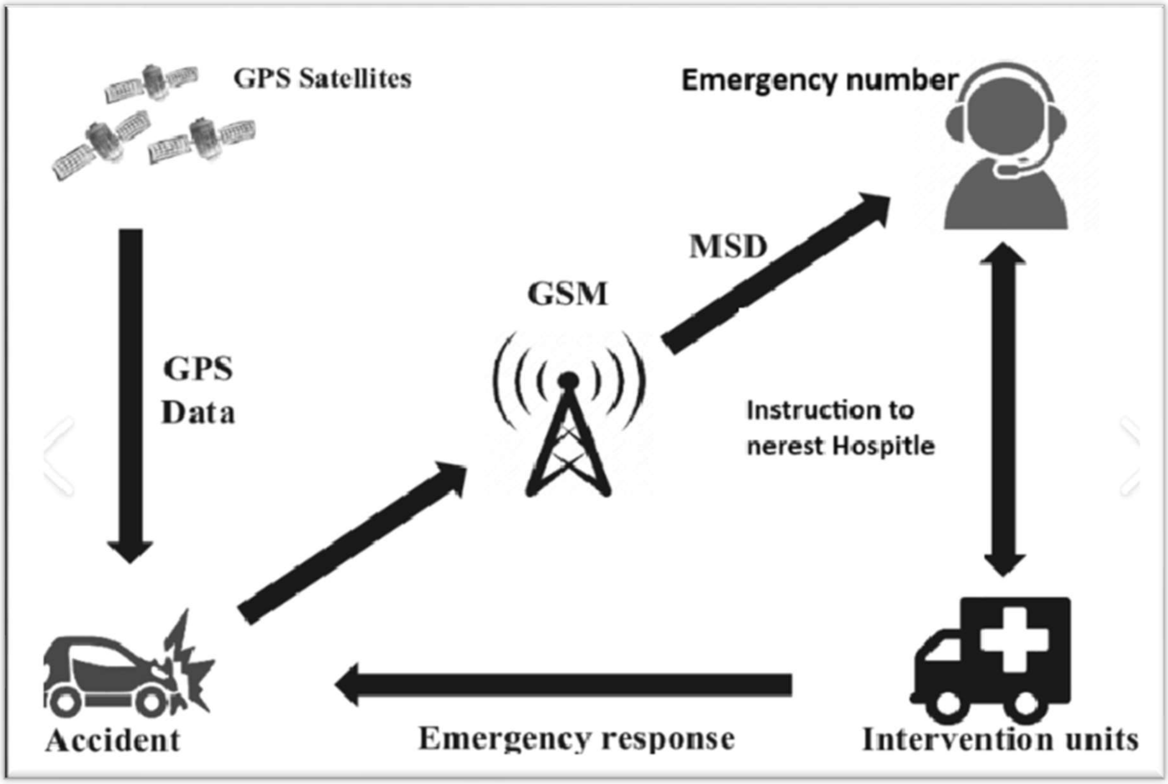


Figure 9: Workflow Diagram

GSM operates using frequency bands such as uplink 890 to 915 MHz and downlink 935 to 960 MHz, with additional bands added later. During program execution, the GSM modem receives the instruction 'STOP', causing the microcontroller to generate an output to disable the ignition switch. Warnings can be sent via telephone servers, enabling alerts to be sent via voice calls or text messages regardless of the recipient's carrier or service provider.

CHAPTER 6: FLOWCHART

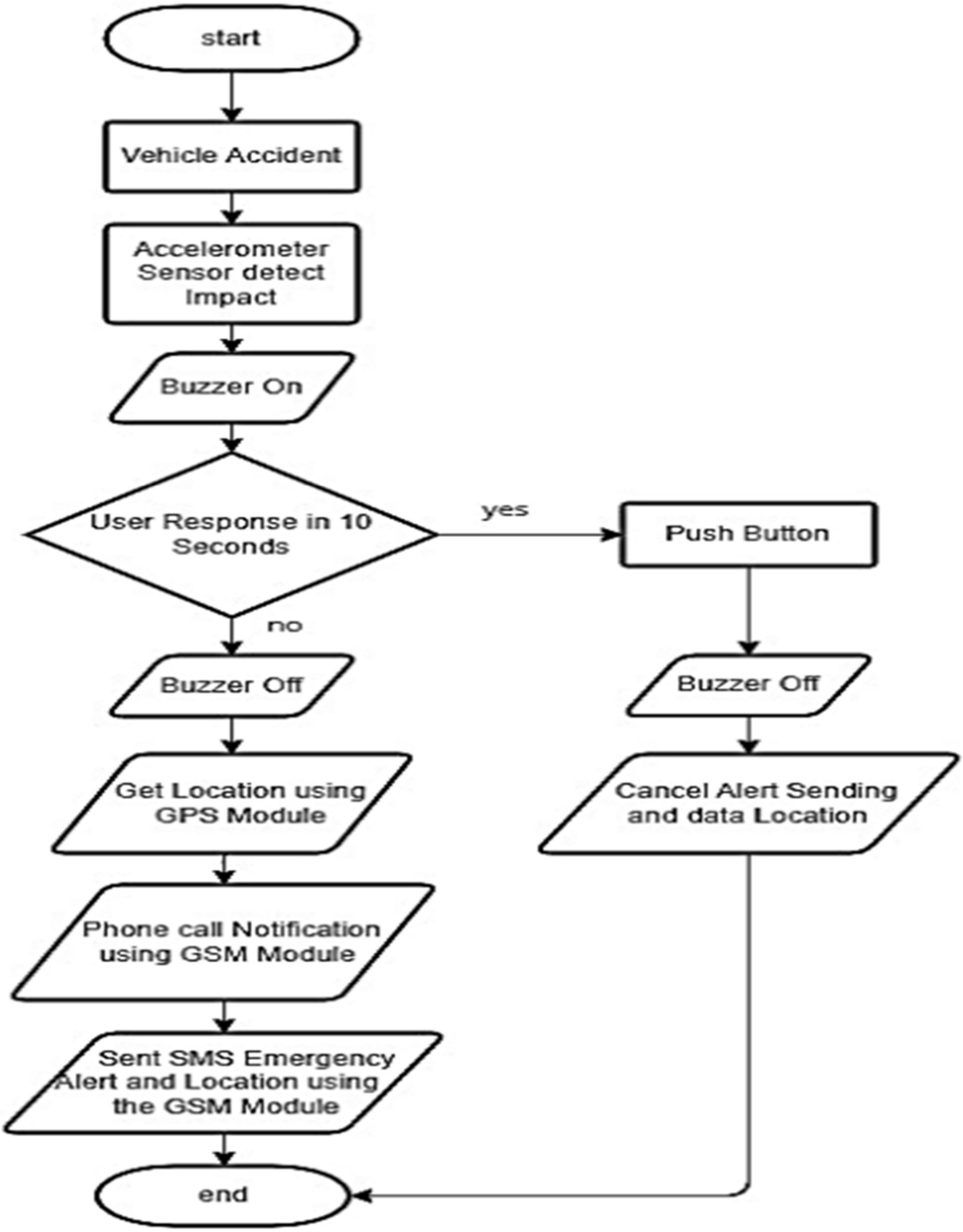


Figure 10: Flowchart

CHAPTER 7: CODE

my_project.ino

```
#include <AltSoftSerial.h>
#include <TinyGPS++.h>
#include <SoftwareSerial.h>
#include <math.h>
#include <Wire.h>

const String EMERGENCY_PHONE = "+917987047208";
#define rxPin 2
#define txPin 3
SoftwareSerial sim900(rxPin, txPin);

AltSoftSerial neogps;
TinyGPSPlus gps;

String sms_status, sender_number, received_date, msg;
String latitude, longitude;

#define BUZZER 12
#define BUTTON 11

#define xPin A0
#define yPin A1
#define zPin A2

byte updateflag;

int xaxis = 0, yaxis = 0, zaxis = 0;
int deltx = 0, delty = 0, deltz = 0;
int vibration = 2, devibrate = 75;
int magnitude = 0;
int sensitivity = 150;
double angle;
boolean impact_detected = false;
unsigned long time1;
```

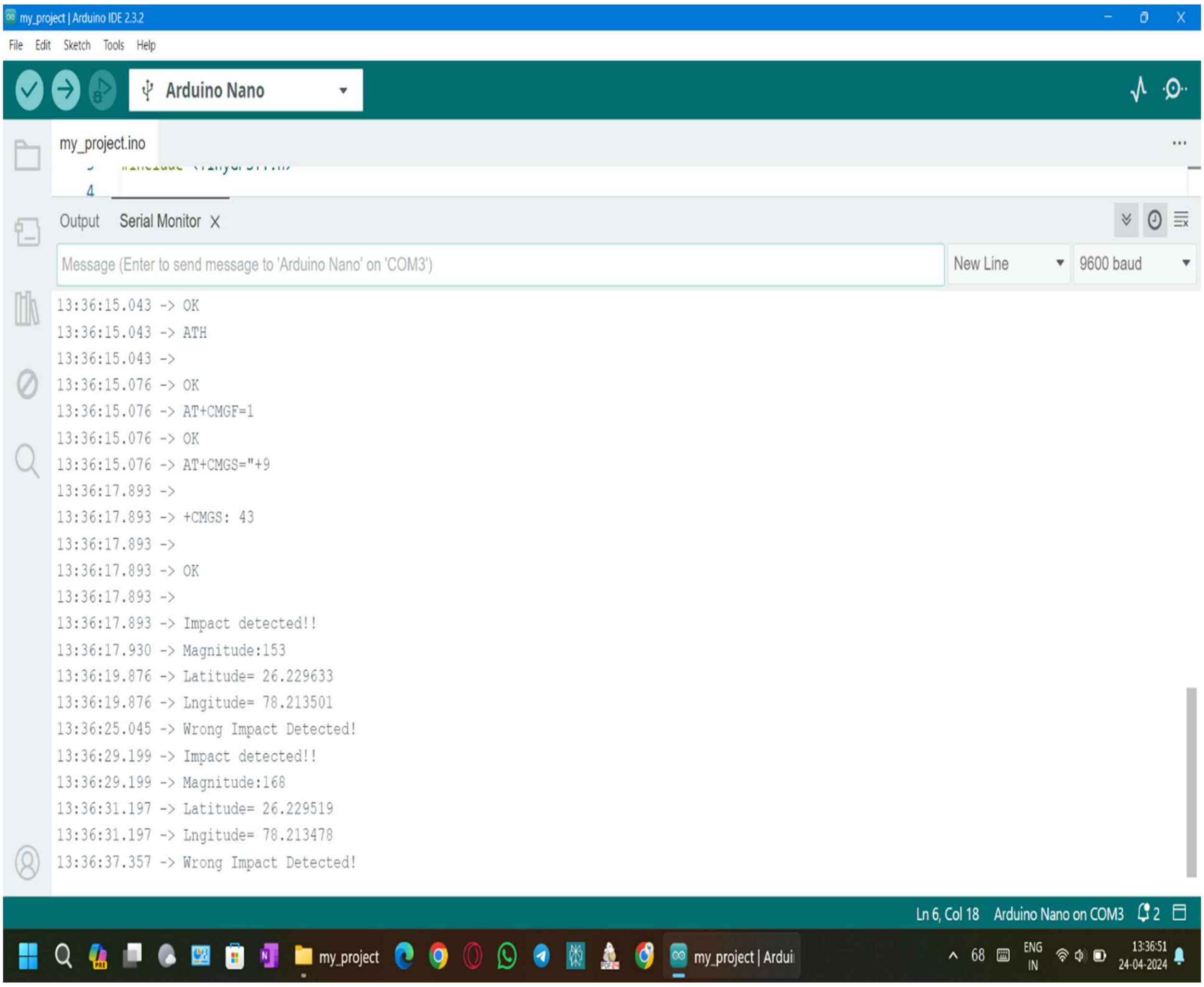
```
unsigned long impact_time;
unsigned long alert_delay = 2000;

void setup() {
  Serial.begin(9600);
  sim900.begin(9600);
  neogps.begin(9600);
  pinMode(BUZZER, OUTPUT);
  pinMode(BUTTON, INPUT_PULLUP);
  sms_status = "";
  sender_number = "";
  received_date = "";
  msg = "";
  sim900.println("AT");
  delay(1000);
  sim900.println("ATE1");
  delay(1000);
  sim900.println("AT+CPIN?");
  delay(1000);
  sim900.println("AT+CMGF=1");
  delay(1000);
  sim900.println("AT+CNMI=1,1,0,0,0");
  time1 = micros();
  xaxis = analogRead(xPin);
  yaxis = analogRead(yPin);
  zaxis = analogRead(zPin);
}

void loop() {
  if (micros() - time1 > 1999) Impact();
  if (updateflag > 0) {
    updateflag = 0;
    Serial.println("Impact detected!!");
    Serial.print("Magnitude:");
```

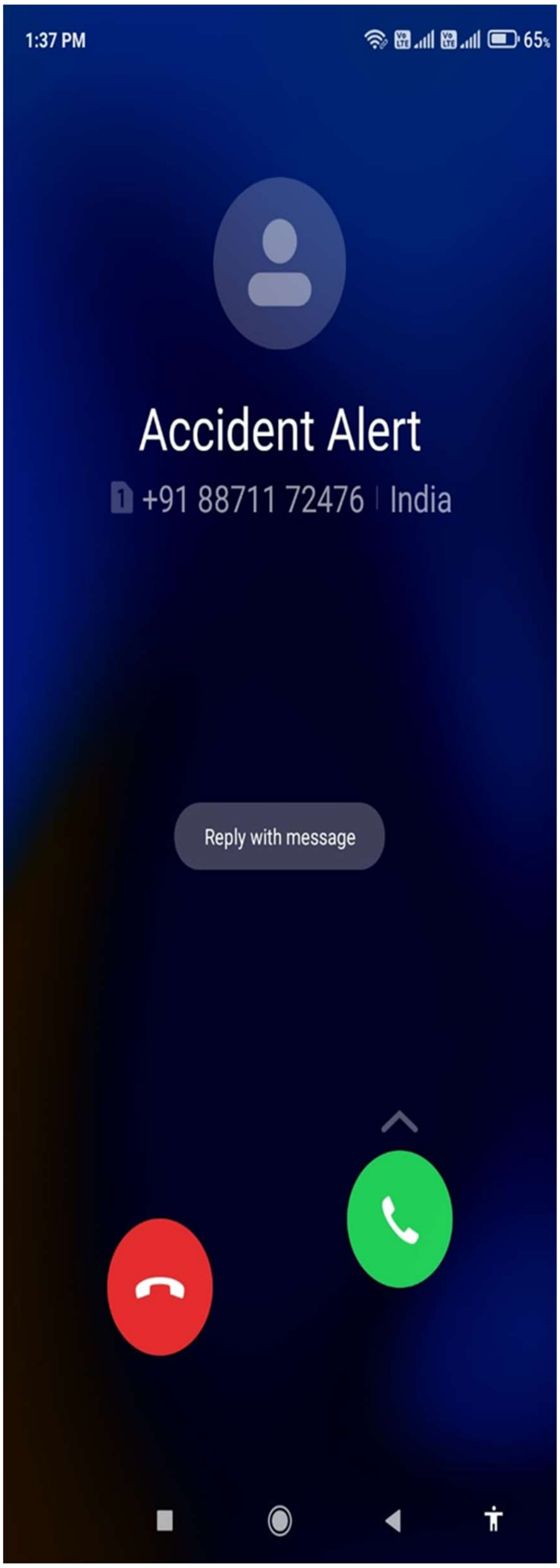
```
      Serial.println(magnitude);
      getGps();
      digitalWrite(BUZZER, HIGH);
      impact_detected = true;
      impact_time = millis();
    }
    if (impact_detected == true) {
      if (millis() - impact_time >= alert_delay) {
        digitalWrite(BUZZER, LOW);
        makeCall();
        delay(1000);
        sendAlert();
        impact_detected = false;
        impact_time = 0;
      }
    }
    if (digitalRead(BUTTON) == LOW) {
      delay(200);
      digitalWrite(BUZZER, LOW);
      impact_detected = false;
      Serial.println("Wrong Impact Detected!");
      impact_time = 0;
    }
    while (sim900.available()) {
      parseData(sim900.readString());
    }
    while (Serial.available()) {
      sim900.println(Serial.readString());
    }
  }

  void Impact() {
    time1 = micros();
    int oldx = xaxis;
```

```
  int oldy = yaxis;
  int oldz = zaxis;
  xaxis = analogRead(xPin);
  yaxis = analogRead(yPin);
  zaxis = analogRead(zPin);
  vibration--;
  if (vibration < 0) vibration = 0;
  if (vibration > 0) return;
  deltx = xaxis - oldx;
  delty = yaxis - oldy;
  deltz = zaxis - oldz;
  magnitude = sqrt(sq(deltx) + sq(delty) + sq(deltz));
  if (magnitude >= sensitivity) {
    updateflag = 1;
    vibration = devibrate;
  } else {
    magnitude = 0;
  }
}

void parseData(String buff) {
  Serial.println(buff);
  unsigned int len, index;
  index = buff.indexOf("\r");
  buff.remove(0, index + 2);
  buff.trim();
  if (buff != "OK") {
    index = buff.indexOf(":");
    String cmd = buff.substring(0, index);
    cmd.trim();
    buff.remove(0, index + 2);
    if (cmd == "+CMTI") {
      index = buff.indexOf(",");
      String temp = buff.substring(index + 1, buff.length());
```

```
      temp = "AT+CMGR=" + temp + "\r";
      sim900.println(temp);
    } else if (cmd == "+CMGR") {
      if (buff.indexOf(EMERGENCY_PHONE) > 1) {
        buff.toLowerCase();
        if (buff.indexOf("get gps") > 1) {
          getGps();
          String sms_data;
          sms_data = "GPS Location Data\r";
          sms_data += "http://maps.google.com/maps?q=loc:";
          sms_data += latitude + "," + longitude;
          sendSms(sms_data);
        }
      }
    }
  }
}

void getGps() {
  boolean newData = false;
  for (unsigned long start = millis(); millis() - start < 2000;) {
    while (neogps.available()) {
      if (gps.encode(neogps.read())) {
        newData = true;
        break;
      }
    }
  }
  if (newData) {
    latitude = String(gps.location.lat(), 6);
    longitude = String(gps.location.lng(), 6);
    newData = false;
  } else {
    Serial.println("No GPS data is available");
```

```
    latitude = "";
    longitude = "";
  }
  Serial.print("Latitude= ");
  Serial.println(latitude);
  Serial.print("Lngitude= ");
  Serial.println(longitude);
}

void sendAlert() {
  String sms_data;
  sms_data = "Accident Alert!!\r";
  sms_data += "http://maps.google.com/maps?q=loc:";
  sms_data += latitude + "," + longitude;
  sendSms(sms_data);
}

void makeCall() {
  Serial.println("calling....");
  sim900.println("ATD" + EMERGENCY_PHONE + ";");
  delay(20000);
  sim900.println("ATH");
  delay(1000);
}

void sendSms(String text) {
  sim900.print("AT+CMGF=1\r");
  delay(1000);
  sim900.print("AT+CMGS=\"" + EMERGENCY_PHONE + "\"\r");
  delay(1000);
  sim900.print(text);
  delay(100);
  sim900.write(0x1A);
  delay(1000);
  Serial.println("SMS Sent Successfully.");
}
```


my_project | Arduino IDE 2.3.2
File Edit Sketch Tools Help
Arduino Nano
my_project.ino
Output Serial Monitor
Message (Enter to send message to 'Arduino Nano' on 'COM3')
New Line
9600 baud
13:36:15.043 -> OK
13:36:15.043 -> ATH
13:36:15.043 ->
13:36:15.076 -> OK
13:36:15.076 -> AT+CMGF=1
13:36:15.076 -> OK
13:36:15.076 -> AT+CMGS="+9
13:36:17.893 ->
13:36:17.893 -> +CMGS: 43
13:36:17.893 ->
13:36:17.893 -> OK
13:36:17.893 ->
13:36:17.893 -> Impact detected!!
13:36:17.930 -> Magnitude:153
13:36:19.876 -> Latitude= 26.229633
13:36:19.876 -> Lngitude= 78.213501
13:36:25.045 -> Wrong Impact Detected!
13:36:29.199 -> Impact detected!!
13:36:29.199 -> Magnitude:168
13:36:31.197 -> Latitude= 26.229519
13:36:31.197 -> Lngitude= 78.213478
13:36:37.357 -> Wrong Impact Detected!
Ln 6, Col 18 Arduino Nano on COM3
my_project
my_project | Ardui
13:36:51
24-04-2024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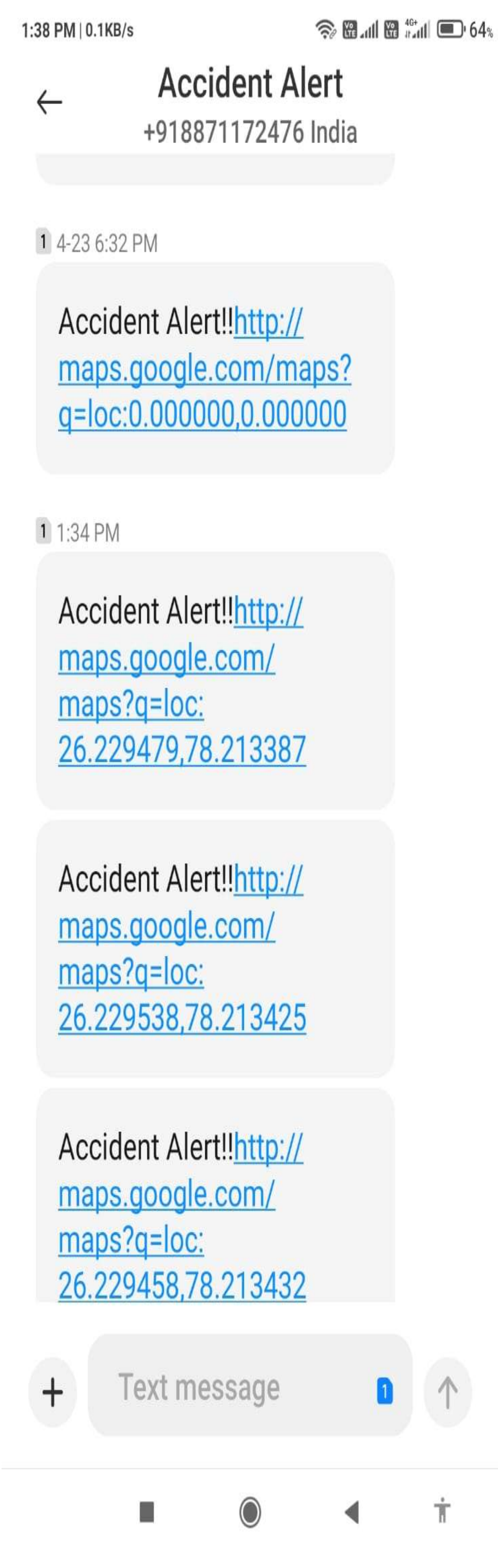
Accident Alert
+91 88711 72476 India
Reply with message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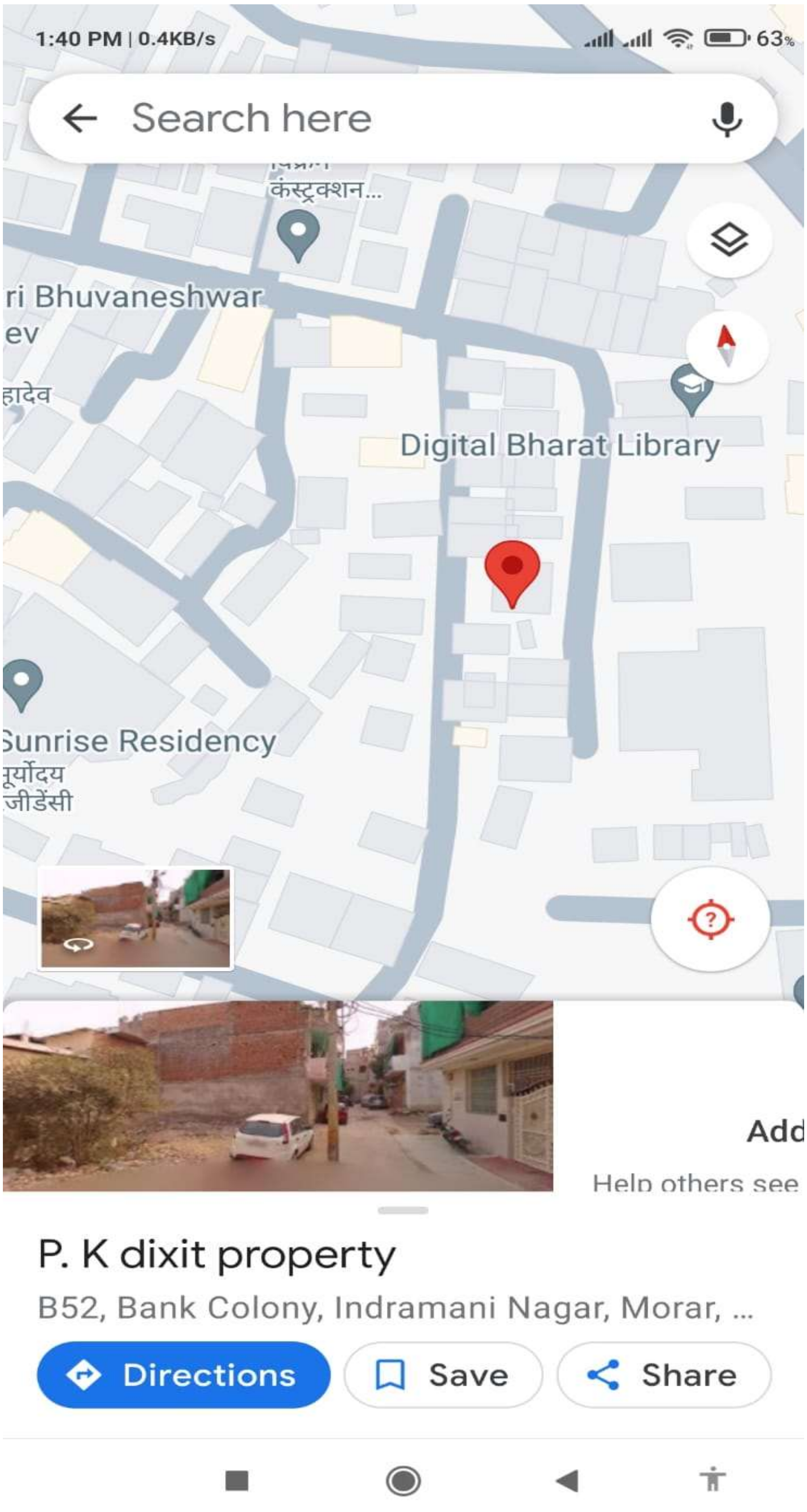
Accident Alert
+918871172476 India
4-23 6:32 PM
Accident Alert!!http://maps.google.com/maps?q=loc:0.000000,0.000000
1:34 PM
Accident Alert!!http://maps.google.com/maps?q=loc:26.229479,78.213387
Accident Alert!!http://maps.google.com/maps?q=loc:26.229538,78.213425
Accident Alert!!http://maps.google.com/maps?q=loc:26.229458,78.213432
Text message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63%
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CHAPTER 9: CONCLUSION AND FUTURE SCOPE

9.1 Conclusion

In conclusion, the development and implementation of intelligent accident detection and alert systems represent a crucial step forward in addressing the persistent challenge of road safety. These systems offer a proactive approach to mitigating the impact of accidents by leveraging advanced technology to detect incidents in real-time and facilitate rapid response and assistance. By integrating components such as microcontrollers, sensors, GPS modules, and GSM technology, these systems can accurately identify the location of accidents and automatically notify relevant authorities and emergency responders. This swift communication enables prompt intervention, potentially reducing the severity of injuries and saving lives. However, the effectiveness of these systems relies on widespread adoption and ongoing advancements in technology and infrastructure. Continued research, development, and investment are necessary to improve the accuracy, reliability, and accessibility of intelligent accident detection and alert systems.

9.2 Contribution

The proposed system significantly contributes to reducing the death rate caused by accidents through its effective accident detection and alert mechanism. By utilizing the proposed methodology, the system swiftly detects accidents and retrieves the accident location using a GPS module. Subsequently, it sends alert messages via a GSM module to medical emergency services, enabling timely arrival at the accident site and potentially saving lives. This integrated approach can substantially decrease the fatalities resulting from accidents by ensuring prompt emergency response and medical assistance.

9.3 Future Scope

The future scope of this system entails several potential enhancements to further improve road safety. One such enhancement involves integrating a wireless webcam to capture images, aiding in providing driver assistance and facilitating post-accident analysis. Additionally, the system can be upgraded to automatically lock all brakes in the event of an accident, mitigating the severity of collisions by halting the vehicle's movement. This improvement leverages a vibration sensor to detect accidents and triggers brake locking mechanisms via the processor. Furthermore, the system's versatility enables its utilization in various domains such as fleet management, food services, traffic violation detection, and rental vehicle services, indicating its potential for broader applications beyond accident detection and response

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