A PROJECT REPORT

ACCIDENT REPORTING THROUGH VEHICLE TRACKING SYSTEM USING GPS

Submitted by

R.BHARGAVI [RA2211004010453]
V.HEASREETHA REDDY [RA2211004010460]
B.AMRUTHA [RA2211004010479]

Semester – V
Academic Year: 2024–25

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

College of Engineering and Technology
SRM Institute of Science and Technology
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu.

ABSTRACT

In modern societies one of the main factors that increases mortalities is Traffic accidents. Everyday a large number of human lives are lost due to accidents and delay in calling the rescue services. Therefore, the elimination of delay in rescuing traffic accidents victims is very important and needs to be addressed extensively. With the rapid developments in embedded systems, GPS and mobile communications, it is becoming possible to develop an in-vehicle automatic accident and theft detection and reporting systems. Such systems utilize sensors provided in the vehicle and mobile communication systems to report the location of the vehicle in the case of accident or theft. In this paper an efficient system that automatically notifies the emergency and police services about the accident or the theft and also guides them to the spot. In the case of accident the system detect the event by the Crash Sensor of the Air Bag System installed in the vehicle. If these observations are above a preset critical point, a controller triggers a message to notify the Emergency Services. While theft detection is performed by sensing the existence of Datatag Car System. For both cases the system obtains the location of the vehicle by a GPS receiver and send SMS through GSM/GPRS system.

OBJECTIVES

1. Accident detection: Using sensors to detect an accident without user input
2. Emergency contact notification: Using a GSM module to send an alert to the user's emergency contacts
3. Location sharing: Using a GPS module to provide the vehicle's location in latitude and longitude coordinates
4. System cancellation: Providing a short window for the user to manually cancel the system if a false detection occurs
5. System interaction: Using an LCD screen to interact with the system and view its state

CHAPTER 1

INTRODUCTION

An Accident Detection and Vehicle Tracking System is a technology designed to enhance road safety and improve the efficiency of emergency responses. This system integrates various components such as sensors, GPS technology, and communication modules to detect accidents automatically and relay critical information to authorities or emergency contacts. Sensors, including accelerometers, gyroscopes, and vibration sensors, play a crucial role in identifying collisions or unusual vehicle movements.

When an accident is detected, the system uses GPS to pinpoint the vehicle's location, while communication modules, like GSM or IoT-based technology, send alerts containing the accident details and coordinates. These alerts can be in the form of messages or automated calls to emergency services, providing real-time data to ensure a timely response. Advanced systems may offer features like smartphone integration, cloud-based monitoring, and machine learning algorithms to improve accuracy and functionality. Such systems are vital in reducing emergency response times, aiding fleet management, and facilitating insurance processes.

As technology advances, these systems are expected to evolve further, integrating with autonomous vehicles, smart city infrastructure, and high-speed networks like 5G, making accident detection and vehicle tracking even more reliable and effective.

When an accident is detected, the microprocessor handles communication tasks, such as activating the GPS module to capture the vehicle's location and using the GSM or communication module to send alerts. The microprocessor manages the protocols and data formatting required to transmit messages effectively. Additionally, if the system is integrated with an IoT platform, the microprocessor facilitates data transfer to cloud servers using secure communication standards, often employing encryption to protect sensitive data.

Overall, the microprocessor’s role in an Accident Detection and Vehicle Tracking System is to seamlessly integrate sensor data processing, decision-making algorithms, and communication functionalities.

CHAPTER 2
LITERATURE SURVEY

1. **Real time vehicular accident prevention system using deep learning architecture**

   Published in: 2022 Expert Systems With Applications

   Authors: Md Fasayal Kabir and Sahadev Roy Department of Electronics & Communication Engineering, NIT Arunachal Pradesh, Jote, India.

   This paper explains that using advanced statistical methodology and analytical analysis of different accident scenarios a strong interrelationship may established between risk factors driving performance.

2. **Accident Prevention and Detection Using GSM/GPS IEEE**

   Published in: March 2024 International Research Journal of Innovations in Engineering and Technology (IRJIET)

   Authors: Mahesh Kandam, Sriya Kakani, Neha Londhe and Prof. Chandrakant patil

   1,2,3 -Student, E&TC Engineering, Zeal College of Engineering and Management, Pune, Maharashtra, India.

   4-Assistant Professor, E&TC Engineering, Zeal College of Engineering and Management, Pune, Maharashtra, India.

   In this paper they explained about a smart automated system, with very little human interact.The proposed system deals with the accident alerting and detection.These techniques include smart phones,GSM and GPS technologies.

3. **Accident Detection and alert system**

   Published in: May 2022 Journal of Engineering, Computing & Architecture

   Authors: Dr. C. K. Gomathy, K Rohan, Bandi Mani Kiran Reddy and Dr. V Geetha.

   1, 4 -Assistant Professor, Department of CSE, SCSVMV University, Kanchipuram.

   2, 3 -Student- Department of CSE, SCSVMV University, Kanchipuram.

In this paper they proposed deals with the detection of the accidents.But this can be extended by providing medication to the victims at the accident spots.

4. **A Real Time analysis of Service Based using Mobile phone controlled vehicle using DTMF For Accident Prevention**

   Published in: March 2016 International Journal of Computer Applications

   Authors: Dr. C. K. Gomathy, and Dr. V Geetha.

   1, 4 -Assistant Professor, Department of CSE, SCSVMV University, Kanchipuram.

   In this paper they explained about the vehicle controlled by mobile phone using DTMF technology which is a very inexpensive method and limitation of wired networks is completely overcome by using latest technology of mobile phones.

CHAPTER 3

SYSTEM DESCRIPTION

HARDWARE SPECIFICATIONS

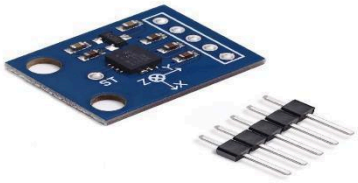
(a) Arduino Uno

It is an easy USB interface. This allows interface with USB as this is like a serial device. The chip on the board plugs straight into your USB port and supports on your computer as a virtual serial port. The benefit of this setup is that serial communication is an extremely easy protocol the microcontroller brain which is the ATmega328 chip. It has more number of hardware features like timers, external and internal interrupts, PWM pins and multiple sleep modes.

(b) 16 X 2 LCD Display

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that or reflector to produce images in color or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock.

(c) ADXL 335 MEMS



The ADXL335 is a 3-axis analog-output accelerometer with ±3 g measurement range. The small size (1" x 1") of the breakout board makes it easy to mount the accelerometer to an existing system without the need for additional hardware and with minimal effect on performance of the system and of the accelerometer.

(d) GSM Module [900A]

SIM900A module allows users to send/receive data over GPRS, send/receive SMS and make/receive voice calls. The GSM/GPRS module uses USART communication to communicate with microcontroller or PC terminal.

(e) GPS VK 16E

Built with fast positioning and the ability to track 20 satellites SIRF III generation chip, built-in backup battery, built-in high gain LNA,, Dual LDO, PCB Immersion Gold process, a large area of radiology GPS signal, not the general locator comparable. Better and more stable signal.

(f) Sim 2g

With 4G, you can enjoy even better data experience with network-enhanced quality such as HDVideo Streaming, Video and voice calls, superfast downloads, online gaming and so much more.

SOFTWARE SPECIFICATIONS

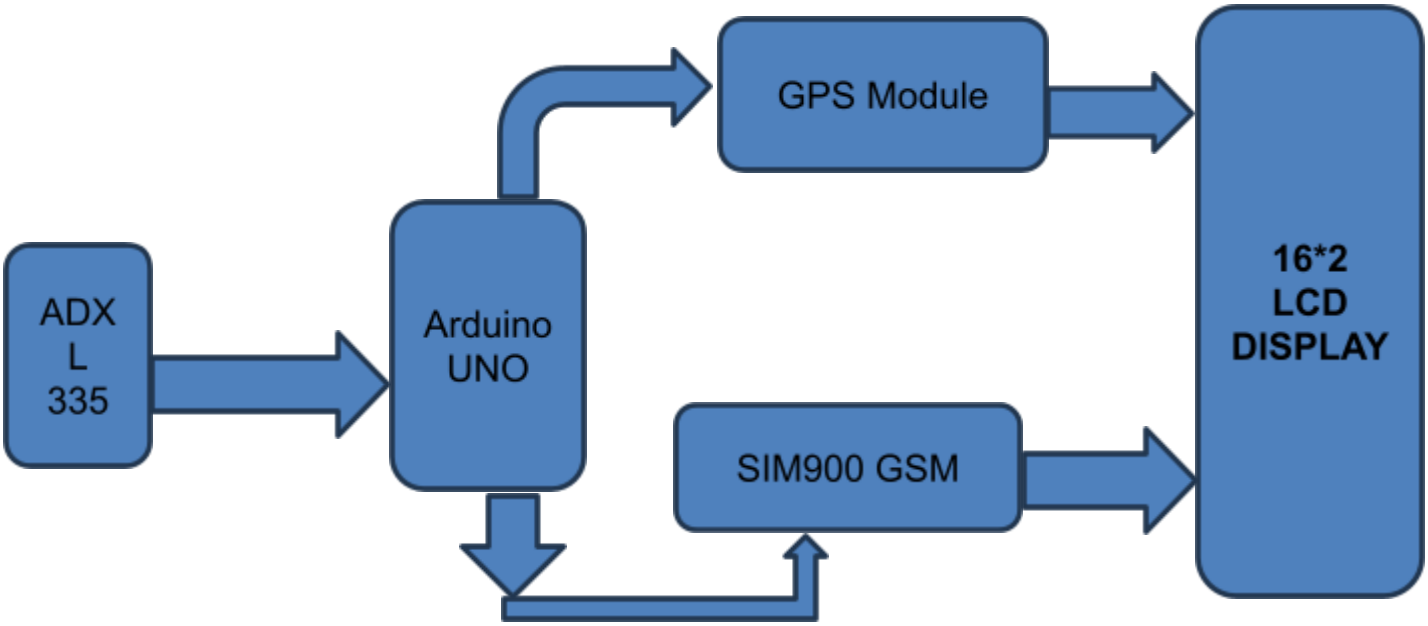
ARDUINO IDE

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting,

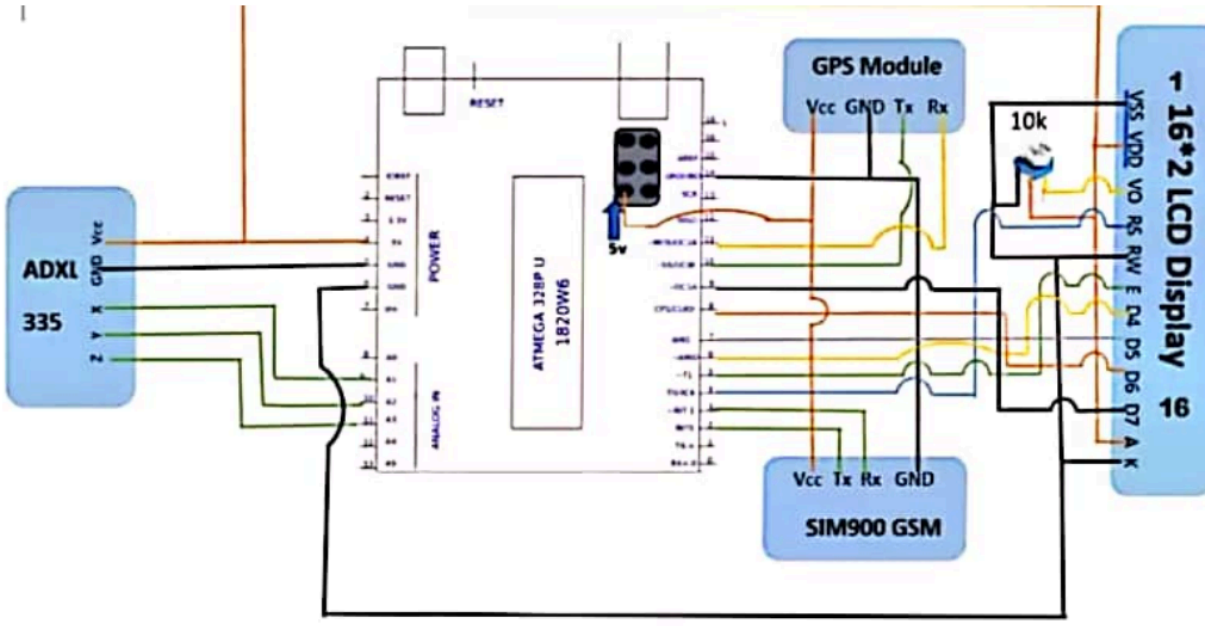
and anyone interested in creating interactive objects or environments. Arduino can interact with buttons, LEDs, motors, speakers, GPS units, cameras, the internet, and even your smart-phone or your TV! This flexibility combined with the fact that the Arduino software is free, the hardware boards are pretty cheap, and both the software and hardware are easy to learn has led to a large community of users who have contributed code and released instructions for a huge variety of Arduino-based projects.

There are many varieties of Arduino boards (explained on the next page) that can be used for different purposes. Some boards look a bit different from the one below, but most Arduinos have the majority of these components in common.

Block diagram of vehicle tracking system using gps



CIRCUIT DIAGRAM:



CHAPTER 4

METHODOLOGY

Step1: Get all the components required which are Arduino ,LCD ,AXDL sensor, GPS module and GSM module and connect them.

Step2: According to the circuit diagram which was built, first connect the Arduino with all the components correctly through given pin configurations and place the AXDL sensor on the car and activate the sim card placed in GSM module

Step3: After connecting all components through the Arduino IDE software program a code and compile it if there was no error then upload the code to Arduino

Step4: After the code has been uploaded give power supply to GSM module then all the components will turn on

Step5: Now move the car left and right so the sensor will detect the data and send it to Arduino and then the Arduino will pass the information to GSM module and when the GPS module tracks the signal the information which means the latitude, longitude and google map location is sent to the hospital number

Step6: All the information can be seen on the LCD display that the data is collected from the sensor and weather the process has initialized

Step 7: Finally the message is received by the respective hospital and send the ambulance to the respective spot to save the person and prevent the human loss

Software model development

```
#include<SoftwareSerial.h>

SoftwareSerial Serial1(2,3); //make RX arduino line is pin 2, make TX arduino line is pin 3.

SoftwareSerial gps(10,11);

#include<LiquidCrystal.h>

LiquidCrystal lcd(4,5,6,7,8,9);

#define x A1

#define y A2

#define z A3

int xsample=0;

int ysample=0;

int zsample=0;

#define samples 10

#define minVal -50

#define MaxVal 50

int i=0,k=0;

int  gps_status=0;

float latitude=0;

float logitude=0;

String Speed="";

String gpsString="";

char *test="$GPRMC";

void initModule(String cmd, char *res, int t)

{

  while(1)
```

```
  {
   Serial.println(cmd);
   Serial1.println(cmd);
   delay(100);
   while(Serial1.available()>0)
   {
     if(Serial1.find(res))
     {
      Serial.println(res);
      delay(t);
      return;
     }

     else
     {
      Serial.println("Error");
     }
   }
   delay(t);
  }
}

void setup()
{
  Serial1.begin(9600);
  Serial.begin(9600);
  lcd.begin(16,2);
  lcd.print("Accident Alert  ");


  lcd.setCursor(0,0);
```

```
lcd.print("     System     ");
delay(2000);
lcd.clear();
lcd.print("Initializing");
lcd.setCursor(0,1);
lcd.print("Please Wait...");
delay(1000);

Serial.println("Initializing....");
initModule("AT","OK",1000);
initModule("ATE1","OK",1000);
initModule("AT+CPIN?","READY",1000);
initModule("AT+CMGF=1","OK",1000);
initModule("AT+CNMI=2,2,0,0,0","OK",1000);
Serial.println("Initialized Successfully");
lcd.clear();
lcd.print("Initialized");
lcd.setCursor(0,0);
lcd.print("Successfully");
delay(2000);
lcd.clear();
lcd.print("Callibrating ");
lcd.setCursor(0,1);
lcd.print("Acceleromiter");
for(int i=0;i<samples;i++)
{
  xsample+=analogRead(x);
  ysample+=analogRead(y);
  zsample+=analogRead(z);
```

```
  }

  xsample/=samples;

  ysample/=samples;

  zsample/=samples;

  Serial.println(xsample);

  Serial.println(ysample);

  Serial.println(zsample);

  delay(1000);


  lcd.clear();

  lcd.print("Waiting For GPS");

  lcd.setCursor(0,1);

  lcd.print("     Signal    ");

  delay(2000);

  gps.begin(9600);

  get_gps();

  show_coordinate();

  delay(2000);

  lcd.clear();

  lcd.print("GPS is Ready");

  delay(1000);

  lcd.clear();

  lcd.print("System Ready");

  Serial.println("System Ready..");

}

void loop()

{

    int value1=analogRead(x);
```

```
    int value2=analogRead(y);
    int value3=analogRead(z);

    int xValue=xsample-value1;
    int yValue=ysample-value2;
    int zValue=zsample-value3;


    Serial.print("x=");
    Serial.println(xValue);
    Serial.print("y=");
    Serial.println(yValue);
    Serial.print("z=");
    Serial.println(zValue);

    if(xValue < minVal || xValue > MaxVal  || yValue < minVal || yValue > MaxVal  || zValue < minVal || zValue >
MaxVal)
    {
      get_gps();
      show_coordinate();
      lcd.clear();
      lcd.print("Sending SMS");
      Serial.println("Sending SMS");
      Send();
      Serial.println("SMS Sent");
      delay(2000);
      lcd.clear();
      lcd.print("System Ready");
    }
}

void gpsEvent()
{
```

```
gpsString="";
while(1)
{
 while (gps.available()>0)            //Serial incoming data from GPS
 {
  char inChar = (char)gps.read();
   gpsString+= inChar;                    //store incoming data from GPS to temparary string str[]
   i++;
  // Serial.print(inChar);
   if (i < 7)
   {
    if(gpsString[i-1] != test[i-1])         //check for right string
    {
      i=0;
      gpsString="";
    }
   }
  if(inChar=='\r')
  {
   if(i>60)
   {
     gps_status=1;
     break;
   }
   else
   {
     i=0;
   }
  }
```

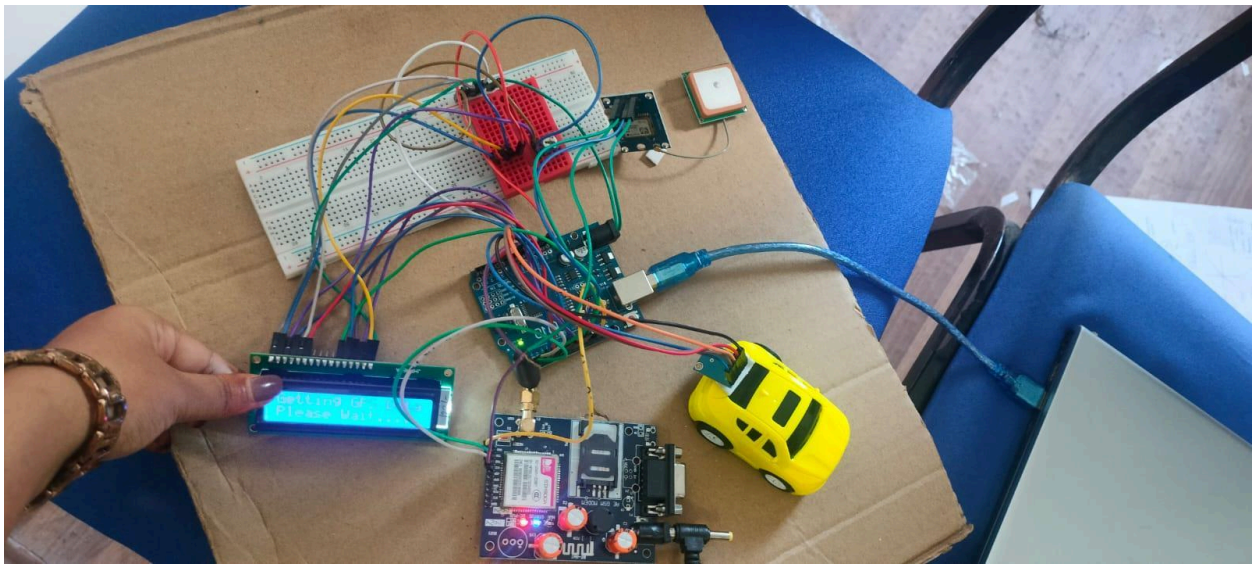
```
  }
   if(gps_status)
    break;
  }
}

void get_gps()
{
  lcd.clear();
  lcd.print("Getting GPS Data");
  lcd.setCursor(0,1);
  lcd.print("Please Wait.....");
   gps_status=0;
   int x=0;
   while(gps_status==0)
   {
    gpsEvent();
    int str_lenth=i;
    coordinate2dec();
    i=0;x=0;
    str_lenth=0;
   }
}

void show_coordinate()
{
    lcd.clear();
    lcd.print("Lat:");
    lcd.print(latitude);
    lcd.setCursor(0,1);
    lcd.print("Log:");
```

```
    lcd.print(logitude);
    Serial.print("Latitude:");
    Serial.println(latitude);
    Serial.print("Longitude:");
    Serial.println(logitude);
    Serial.print("Speed(in knots)=");
    Serial.println(Speed);
    delay(2000);
    lcd.clear();
    lcd.print("Speed(Knots):");
    lcd.setCursor(0,1);
    lcd.print(Speed);
}

void coordinate2dec()
{
  String lat_degree="";
    for(i=20;i<=21;i++)
      lat_degree+=gpsString[i];

  String lat_minut="";
     for(i=22;i<=28;i++)
      lat_minut+=gpsString[i];

  String log_degree="";
    for(i=32;i<=34;i++)
      log_degree+=gpsString[i];

  String log_minut="";
    for(i=35;i<=41;i++)
      log_minut+=gpsString[i];
```

```
    Speed="";
    for(i=45;i<48;i++)          //extract longitude from string
      Speed+=gpsString[i];

    float minut= lat_minut.toFloat();
    minut=minut/60;
    float degree=lat_degree.toFloat();
    latitude=degree+minut;

    minut= log_minut.toFloat();
    minut=minut/60;
    degree=log_degree.toFloat();
    logitude=degree+minut;
}

void Send()
{
  Serial1.println("AT");
  delay(500);
  serialPrint();
  Serial1.println("AT+CMGF=1");
  delay(500);
  serialPrint();
  Serial1.print("AT+CMGS=");
  Serial1.print("");
  Serial1.print("Enter your mobile nomber");//rough firstly
  Serial1.println("");
  delay(500);
  serialPrint();
```

```
  Serial1.print("Latitude:");
  Serial1.println(latitude);
  delay(500);
  serialPrint();
  Serial1.print(" longitude:");
  Serial1.println(logitude);
  delay(500);
  serialPrint();
  Serial1.print(" Speed:");
  Serial1.print(Speed);
  Serial1.println("Knots");
  delay(500);
  serialPrint();
  Serial1.print("https://maps.app.goo.gl/9rUqTGt4GLdcr1aM6");
  Serial1.print(latitude,6);
  Serial1.print("+");      //18.490866,73.843418
  Serial1.print(logitude,6);
  Serial1.write(26);
  delay(2000);
  serialPrint();
}

void serialPrint()
{
 while(Serial1.available()>0)
 {
   Serial.print(Serial1.read());
 }
```

Hardware model development



According to the circuit diagram which was built, first connect the Arduino with all the components correctly through given pin configurations and place the AXDL sensor on the car and activate the sim card placed in GSM module

After connecting all components through the Arduino IDE software program a code and compile it if there was no error then upload the code to Arduino

After the code has been uploaded give power supply to GSM module then all the components will turn on

Now move the car left and right so the sensor will detect the data and send it to Arduino and then the Arduino will pass the information to GSM module and when the GPS module tracks the signal the information which means the latitude, longitude and google map location is sent to the hospital number

CHAPTER 5

CONCLUSION

Accident alert and vehicle tracking systems can help save lives and improve road safety by:

1. Detecting accidents

These systems can detect accidents and alert emergency services quickly. They can also detect different types of accidents, such as sudden acceleration.

2. Providing accurate location information

These systems can provide precise information about the location of an accident.

3. Preventing accidents

These systems can help prevent accidents by detecting drunk or drowsy drivers and regulating vehicle speed.

4. Providing medical help

These systems can provide alerts using SMS or an Android application to help provide medical assistance.

REFERENCES

[1] Mr S.Kailasam, Mr Karthiga, Dr Kartheeban, R.M.Priyadarshani, K.Anithadevi, “Accident Alert System using face Recognition”,IEEE, 2019

[2] Rajvardhan Rishi, Sofiya Yede, Keshav Kunal, Nutan V. Bansode,” Automatic Messaging System for Vehicle Tracking and Accident Detection, Proceedings of the International Conference on Electronics and Sustainable Communication Systems,ICESC, 2020

[3] Aarya D.S, Athulya C.K, Anas.P, Basil Kuriakose, Jerin Susan Joy , Leena Thomas, “Accident Alert and Tracking Using Arduino”, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 7, Issue 4, April 2018

[4] Nicky Kattukkaran, Arun George, Mithun Haridas T.P, “Intelligent Accident Detection and Alert System for Emergency Medical Assistance “, International Conference on Computer Communication and Informatics, 2017

[5] Prashant Kapri, Shubham Patane, Arul Shalom A, “Accident Detection & Alert System”, IEEE, 2018 Bruno Fernandes, Vitor Gomes, Joaquim Ferreira and Arnaldo Oliveira, “Mobile Application for Automatic Accident Detection and Multimodal Alert”, IEEE, 2015