International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 05 | May - 2023 SJIF 2023: 8.176 ISSN: 2582-3930

Accident Notification Using ESP Node MCU 32 S

Bhingare Prerana V.[1], Gaikwad Sakshi S.[2], Dongare Sadhana B.[3], Prof. Dr. R.P. Labade[4]

[1,2,3,4]*Department of E&TC Engineering Amrutvahini COE, Sangamner, India*

ABSTRACT

In current situation Accident is an unpredicted event which made us realize the importance of accident notification system which will help to getting immediate help for a driver also passenger. We need to understand a lots of effect of not getting a immediate help for driver and passenger, now more than that time. Right now there are no accident notifiers installed in the four wheeler vehicle but we have confidence in that it is of extreme significance that at night time rural areas, mountains valley roads it is now very necessary to take place accident notification model to make sure to protect to the public.

We have take efforts to develop this model in this paper which will be simple to implement at the describe outlet according to the Node MCU ESP32S so now it is happen to detect and notify this accident on large scale we have used Node MCU ESP32S for the implementation of our model the development process is completed in Embedded C and the Embedded C code implementation will help to detect the accident and the locations .

We have added more robust features and train our model on various variations ,we made sure that no need of internet to notify the accident to the registered authorities. The trained model was tested on real time cases system was more accurate as compared to other models.

Key Words: embedded, notification ,Node MCU ESP 32S.

1.INTRODUCTION

According to a research from 2020, there are more than 4,03,116 registered vehicles in India overall. In India, there are 22,536,000 car owners, and in 2020, almost 17.6 million two-wheelers were sold to consumers. Every day, there are 1214 traffic accidents in India. Vehicle accidents account for 25% of all fatalities from traffic accidents. According to a recent survey, Tamilnadu is the state where the most injuries from traffic accidents occur. In India, there is one fatality from a traffic accident every four minutes. Vehicle tracking system main aim is to give help Security to all vehicles.

The primary goal of an accident alert system is to save lives in accidents. This is an improvement in car security systems. The most recent innovations, such as GPS, are quite helpful today; with this system, the owner may watch and track his vehicle and learn about its location.

Accident Notification Systems, a newly developed technology, has greatly improved both individual and vehicle security. This hardware is installed on the car in a way that prevents anyone inside or outside the car from seeing it. Thus, it serves as a hidden device that transmits location information to the monitoring unit constantly or in response to any system interruption

Its accident warning system locates the accident's site and detects it, sending GPS coordinates to the designated mobile device, PC, etc.

In the current study, some accidents result in the car remaining STARTED, but we plan to create a mechanism that will cause the vehicle to turn OFF automatically after the accident.

In some of the other situations, simply the message Accident Detected is sent; but, in our case, the message also includes a URL link to the accident location.

2. LITERATURE SURVEY

Ashish Kushwaha et al. in [1] have proposed GPS And GSM Based Accident Alarm System. The purpose of this work is to find the vehicle accident location by means of sending a message using a system which is placed inside the vehicle system. Author has used assembly programming for better accuracy along with GPS and GSM. In this project, whenever a vehicle meets with an accident immediately vibration sensor will detect the signal and send it to the microcontroller. Microcontroller sends the alert message through the GSM to an authorized mobile no. An alternate condition can be allowed by pressing a switch, in order to interrupt the flow of sending the message in case of no casualty.

Hu Jian- ming , Li Jie, Li Guang-Hui et al. in [2] proposed an stolen vehicle recovery system. The system ensured increased safety and credibility. It used C8051F120 microcontroller and a vibration sensor. The vehicle owner gets the message regarding the vehicle location at specific intervals through GSM.

C .Prabha et al. in [3] demonstrate a GSM and GPS-based automated system for detecting and communicating vehicle accidents. In this study, we demonstrate how an accelerometer may be applied to a car alarm application to identify risky driving. This study can help in accurately identifying the accident using an accelerometer and a micro electro mechanical system (MEMS).

In this project, the location of the car is tracked using GPS, and the mobile number is saved in the EEPROM and contacted when an accident occurs using GSM and an ARM controller.

T. Krishna Kishore et al. in[4] placed a strong emphasis on a system that is both economical and incorporates the modern internet facility for networking. General Packet Radio Service (GPRS) has been used in conjunction with the Linux operating system.The ability to communicate data more easily and

without being subject to software monitoring are improvements along with more accurate identification of the vehicle's location at all times.

Nirav Thakor et al. in [5] have presented an ARM & GPS-based automatic vehicle accident detection system. The technology uses a vibration sensor or a MEMS sensor to identify car accidents. The position of the car accident was recorded by the GPS module, and a message with the coordinate values was sent using a GSM modem. There is also another facility available, and it can be quite helpful at crucial moments. If someone needs assistance for another reason, such as experiencing heart attack symptoms, all they need to do is press one of the system's switches. By hitting this switch, the GSM module sends a message to the help centre that includes the location of the automobile as provided by GPS along with the information with users

3. PROPOSED WORK

The administration of detection and rescue is the project's main tenet. The system is turned on and starting up. No communications have been sent to the rescue crew if the car is normal. Additionally, the driver's temperature is constantly tracked, and if it rises above a certain point, an automated reaction is launched. The MEMS sensor, tilt sensor, and fire sensor all detect accidents when they involve a vehicle. The controller receives information from the sensors and sends an accident alarm to the roadside unit, which then sends a message to the rescue team. Additionally, WIFI and GPS are used to locate the car, and that information is also sent to the rescue team. It will make it easier to link to the local hospital and provide medical help.

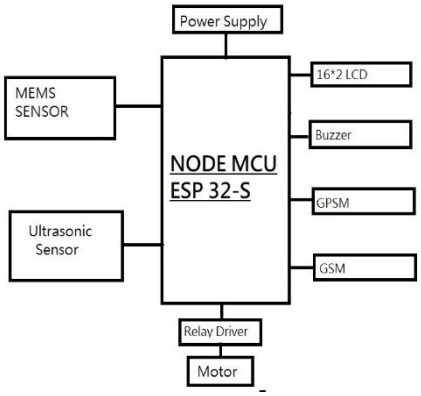

Fig.1 System Architecture

3.1 CNN ALGORITHM

Step1:Start
Step 2: Initialize S/M,GSM,EPS Module controller.
Step 3: Ultrasonic Sensor and MEMS accelerometer start to sense and give output to node MCU 32 S.
Step 4: Accident Detected.
Step 5: Buzzer blow.
Step 6: Motor vehicle Engine OFF.
Step 8: Node MCU get current location from GPS.
Step 9: Send SMS to family member and hospitals about accident with location.
Step 10: All parameter continuously display on LCD Display.
Step 11:Stop.

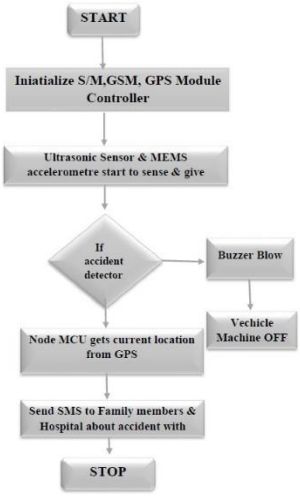

Fig.2 Algorithm

3.2 Block Diagram

When an accident occurs and the car hits a wall, a tree, or another object, the vibration sensors detect the threshold frequency and, if the value exceeds the stress limit, the GPS module extracts the precise location of the place. Latitudinal and longitudinal data about the rider and their whereabouts are promptly communicated to the registered emergency contacts. The maps will show the precise location of the accident and any pertinent information from the message.

3.3 Components Required

3.3.1 Ultrasonic Sensor:

The 2cm–400cm non-contact measurement feature is offered by the ultrasonic ranging module HC–SR04, and the ranging accuracy is up to 3mm. Ultrasonic transmitters, receivers, and control circuits are all included in the modules. The fundamental working principle:

1.Using IO trigger for at least 10us high level signal,

2.The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

3.IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

Test distance = (high level time ×velocity of sound (340M/S) / 2,

Wire connecting direct as following:

5V Supply

Trigger Pulse Input

Echo Pulse Output

0V Ground

Working Voltage	DC 5 V
Working Current	15mA
Working Frequency	40Hz
Max Range	4m
Min Range	2cm
MeasuringAngle	15 degree
Trigger Input Signal	10uS TTL pulse
Echo Output Signal	Input TTL lever signal and the range in proportion
Dimension	45*20*15mm

Table 1.Specifications of Ultrasonic Sensor

Fig.3: ULTRASONIC SENSOR

3.3.2 MEMS Sensor:

Micro Electro-Mechanical System, or MEMS, is a chip-based technology that uses capacitive sensors made of a suspended mass between two plates. This suspended material causes an electrical potential difference when the sensor is tilted. A change in capacitance is then used to measure the difference that was created.

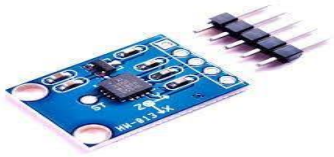

Fig.4: MEMS SENSOR

Features:
Small size, low weight, affordable batch production, and precision control of physical dimensions are all appealing characteristics of MEMS that have contributed to its commercial success.13 input channels in a 10-bit analog-to-digital module 3.3.3 Node MCU ESP 32 S:

The scalable and adaptive ESP32 chip serves as the module's central processing unit. You can control each of the two CPU cores separately. With support for RTOS, the clock frequency is programmable between 80 MHz and 240 MHz. It is an all-purpose MCU module for Wi-Fi, BT, and BLE.ESP-

Fig5:NODE MCU ESP 32-S

3.3.4 ACEELEROMETRE ADXL335:

ADLXL 335, a triple-axis accelerometer by Analogue Devices, with a digital I2C and SPI interface. It is now the ideal option for integrating with any 3V or 5V microcontroller, including the pic, thanks to our addition of an on-board 3.3V regulator and logic-level shifting circuitry.

The sensor contains pins that can be used for I2C or SPI digital connection and three measurement axes, X, Y, and Z. The sensitivity level can be adjusted to +-2g, +-4g, +-8g, or +-16g. The higher range is useful for high speed tracking, while the lower range provides more detail for sluggish motions. The newest and finest product from Analogue Devices, a manufacturer of MEMS devices of the highest calibre , is the ADXL335. The VCC adjusts input voltage of up to 5V to 3.3V using an output pin.

Fig.6: ACCELEROMETRE ADXL335

3.3.5GSM MODULE (SIM300 ATC V1.06):

Since the majority of GSM modems have a serial interface, connecting one to a PIC microcontroller is extremely simple. Here, the microcontroller's pins 25 TX and 26 RX of

the USART serial input were used to connect the TXD and RXD pins of the SIM300 ATC GSM module.

To obtain all parameters on a mobile phone, the GSM module is used.

Fig.7: GSMSIM800

3.3.6 LCD:

An electronic display module called an LCD (Liquid Crystal Display) screen has several uses. A 16x2 LCD display is a very fundamental module that is frequently included into many different devices and circuits. These modules are preferable over multi-segment LEDs with seven segments and additional segments. The explanations are that LCDs are inexpensive, simply programable, and have no restrictions on showing customised and even customised characters, animations, and other content.

With a 16x2 LCD, there are 2 lines that can each display 16 characters. Each character on this LCD is presented using a 5x7 pixel matrix. The Command and Data registers on this LCD are its two registers. The command instructions sent to the LCD are stored in the command register. A command is a directive issued to an LCD device to carry out a certain action, such as initialising it, clearing its screen, adjusting the cursor, managing the display, etc. The data that will be displayed on the LCD is kept in the data register. The character's ASCII value, which will be displayed on the LCD, is the data. Click to find out more about an LCD's internal construction.The purpose of using 16x2 LCD in our project is to display all the parameters of solar panel and is connected to pin no 37 and 38 of microcontroller.

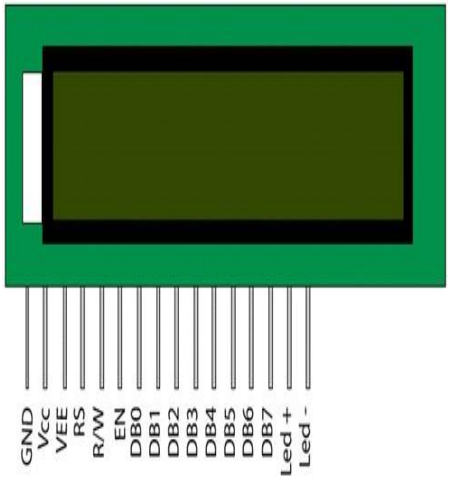

Fig.8: 16x2 LC

3.3.7 BUZZER:

A buzzer or beeper is an audio signal 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. If embedded system is misplaced from dashboard, the IR sensor becomes active. The signal is sent to microcontroller to ring the buzzer. It is connected to the pin no.28 of microcontroller.

Fig.9: Buzzer

4. MATHEMATICAL MODEL

```
#include <LiquidCrystal.h>

TinyGPSPlus gps;

LiquidCrystal lcd(15, 2, 4, 18, 19, 5);

#define ADC_VREF_mV    3300.0 // in millivolt

#define ADC_RESOLUTION 4096.0

#define PIN_LM35       36 // ESP32 pin GIOP36 (ADC0) connected to LM35

const int trigPin = 26;

#define SOUND_SPEED 0.034

#define CM_TO_INCH 0.393701

long duration;

float distanceCm;
```

```
float distanceInch;
 void setup() {
  // set up the LCD's number of columns and rows:
  Serial.begin(9600);
  Serial2.begin(9600);
  lcd.begin(16, 2);
   pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
  pinMode(echoPin, INPUT); // Sets the echoPin as an Input
    pinMode(BUZZ, OUTPUT); // Sets the trigPin as an OUTPUT
 pinMode(relay1, OUTPUT); // Sets the trigPin as a
     pinMode(relay, OUTPUT); // Sets the trigPin as an OUTPUT
  pinMode(pulse, INPUT);
   pinMode(key1, INPUT);
    pinMode(key2, INPUT);
  lcd.setCursor(0, 0);
   lcd.print("NODE MCU BASED  ");
lcd.setCursor(0, 1);
   lcd.print("ACCIDENT ALERT  ");
   delay(1000);
   delay(1000);
   digitalWrite(relay, LOW);
    digitalWrite(BUZZ, HIGH);
        digitalWrite(relay1, HIGH);
    delay(1000);
    digitalWrite(BUZZ, LOW);
    digitalWrite(relay, HIGH);
     digitalWrite(relay1, HIGH);}
void loop() {
while (Serial2.available() > 0)
 if(gps.encode(Serial2.read()))
displayInfo();
if (millis() > 5000 && gps.charsProcessed() < 10)
{Serial.println(F("No GPS detected: check wiring."));
while (true);  }
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  // Sets the trigPin on HIGH state for 10 micro seconds
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distanceCm = duration * SOUND_SPEED/2;
adcVal = analogRead(PIN_LM35);
adcVal =( adcVal /10);
 int buttonState1 = digitalRead(key1);
    int buttonState2 = digitalRead(key2);
      int pulsecount = digitalRead(pulse);
  if(buttonState1 == LOW)
  { digitalWrite(BUZZ, HIGH);
     delay(1000);
     digitalWrite(BUZZ, LOW);}
 if((adcVal < 320)||(adcVal > 400))
 {digitalWrite(BUZZ, HIGH);
   delay(1000);
    digitalWrite(BUZZ, LOW);
    ucaccident = 1;
    digitalWrite(relay, HIGH);
     // digitalWrite(relay1, LOW);
     SendMessage(); }  else
 { ucaccident = 0;
   digitalWrite(relay1, HIGH)}
if(distanceCm < 5)
{ digitalWrite(BUZZ, HIGH);
```

```
    delay(1000);
     digitalWrite(BUZZ, LOW);}
if(buttonState2 == LOW)
{ digitalWrite(BUZZ, HIGH);
    delay(1000);
     digitalWrite(BUZZ, LOW);
     ucemergency = 1;
    SendMessage();}else
{ucemergency = 0;}
if(uccountf == 1)
{  uccountf = 0;
}lcd.setCursor(0, 0);
  lcd.print("MEMS:");
    //lcd.setCursor(0, 0);
  lcd.print(adcVal);
 lcd.print("     ");
   lcd.setCursor(9, 0);
 lcd.print("D:");
    //lcd.setCursor(0, 0);
  lcd.print(distanceCm);
  lcd.print("       ");
  //delay(100);
}void displayInfo()
{Serial.print(F("Location: "));
 if (gps.location.isValid()){
   Serial.print("Lat: ");
   Serial.print(gps.location.lat(), 6);
 Serial.print(F(","));
Serial.print("Lng: ");
  Serial.print(gps.location.lng(), 6);
   Serial.println();
    lcd.setCursor(0, 1);
  lcd.print("GPS DETECTED   ");
 }  else
{ Serial.print(F("INVALID"));
      lcd.setCursor(0, 1);
  lcd.print("NO GPS DETECT   ");  }}
void updateSerial()
{ delay(500);
while (Serial.available()) {
Serial2.write(Serial.read());//Forward what Serial received to Software Serial Port  }
 while (Serial2.available()) {Serial.write(Serial2.read());//Forward what Software Serial received to Serial Port}}void Sendiot()
// Serial.println("Setting the GSM in text mode");
Serial.println("AT+CGATT?\r");delay(1500);

Serial.println("AT+SAPBR=3,1,\"CONTYPE\",\"GPRS\"\r");
delay(1500);
Serial.println("AT+SAPBR=1,1\r")delay(1500);Serial.println("AT+HTTPINIT\r"); delay(1500);

Serial.print("AT+HTTPPARA=\"URL\",\"api.thingspeak.com/update?api_key=K9U76GC52T9F443X&field1=");
delay(1500);

Serial.println("AT+HTTPACTION=0\r");    // SMS Text
   delay(2000);
 Serial.println("AT+HTTPTERM\r");
 //  Serial.println((char)26);                  // ASCII code of CTRL+Zdelay(2000);}void SendMessage()
{ //Serial.println("Setting the GSM in text mode");
    digitalWrite(relay1, LOW);
   Serial.println("AT+CMGF=1\r");
   delay(2000);
  //Serial.println("Sending SMS to the desired phone number!");Serial.println("AT+CMGS=\"+919527394674\"\r");     // Replace x with mobile number delay(2000);
if(ucemergency == 1)  {
Serial.println("Emergncy Alert");
ucemergency = 0;} if(ucaccident == 1)
```

```
{Serial.println("Accident Alert");
  ucaccident = 0; }
Serial.print("http://maps.google.com/?=");
Serial.print(gps.location.lat(), 6);
Serial.print(gps.location.lng(), 6);
 delay(200);
Serial.println((char)26);              // ASCII code of CTRL+Z
 delay(2000);}
```

5.RESULTS AND DISCUSSIONS

Our technology will unintentionally identify hate speech. If an accident is found, it will notify the appropriate hospital and registered mobile number. Using a relay, a vehicle may occasionally turn ON when an accident occurs before turning OFF.

Figure 4 shows the accident that was found above.

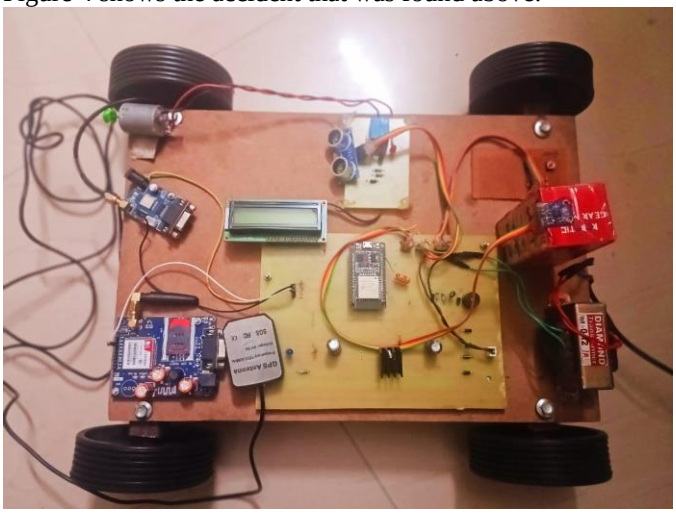

Fig.10 Accident Notification Using Node MCU 32 S

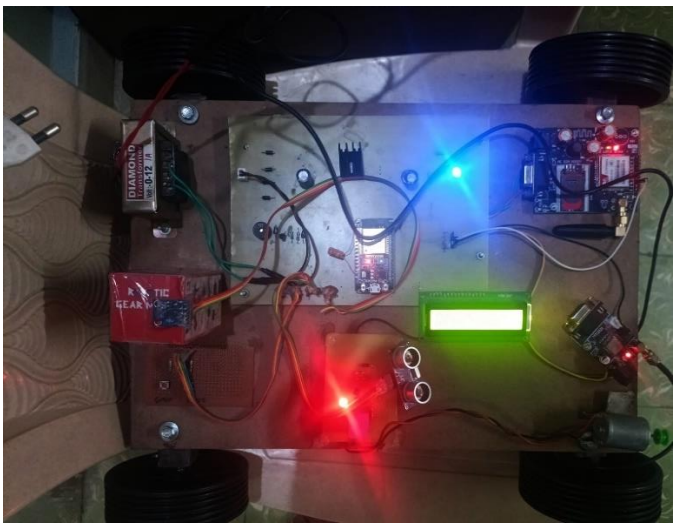

Fig.11 Accident Notification Using Node MCU 32 S with results

On the LCD Display, fig. 11, our system displays the GPS detected message and the MEMS range. In this work, the Node MCU ESP 32S is the main topic. Then, in order to enhance the performance of the classifiers as a whole, we merge them using fusion approaches.

6.CONCLUSION

The majority of accidents in recent years have involved vehicles. The alarming increase in traffic accidents causes a large number of fatalities. The primary cause of many deaths is inadequate treatment received at the appropriate time. The main factors may be the ambulance's tardy arrival or the absence of a witness who could provide the ambulance with information or a family member who could provide it.

By creating an accident detection and reporting system that aims to save at least half of the lives lost in motor vehicle accidents, the proposed effort provides a solution to this issue. This method might be used in the future to protect locks and for other safety concerns.

By relaying the information to the person's family, it may also be used to limit the speed of the car and stop the driver from driving too fast. The duty of saving countless lives will fall on early detection and reporting.

REFERENCES

[1] H.S. Rauschenbusch, Solar Cell Array Design Handbook, "*The Principles and Technology of Photovoltaic Energy Conversion",* New York: Van Nostrand, 1980.

[2] Jhen -Hong Chen, Hao-Chiao Hong and Kuo-Hsing Cheng, "Low-Voltage Indoor Energy Harvesting Using Photovoltaic Cell", IEEE, 2016.

[3] B. A. D. J. C. K. Basnayake, W.A.D.M. Jayathilaka ,Y.W.R.Amarasinghe, R.A.Attalage, "Smart Solar Tracking and On-Site Photovoltic Efficiency Measurement System",IEEE,2016.

[4] Shahriar Bazyari, Reza Keypour, Shahrokh Farhangi, Amir Ghaedi, Khashayar Bazyari,"A Study on the Effects of Solar Tracking Systems on the Performance of Photovoltaic Power Plants", Journal of Power and Energy Engineering,2014.

[5] Amit Kumar Mondal and Kamal Bansal, "Structural analysis of solar panel cleaning robotic arm", IEEE,2015.

[6] Jan T. Balasiewicz ,"Renewable Energy Resource with Photovoltaic Power Generators: Operating and modelling", IEEE,2008

[7] Joseph J. Loferski, "Recent research on photovoltaic solar energy converters", IEEE, 1963.

[8] Monto Mani, Rohit Pillai,"Impact of dust on solar photovoltaic (PV) performance: Research status, challenges and recommendations", IEEE, 2010.

[9] K.A. Moharram , M.S. Abd- Elhady, H.A. Kandil , H. El-Sherif, "Influence of cleaning using water and surfactants on the performance of photovoltaic panels", Energy Conversion and Management, 2013.