Module Code & Module Title

CC5068NT– Cloud Computing & IoT

<< Accident Detection and Notification System>>

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Semester

2023 Spring

Group members

LONDON MET ID	STUDENT NAME
23049216	**Bidur Siwakoti**
23049241	**Gautam Sah**
23050017	**Suva Nepal**
23049235	**Dipin Karki**
23049300	**Pausan chaudhary**

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Acknowledgement

We would like to express our heartfelt gratitude to everyone who contribute the development and success of our “Accident detection system” project. First, we extend our sincere appreciation to our project supervisor, Mr Sonam Rai sir, for his invaluable guidance and support throughout the project. His knowledge and encouragement were super important in turning our ideas into the “Accident detection system” we also want to thank everyone else who supported us and acknowledge the efforts of all team members who dedicated their time and skills to make this project a reality. Each person’s contribution has played an important role in the project success, from designing the IoT device to developing the user-friendly web application. Moreover, we would like to thank my external resources that helped, insights or materials essential to the project’s completion.

Finally, our deepest appreciation goes to the pet owners and their furry companions who inspired the creation of the ‘Accident detection system”. Thank you everyone involved for making the “Accident detection system” successful. Your support and collaboration have been truly valuable.

Abstarct:

Accident detection system with cloud is a project that creates an accident detection system that saves lives of many people. In our daily life we drive our vehicle on daily basis people often meet with unwanted accident lose their life due to lack of medical facility and exact location.

The Accident detection system introduces a live saving project, aiming to help who lose their life unnecessarily. This project is designed in that way so that no one will lose their life. This project works with high quality sensors and components that made this project more efficient and convenient to use. In this project a vehicle crashes and motion sensor will send signal to another component. The GPS will track the location of the vehicle and spot and send the location of the vehicle to the nearest medical facility. The project combines IoT technology with accident detection which makes it possible to save lives.

This increases the impact of Iot in daily experiences in addition to meeting the practical demands of users. Overall, the IoT accident detection system is a project which will be very demanding in the coming years. It will improve with modern technology and components.

I hope this abstract provides a good overview of our project “Accident detection system”. Feel free to ask any questions you may have.

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1 Introduction

The Accident Detection and Notification System Using IoT is designed to improve road safety by addressing delays in emergency response times. This innovative system integrates IoT technology, including accelerometers, gyroscopes, GPS, and GSM modules, all managed by an ESP8266 microcontroller. The system autonomously detects accidents and sends real-time notifications with the accident location to emergency contacts, ensuring rapid communication without needing manual input. By using real-time data, the system helps emergency services reach the accident site more efficiently, reducing delays that can make a critical difference. With the ability to detect sudden impacts and provide accurate GPS data, this solution can bridge the gap between an accident occurring and timely assistance arriving, making roads safer for everyone.

1.1 Current scenario

Road accidents remain a major global problem, leading to roughly 1.19 million deaths each year and causing serious injuries to tens of millions more. These accidents are the leading cause of death for children and adults age between 5–29 years. The impact is particularly severe in low- and middle-income countries, which account for 92% of global traffic fatalities, despite having only 60% of the world’s vehicle. Progress has been made, with a reduction in death since 2010, but road traffic crashes continue to claim over 3,200 lives daily, emphasizing that current efforts are not sufficient. (WHO, 2022) In terms of Nepal has been leading the race in the road accident and lose many lives. Considering the current situation our team planned to make accident detection system and notification alert which send alert messages to the nearest medical facility and to the victims closest. Our project aim is to solve the unwanted death from the road accident and save life.

1.2 Problem Statement and Project as a solution

1.2.1 Problem Statement

Road accidents are a significant cause of death and injury worldwide, resulting in severe human suffering and substantial economic losses. According to the World Health Organization (WHO), approximately 1.19 million people die annually due to these accidents, with millions more suffering life-altering injuries. The impact is even more pronounced in low- and middle-income countries, where 92% of traffic-related deaths occur, despite these regions only accounting for 60% of the world's vehicles. (WHO, 2023) Vulnerable road users, such as cyclists, and motorcyclists, face the highest risk, making up more than half of all traffic fatalities.

1.2.2 Project as a solution

An IOT based system will detect the vehicle accident and send alerts message for help. Such a system makes use of IOT technologies. With the help of sensors mounted in the vehicle, the system detects collisions or crash, and the microcontroller uses this information to validate the accident. Once it is detected, it will use GPS to find the location and it will use GPS to find the location and it will automatically send an emergency SMS through the GSM module to the pre-programmed contacts like family members, hospitals, and police. This fast response system is greatly needed if an accident victim cannot call for assistance himself. It could potentially save valuable minutes during an emergency.

1.3 Aims and Objectives

Aims

To develop an innovative and reliable IoT-based Accident Detection and Notification System that ensures rapid emergency response, reduces road traffic fatalities and injuries, and enhances road safety for vulnerable road users.

Objectives

- Integrate IoT components (accelerometers, gyroscopes, GPS, and GSM modules) with an ESP8266 microcontroller to create an accident detection and notification system.
- Automate accident detection through sensor data analysis to identify sudden motion changes and trigger alerts.
- Ensure real-time communication by sending instant notifications containing the accident location to emergency contacts.
- Minimize human intervention by designing a system that operates autonomously for faster response time.

2 Background

2.1 System Overview

Our accident detection system is well-designed to help people from car accidents or any vehicle accidents. Our system quickly identifies the accident spot and sends a signal or notification to the nearest medical facility. This project will quickly take action to prevent any unnecessary deaths among the victims. This project is designed with the best quality sensors and objects that make our project run efficiently and smoothly. This system can be installed on smartphones, any smart wearable device, and potentially in vehicles too. This project will create a balanced combination of both software and hardware components. We will use the best quality sensors to detect the accident spot and location with efficiency. Basically, GPS sensor tracks the location of accident spot all over the world. The GSM sensor used to send message to the nearest medical facility with proper information. The Accelerometer/Gyroscope sensor detects the real-time motion sensor and sends signal to other components. The lcd display shows the live incident of the project for instance, if accident detected then it will show accident detected on the lcd board. This is how the component will work with great efficiency and provide good quality project.

2.2 Design Diagram

This session covers all the hardware architecture explanations, including a short description of each development. This shows the circuit diagram and gives a better explanation of the flowchart.

2.2.1 Hardware Architecture

A hardware architecture is the plan for how a computer is constructed and how its components fit together. It involves the bodily components and connection of them. The hardware architecture layout determines where things go and how they all operate together.

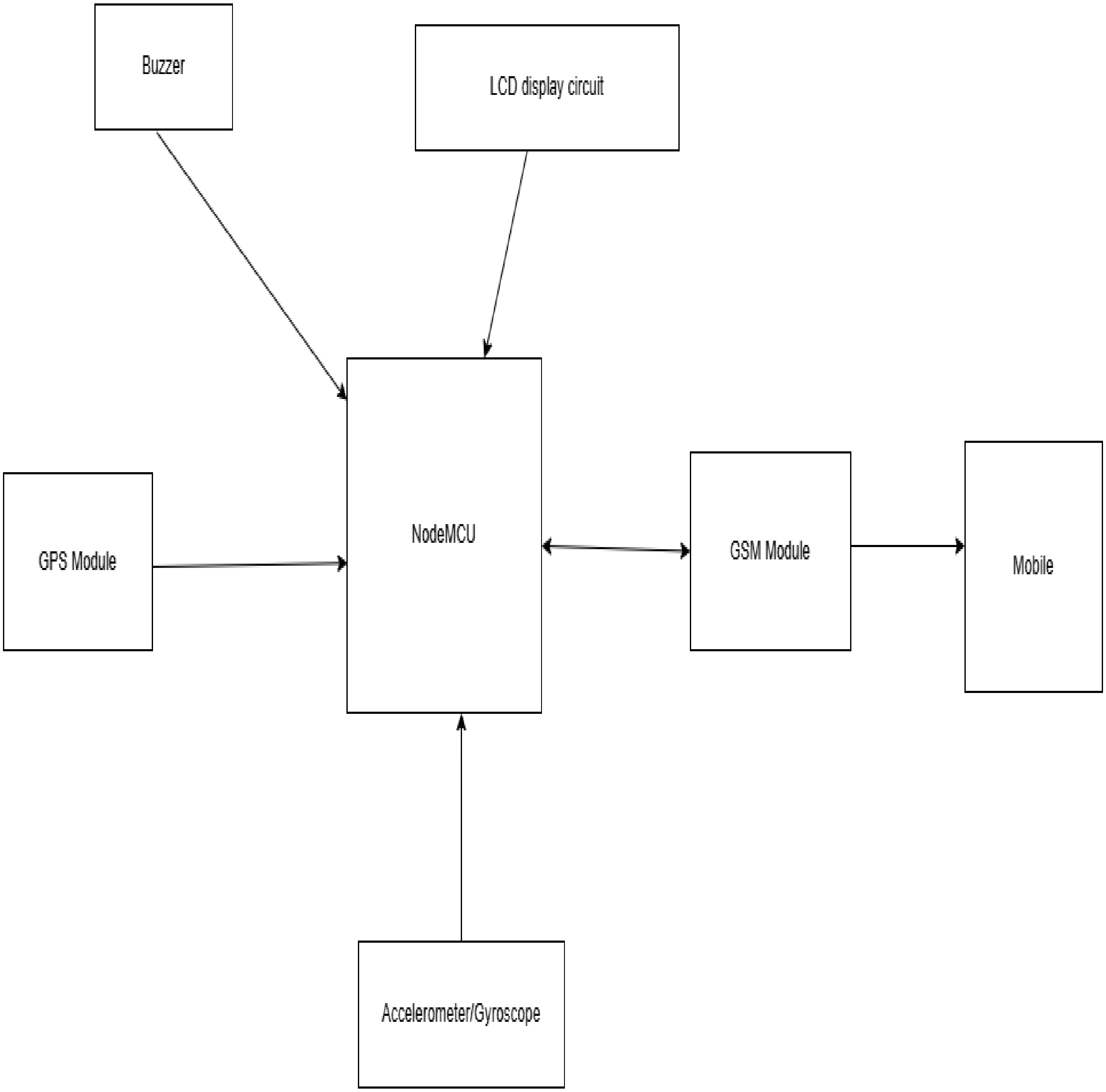


Figure 1:Hardware Architecture.

2.2.2 Flowchart

A flowchart is basically a visual representation of how the project works. It produces a clear and easy to understand illustration to ensure how the device works and operates. (ASQ, 2023) This device's functions and all its operations have all the fundamental specified. There are many shapes on a flowchart which has multiple meanings. Oval shaped depicts the starts and end of the flowchart the parallelogram shape represents the input and output. Just like that, rectangular shape shows the process, diamond shape shows the condition, and the arrow shows the data flow.

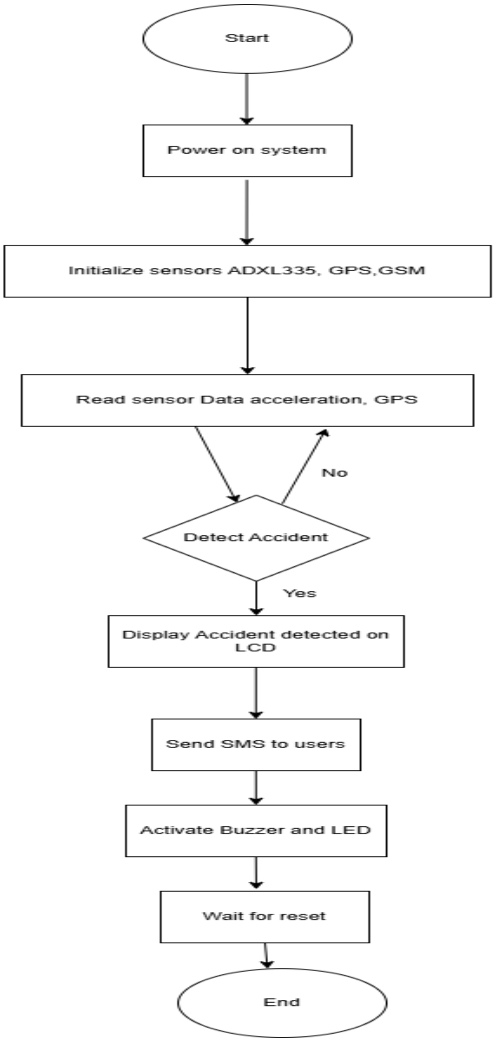

Start
Power on system
Initialize sensors ADXL335, GPS,GSM
Read sensor Data acceleration, GPS
No
Detect Accident
Yes
Display Accident detected on LCD
Send SMS to users
Activate Buzzer and LED
Wait for reset
End

Figure 2:Flowchart.

2.2.3 Circuit diagram:

Usually, an IOT project consists of many electronic components like microcontrollers, sensors, etc. To showcase connectivity between the electronic components, we use some circuit diagram. It uses signs for each part of the circuit with the line connects them meaning what they connect.

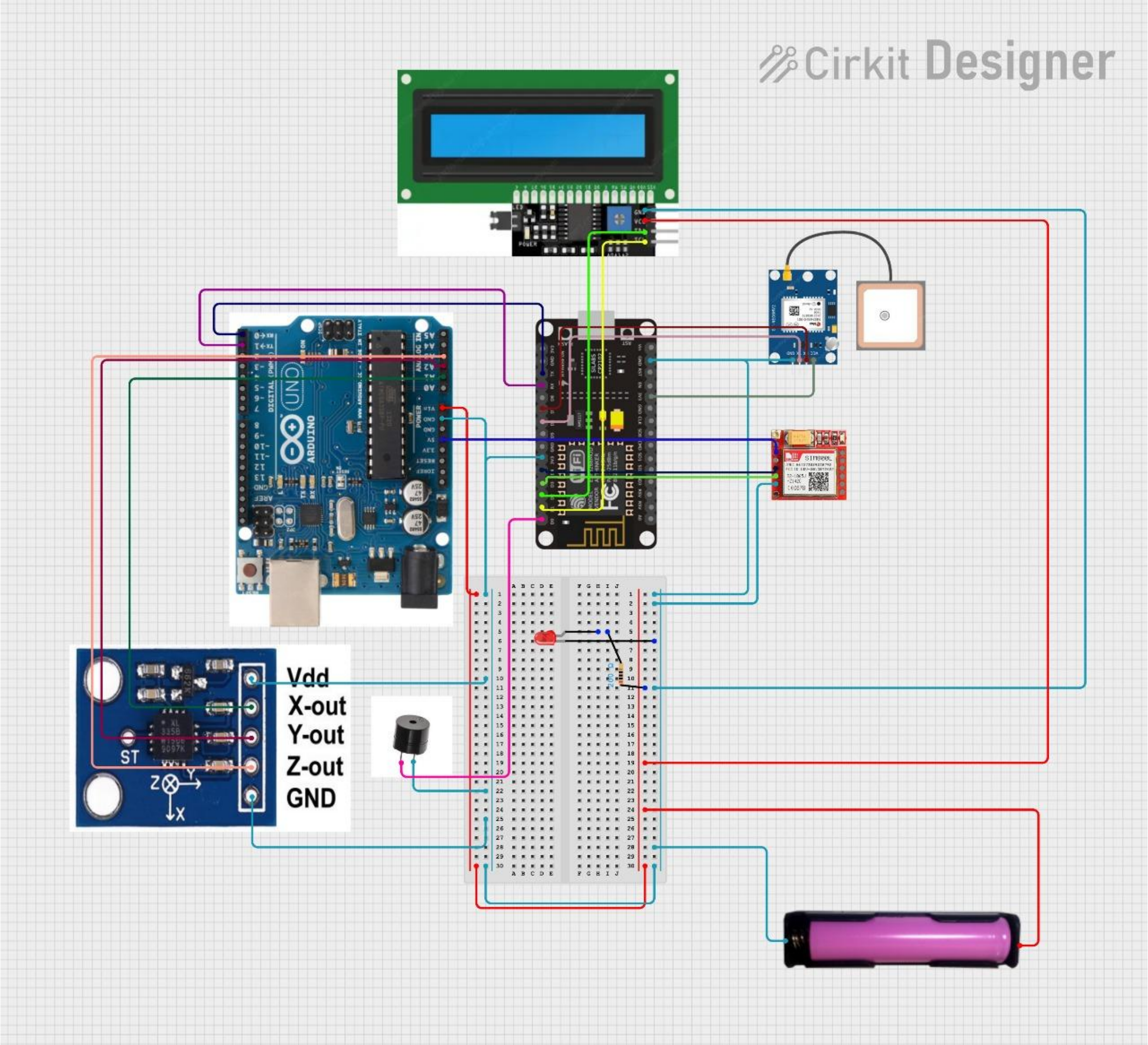


Figure 3:Circuit Diagram.

2.3 Requirement Analysis

2.3.1 Hardware Components

- **ESP8266 Microcontroller**: It works as the central unit for processing data from the sensors and controlling communication modules. It contains Wi-Fi and Bluetooth module inbuilt. The ESP8266 microcontroller has complete Wi-Fi connection due to its 32-bit CPU and integrated TCP/IP stack management in its Wi-Fi chip. The module can be programmed using Arduino and makes it easy to create internet connected projects.

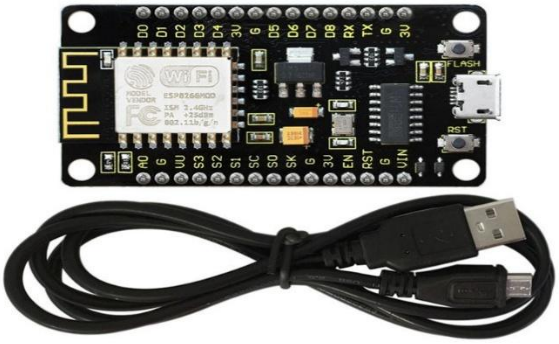


Figure 4:ESP8266 Microcontroller.

- **GSM Module**: GSM is a digital mobile network that has other uses, especially by mobile phone users in all over the world. GSM applies a variation of the time division multiple access technologies, GSM is the most widely use three digital wireless telephony technologies; TDMA, GSM as well as code-division multiple access (CDMA). (Ndungu & Mixon, 2021)

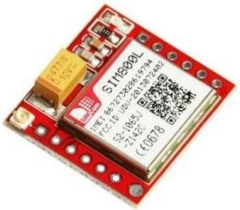


Figure 5:GSM Module (twinschip, 2010-2024).

- **GPS Module:** A GPS is a satellite-based navigation system that permits users to give their absolute position, speed, and time continuously to give the best of service 24 hours a day, in any weather, anywhere in the world. Global positioning system, achieved by the U.S. Department of Defense. It was intended to help troops and military vehicles, but after a couple of years, it was available to anyone with a GPS device. GPS is a system most of us use to go from point A to point B (himalayansolution, 2018).

Figure 6:GPS Module.

- **Accelerometer/Gyroscope:** An Accelerometer and gyroscope sensors help in determining orientation and movement are an accelerometer and a gyroscope. By detecting acceleration forces such as motion or gravity, an accelerometer determines how quickly an object is moving or tilting. However, a gyroscope measures rotation, or the way an object revolves around an axis (analog.com, 2024) .

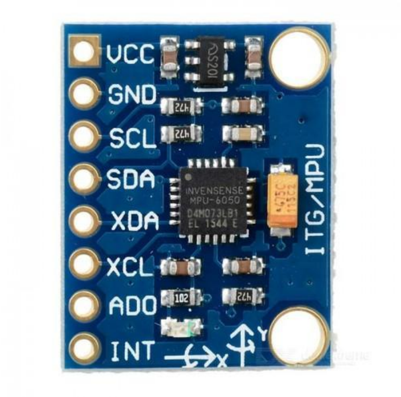


Figure 7:Accelerometer/gyroscope
(daraz, 2025).

- **Lithium-ion battery:** It Supplies power to the entire system, ensuring uninterrupted operation. We will be using 3.7v power battery which is going to run vehicle and smoothly. The capacity of 3.7V lithium (Ah). It has enough energy storage. It is rechargeable which is cost effective and last longer in a single charge .

Figure 8:Lithium-ion battery (lipolbattery, 2002-2025).

- **Breadboard shell:** A breadboard is a white rectangular board having small, multiple holes to insert electronic components. People use it a lot for electronic projects. The breadboard is a type of prototype; this prototype works as the construction base of electronics. It is a reusable component for creating and testing circuit of electrical devices.

Figure 9:Breadboard shell (daraz, 2025).

2.3.2 Software Component

- **Arduino IDE**: Arduino is an open-source prototype platform built on user-friendly hardware and software. The circuit board, also known as a microcontroller, is the material it is built of. The Arduino IDE is a pre-made program that is used to write and upload computer code to the actual board. This software supports mainly C/C++ programming and makes it easy to understand for beginners and experts is more friendly to develop interactive electronics (Arduino, 2023).

Figure 10:Arduino IDE (pngwing, 2025)

- **Google Map API:** Google Map API is a service provided by google that allows developers to integrate with geographical location. It is used to track the location of accident spot on the real time location of the vehicle with accurate details. It includes services for map, search, cloud storage and more helps developers to build apps using google API.

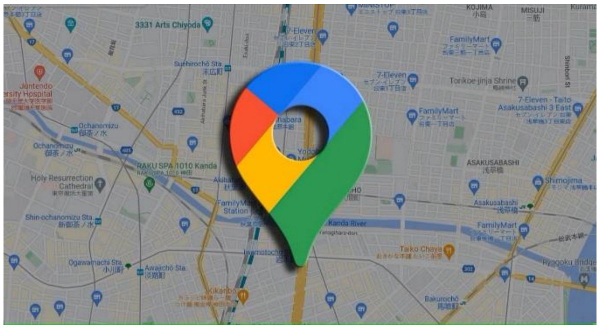


Figure 11: Google Map API (Gopal, 2024).

3 Development

To develop any project accordingly proper steps are required to follow to complete the project. Here is the step-by-step process that are mentioned in the overall project development.

3.1 Planning and design

The development of an accident detection system involves careful planning and design to address the challenges faced by accident victims. In early stage, we are focused on defining the scope, objectives, and overall vision for the accident detection system IOT system.

- Define project goals and objectives.
- Analyzing current problems and its factor.
- Conducted research to understand existing solutions and identify unique features for the accident detection system.

3.2 Resource collection

- NodeMCU
- Breadboard
- Jumper wire
- Accelerometer/Gyroscope
- GSM module
- GPS module
- Arduino Uno

3.3 System Development

The accident detection system project aims to create a smart assist for medical help after the vehicle accident using IOT, providing a solid solution for the unusual death of the accident victim due to lack of emergency facility. This system will track victims live location and send SMS to the nearest medical facility. The development process includes many steps they are as follows:

In the early stage, we established a connection between the NodeMCU and our laptop using USB type B to give power to NodeMCU and start the coding process for the accident detection system. Once the first connection and NodeMCU setup were confirmed, we jumped on to the next step. Connection foe various elements were carefully established. Such as:

- Joining LCD with I2C module to display the real-time event on the project.
- Joining female to female jumper wire on the NodeMCU.

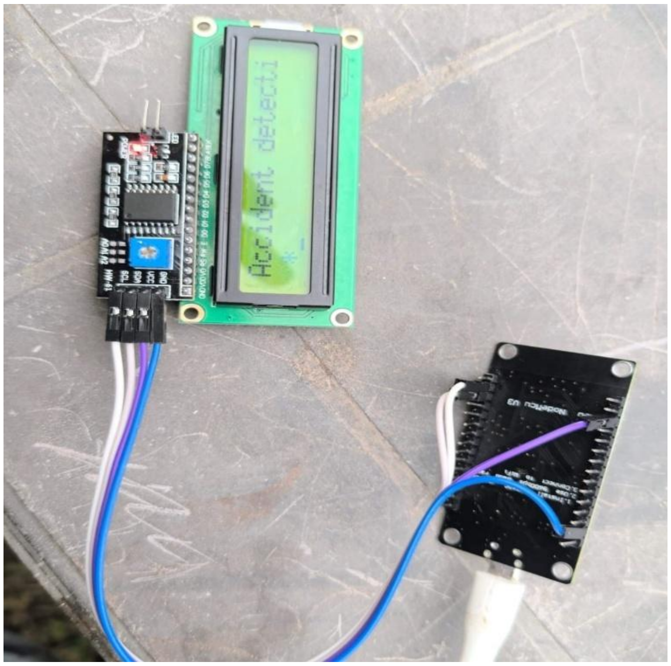


Figure 12:Connection of LCD with I2C module.

- Connection of GPS module in the breadboard.

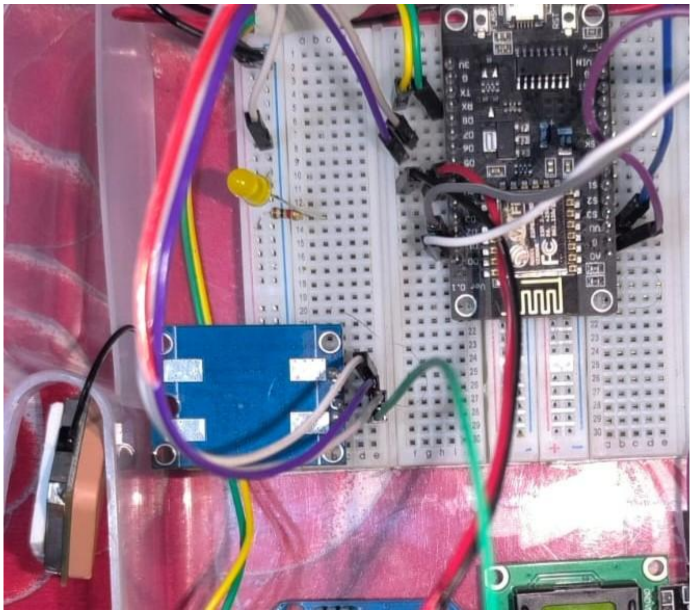


Figure 13:Connection of GPS.

- Setup Arduino to control accelerometer/gyroscope.

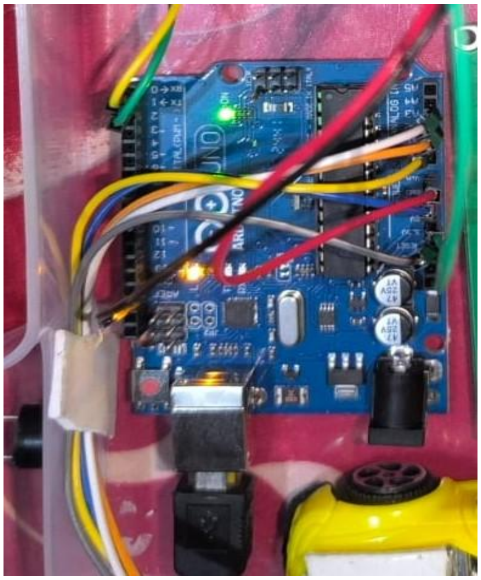


Figure 14:Connection of Arduino.

- Connection of GSM module in the breadboard.

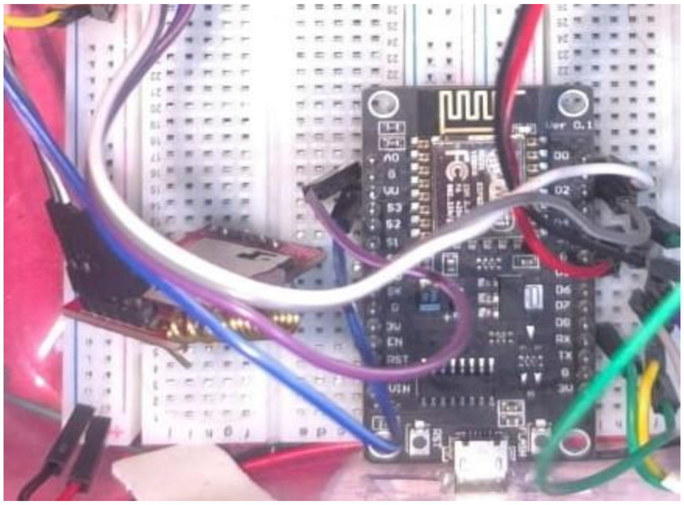


Figure 15:connection of GSM module.

3.4 Testing and Debugging

With the successfully implementation of all the component and the connectivity, the accident detection system was tested carefully to ensure reliability and functionality. Various challenges were simulated to estimate the system responses, and improvements were made to enhance the detection system and the interface.

3.5 Deployment:

Our accident detection system has successfully completed the stage testing and debugging, now our project is ready for deploying. We want to take this project into the real world to extract the best of this project.

4 Result and Findings

The accident detection system is proved to be successfully implemented of IOT technology in addressing the challenges faced by accident victims. The project has received positive response for its convenience location tracking and messages. It provides easy to use solution for accident detection system seeking unique features and modern solutions. We went through difficult times due to the component failures and finding error on the code. We as a team figured out the best solution and made the project run successfully, and our hardworking and cooperation we finished the project successfully.

Test 1: Working LCD with IC2

Table 1:Table of Test 1 working LCD with IC2

Test	Working LCD with IC2
Action	Lcd display should show the information of live action.
Expected Result	The LCD expected to display the current action and information.
Actual Result	The LCD displays the information correctly with live incident.
Conclusion	Test is successful.

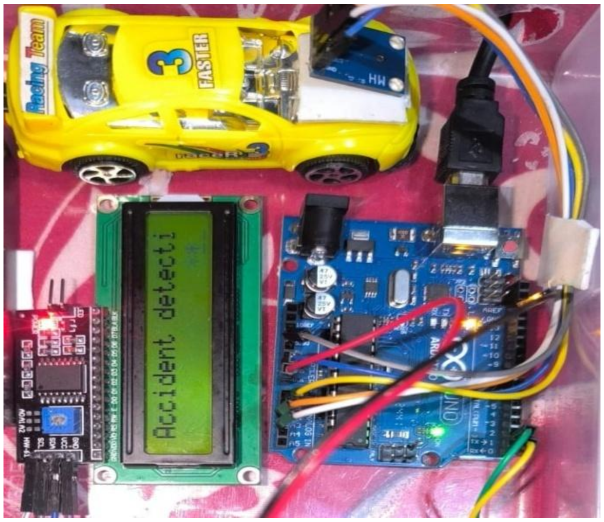


Figure 16:Working LCD with I2c.

Test 2: GPS Tracking

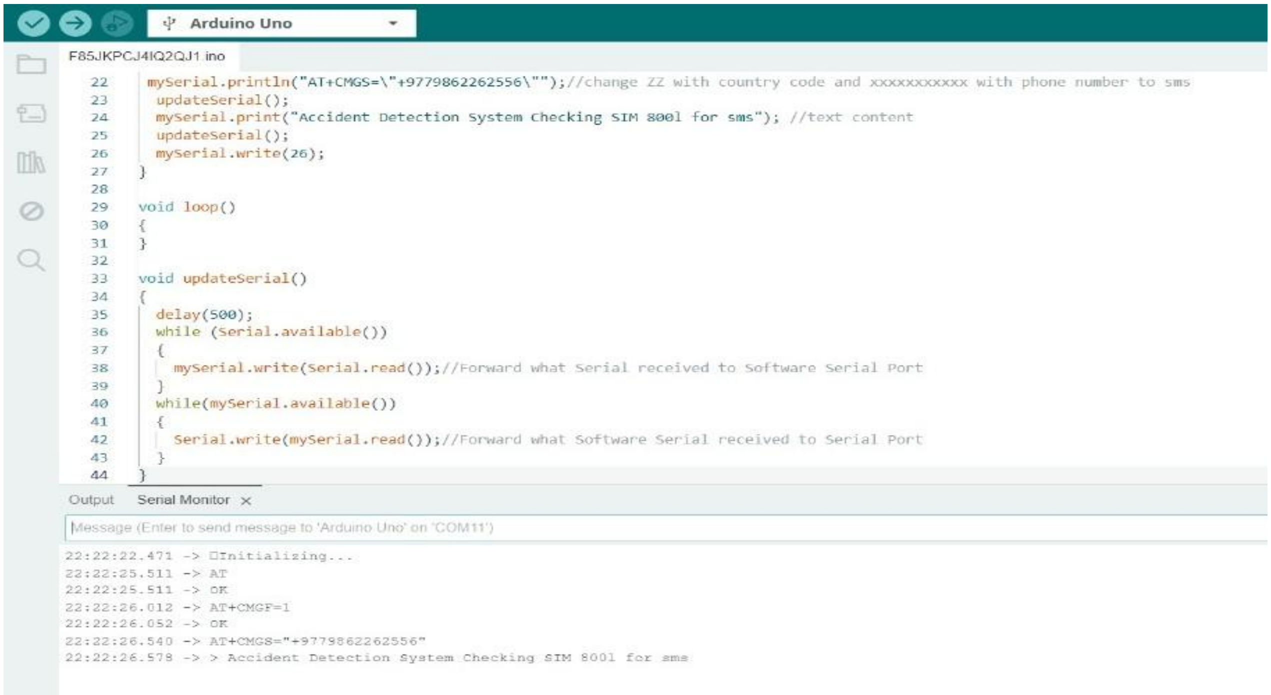
Table 2 : Table of Test 2 GPS Tracking

Test	GPS Tracking
Action	Using GPS sensor, live location is tracked.
Expected Result	Exact location of accident spot is expected to be displayed.
Actual Result	Exact location of accident is displayed.
Conclusion	Test is successful.

Test 3: Working GSM and sending SMS.

Table 3: Table of test 3 working GSM and sending SMS

Test	Working GSM and sending SMS.
Action	Detects the accident spot and sends message to the nearest medical facility by GSM sensor.
Expected Result	The GSM sensor is expected to send SMS of live location information.
Actual result	The GSM sensor sends live location information to the nearest medical facility.
Conclusion	Test is successful.



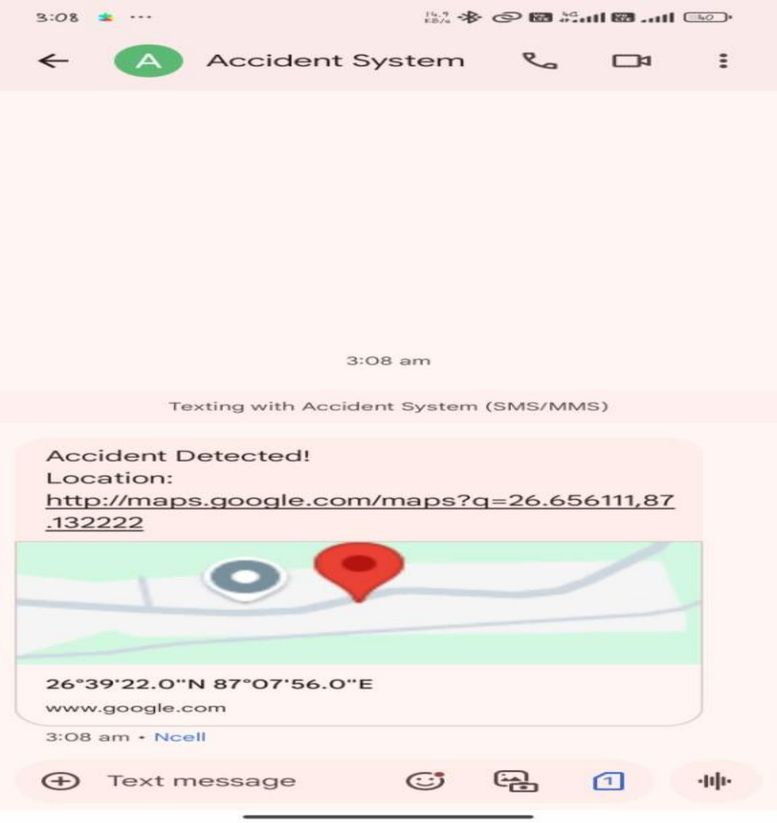
```
 mySerial.println("AT+CMGS=\"+9779862262556\"");//change ZZ with country code and xxxxxxxxxxx with phone number to sms
  updateSerial();
  mySerial.print("Accident Detection System Checking SIM 800l for sms"); //text content
  updateSerial();
  mySerial.write(26);
}

void loop()
{
}

void updateSerial()
{
  delay(500);
  while (Serial.available())
  {
    mySerial.write(Serial.read());//Forward what Serial received to Software Serial Port
  }
  while(mySerial.available())
  {
    Serial.write(mySerial.read());//Forward what Software Serial received to Serial Port
  }
}
```

```
22:22:22.471 -> □Initializing...
22:22:25.511 -> AT
22:22:25.511 -> OK
22:22:26.012 -> AT+CMGF=1
22:22:26.052 -> OK
22:22:26.540 -> AT+CMGS="+9779862262556"
22:22:26.578 -> > Accident Detection System Checking SIM 800l for sms
```

Figure 17: Successfully compiled GSM sensor.



Accident Detected!
Location:
http://maps.google.com/maps?q=26.656111,87.132222

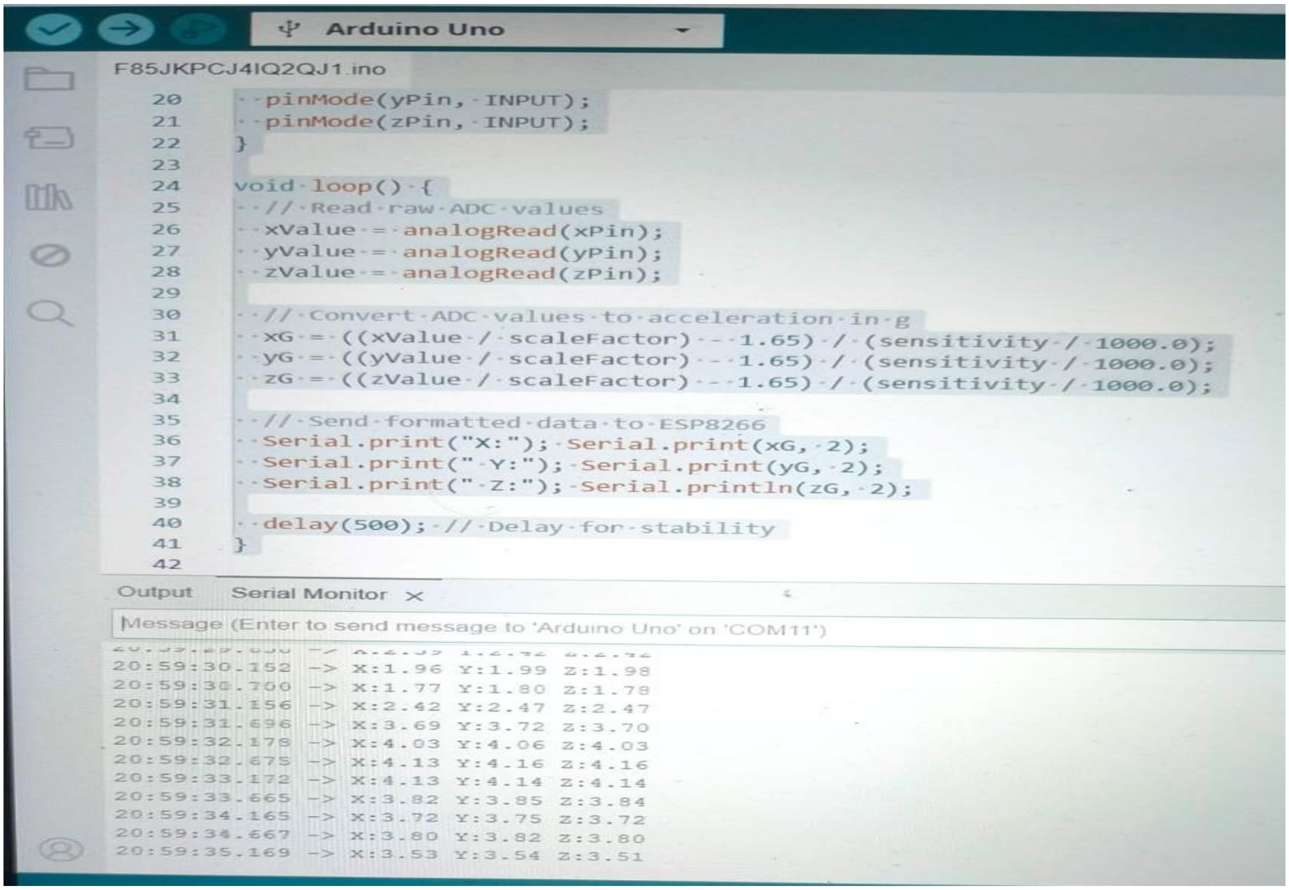
26°39'22.0"N 87°07'56.0"E
www.google.com

Figure 18: testing of GSM sending SMS.

Test 4: Working accelerometer/Gyroscope.

Table 4: Table of test 4 working accelerometer/Gyroscope

Test	Working accelerometer/Gyroscope
Action	Accelerometer/gyroscope detects the vehicle accident and gives real-tine response.
Expected result	Accelerometer/gyroscope sensor is expected to detect motion and response quickly and sends correct data.
Actual result	Accelerometer/gyroscope sensor detect the vehicle crash motion and sends correct data.
Conclusion	Test is successful.



```
  pinMode(yPin, INPUT);
  pinMode(zPin, INPUT);
}

void loop() {
  // Read raw ADC values
  xValue = analogRead(xPin);
  yValue = analogRead(yPin);
  zValue = analogRead(zPin);

  // Convert ADC values to acceleration in g
  xG = ((xValue / scaleFactor) - 1.65) / (sensitivity / 1000.0);
  yG = ((yValue / scaleFactor) - 1.65) / (sensitivity / 1000.0);
  zG = ((zValue / scaleFactor) - 1.65) / (sensitivity / 1000.0);

  // Send formatted data to ESP8266
  Serial.print("X:"); Serial.print(xG, 2);
  Serial.print(" Y:"); Serial.print(yG, 2);
  Serial.print(" Z:"); Serial.println(zG, 2);

  delay(500); // Delay for stability
}
```

Message (Enter to send message to 'Arduino Uno' on 'COM11')

```
20:59:30.152 -> X:1.96 Y:1.99 Z:1.98
20:59:30.700 -> X:1.77 Y:1.80 Z:1.78
20:59:31.156 -> X:2.42 Y:2.47 Z:2.47
20:59:31.696 -> X:3.69 Y:3.72 Z:3.70
20:59:32.178 -> X:4.03 Y:4.06 Z:4.03
20:59:32.675 -> X:4.13 Y:4.16 Z:4.16
20:59:33.172 -> X:4.13 Y:4.14 Z:4.14
20:59:33.665 -> X:3.82 Y:3.85 Z:3.84
20:59:34.165 -> X:3.72 Y:3.75 Z:3.72
20:59:34.667 -> X:3.80 Y:3.82 Z:3.80
20:59:35.169 -> X:3.53 Y:3.54 Z:3.51
```

Figure 19:Testing Accelerometer/Gyroscope.

5 Future Works

So, our project ‘Accident Detection System’ is one of the most usable and perfect electric devices that will be taking place in the future that will save lives of many accident victims and prevent any unnecessary death. This project will send live information about accident spot to the nearest medical facility. This project is built with good quality sensors that functions properly and provides an additional reliability. GPS sensor tracks the live locations all over the world with high accuracy that will help medical team to follow up on that location.

There may be many similar projects to ours but still we can believe that this project offers best quality and experience. By the time this project will be very useful to each people who operates vehicle on daily basis. This project will improve much in future by implementing high technology tools. This project is user friendly and easy to access all over the world via website because this is a cloud-based project that sends exact visual map location of all over the world. With the help of GSM sensor, it sends the message to the nearest medical facility. The Accelerometer/Gyroscope sensor, detect the real-time motion and response quickly and help other component work accordingly. There are many aspects that can be improvised in the future to grow the efficiency of the gadget. It can be promoted according to the users need and the future goals. This gadget is very reliable and versatile and easy that it can be used by users. It can be completely upgraded meeting the future demands of the users.

6 Conclusion:

The Accident Detection and Notification System Using IoT project aims to address real life problems using technology. By combining IoT devices with creative programming and design, our system focuses on improving emergency response times and potentially saving lives. This project was a team effort, with everyone contributing to research, hardware and software setup, testing, and documentation. The system detects accidents in real-time and sends notifications to pre-set contacts, helping to ensure quick action. We faced several challenges during development, but through testing and improvements, we built a solution that is reliable and scalable. Working on this project taught us a lot about IoT and its practical uses, while also improving our problem-solving, technical, and teamwork skills. In the future, this system could include more advanced features like real-time data analysis, machine learning for better detection, and integration with other systems. This project not only addresses an important issue but also opens doors to further innovations in IoT and safety.

In conclusion, the accident detection system merge IOT technology and advance detection mechanism to provide an efficient and convenient solution for accident victims. The planning, development and testing phases have resulted in a reliable system that make better detection system. With lots of struggle, positive response and successful test output, the accident detection system sounds promising solution for the challenge that are faced by the users in this modern world. The future scope includes potential enhancements and adaptability to evolving user demands, making it a valuable contribution to accident detection system.

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8 Appendix

8.1 Appendix A: Source code

ESP code:

```
#include <Wire.h>

#include <LiquidCrystal_I2C.h>

#include <SoftwareSerial.h>

#include <TinyGPS++.h>

#include <math.h>


// LCD setup

LiquidCrystal_I2C lcd(0x27, 16, 2);  // Adjust the address if needed


// GPS Module

SoftwareSerial gpsSerial(D6, D7);  // D6 (RX) and D7 (TX) for GPS

TinyGPSPlus gps;


// GSM Module

SoftwareSerial gsmSerial(D5, D4);  // D5 (RX) and D4 (TX) for GSM


// Accelerometer data pins (from Arduino)

SoftwareSerial espSerial(2, 3);    // RX, TX for receiving data from Arduino


// Buzzer
```

```
#define BUZZER D0

// Emergency contact number
const String EMERGENCY_PHONE = "+977970511333";  // Replace with the actual phone number

// Impact detection variables
int sensitivity = 100;  // Sensitivity threshold for accident detection
int magnitude = 0;
bool impactDetected = false;
unsigned long impactTime = 0;
const unsigned long alertDelay = 30000;  // 30 seconds delay for sending alerts

// Accelerometer values
int xAxis = 0;
int yAxis = 0;
int zAxis = 0;

void setup() {
  // Initialize serial for debugging
  Serial.begin(115200);
  espSerial.begin(9600);  // Communication with Arduino for accelerometer data
  gsmSerial.begin(9600);
```

```
gpsSerial.begin(9600);


// Initialize GSM module
gsmSerial.println("AT");  // Test communication with GSM module
delay(1000);
gsmSerial.println("AT+CMGF=1");  // Set SMS to text mode
delay(1000);


// Initialize GPS module
gpsSerial.begin(9600);


// Initialize LCD
lcd.begin();
lcd.backlight();
lcd.clear();
lcd.print("System Starting...");
delay(9000);
lcd.clear();
lcd.print("Ready!");
delay(9000);
lcd.clear();
lcd.print("initializing Component");
```

```
  // Initialize buzzer
  pinMode(BUZZER, OUTPUT);
  digitalWrite(BUZZER, LOW);

  // Display system initialization status
  Serial.println("System initialized successfully!");
}

void loop() {
  // Check if data is available from Arduino (ADXL335)
  if (espSerial.available()) {
    String data = espSerial.readStringUntil('\n');  // Read incoming data from Arduino
    parseAndDisplayData(data);  // Parse and display the data on LCD
  }

  // Check for GPS data
  if (gpsSerial.available() > 0) {
    if (gps.encode(gpsSerial.read())) {
      displayGPSInfo();  // Display GPS data
    }
  }

  // Process accelerometer data and impact detection
  processAccelerometerData(xAxis, yAxis, zAxis);

  // Handle impact detection
  if (impactDetected && millis() - impactTime >= alertDelay) {
    digitalWrite(BUZZER, LOW);
    sendAlert();
    impactDetected = false;
  }
}

void processAccelerometerData(int xAxis, int yAxis, int zAxis) {
  // Calculate magnitude of the vector change
  int deltaX = xAxis - 512;
  int deltaY = yAxis - 512;
  int deltaZ = zAxis - 512;
  magnitude = sqrt(sq(deltaX) + sq(deltaY) + sq(deltaZ));

  // Check for impact
  if (magnitude >= sensitivity) {
    impactDetected = true;
    impactTime = millis();
    digitalWrite(BUZZER, HIGH);
    lcd.clear();
    lcd.print("Impact Detected!");

    lcd.setCursor(0, 1);

    lcd.print("Magnitude: " + String(magnitude));

    Serial.println("Accident detected! Magnitude: " + String(magnitude));

    delay(4000);

    lcd.clear();

    lcd.print("Sending SMS +9779702511333");

    delay(5000);

    lcd.clear();

    lcd.print(" SMS Sent");

  }

}


void sendAlert() {

  String message = "Accident Detected!\n";

  message += "Location: ";

  message += getGPSLocation();

  Serial.println("Sending SMS: " + message);

  sendSMS(message);

      lcd.clear();

    lcd.print("Sending SMS +9779702511333");

    delay(5000);

    lcd.clear();
    lcd.print(" SMS Sent");



}


String getGPSLocation() {

  if (gps.location.isUpdated()) {

    String latitude = String(gps.location.lat(), 6);

    String longitude = String(gps.location.lng(), 6);

    return "http://maps.google.com/maps?q=" + latitude + "," + longitude;

  } else {

    return "Location Unavailable";

  }

}


void sendSMS(String text) {

  gsmSerial.print("AT+CMGS=\"");

  gsmSerial.print(EMERGENCY_PHONE);

  gsmSerial.println("\"");

  delay(1000);

  gsmSerial.print(text);

  delay(100);

  gsmSerial.write(0x1A);  // Ctrl+Z to send the SMS
  delay(5000);

  Serial.println("SMS sent!");

}


void displayGPSInfo() {

  if (gps.location.isUpdated()) {

    lcd.clear();

    lcd.print("Lat: ");

    lcd.print(gps.location.lat(), 6);

    lcd.setCursor(0, 1);

    lcd.print("Lng: ");

    lcd.print(gps.location.lng(), 6);

    Serial.print("Latitude: ");

    Serial.println(gps.location.lat(), 6);

    Serial.print("Longitude: ");

    Serial.println(gps.location.lng(), 6);

  }

}


void parseAndDisplayData(String data) {

  // Split the data into x, y, z axis readings

  int commaIndex1 = data.indexOf(',');

  int commaIndex2 = data.indexOf(',', commaIndex1 + 1);
```

```
// Extract X, Y, Z values from the received string
xAxis = data.substring(0, commaIndex1).toInt();
yAxis = data.substring(commaIndex1 + 1, commaIndex2).toInt();
zAxis = data.substring(commaIndex2 + 1).toInt();

// Print to Serial Monitor for debugging
Serial.print("X: "); Serial.print(xAxis);
Serial.print(" Y: "); Serial.print(yAxis);
Serial.print(" Z: "); Serial.println(zAxis);

// Display values on LCD
lcd.clear();
lcd.print("X: ");
lcd.print(xAxis);
lcd.setCursor(0, 1);
lcd.print("Y: ");
lcd.print(yAxis);
lcd.setCursor(8, 1);
lcd.print("Z: ");
lcd.print(zAxis);

delay(500);  // Delay to make sure LCD can update smoothly
```

```
}
```

Arduino Uno code:

```
#include <SoftwareSerial.h>


// ADXL335 Pins
#define xPin A1
#define yPin A2
#define zPin A3


// Serial connection to ESP8266
SoftwareSerial espSerial(2, 3); // RX, TX


void setup() {
  // Initialize Serial for debugging and communication with ESP8266
  Serial.begin(9600);
  espSerial.begin(9600);


  // Print initial message
  Serial.println("ADXL335 Reader Initialized");
}


void loop() {
  // Read ADXL335 axis values
  int xAxis = analogRead(xPin);
  int yAxis = analogRead(yPin);
  int zAxis = analogRead(zPin);

  // Send data to ESP8266
  espSerial.print(xAxis);
  espSerial.print(",");
  espSerial.print(yAxis);
  espSerial.print(",");
  espSerial.println(zAxis);

  // Debug output
  Serial.print("X: "); Serial.print(xAxis);
  Serial.print(" Y: "); Serial.print(yAxis);
  Serial.print(" Z: "); Serial.println(zAxis);

  delay(100); // Adjust the delay as needed
}
```

8.2 Appendix B: screenshot of system

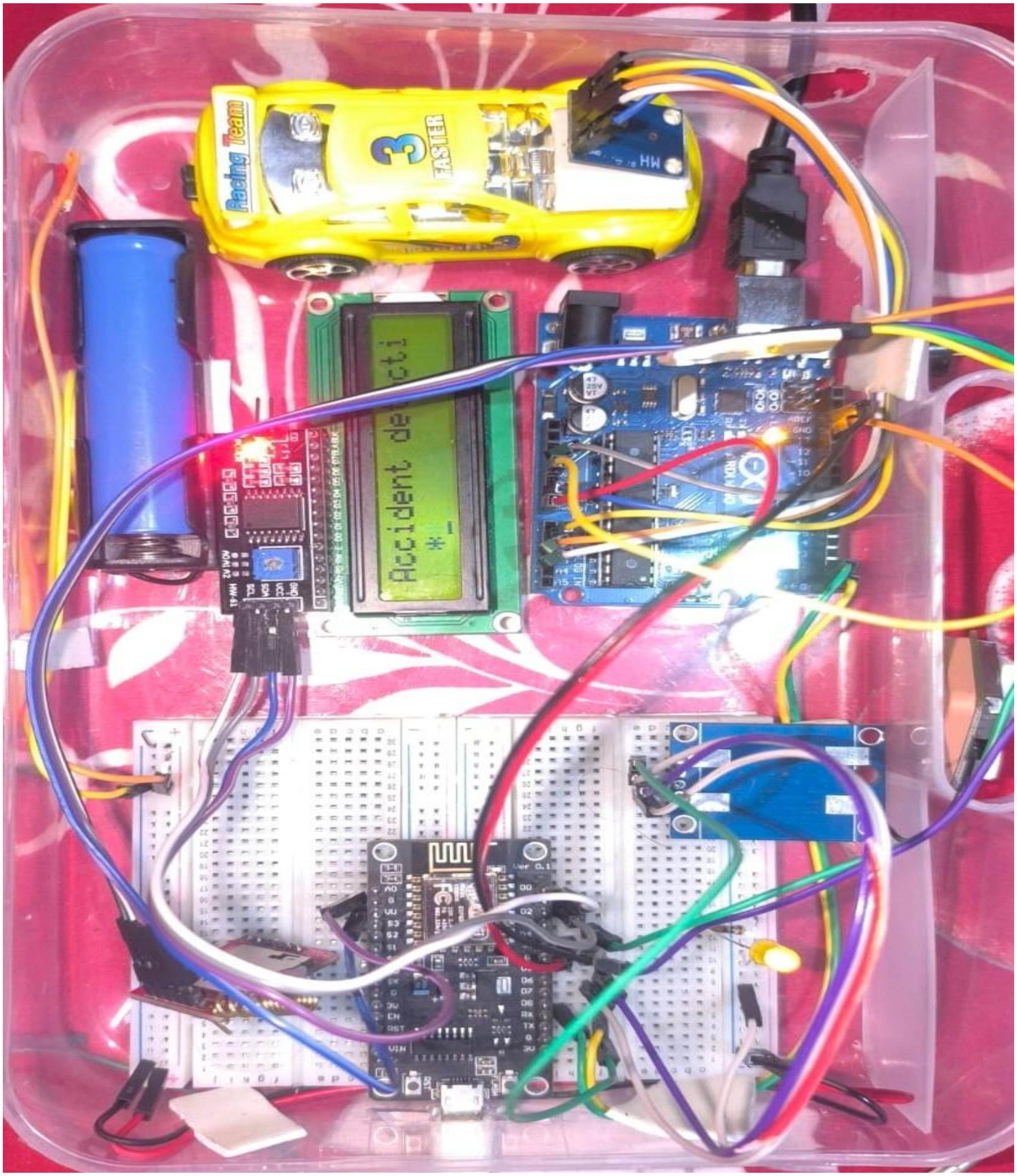

Figure 20: Screenshot of system

8.3 Appendix C: Design Diagram

Individual Contribution Plan

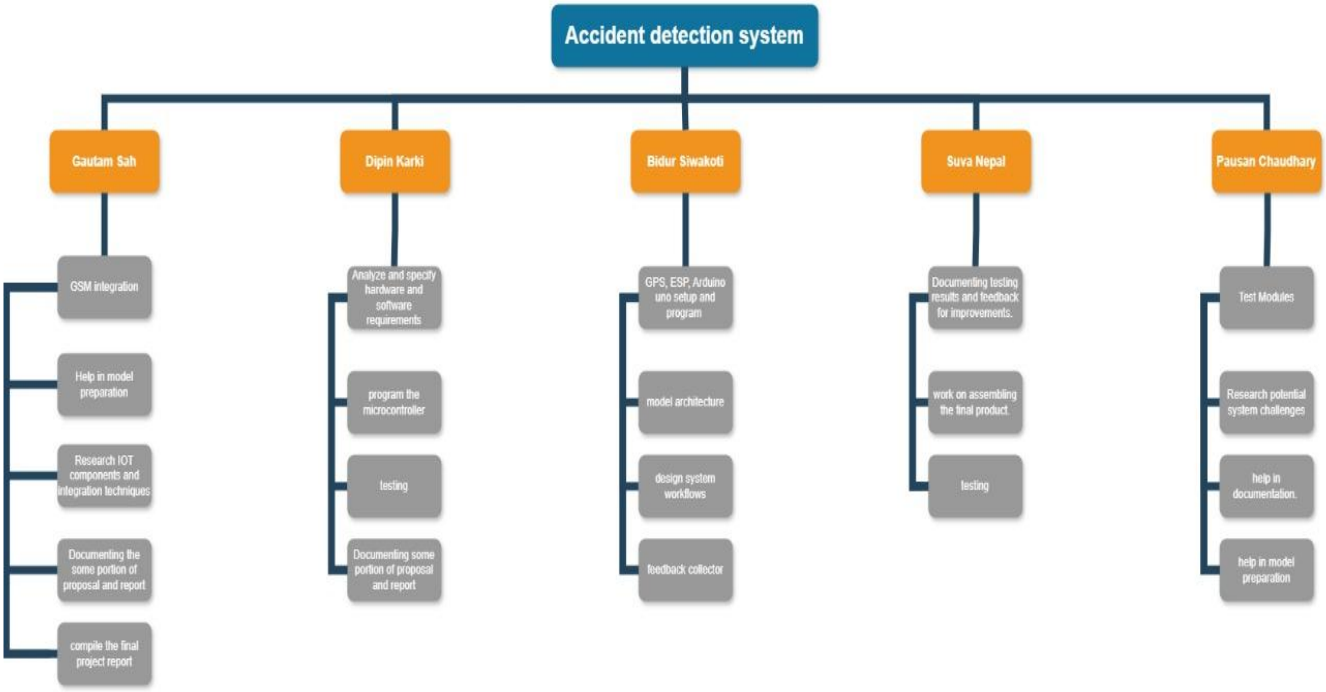
Accident detection system
Gautam Sah
GSM integration
Help in model preparation
Research IOT components and integration techniques
Documenting the some portion of proposal and report
compile the final project report
Dipin Karki
Analyze and specify hardware and software requirements
program the microcontroller
testing
Documenting some portion of proposal and report
Bidur Siwakoti
GPS, ESP, Arduino uno setup and program
model architecture
design system workflows
feedback collector
Suva Nepal
Documenting testing results and feedback for improvements.
work on assembling the final product.
testing
Pausan Chaudhary
Test Modules
Research potential system challenges
help in documentation.
help in model preparation

Figure 21: Individual Contribution plan chart