GPCET
Pioneering Innovative Education

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY (AUTONOMOUS)

Department of IoT

IoT Based Intelligent System for Vehicle

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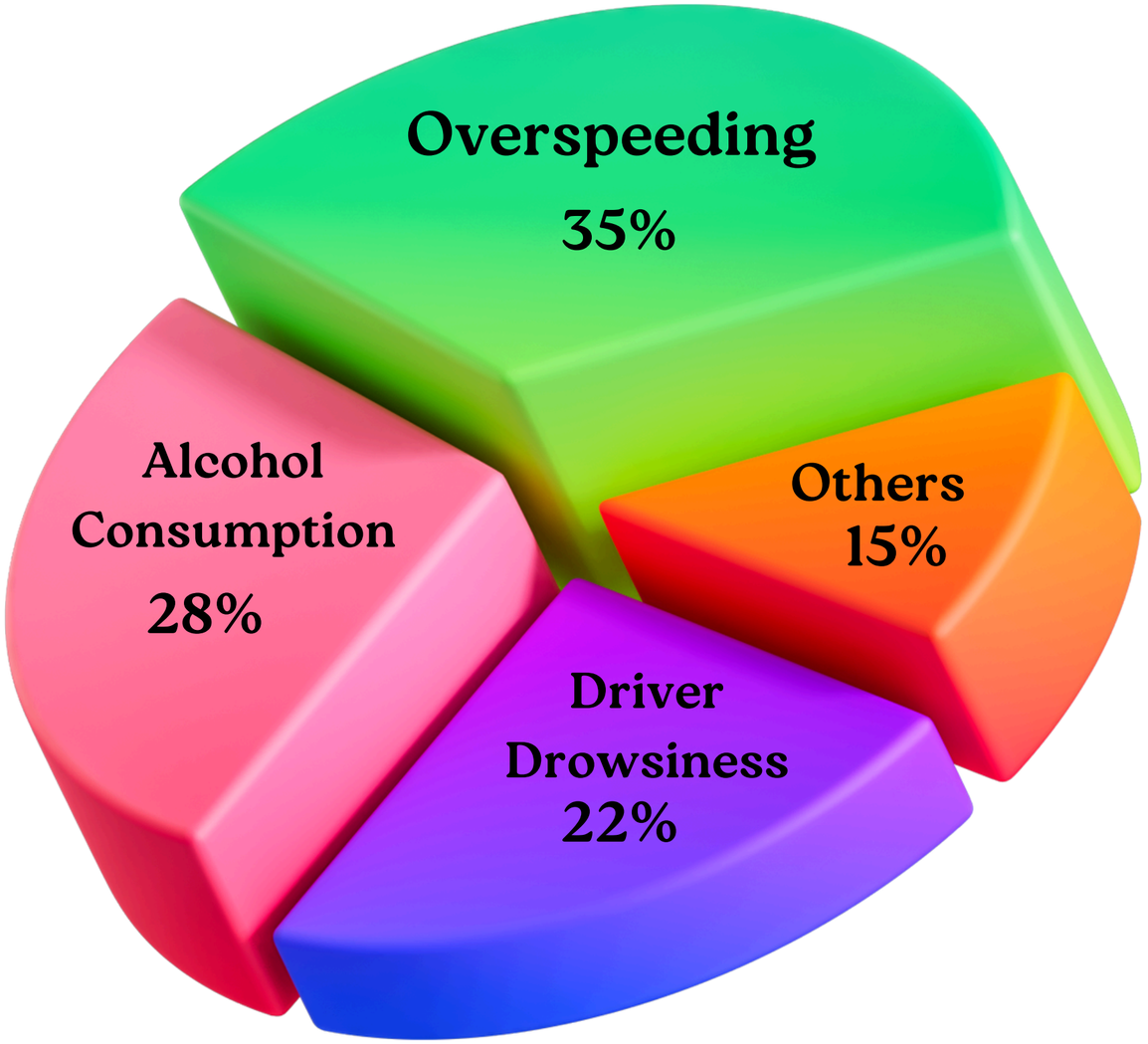
Abstract

The Intelligent System for Vehicle is an IoT-based project that integrates various features to enhance vehicle safety and monitoring capabilities. This comprehensive system incorporates:

1. Alcohol Detection
2. Accident Alert
3. Real-time Vehicle Tracking
4. Driver Fatigue Detection
5. Seat Belt Alert
6. Vehicle Environment Monitoring
7. Fuel Level Monitoring

Scan Me!

Major Reasons of Accidents in India



- **Over Speeding (35%):** Excessive speed remains a leading contributor to accidents, jeopardizing road safety and causing significant harm.

- **Alcohol Consumption (28%):** Driving under the influence continues to pose a grave threat, impairing judgment and coordination, resulting in avoidable accidents

- **Driver Drowsiness (22%)**: Fatigue- induced incidents emphasize the critical need for alertness, highlighting the risks of driving while tired.

Literature Survey

The project focuses on using IoT technology to make vehicles safer. It integrates various sensors for accident detection, alcohol monitoring, and driver fatigue alert. Real-time vehicle tracking and communication with emergency services are key features. The system also monitors environmental conditions and fuel levels for better comfort and efficiency. Research shows these IoT-based systems can significantly improve road safety and driver convenience.

Existing Systems

The automotive industry faces significant safety and security challenges. It doesn't have complete safety features like built-in alcohol detection, relies on people to report accidents manually, has only basic vehicle tracking abilities, and doesn't do enough to detect driver fatigue. These shortcomings create important gaps in ensuring road safety.

- No Alcohol Detection
- Limited Vehicle Tracking
- Not Enough Fatigue Detection

Limitations of Existing Systems

No Alcohol Detection:

- Dependence on human responsibility
- Relies on people to avoid drinking and driving
- Makes legal issues more complicated

Limited Vehicle Tracking:

- Inaccurate location data
- Lack of contextual information
- Limited connectivity in remote areas

Not Enough Fatigue Detection:

- Lack of early warning signs
- Gives wrong warnings or misses real fatigue

Proposed Systems

Addressing high road accidents from human errors, drunk driving, and fatigue through an innovative Intelligent Vehicle System, filling gaps in current safety solutions for comprehensive prevention.

Accident Alert & Real-time Vehicle Tracking

Vehicle Environment Monitoring

Alcohol Detection & Fuel Level Monitoring

Driver Fatigue Detection

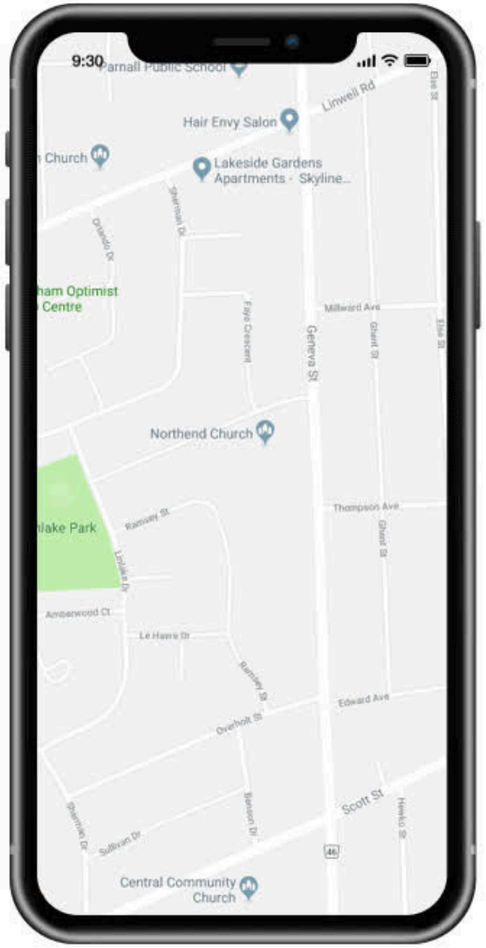
Seat-Belt Alert

THE SOLUTION - 1

Accident Alert

Accident Alert system instantly detect and communicate vehicular accidents through sensors and connectivity triggering timely notifications to emergency services

THE SOLUTION - 2



Vehicle Tracking

Uses GPS module to monitor and track the location, movement and operational status of vehicles in real-time this system improves security and optimizes logistical efficiency

THE SOLUTION - 3

Alcohol Detection

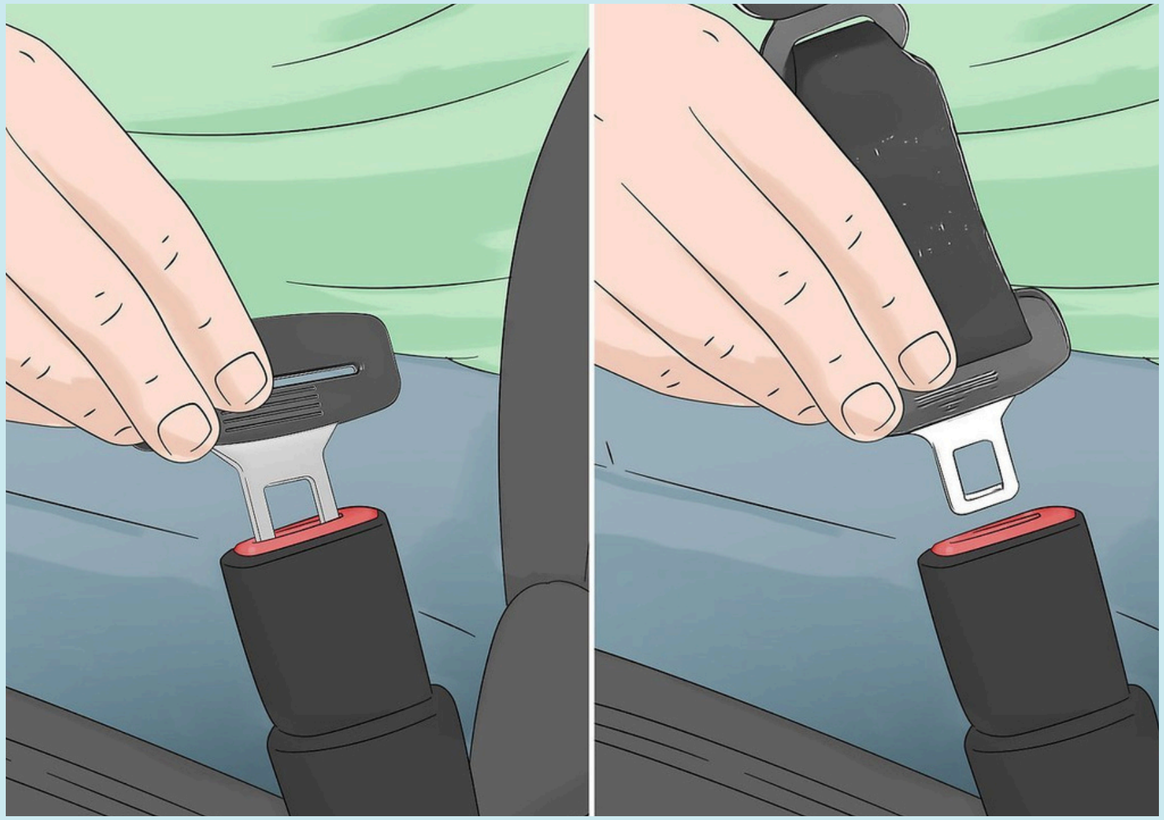
Promotes responsible driving by identifying alcohol presence, alerting both the driver and family members to enhance road safety.
It helps keep things safe by giving warnings or information about the alcohol levels

THE SOLUTION - 4

Driver Fatigue Detection

Uses sensors to detect signs of drowsiness and send warnings to the driver
preventing accidents and promoting safer journey on the road

THE SOLUTION - 5



Seat Belt Alert

This system that reminds you to wear seat belt keeping you safe on the road
this simple system helps to reduce injuries and enhance road safety by encouraging the use of seat belts in vehicles

THE SOLUTION - 6

Vehicle Environment Monitoring

Integrates a DHT11 sensor for monitoring temperature and humidity within the vehicle..

Sends data to ThingSpeak cloud for monitoring and analysis.

THE SOLUTION - 7

Fuel Level Monitoring

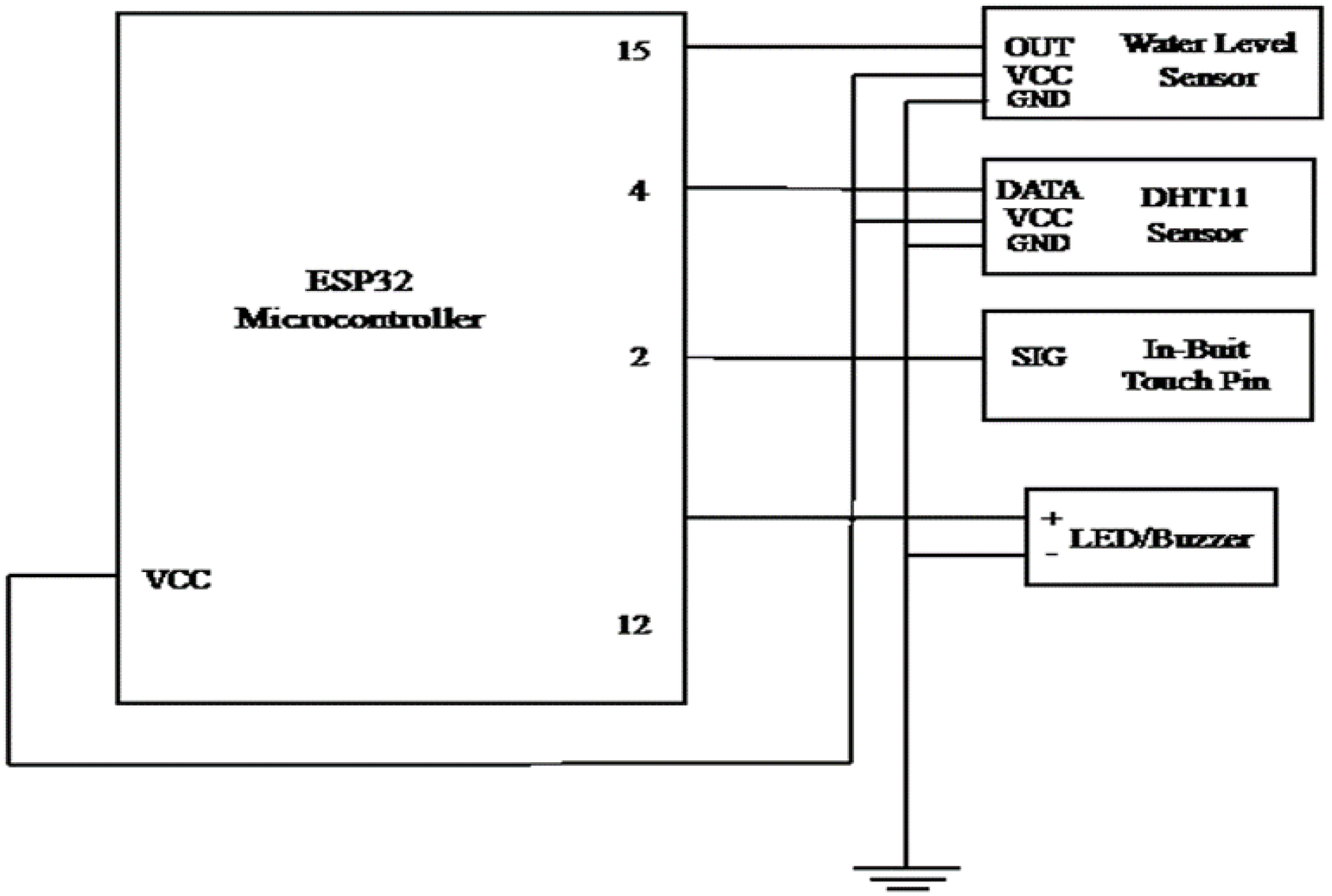
Utilizes a water level monitoring sensor to track fuel levels.

Displays fuel status on ThingSpeak and updates in real-time..

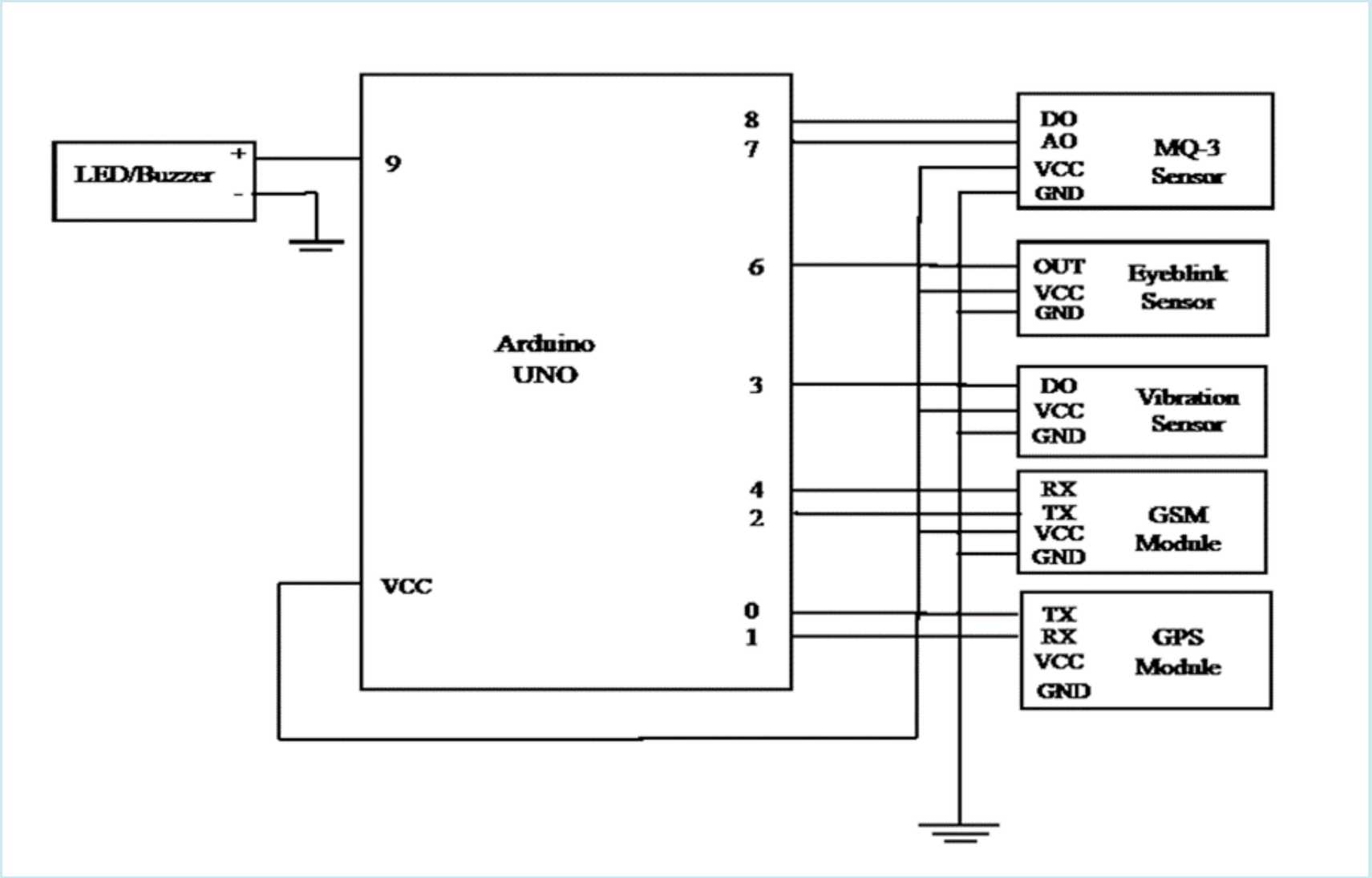
Advantages of Proposed Systems

- Quick accident detection
- Alcohol detection and warning
- Fatigue detection and alert
- Seat belt reminder
- Environment monitoring (temperature, humidity)
- Fuel level monitoring and alerts
- Real-time vehicle tracking
- Enhanced driving safety

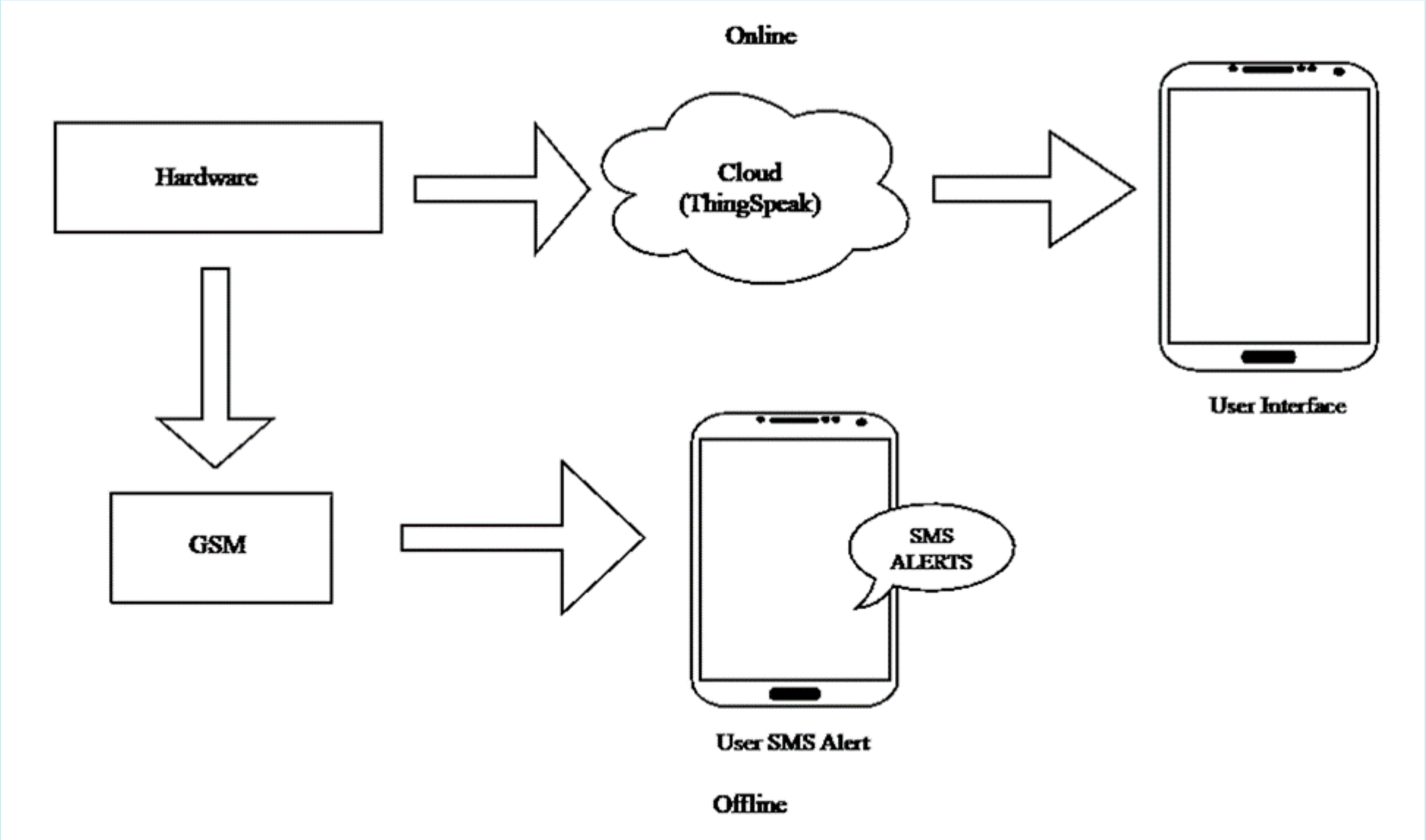
Circuit Diagram-1



Circuit Diagram-2

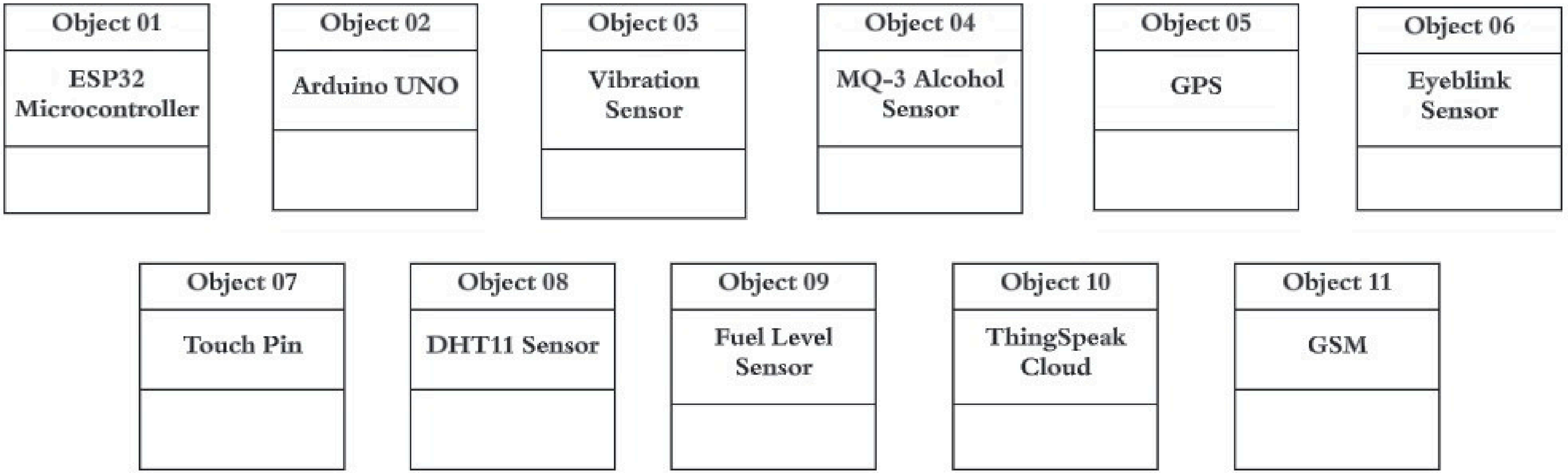


Block Diagram



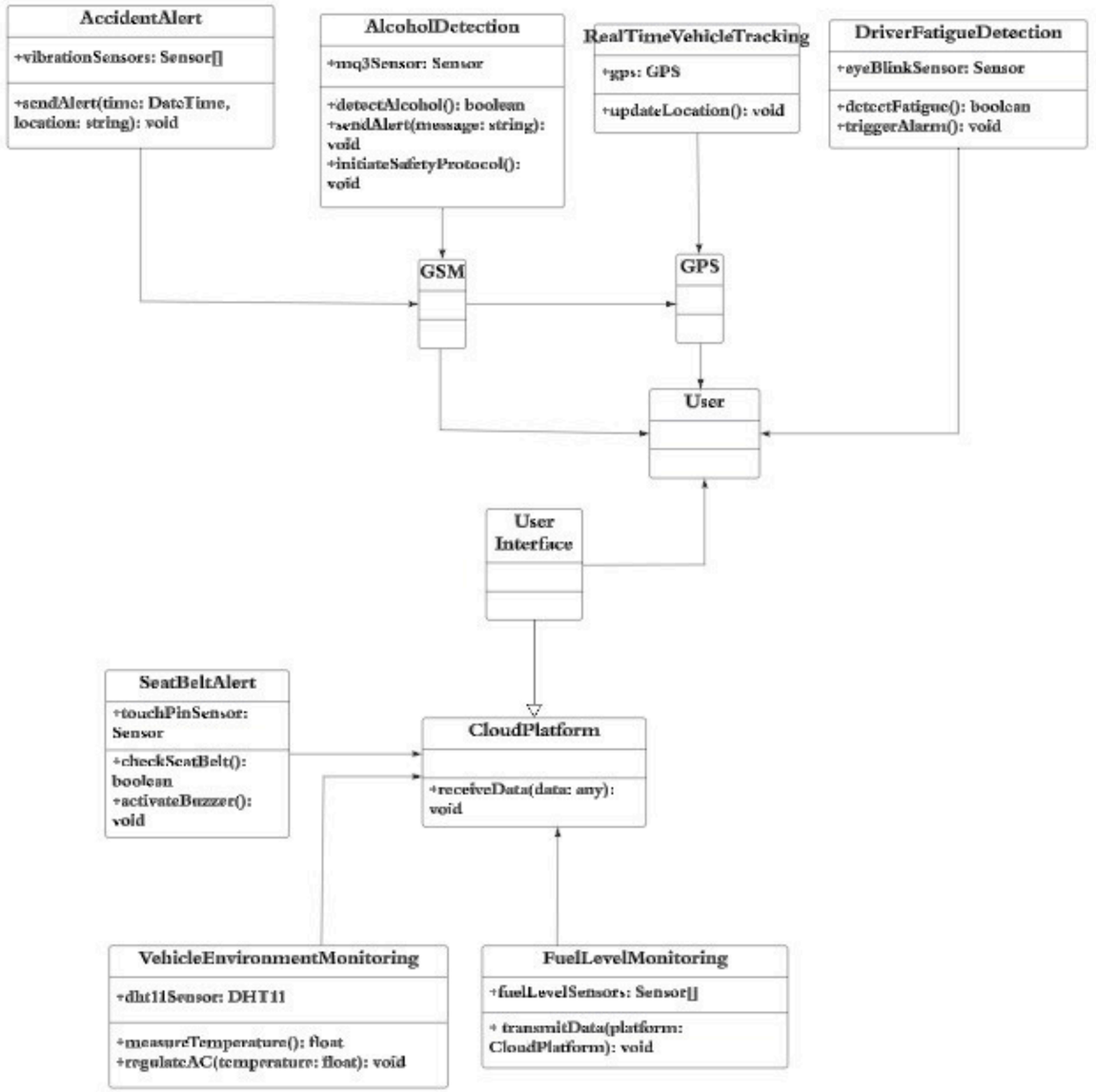
Class Diagram

It is a type of static structure diagram that describes the structure of a system by showing the system's classes.



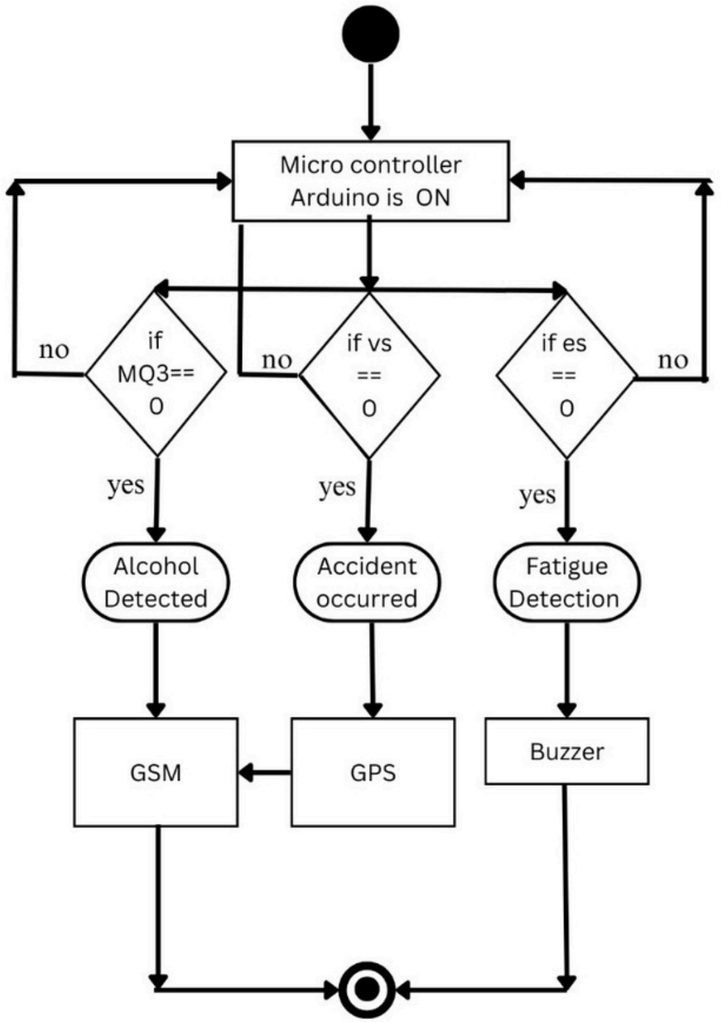
Object Diagram

That shows a complete or partial view of the structure of a modeled system at a specific time



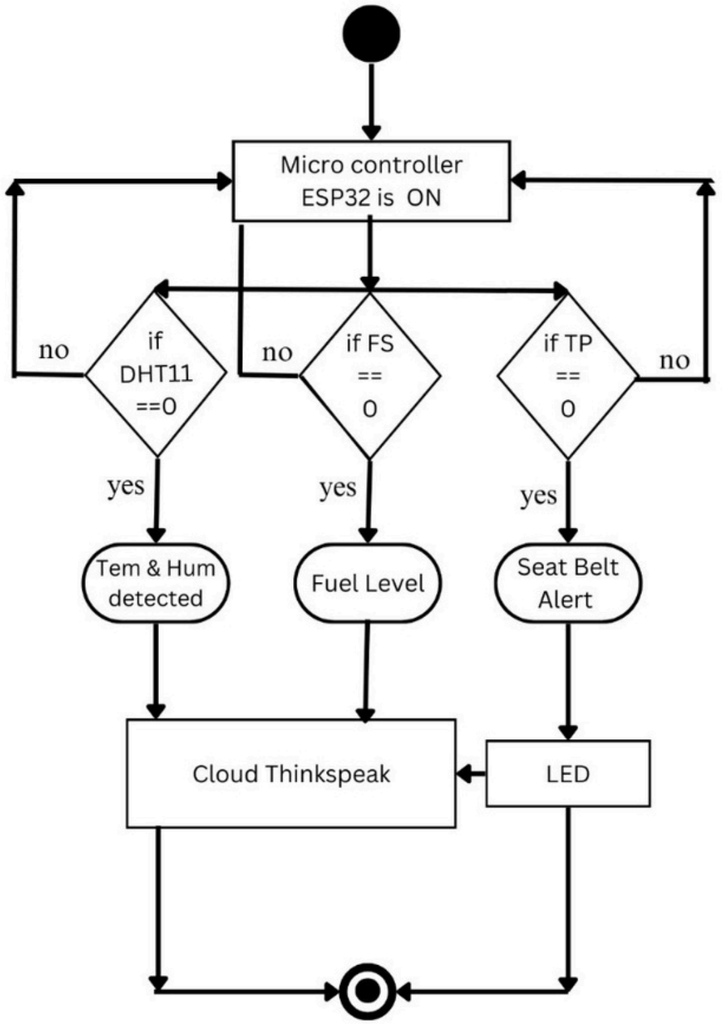
Activity Diagram

They are intended to model both computational and organizational processes (i.e., workflows), as well as the data flows intersecting with the related activities.



-/ Offline Mode

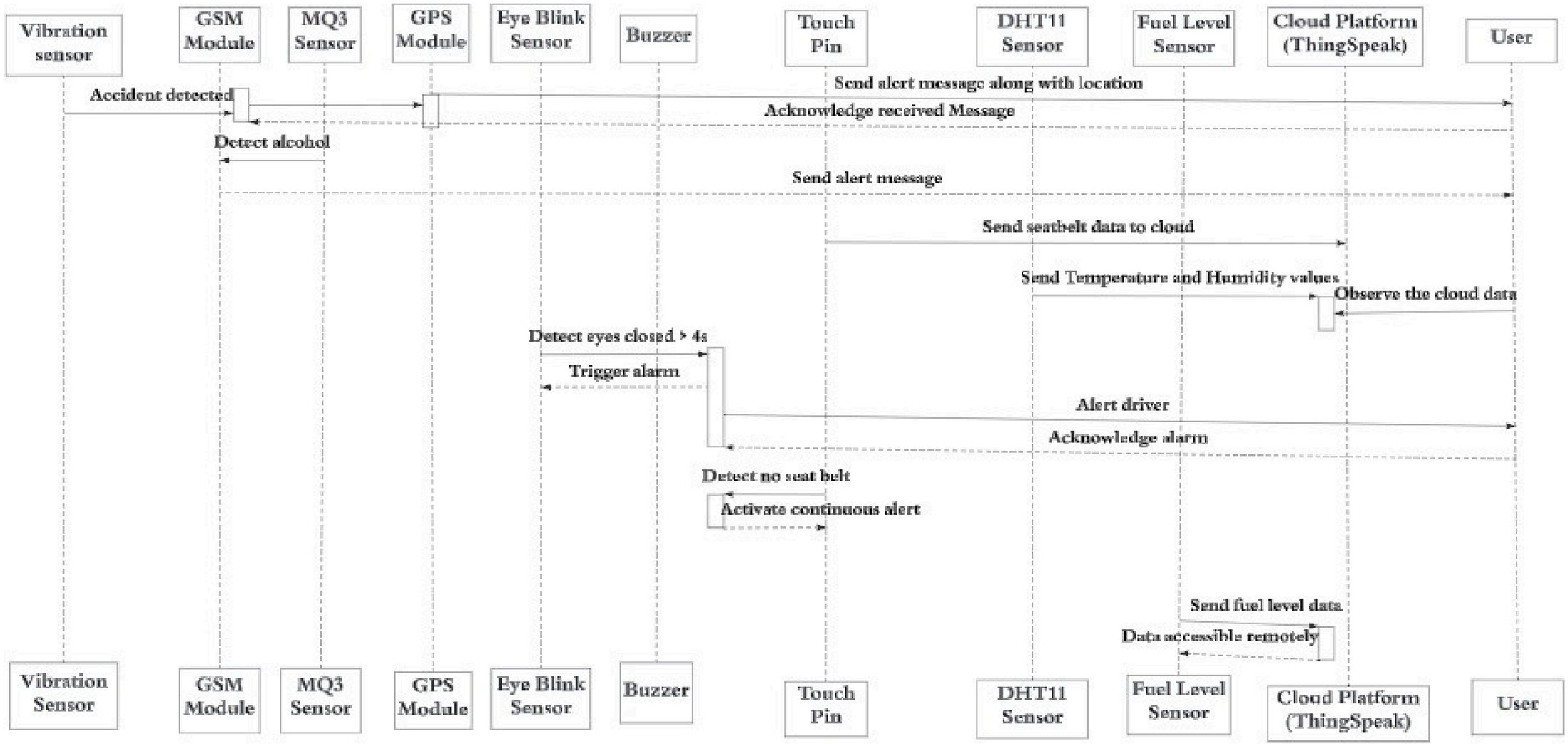
Activity Diagram



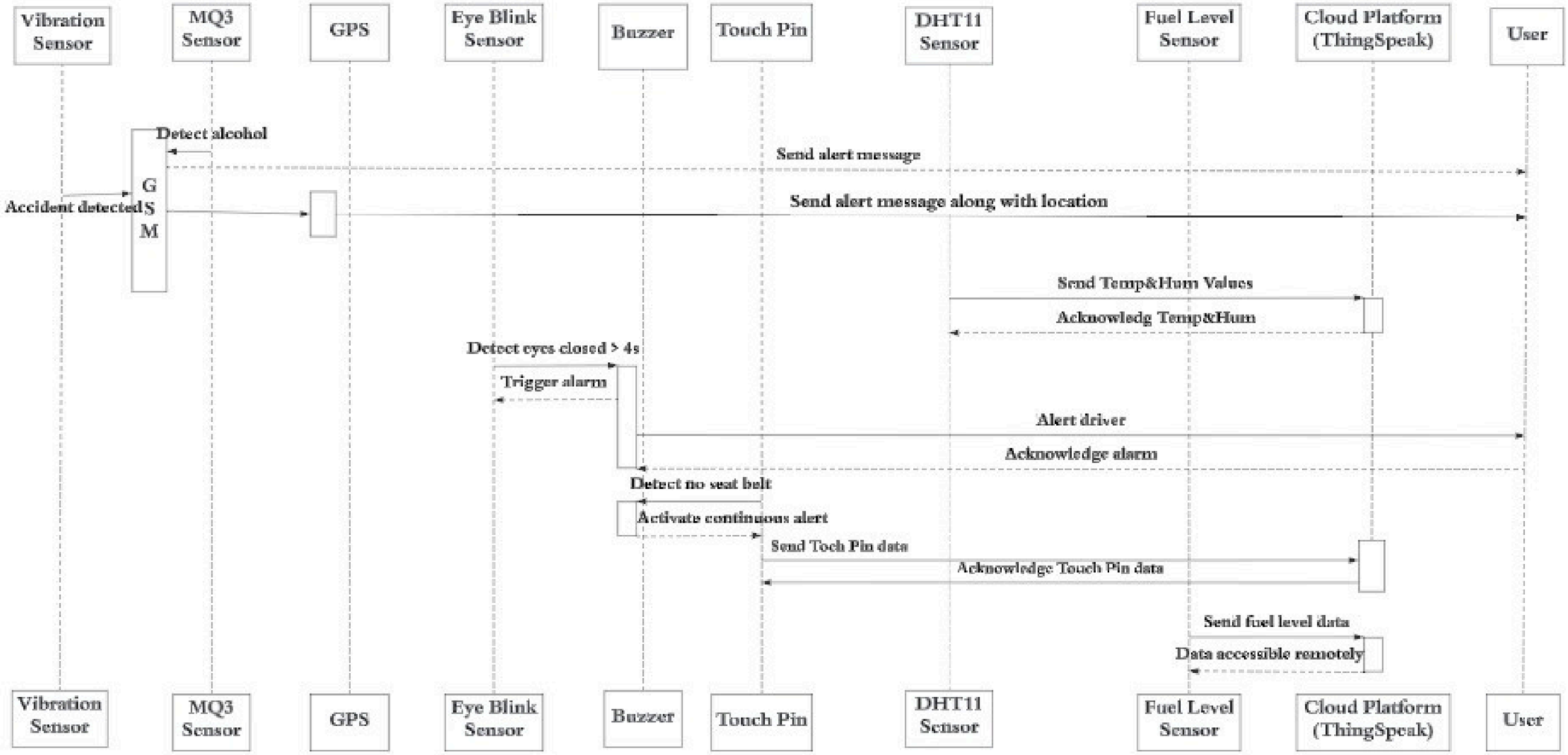
DHT11 - Temperature and humidity
FS - Fuel Level sensor
TP - Touch pin

-/ Online Mode

Sequence Diagram

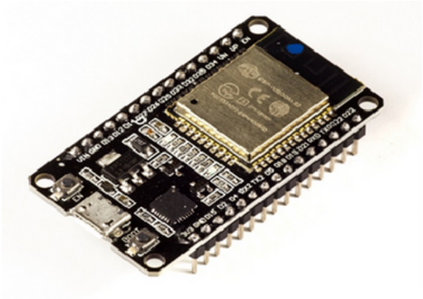


Interaction Diagram



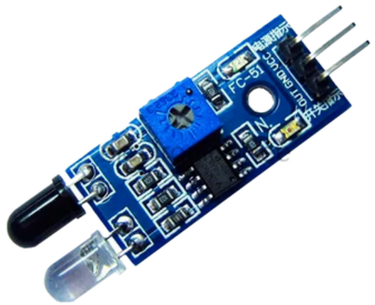
System Requirements

- **Hardware :**
  - ESP32 Microcontroller
  - Arduino UNO
  - GSM and GPS Module
  - IR Sensor
  - Fuel level Sensor
  - MQ-3 Sensor & Motors , LEDS and Buzzers as Output Devices
  - Eyeblink Sensor
- **Software :**
  - Arduino IDE
  - ThingSpeak

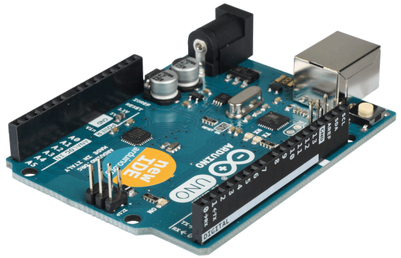


ESP32

GSM



IR sensor



Arduino UNO

MQ-3 Sensor

GPS

Eyeblink Sensor

PseudoCode

Accident Alert & Seat Belt Alert :

1. Set vibration_sensor = 15
2. Set touch_pin = 4
3. Set touch_led = 2
4. Set vibration_led = 5

5. Start serial communication
6. Set pins as output or input
7. Print "ESP32 Touch Test"
8. Wait 1 second

9. Repeat
10. vibration = digital value of vibration_sensor pin
11. touch = analog value of touch_pin
12. If touch < 10
13. Turn on touch_led
14. Print touch
15. Else
16. Turn off touch_led
17. Print touch
18. Wait 1 second
19. If vibration = 0
20. Turn on vibration_led
21. Print "Accident has occured please reach out to the location, quickly"
22. Else
23. Turn off vibration_led
24. Print "Everything is Safe!"
25. End Repeat

PseudoCode

Driver Sleep & Alcohol Detection :

1. Set sensor_pin = 7
2. Set sensor = 8
3. Set buzzer = 3
4. Set LED_PIN = 13

5. Start serial communication
6. Set pins as output or input
7. Print "MQ3 warming up!"
8. Wait 1 second

9. Repeat
10. If sensor_pin and sensor are both 1
11. Print "No alcohol and eyes are open"
12. Turn off LED_PIN and buzzer
13. Else if sensor_pin is 0 and sensor is 1
14. Print "Alcohol detected and eyes are open"
15. Turn on LED_PIN and buzzer
16. Else if sensor_pin is 1 and sensor is 0
17. Print "No alcohol and eyes are closed"
18. Turn on LED_PIN and buzzer
19. Else
20. Print "Alcohol detected and eyes are closed"
21. Turn on LED_PIN and buzzer
22. Wait 2 seconds
23. End Repeat

PseudoCode

//Step 1 - Initialization

initializeAccidentAlertSystem() // Define ir sensor and buzzer pins

initializeAlcoholDetection() // Define alcohol sensor pin

initializeDriverFatigueDetection() // Define eye blink sensor and buzzer pins

// Step 2 - Setup

setupAccidentAlertSystem() // Set ir sensor as input and buzzer as output

setupAlcoholDetection() // Set alcohol sensor as input

setupDriverFatigueDetection() // Set eye blink sensor as input and buzzer as output

// Step 3 - Loop

```
while (true) {
    loopAccidentAlertSystem() // Check for ir sensor trigger and send emergency SMS if triggered
    loopAlcoholDetection() // Check for alcohol detection and send alert SMS if detected
    loopDriverFatigueDetection() // Check for eye blink and activate buzzer if eyes are closed
}
```

PseudoCode - Initialization

Accident Alert System:

```
Function initializeAccidentAlertSystem():
    Define ir sensor pin
    Define buzzer pin
End function
```

Alcohol Detection:

```
Function initializeAlcoholDetection():
    Define alcohol sensor pin
End function
```

Driver Fatigue Detection:

```
Function initializeDriverFatigueDetection():
    Define eye blink sensor pin
    Define buzzer pin
End function
```

PseudoCode - Setup

Accident Alert System:

```
Function setupAccidentAlertSystem():
    Set ir sensor pin as input
    Set buzzer pin as output
End function
```

Alcohol Detection:

```
Function setupAlcoholDetection():
    Set alcohol sensor pin as input
End function
```

Driver Fatigue Detection:

```
Function setupDriverFatigueDetection():
    Set eye blink sensor pin as input
    Set buzzer pin as output
End function
```

PseudoCode - Loop

Accident Alert System:

```
Function loopAccidentAlertSystem():
    Read ir sensor value
    If ir sensor value is triggered:
        Call sendEmergencySMS()
    End if
End function
```

Alcohol Detection:

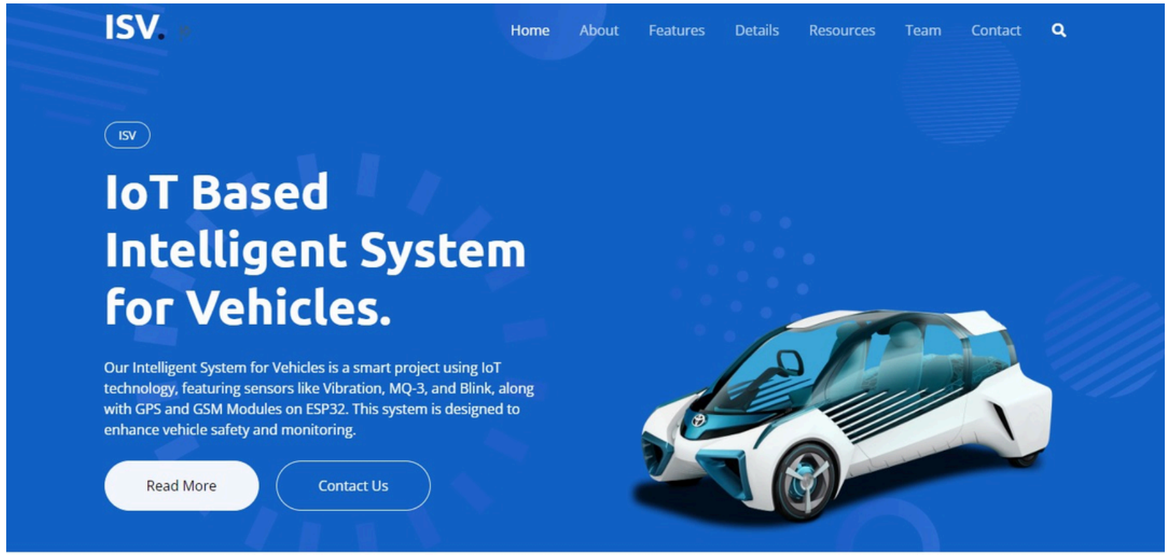
```
Function loopAlcoholDetection():
    Read alcohol sensor value
    If alcohol is detected:
        Call sendAlcoholDetectedSMS()
    End if
End function
```

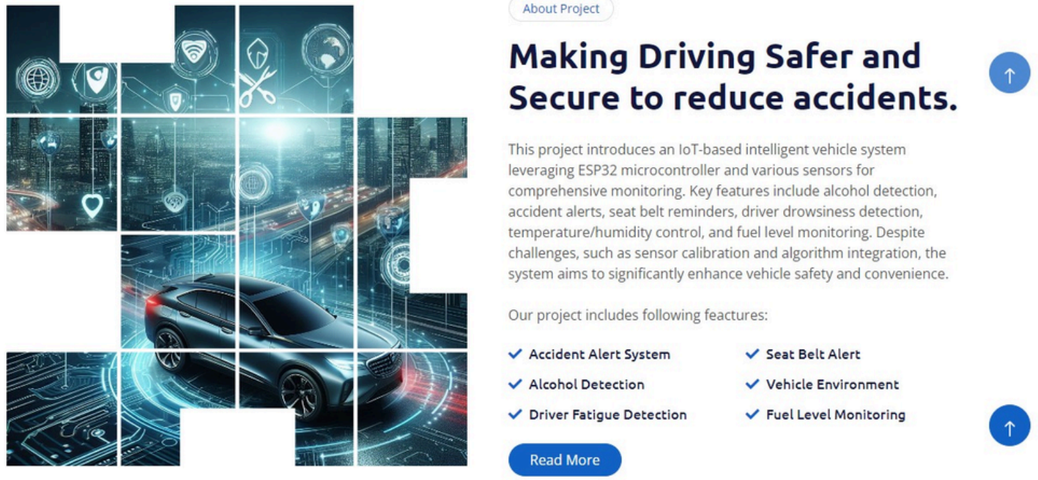
Driver Fatigue Detection:

```
Function loopDriverFatigueDetection():
    Read eye blink sensor value
    If eyes are closed:
        Turn on buzzer
    Else:
        Turn off buzzer
    End if
End function
```

Website Link

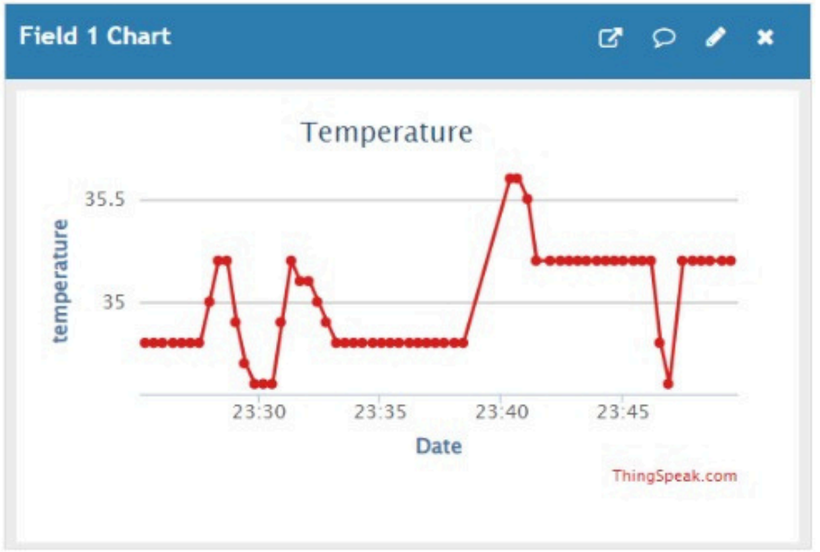
https://gpcet-isv.000webhostapp.com/

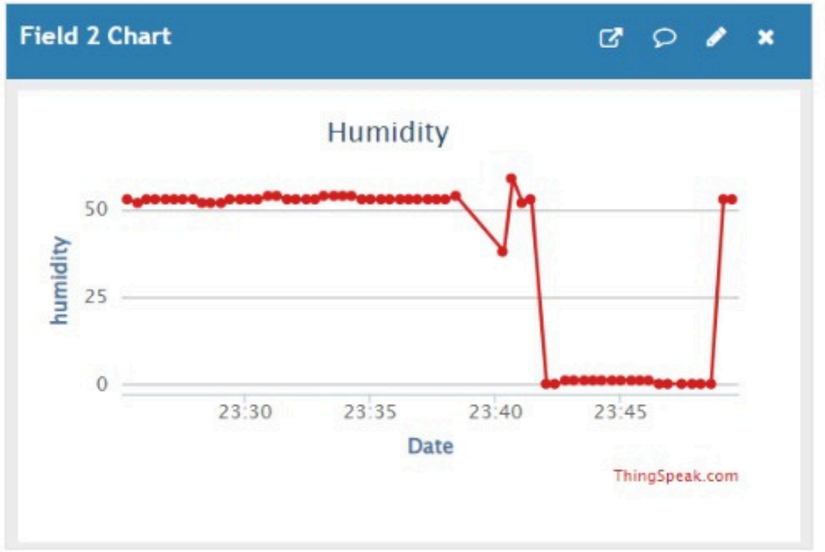


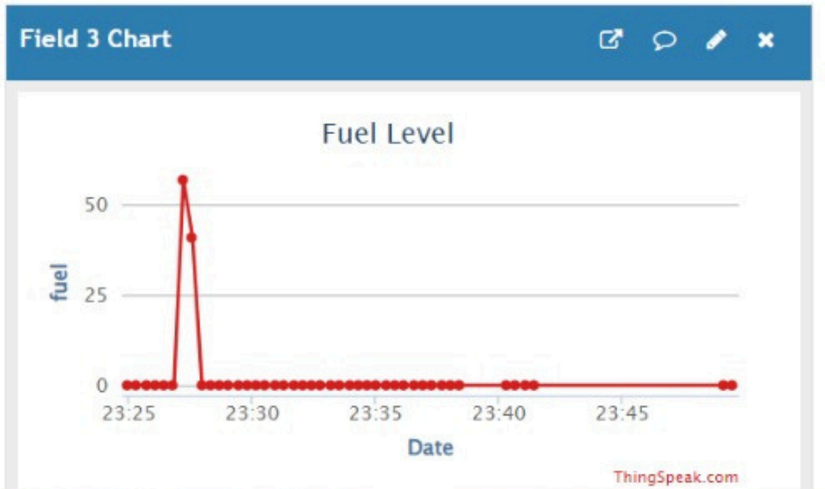


Screen Shots of Output

ThingSpeak™ Channels Apps Devices Support Commercial Use How to Buy AA



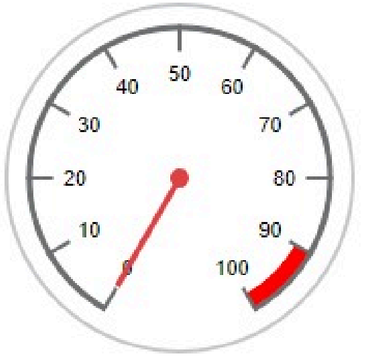




Seat Belt Alert

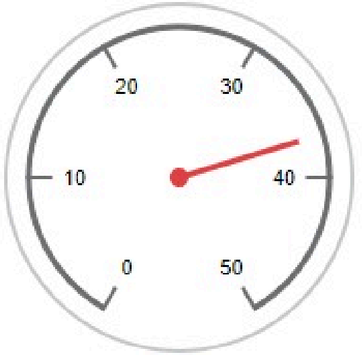
14 days ago

Fuel Level



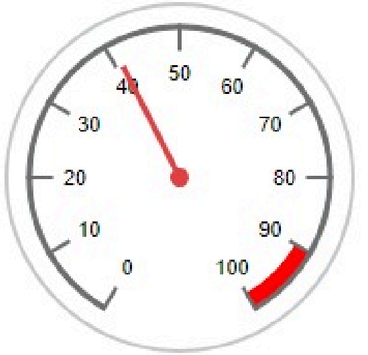
0

Temperature



37.2

Humidity



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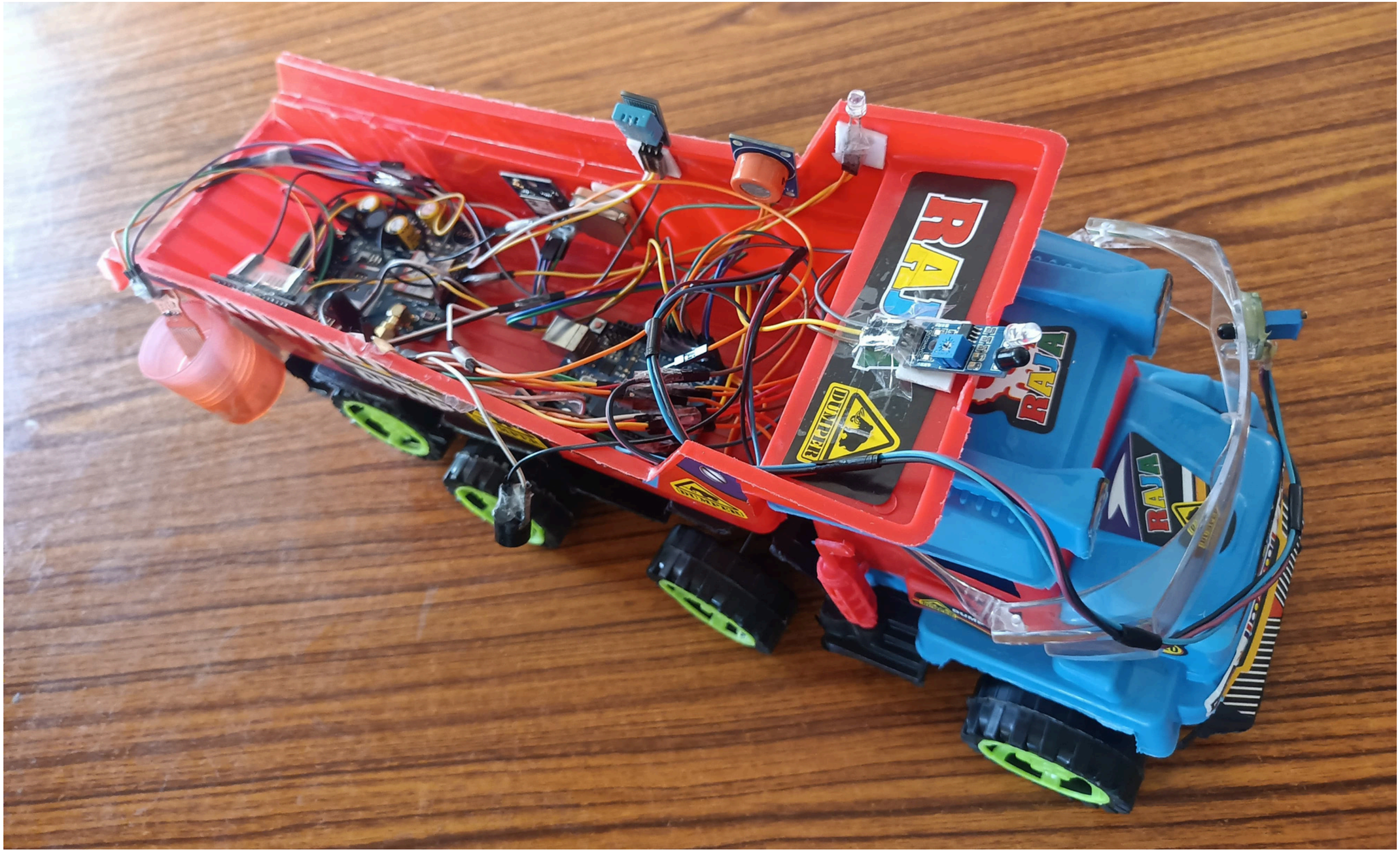
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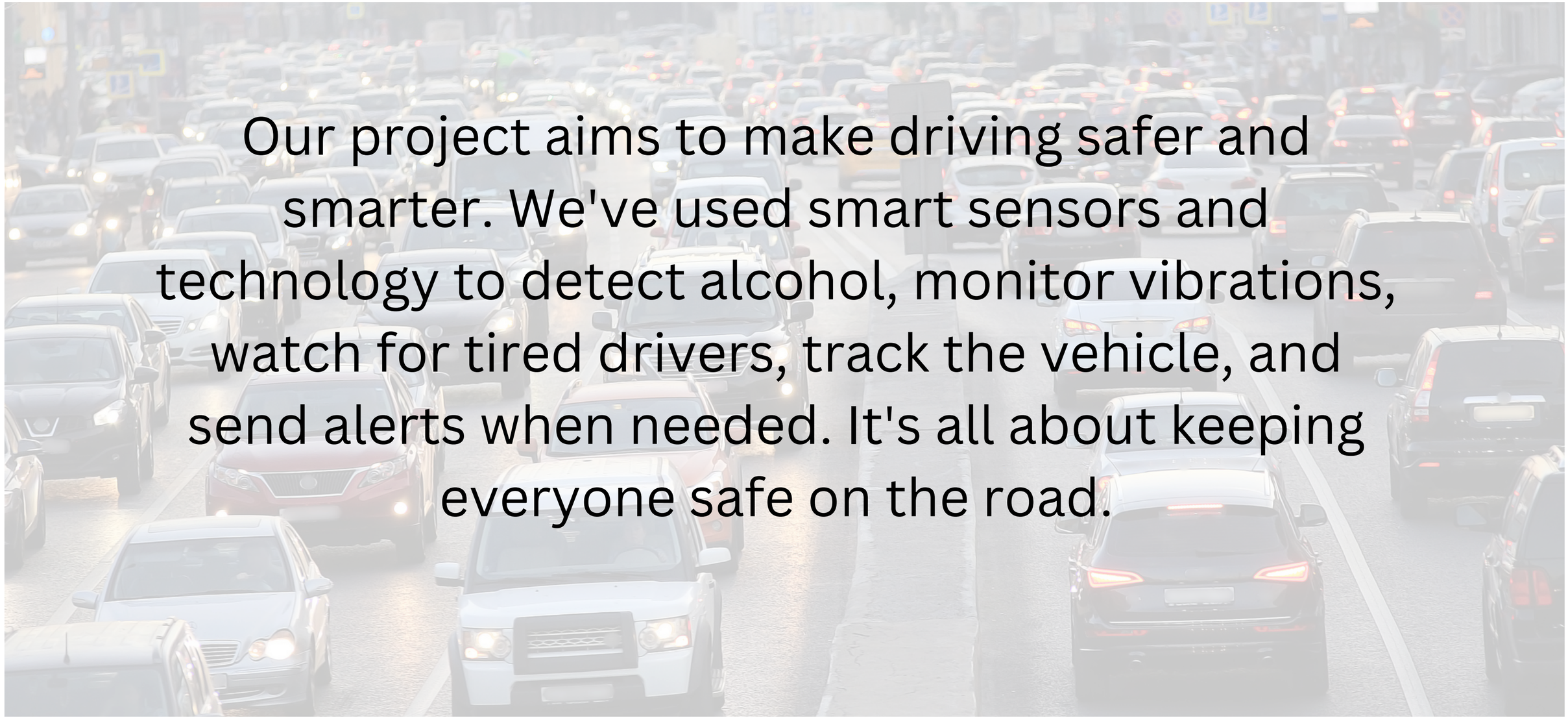
Methodology

- **Research and Requirements Gathering:** Conduct research on existing technologies and use-cases.
- **Sensor Selection and Integration:** Identify appropriate sensors, micro-controllers and integrate them into the vehicle's system. Ensure compatibility with existing hardware and software components.
- **Algorithm Development:** Develop algorithms to read sensor data accurately.
- **Testing and Validation:** Conduct extensive testing to verify the accuracy and reliability real-world performance.
- **Integration and Deployment:** Integrate the System with other vehicle safety features. Ensure seamless operation and user-friendly interfaces.

Future Enhancement

- **Autonomous Driving Support:** Integrate self-driving features for safer and more efficient journeys.
- **Advanced Driver Assistance:** Enhance real-time alerts and guidance for avoiding potential hazards.
- **Predictive Maintenance:** Implement predictive analytics to anticipate and prevent vehicle maintenance issues.
- **Enhanced Connectivity:** Improve connectivity for seamless integration with other smart devices and services.
- **Personalized User Experience:** Develop personalized settings and recommendations based on individual driver preferences and habits.

Conclusion



Our project aims to make driving safer and smarter. We've used smart sensors and technology to detect alcohol, monitor vibrations, watch for tired drivers, track the vehicle, and send alerts when needed. It's all about keeping everyone safe on the road.


THANKYOU