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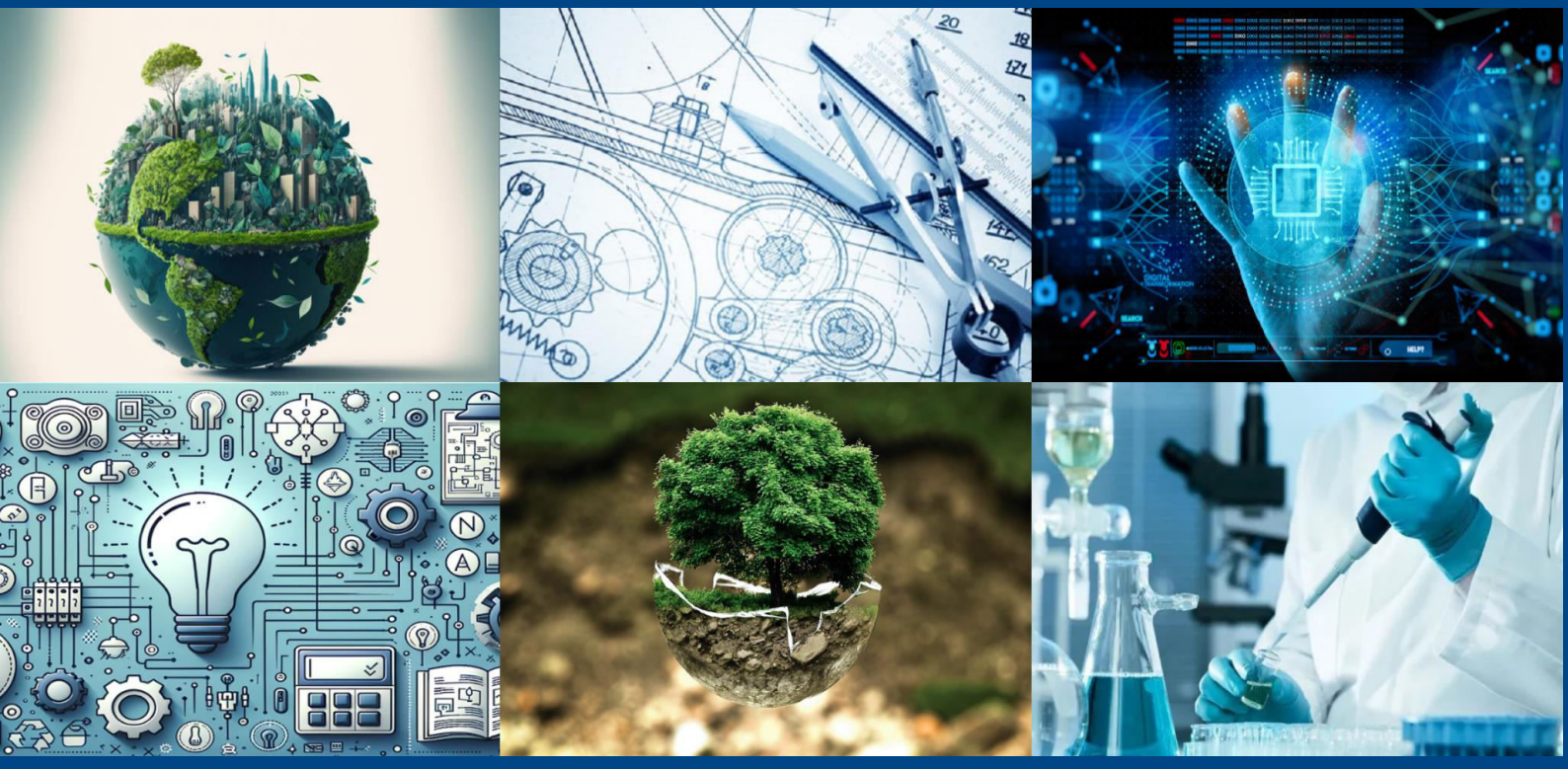

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Accident Alert and Location Tracking System

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ABSTRACT: In today's world, road accidents are a major cause of fatalities due to delayed medical assistance and lack of immediate reporting. This project aims to develop an Accident Alert and Location Tracking System that detects vehicle collisions and sends real-time alerts with the exact location to emergency contacts and a cloud platform for remote monitoring.The system utilizes an MPU6050 Accelerometer and Gyroscope to detect sudden changes in motion or tilting angles, indicating a possible accident. Upon detection, the NEO-6M GPS Module captures the exact latitude and longitude coordinates. The system then sends an SMS alert with the location link via the SIM800L GSM Module to predefined contacts, enabling faster response. Simultaneously, data is transmitted to the cloud via ESP8266/ESP32 WiFi Module, allowing real-time monitoring through a web or mobile application.

KEYWORDS: Accident Detection, GPS Tracking, GSM Alert, WiFi Cloud Monitoring, Real-time Alert System.

I. INTRODUCTION

Road accidents are one of the leading causes of fatalities worldwide, with millions of lives lost each year due to delayed response and lack of timely medical attention. In most accident cases, the absence of immediate notification to emergency services results in increased mortality rates. To address this challenge, this project proposes an **Accident Alert and Location Tracking System** that ensures rapid communication of accident details and real-time location tracking, enabling faster emergency response.The system utilizes an **MPU6050 Accelerometer and Gyroscope** to detect sudden changes in the vehicle's motion, including high-impact collisions and rollovers, which indicate an accident. Once an accident is detected, the **NEO-6M GPS Module** captures the geographical coordinates (latitude and longitude) of the accident location. This information is then transmitted via the **SIM800L GSM Module** to emergency contacts or authorities in the form of an SMS alert, including a Google Maps link for easy navigation.

In parallel, the **ESP8266/ESP32 WiFi Module** sends real-time data to the cloud (using platforms like Blynk, Firebase, or ThingSpeak), enabling continuous monitoring and tracking through a mobile app or web interface. A **buzzer and LED** provide immediate audio and visual notifications, alerting people nearby to the incident.

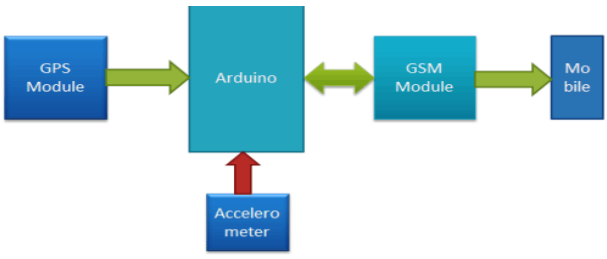

Fig1.Block Diagram

II. OBJECTIVES OF PROJECT WORK

1. Accurate Accident Detection:

Utilize the **MPU6050 Accelerometer and Gyroscope** to detect sudden impact, tilting, or abnormal changes in vehicle motion.

Set predefined threshold values to identify potential accidents and trigger immediate responses.

2. Real-Time Location Tracking:

- Integrate the **NEO-6M GPS Module** to capture the exact latitude and longitude coordinates of the accident site.

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- Send real-time GPS location data to emergency contacts for quick navigation.

3. Immediate Alert Transmission:

- Use the **SIM800L GSM Module** to send SMS alerts containing accident details and Google Maps location links to predefined contacts.
- Ensure reliable and fast communication with emergency services.

4. Cloud-Based Remote Monitoring:

- Implement **ESP8266/ESP32 WiFi Module** to transmit accident data to cloud platforms such as **Blynk, Firebase, or ThingSpeak**.
- Enable real-time data access and monitoring through mobile or web interfaces for better decision-making.

5. Hardware Setup and Connections

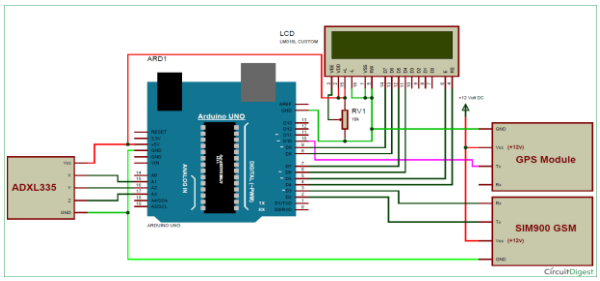

Fig 2. Circuit Diagram

6. ESP32 Setup:

- Connect ESP32 to power supply via USB.
- Ensure Wi-Fi configuration for IoT connectivity.

7. Sensor Connections:

- Soil Moisture Sensor → GPIO32 (Analog Pin)
- DHT11/DHT22 Sensor → GPIO27 (Digital Pin)

Rain Sensor → GPIO33 (Digital Pin)

8. Relay and Motor Setup:

- Relay Module IN Pin → GPIO25 of ESP32.
- Motor connected to relay for ON/OFF control.

III. DATA ACQUISITION AND SENSOR CALIBRATION

3.1 Soil Moisture Sensor:

- Measure soil moisture percentage in analog values.
- Define threshold values to determine dry, wet, and optimal conditions.

DHT11/DHT22 Sensor:

- Measure temperature and humidity.
- Provide environmental data to optimize irrigation cycles.

Rain Sensor:

- Detect rainfall to prevent unnecessary irrigation.
- Stop the water motor during rainy conditions.

3.2 IoT Platform Configuration and Cloud Integration

Platform Setup:

- Use **Blynk** or **ThingSpeak** to establish a cloud connection for remote data monitoring.
- Create a mobile app/dashboard to visualize real-time sensor data.
- Configure triggers and alerts for critical sensor readings.

Wi-Fi Communication:

- Configure ESP32 to connect with the cloud platform via Wi-Fi.
- Transmit sensor data to the cloud for real-time monitoring.

3.3 Data Processing and Decision-Making

Sensor Data Processing:

- Analyze sensor data to assess soil and weather conditions.
- Compare sensor values against pre-set thresholds.

Motor Control Logic:

- If soil moisture is **below** threshold and no rain is detected → **Turn ON** motor.
- If soil moisture is **above** threshold or rain is detected → **Turn OFF** motor.

3.4 Remote Monitoring and User Interaction

Real-Time Monitoring:

- Visualize live data on the mobile app/web dashboard.
- Monitor motor status and environmental conditions remotely.

User Alerts and Notifications:

- Send alerts when soil moisture falls below the threshold.
- Notify users when the motor is activated or deactivated.

3.5 Testing and Validation

Hardware Testing:

- Validate sensor accuracy and motor control performance.
- Ensure stable Wi-Fi connectivity and cloud communication.

Software Debugging:

- Verify correct execution of control logic.
- Test sensor calibration for accuracy.

3.6 System Implementation and Deployment

Final System Deployment:

- Install the system in an agricultural field for continuous monitoring.
- Ensure protection against environmental factors to enhance durability.

Performance Analysis:

- Analyze collected data to evaluate system efficiency.
- Fine-tune system thresholds based on real-time results.

IV. FEATURES OF THE PROJECT

4.1 Accident Detection and Analysis

- MPU6050 Accelerometer and Gyroscope
- Customizable Threshold Values

4.2 Real-Time GPS Location Tracking

- NEO-6M GPS Module

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- Google Maps Link Generation

4.3 GSM-Based Alert Transmission
- SIM800L GSM Module
- Multiple Contact Alerts

4.4 Cloud-Based Remote Monitoring
- ESP8266/ESP32 WiFi Module
- Data Logging and Visualization

V. ENHANCED SAFETY AND HAZARD PREVENTION: ACCIDENT ALERT AND LOCATION TRACKING SYSTEM USING ARDUINO AND WIFI

The **Accident Alert and Location Tracking System** enhances safety by providing real-time accident detection, immediate alerts, and accurate location tracking, ensuring quick emergency response and preventing further hazards. The system integrates multiple technologies such as **MPU6050 Accelerometer, GPS, GSM, and WiFi Modules** to ensure safety and minimize the risk of fatalities.

5.1 Accurate and Timely Accident Detection
- MPU6050 Accelerometer and Gyroscope
- Gyroscopic Analysis for Rollovers

5.2 Real-Time Location Tracking for Emergency Response
- NEO-6M GPS Module
- Google Maps Link Generation

5.3 Instant Communication with Emergency Contacts
- SIM800L GSM Module
- Multiple Contact Notifications

VI. APPLICATION IN VARIOUS TRANSPORTATION SYSTEMS

1. Personal Vehicles
2. Public Transport and Commercial Fleets
3. Industrial and Heavy-Duty Vehicles

VII. DISADVANTAGES OF THE HUMAN SAFETY DEVICE

1. Limited Network Coverage in Remote Area.
2. Power Supply and Battery Limitations
3. Wearability and Comfort Issues
4. Data Transmission Delays and Latency
5. Maintenance and Calibration Requirements
6. Limited Storage and Processing Capacity
7. Risk of False Alarms
8. Environmental and Mechanical Constraints
9. Initial Cost and Implementation Complexity
10. Privacy and Data Security Concerns

VIII. CONCLUSION

8.1 Conclusion

The system detects hazardous conditions such as abnormal motion, harmful gas levels, and temperature changes using multiple sensors. Alerts are generated instantly, notifying miners and authorities to take necessary action. The

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integration of the **NEO-6M GPS Module** ensures that the exact location of the miner is tracked and transmitted during emergencies. The system sends GPS coordinates via SMS and cloud platforms, enabling quick location of affected individuals. The **SIM800L GSM Module** transmits accident alerts and hazardous condition data to predefined emergency contacts. Real-time communication reduces response time and prevents further damage or loss of life.

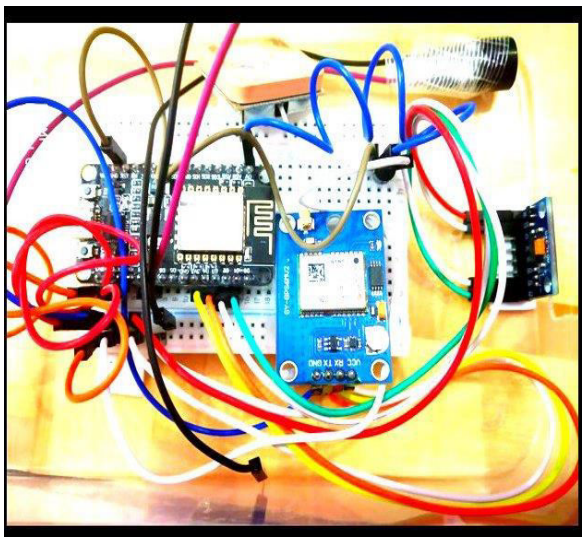
8.2 Future Scope

1. Integration of AI for Predictive Analysis
2. Improved Battery Efficiency
3. Multi-Channel Communication
4. Enhanced User Interface for Remote Monitoring

8.3 Result

- Delivered SMS alerts to predefined emergency contacts within 3-5 seconds after detecting a hazardous event.
- Communication was successfully maintained even in low-signal areas, ensuring reliable alert transmission.
- Provided accurate location coordinates with an error margin of ±2 meters.
- Location data was transmitted to emergency contacts and cloud platforms, enabling real-time tracking.

Test conditions	Success Rate(%)	Response Time(sec)
Accident /Impact Detection	97%	0.5-1.0
Gas detection and alert	96%	< 2
GPSD Location Accuracy	98	2-3



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