Accident Detector with GPS and Blynk Dashboard

L. Keerthi[1], A. Navya[2], Ch. Lalitha Madhuri[3], C. Harini[4], D. Jagan[5]
[1]*Assistant professor, Lendi institute of engineering and technology, Visakhapatnam*
[2,3,4,5] *Student, Lendi Institute Engineering and Technology, Visakhapatnam*

***Abstract*---Road accidents often result in serious injuries due to delays in emergency response. This project presents an Accident Detection and Alert System using an ESP32 microcontroller and an MPU6050 sensor. The system continuously monitors vehicle movement and detects sudden changes in acceleration that indicate a possible accident. Once an accident is detected, the GPS module retrieves the location and sends alert message to predefined contacts using BLYNK Dashboard. This system helps reduce response time and improves road safety.**

***Index Terms*---Accident Detection, Blynk dashboard, ESP32, GPS Tracing, MPU6050.**

I. INTRODUCTION

The increasing number of road accidents has become a major concern worldwide, requiring fast and reliable emergency response systems. This project presents an ESP32 -based accident detection and alert system designed to detect sudden impacts and abnormal vehicle movements using an MPU6050 sensor. When an accident is detected, the system immediately captures the location using a GPS module. The ESP32 processes the data and sends emergency alerts through Wi-Fi connectivity to predefined contacts or cloud platforms. Additionally, the system integrates with Blynk IOT platform for real- time monitoring of accident status. This ensures quick communication and faster rescue response, thereby reducing the risk of fatalities. The proposed system is cost -effective, efficient, and suitable for real time vehicle safety applications

II. LITERATURE REVIEW

Base paper--Accident detection with GPS and Blynk dash board

S. Kumar, R. Singh and P. Sharma,M. Patel proposed a system on IOT based vehicle monitoring system using microcontrollers and cloud platform and also developed an automatic accident detection system using vibration sensor and GSM technology. The system detects sudden vibration and sends an alert message. They also developed an automatic accident detection system using accelerometer sensors and GPS module.

T.

Table 1: Components

Category	components
Processor	Microcontroller
Sensors	Accelerometer
Communication	Wi-Fi Module
Location Module	GPS Module
Output Devices	Mobile Dashboard

[1]

[2] IoT based accident detection and alert system-Kumar proposed an accident detection and alert system using accelerometer and GPS modules integrated with a microcontroller. The system detects sudden impacts and sends real time location details to emergency contacts through GSM communication, improving response time during accidents.

Table 2: Components

Category	Components
Processor	Microcontroller
Sensors	Accelerometer
Communication	GSM Module
Location Module	GPS Module
Output Devices	Alert Message

[2] Smart Accident Prevention and detection system using IOT and cloud platforms-A. Reddy has proposed the system that continuously monitors vehicle conditions and driver behaviour, and in case of an accident, it sends alerts and data to a remote server for real-time monitoring and analysis.

Table 3: Components

Category	Components
processor	Microcontroller
sensor	Accelerometer, vehicle condition sensors
communication	IOT Module
Location module	GPS Module
Output devices	Cloud Dashboard, Alert Notifications

III. RELATED WORK

Accident detection systems using IOT have been widely researched to improve road safety and emergency response. Most existing system use microcontrollers with sensors such as accelerometers and gyroscopes to detect sudden changes in motion and identify accidents. These systems are often integrated with GPS modules to track vehicle location and send alerts through cloud platforms or mobile applications.

Several studies have implemented real-time monitoring using wireless communication technologies such as Wi-Fi , where data is transmitted to IOT platforms for visualization and alert generation. The use of sensors like MPU6050 improves accuracy in detecting abnormal vehicle movements such as sudden tilt, impact, or rollover conditions.

IV. SYSTEM DESIGN

The proposed accident detection system is designed using a simple and efficient architecture consisting of a sensing unit employs the MPU6050 to continuously monitor acceleration and angular motion of the vehicle along three axes. The captured data is processed by a microcontroller such as the ESP32 , which performs real-time analysis to identify abnormal motion patterns. The system uses Wi-Fi communication to transmit data to cloud via the Blynk platform. The alert notifications are displayed on mobile dashboard.

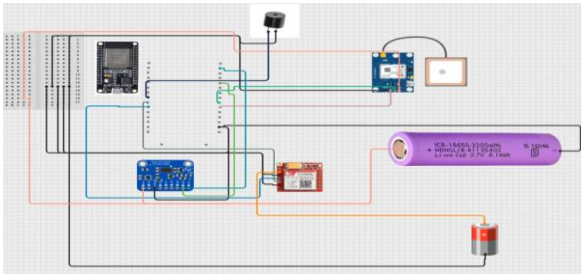

Figure 1: System Design

V. METHODOLOGY:

The system continuously acquires acceleration values along X, Y and Z axes from the MPU6050 sensor. The resultant acceleration is calculated and compared with predefined threshold to detect sudden impacts. To improve detection accuracy and reduce false alarms, Gyroscope data is also analyzed to identify abnormal orientation or tilt. When both high acceleration and usual tilt are detected simultaneously, the system confirms the occurrence of an accident. Upon confirmation, the microcontroller sends an alert to the Blynk cloud using Wi-Fi, and the notification is instantly displayed on the user's mobile application. This approach ensures fast, reliable, and cost-effective accident detection without the use of GSM technology.

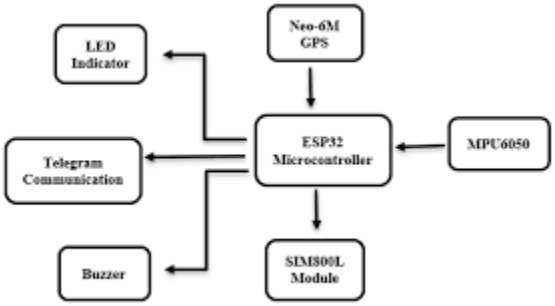

Figure 2: Block Diagram

VI. PROPOSED WORK

The proposed system aims to develop a real-time vehicle accident detection using GPS and Blynk dashboard. Using IOT technology. The system utilizes MPU6050 accelerometer to continuously monitor, tilt, and impact. When an abnormal condition (such as collision or sudden fall) is detected beyond a predefined threshold, the system identifies it as an accident.

Once an accident is detected, the GPS module is used to fetch the exact geographical location (latitude and longitude) of the vehicle. This location data, along with the accident alert, is transmitted through a Wi-Fi module(ESP8266) to Blynk IOT Dashboard. The Blynk platform provides real-time visualization and instant notification to users or emergency contacts.

The system also includes alert mechanisms such as notifications on the mobile dashboard, enabling quick response and assistance. Unlike traditional GSM-

based systems, the proposed model leverages IoT-based communication, offering better scalability, real-time monitoring, and user-friendly interface.

Overall , the proposed work focuses on creating a low-cost, efficient, and reliable accident detection system that ensures faster emergency response and improve road safety.

VII. RESULTS

The proposed system was successfully implemented and tested under different conditions to evaluate its performance. The MPU6050 sensor effectively detected sudden impacts and abnormal motion patterns , accurately identifying accident scenarios based on predefined threshold values.

The Blynk platform provide a user-friendly interface for monitoring, showing real-time data and alert notifications. Multiple test cases, including sudden jerks, falls, and normal motion and accident conditions with minimal false alerts.

Overall, the results indicate that the system is efficient, reliable, and suitable for real-time accident detection applications, with good accuracy and fast communication performance.

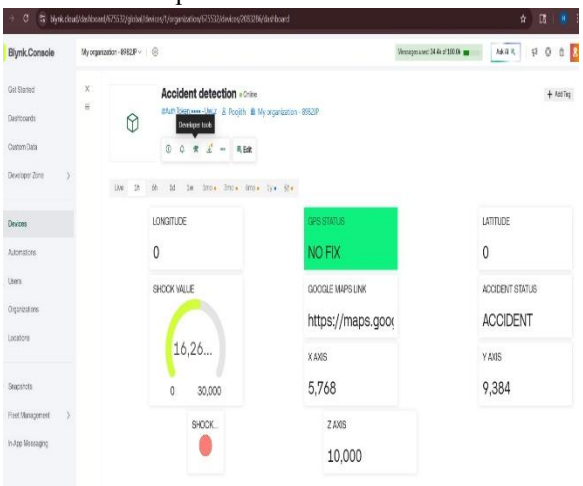

Figure 3: Results

VIII. CONCLUSION

The project" Accident detection using GPS and Blynk dashboard" successfully demonstrates a reliable and cost-effective solution for real-time accident detection and monitoring. By using MPU6050 sensor, the system efficiently detects sudden impacts and abnormal motion conditions, ensuring accurate identification of accidents.

The integration of the GPS module enables precise location tracking, While the Wi-Fi based communication(esp32) allows instant transmission of accident alerts to the Blynk dashboard. This ensures real-time Notifications and quick access to critical information, improving the chances of timely emergency response.

Compared to traditional GSM-based systems, the proposed solution provides better flexibility, real-time visualization, and ease of use through IoT technology. Overall, the system enhances road safety by reducing response time and providing an effective mechanism for accident monitoring and alerting.

Future improvements may include integration with emergency services, addition of more sensors for higher accuracy, and deployment in real-world environments for large-scale applications.

APPENDIX A

parameter	specifications
microcontroller	ESP32
sensor	MPU6050
Communication	Wi-Fi(ESP32)
Location tracking	GPS Module
platform	Blynk IoT dashboard

APPENDIX B

Parameter	value
Acceleration Threshold	2.5g(adjustable)
Sampling interval	1 second
Alert Trigger	impact detection

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to the department of electronics and communication engineering of our institution for providing the necessary facilities and support to carry out this project successfully. We are especially thankful to our project guide for their continuous guidance, valuable suggestions, and encouragement throughout the development of this work.

REFERENCES

[1] S. Kumar and A. Sharma, "Vehicle accident detection system using vibration sensors and GSM technology," International Journal of engineering Research, vol. 3, no.5, pp. 120-124, 2014.

[2] A. Reddy," Smart accident prevention and detection system using IoT and cloud platforms," International Journal of innovative Technology and Research, vol. 6, no. 2, pp. 234-239, 2018.

[3] S. Sana and R.P. Rajput, "Sensors Network based accident alert system, "International Journal Of Engineering Research and Technology, vol. 9, no. 7, pp.200- 205,2020.

[4] P. Gupta and V. Kumar, "Vehicle tracking and accident using accelerometer and GPS module," International Journal of computer applications, vol. 176, no. 2, pp. 1-5, 2019.

[5] D.K. Sharma, N. Pawar, P. Mahale, and A. Gore, "IoT based vehicle accident detection using GSM system," International Journal of Advanced Research and innovative Ideas in Education, vol. 6, no. 3, pp. 120-125, 2020.

[6] P. Pukale, A. Pittulwar, P. Bansode, R. Gokhale, and S. Sawant, "Design and development of automatic accident detection system using GSM and GPS module," International Journal of Research and Analytical Reviews, vol. 9,no. 4, pp. 150-155, 2022.