International Journal of Engineering Research and Science & Technology

www.ijerst.org

ISSN : 2319-5991

Vol. 21 No. 3 (1) 2025

ijerst.editor@gmail.com

editor@ijerst.com

International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com
Vol. 21, No. 3(1), 2025

Research Paper

ACCIDENT DETECTION AND NOTIFICATION USING AWS

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Abstract:

Road accidents are one of the leading causes of death globally, especially in developing countries where response times are slow due to late or no communication. The **"Accident Detection and Notification Using AWS"** project aims to build an automated and intelligent system that detects vehicular accidents in real time and immediately notifies emergency services and registered contacts using AWS cloud infrastructure. The system utilizes sensors like accelerometers, GPS, and gyroscopes connected to an IoT device or mobile app. Upon detecting sudden impact or abnormal motion, the system sends location details and alerts to the AWS cloud, which processes and dispatches notifications via AWS services such as Lambda, SNS (Simple Notification Service), and DynamoDB. This project can significantly reduce emergency response time, save lives, and enable smarter traffic monitoring systems using scalable and serverless cloud technology.

Received: 08-7-2025 Accepted: 16-8-2025 Published: 23-8-2025

I.INTRODUCTION

With the rise in vehicle usage, road safety has become a growing concern. Delays in notifying emergency responders and family members after an accident often result in fatalities that could have been prevented with a quicker response. Manual communication is unreliable and often impossible for unconscious or severely injured victims.To solve this, accident detection and alerting must become automated and real-time. By integrating IoT devices with AWS cloud services, accidents can be detected as they happen and critical information like exact location and time can be instantly shared with responders. AWS provides a robust, scalable, and cost-effective platform to host such applications

through services like AWS Lambda (for event-driven compute), Amazon SNS (for alert delivery), Amazon DynamoDB (for real-time data storage), and AWS IoT Core (for device communication). This system bridges the gap between accident occurrence and emergency response, potentially saving countless lives.

II.LITERATURE SURVEY

1. Patel et al. (2020) developed an Android-based crash detection app using mobile sensors. While effective, it lacked integration with emergency services and cloud-based notification systems.
2. Sharma & Desai (2021) proposed a GSM-based alert system for accident notification. Though simple and cost-effective, the system was limited by coverage issues and lack of real-time processing.
3. Kumar et al. (2019) explored the use of GPS and GSM modules to send location data post-collision. They emphasized the need for automation but faced latency in SMS delivery and limited data tracking.
4. AWS IoT Developer Guide (2023) highlights AWS IoT Core's capability to securely connect billions of devices, process telemetry data, and trigger alerts via Lambda and SNS—making it ideal for this system.
5. Chen et al. (2018) introduced an ML-based model to reduce false alarms in accident detection using accelerometer and gyroscope data. Their work is relevant to improving accuracy in detection.
6. Singh & Rajan (2022) implemented accident detection using Raspberry Pi and cloud notification through Firebase. However, it lacked scalability and enterprise-grade reliability compared to AWS.
7. WHO Road Safety Report (2023) states that nearly 1.35 million people die annually due to road accidents, and timely response could save up to 40% of victims—justifying the importance of real-time alert systems.
8. Zhang et al. (2020) used vehicular ad hoc networks (VANETs) for accident data transmission. Although promising, their model required smart infrastructure deployment, limiting practical use.
9. Miller & Joshi (2021) examined the role of IoT and cloud in emergency healthcare, concluding that serverless cloud platforms like AWS are highly effective in automating real-time

emergency communication.

10. Google Research (2020) developed car crash detection in Pixel phones using sensor fusion and ML, proving the feasibility of mobile-based accident

III.EXISTING SYSTEM

Currently, accident reporting largely relies on human intervention—bystanders, victims, or witnesses making calls to emergency services. This method is prone to delays, inconsistencies, and communication errors. Some vehicle manufacturers integrate crash detection in high-end vehicles, but these are expensive and not scalable to all users, especially in developing nations. Mobile applications exist that track user motion but have limitations like battery consumption, false positives, and lack of direct integration with emergency services. Furthermore, most existing systems do not leverage cloud platforms for real-time, scalable alerting and data processing, leading to fragmented or inefficient responses.

IV.PROPOSED SYSTEM

The proposed system is an IoT and cloud-based accident detection and notification platform using AWS services. An onboard IoT device or smartphone application constantly monitors vehicle dynamics through accelerometer and gyroscope sensors. When an abnormal force (e.g., sudden deceleration or collision impact) is detected, the system captures GPS coordinates and accident data. This information is transmitted via AWS IoT Core to the cloud. A **Lambda function** is triggered to analyze the data and determine if it meets accident criteria. Once confirmed, the system stores the event in **DynamoDB** and sends real-time notifications using **Amazon SNS** to predefined emergency contacts, nearby hospitals, and police stations. The system also supports a panic button feature and can be expanded with AI-based crash prediction or camera input. This cloud-powered architecture ensures real-time responsiveness, scalability, and fault tolerance.

V.SYSTEM ARCHITECTURE

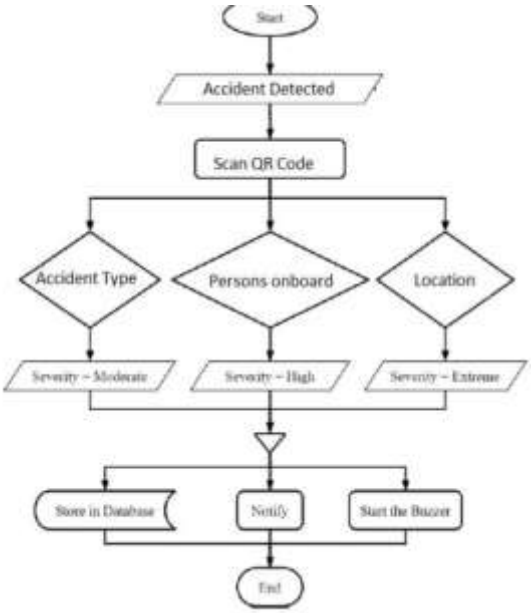

Fig 5.1 System Architecture

The **system architecture** for the *Farmers Agriculture Assistance Chatbot* is designed to provide real-time, reliable, and personalized agricultural support to farmers using a conversational interface. It combines Natural Language Processing (NLP), Machine Learning (ML), speech processing, and backend integration with agricultural data sources.

VI.IMPLEMENTATION

Fig 6.1 Profile page

Fig 6.2 :User Login

Fig 6.3 Contact Information

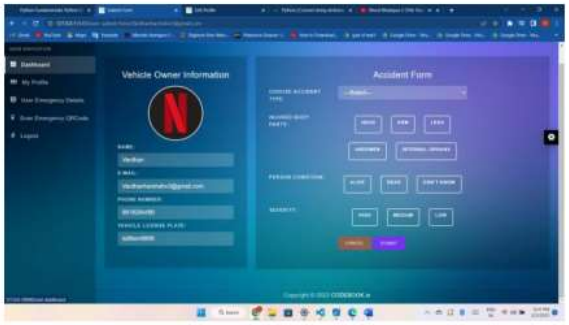

Fig 6.4 Emergency form

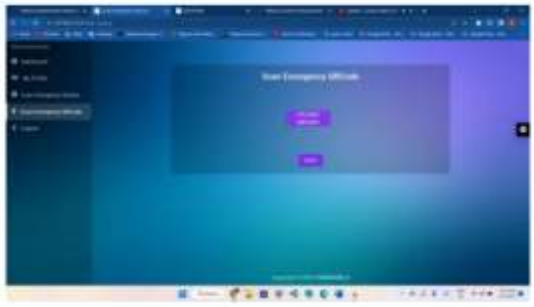

Fig 6.5 Scan Emergency QRCode

VII.CONCLUSION

The Accident Detection and Notification System Using AWS offers a powerful and scalable solution to address the critical time gap between accident occurrence and emergency response. By leveraging cloud services like AWS Lambda, IoT Core, SNS, and DynamoDB, the system ensures fast, reliable, and automated communication of accident data to emergency responders and contacts. It provides a cost-effective alternative to expensive built-in vehicle crash detection systems and is deployable in both developed and developing regions.

Through real-time monitoring, automated

alerts, and minimal human intervention, the system drastically improves the chances of survival and timely rescue. The modularity of AWS infrastructure also allows the system to be extended with advanced features like image processing, AI predictions, and IoT integrations. As smart cities and intelligent transportation systems evolve, cloud-powered accident detection will be a cornerstone of road safety infrastructure.

VIII.FUTURE SCOPE

- This system can be expanded in multiple directions:
- AI-based accident prediction using driving patterns and environmental data.
- Integration with traffic management systems to automatically control nearby signals and redirect emergency vehicles.
- Use of camera feeds and image recognition for accident verification and severity assessment.
- Voice assistant integration for victim interaction post-accident (e.g., Alexa or Google Assistant).
- Development of a centralized dashboard for emergency response teams showing real-time alerts, heatmaps of accident zones, and severity levels.
- Battery and connectivity optimization for rural or low-signal areas using LoRaWAN or MQTT over satellite IoT networks.

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