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# Accident Prevention System Using IOT for Car Safety

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**Abstract:** Car accidents truly can be considered as one of the most disastrous phenomena. Though the reasons can be different for those accidents like the main problem can be driver's unawareness as well as speed. With the help of IoT we can try to prevent as well as reduce the number of accidents. IoT (Internet of things), is one of the most growing technology in IT industries and is used to decrease the burden of human beings. With the help of IoT we are creating a solution for the accident prevention. This is an intention to implement an innovative solution for this problem by developing An Accident Prevention System Using Iot For Car Safety. In this project, we are developing a system which will monitor and help to reduce those accidents. This paper discusses the process of developing a accident prevention system. With the growing population the use of car as became superfluous and this has led to increase in the number of accidents at the alarm rate. This project aims at preventing the accident. In this project, we first applied Eclat algorithm to group the crime locations into 0 level, 1 level, 2 level accident location.

**Keywords:** Eclat algorithm, Clustering, Classification, GPS tracking, Accident.

## I. INTRODUCTION

The number of fatalities resulting from traffic accidents remains alarmingly high, underscoring a global road safety crisis. Each year, approximately 1.3 million people are killed, and around 50 million are injured in road accidents worldwide, which translates to an average of 3,287 lives lost every day. More than half of these fatalities occur among young adults aged 15-44. Around 400,000 individuals under the age of 25 die annually in traffic accidents. Even in countries with robust road safety measures, the number of road traffic deaths continues to rise year by year. Over 90 percent of these deaths occur in middle-income countries, and the situation is even worse in low-income nations. In India, the World Health Organization's (WHO) Global Status Report on Road Safety has revealed that more people die in road accidents in India than anywhere else in the world, surpassing even China. The report calls road fatalities an "epidemic" that is expected to become the fifth leading cause of death globally by 2030. While wealthier nations have managed to reduce road fatalities, the numbers are sharply rising in developing countries. The report further states that 90 percent of road traffic deaths happen in low and middle-income countries, which collectively account for just 48 percent of all registered vehicles. The statistics for India are particularly grim, with at least 13 people dying every hour in road accidents, according to the latest report from the National Crime Records Bureau. Road safety experts believe the true numbers may be even higher, as many accidents go unreported.

## II. LITERATURE SURVEY

Azhar et al. (2023): This study reviewed the use of deep learning techniques like CNNs, RNNs, and LSTMs for traffic accident detection and prediction. By integrating data from traffic cameras, sensors, and GPS, the authors demonstrated how deep learning can effectively identify anomalies and patterns in traffic, improving road safety through proactive accident prediction.

Fernandez et al. (2022): The authors proposed a fuzzy ontology-based system for classifying driver behaviors (e.g., safe, aggressive, distracted) using sensor data (GPS, accelerometer, gyroscope). Their hybrid fuzzy logic and ontological reasoning model outperformed traditional ML in real-time classification accuracy, enhancing driver monitoring and road safety.

Mohanta et al. (2022): They introduced an ML-based accident prediction system using IoT sensor data. Employing algorithms like Random Forest, SVM, and Gradient Boosting, the system accurately predicted accident risks based on variables such as driver behavior, speed, road conditions, and weather, helping to deliver timely alerts and

improve transportation safety.

Onesimu et al. (2021): This research developed an IoT-based intelligent system to prevent accidents caused by poor weather and road conditions. It collects real-time data on vehicle speed, driver behavior, and the environment, and uses ML to predict accidents, sending alerts and making adjustments to avoid potential collisions.

Thaduri et al. (2021): They proposed a CNN-based accident prediction model using traffic surveillance images. The system learned accident-prone patterns and outperformed traditional methods in predicting incidents, emphasizing the effectiveness of computer vision and deep learning in proactive road safety.

Mountain Road Safety System: This study focused on mountainous regions, where sharp curves, fog, and landslides raise accident risks. The proposed IoT-GPS-GSM system monitors hazardous conditions and sends real-time alerts to drivers and emergency services. It addresses gaps in existing systems by improving monitoring and emergency response.

Ajagbe et al.: The authors explored how IoT and CNNs can be integrated for applications like smart surveillance and object detection. They discussed technical methods such as edge computing and transfer learning, addressed challenges like data quality and energy use, and highlighted the potential for automation and real-time decision making in smart cities and transportation.

Han et al.: They introduced LMCA, a lightweight model for detecting anomalies in IoT network traffic. Using an optimized MobileNet and Coordinate Attention, LMCA effectively detected anomalies with high accuracy and minimal computational cost, outperforming conventional models in precision and efficiency.

### III. PROPOSED SYSTEM

The proposed system enables real-time identification and categorization of accident spots using IoT devices and the Eclat algorithm. It allows police to mark accident locations and classify them into danger levels (Level 0, 1, 2) for public awareness. Government authorities can monitor all data, enhancing road safety through informed decision-making and timely alerts.:

#### A. Government Admin:

GovernmentAdmin add the police station, police station can add all accident spot like crime location on map. GovernmentAdmin can view all data.

#### B. Police:

Police will integrate the accident spot of accident and then decide the level of accident according to admin's police decided the danger level of that spot level wise. All spots are to be declared as level wise like Level 0, Level 1, Level 2. These levels are defined by using Eclat Algorithm, using this algorithm the accident spot will be defined in above three level of dangerous zone from which people can be alerted and safely choose their path of travelling.

#### C. Transport Ministry:

The Transport Ministry serves as the central authority overseeing all accident-related data and reports submitted by the Government Admin and Police. It has access to a comprehensive dashboard that displays accident spots categorized into danger levels (Level 0, 1, and 2) as determined by the Eclat Algorithm. This enables the ministry to analyze high-risk areas, identify accident trends, and make data-driven decisions to improve road safety. Using this information, the ministry can implement preventive measures, plan infrastructure upgrades, allocate resources efficiently, and coordinate with emergency services.

### IV. OBJECTIVES

The primary objectives of this project are as follows:

#### A. Speed Alert System:

This system detects vehicles exceeding speed limits using real-time monitoring. Instant alerts are sent to drivers to prevent overspeeding-related accidents. It promotes safe driving by encouraging speed awareness.

**B. Accident Prevention via GPS:**

GPS and map data monitor road and vehicle conditions continuously. Drivers are alerted about accident-prone zones and unsafe conditions. It helps prevent accidents through timely information and warnings.

**C. Location Tracking System:**

Tracks vehicles and accidents using Google Maps in real time. Enables users and authorities to view exact positions for quick action. Aids in faster response and better route planning.

**D. Traffic Data Analysis:**

Analyzes traffic patterns, accident trends, and road usage scientifically. Identifies peak hours and risky behaviors using data analysis tools. Helps implement data-driven road safety improvements.

**E. Accident Hotspot Detection:**

Identifies frequent accident zones using pattern recognition algorithms. Eclat algorithm helps categorize these areas based on severity. Supports focused safety measures in critical spots.

**F. Reduce Road Accident Deaths:**

Smart alerts and monitoring systems aim to reduce fatal accidents. Early warnings and danger level classification improve driver safety. The ultimate goal is to save lives and make roads safer.

## V. SYSTEM ANALYSIS AND FEASIBILITY

The Accident Prevention System using IoT for Car Safety integrates various technologies and devices to monitor and ensure safe driving. The system incorporates sensors, GPS, and real-time data analysis to detect potential hazards on the road. It also provides alerts and real-time data to drivers, helping reduce road accidents. The feasibility of the system depends on the effective use of hardware, software, and communication protocols to ensure quick response times and accurate hazard detection.

## VI. TOOLS AND TECHNOLOGIES USED

**A. Front-End**

- 1) **HTML:** HTML is used to structure the content of web pages, displaying information such as alerts, speed, and hazard warnings on the dashboard.
- 2) **JavaScript:** Used to create interactive elements on web pages, JavaScript enhances the user experience by enabling dynamic updates and responsive actions on the dashboard.

**B. MySQL**

MySQL is an open-source relational database management system (RDBMS) used to store the system's data, such as car information, driver profiles, accident data, sensor logs, and maintenance records. Its robustness and scalability make it ideal for handling large volumes of real-time data.

**C. Arduino Uno**

The Arduino Uno, a microcontroller board, is used to interact with sensors such as accelerometers, GPS, and other IoT devices. It enables the system to collect data and send real-time alerts based on the vehicle's conditions.

**D. Buzzer**

A buzzer alerts the driver to a potential hazard or accident by producing an audible sound. It operates with low voltage and has a high sound output (80dB), ensuring the driver hears the warning clearly.

**E. LCD**

A 2.4-inch TFT-LCD screen displays real-time data like speed, distance, and hazard alerts to the driver. This dis-



play is critical for providing immediate feedback on the vehicle's status and any danger detected by the system.

#### F. Accelerometer

The accelerometer is used to measure changes in the vehicle's acceleration. It helps detect sudden deceleration or movement, which can be indicative of an accident or collision. The accelerometer data is processed and used to trigger alerts if needed.

### VII. DATABASE DESIGN

The database stores all critical information related to the vehicles, drivers, IoT devices, sensors, accidents, and maintenance. It includes the following entities and attributes:

- *Car*: Make, model, year, license plate, VIN, and owner details.
- *Driver*: Name, contact information, driver's license number.
- *IoT Devices*: Device type, make, model, IP address, and location.
- *Sensors*: Type, make, model, location, and data collected.
- *Accidents*: Date, time, location, involved vehicles, severity, and casualties.
- *Maintenance*: Maintenance date, type, cost, and parts replaced.

### VIII. METHODOLOGY

The proposed Accident Prevention System uses IoT-based sensors to continuously monitor vehicle parameters such as speed, acceleration, and location. Data from sensors is processed in real-time using a micro-controller (Arduino), which triggers alerts when potential hazards are detected. The system uses cloud-based storage to record data and generate real-time reports accessible through a web interface. Java and MySQL are employed to build a robust platform for managing user and vehicle data, ensuring scalability and efficient performance.

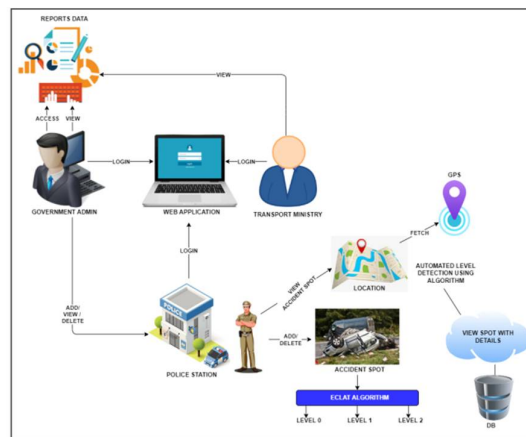


Figure 1: System Architecture

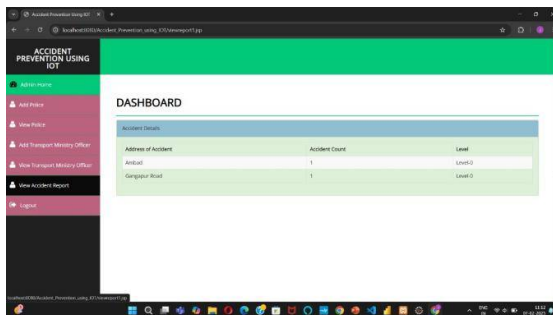
### IX. RESULTS AND DISCUSSION

The proposed system successfully detects accident locations using GPS and transmits alerts via GSM to the nearest emergency services, ensuring timely assistance. The ECLAT algorithm effectively classifies accident-prone areas based on frequency, allowing the system to assign severity levels and prioritize emergency responses. The buzzer alert mechanism for driver drowsiness and overspeeding improves road safety by warning drivers in real time, reducing the likelihood of accidents. The modular system design, with separate interfaces for Government

Admin, Police, and Transport Ministry, ensures efficient data handling, monitoring, and response coordination across departments.

## X. IMPLEMENTATION

The implementation of this system leverages IoT devices, GPS technology, and machine learning models to ensure accurate detection and timely communication of accident risks. The core objective is not only to minimize accident response time but also to prevent accidents before they happen by monitoring vehicle speed, driver alertness, and environmental conditions. With the integration of modules for government authorities, police, and transport ministries, the project ensures efficient data sharing and decision-making. Reduce human fatalities, and support real-time decision-making through automated alerts and data-driven insights.



## XI. CONCLUSION

We have proposed a system aimed at accident prevention, with the goal of making the world a safer place to live. The other on detecting the accident location to assist in tracking and rescue efforts. The proposed system is designed to provide information about the occurrence and location of an accident, making it easier to offer timely assistance to the victims. This system uses a GPS module to locate the vehicle and GSM technology to send accident alerts. The results of the proposed system are promising. The core objective of the accident prevention system is to reduce the chances of fatalities in accidents that are unavoidable. Once an accident is detected, paramedics are alerted and can reach the specific location to improve the chances of saving lives. Ultimately, this system aims to reduce the death toll and fatalities in countries like India and will have significant impact on daily life. Article.

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