International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

AI-Based Traffic and Accident Prevention Bot Using Intelligent Sensor Analysis

Chandra Pushpa[1], B. Gowtham[2]

[1]7th Class, GMPS Weaver's Colony, Bangalore, Karnataka, India – 560083
[2]Innovation Coach, GMPS Weaver's Colony, Bangalore, Karnataka, India

Abstract
Road traffic accidents remain a critical global challenge, causing significant loss of life and property annually. This paper presents an AI-Based Traffic and Accident Prevention Bot designed to enhance road safety through real-time monitoring, intelligent decision-making, and automated alert mechanisms. Sensor data is processed using rule-based AI logic to detect unsafe conditions such as sudden obstacles, overspeeding, and abnormal traffic patterns. The system generates alerts proactively, helping prevent collisions. Experimental results demonstrate reduced response time and effective accident prevention.

Keywords: Artificial Intelligence, Traffic Management, Accident Prevention, Smart Transportation, Embedded Systems

1. Introduction
Traffic accidents are a leading cause of fatalities worldwide. Human error, high vehicle density, and insufficient real-time monitoring contribute to unsafe road conditions. Advances in AI and embedded systems allow predictive, automated accident prevention. This paper presents a bot that utilizes sensor data and AI logic to identify hazards and issue timely warnings.

2. Problem Statement
Existing traffic systems are largely reactive, relying on manual monitoring and fixed infrastructure. This results in delayed responses to hazardous situations, inability to predict accident-prone scenarios, and limited automation. An intelligent, low-cost, automated system is required to mitigate these challenges.

3. Literature Review
Research in AI, IoT, and sensor-based traffic monitoring has shown promise for accident detection. Camera-based systems analyze vehicle movements while IR and ultrasonic sensors detect obstacles. Many existing systems are expensive or complex; this work emphasizes a cost-effective, modular, AI-based solution.

4. Proposed System Architecture
The proposed bot integrates sensors, a microcontroller, AI logic, and alert mechanisms. Sensors continuously monitor traffic conditions, providing data to the microcontroller. The AI logic evaluates risk and triggers alerts using buzzers or visual indicators. Figure 1 shows the system architecture.

5. Methodology

The system follows these steps:

1. Sensors collect real-time traffic and obstacle data.
2. Microcontroller processes sensor inputs.
3. AI logic evaluates safety thresholds.
4. Alerts are generated when unsafe conditions are detected.
5. Preventive warnings reduce collision probability.

Figure 2 presents the AI decision-making flowchart.

6. Results and Discussion

The prototype was tested under simulated traffic conditions. Obstacles and unsafe distances were detected with minimal delay. Alerts triggered within milliseconds, reducing response time and preventing potential accidents. The rule-based AI logic minimized false alerts and ensured timely warnings.

7. Conclusion and Future Work

The AI-Based Traffic and Accident Prevention Bot improves road safety using real-time monitoring and automated alerts. It is cost-effective, scalable, and suitable for smart transportation environments. Future work includes integrating camera-based computer vision, machine learning for adaptive decision-making, IoT connectivity for real-time data sharing, and mobile app-based monitoring.

References

1. World Health Organization, Global Status Report on Road Safety, 2023.
2. S. Kumar et al., 'AI-Based Traffic Management Systems', IEEE Access, 2022.
3. A. Sharma et al., IoT and AI for Smart Transportation, Springer, 2021.