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IOT-DRIVEN VEHICLE CRASH DETECTION AND EMERGENCY RESPONSE SYSTEM

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ABSTRACT

Rapid detection of vehicular accidents and timely notification of emergency services are critical factors in reducing fatalities and mitigating the severity of injuries. This paper presents an IoT-driven Vehicle Crash Detection and Emergency Response System based on the ESP32 microcontroller platform. The proposed system integrates an Vibration sensor to detect sudden impacts or abnormal vehicle movements, indicative of a collision. Upon detection, the ESP32 processes the data in real-time and triggers an automated alert mechanism, sending critical information such as vehicle location and impact severity to predefined contacts and emergency responders via GSM, Wi-Fi, or MQTT protocols. The system also includes optional components such as GPS modules for accurate geolocation and cloud-based monitoring for real-time tracking. Experimental results demonstrate that the system can reliably detect accidents, minimize response time, and potentially save lives by enabling swift emergency intervention. The modular design ensures scalability and adaptability for various vehicle types, paving the way for smarter, safer transportation systems.

KEYWORDS: *IoT, ESP32, Vehicle Accident Detection, Emergency Alert System, Real-Time Monitoring, Vibration, GPS, Smart Transportation*

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