

Accident Detection and Alerting Using Embedded System

¹Ganesh Navnath Surwase, ²Ashish Tukaram Jadhav, ³Krushna Dinesh More,

⁴Ingudam Chitrasen Meitei, ⁵Suhas B Khadake

^{1,2,3} Students, Department of Electrical Engineering

^{4,5} Guide, Department of Electrical Engineering,

SVETI'S College of Engineering, Pandharpur, Maharashtra, India

Abstract: Road accidents are among the leading causes of fatalities worldwide, often exacerbated by delayed emergency response and a lack of real-time information. This paper presents the design and implementation of an embedded accident detection and alerting system designed to reduce response times and enhance road safety. The proposed system integrates multiple sensors, an accelerometer (ADXL335) for detecting sudden motion changes, a vibration sensor (SW420) for sensing impact, and an ultrasonic sensor (HC-SR04) for collision confirmation. These sensors are interfaced with an Arduino Uno microcontroller, which processes the sensor data to accurately identify accidents while minimizing false alarms. Upon accident detection, the system utilizes a GSM module (SIM800L) to transmit an alert message containing the geographical coordinates obtained from a GPS module (NEO-6M) to predefined emergency contacts, including police stations and medical facilities. Both simulation and hardware implementation validate the system's effectiveness in real-time accident detection, location tracking, and rapid alert dissemination. Experimental results demonstrate improved accuracy and reduced response time, thereby enhancing the likelihood of timely medical intervention. The proposed system is cost-effective, portable, and energy-efficient, making it adaptable across different types of vehicles. Potential future enhancements include integration of wireless imaging for accident scene capture and cloud-based storage for data analysis and intelligent transportation systems.

Keywords: Accident detection, Embedded system, Arduino Uno, GPS, GSM

