Abstract

The proposed system introduces a cost-effective and reliable solution for enhancing road safety. Leveraging affordable sensors, wireless communication, and data analytics, the proposed system combines accident detection, driver drowsiness monitoring, and real-time vehicle tracking. It utilizes an accelerometer to detect collisions, an image-pressing system to monitor driver drowsiness, and GPS for precise vehicle tracking. Upon accident detection or driver drowsiness, the system sends alerts via SMS and a mobile app, providing real-time location information. The microcontroller processes sensor data and controls communication modules, prioritizing critical events. Extensive testing demonstrates high accuracy in accident detection (95% in cities, 70% in rural areas), driver drowsiness detection (96%), and unauthorized access detection (97%). The system also excels in detecting accidents in parking mode (95%) and offers a battery backup of 1 day. Comparative analysis highlights this system's superiority in accuracy, comprehensive features, and integration of multiple safety aspects. The proposed system's impact extends beyond individual vehicles, offering opportunities for innovation, economic growth, and sustainable transportation. With ongoing improvements and consideration of ethical and societal factors, this system has the potential to revolutionize vehicle safety and contribute to a safer and smarter transportation ecosystem.