

Accident Detection System (ResQMe) Utilizing an Android Mobile-Based Accelerometer Sensor

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ABSTRACT

Traffic accidents are a leading cause of mortality, often exacerbated by delays in post-accident medical response. This study aims to develop an Android smartphone-based accident detection system (ResQMe) utilizing accelerometer and GPS sensors to automatically detect accidents and send emergency messages. The system reads shock data in real-time, which is then processed using a Low-Pass Filter (LPF) to reduce gravity noise. The data is extracted into statistical features based on the Signal Magnitude Vector (SMV) value through a windowing technique. The Random Forest Machine Learning algorithm is then used to classify shock patterns into safe or accident conditions. The class imbalance problem in the dataset is handled using the `class_weight='balanced'` parameter. Model evaluation shows that the optimal threshold value is 0.8. Based on field testing, the system achieved an accuracy rate of 88% in normal driving conditions and 96% in accident simulations, with an overall average accuracy of 92%. When an accident condition is detected, the ResQMe application automatically sends notifications and location coordinates to emergency contacts via WhatsApp.

Keyword: *Accident, Accelerometer, GPS, Random Forest, Smartphone*