

**IOT AND MACHINE LEARNING-BASED PERSONALIZED HUMAN
ACCIDENT DETECTION AND TRACKING SYSTEM**

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Abstract

Accidents pose a significant threat all over the world, which often results in severe harm and loss. Existing solutions are primarily aimed at vehicle-related accidents and are predominantly based on smartphones, thus leaving a loophole to detect and alert accidents. This research proposes an IoT and machine learning-based personalized human accident detection and tracing system that aims to address this gap. The platform consists of three key components: (1) an IoT enabled smart band with sensors to monitor real-time vital signs heart rate, blood pressure, body temperature and SpO_2 supported by GPS for precise location tracking; (2) a user specific machine learning model that identifies abnormal states of health based on personal physiological patterns; and (3) a cross-platform mobile application that provides real-time emergency alerts and location information to respective responders. The readings from the sensor are transmitted via Wi-Fi to a cloud server to reduce dependency on the victim's smartphone and reduce latency as compared to GSM/GPRS-based systems. The machine learning model was trained using publicly accessible datasets as well as locally collected data and it had an accuracy of 99.44% using a Random Forest classifier. Comparative verification against medical-grade devices resulted in good measurement agreement with Pearson correlation coefficients of greater than 0.94 for all the parameters. Field trials confirmed stable device function, accurate sensor operation and compatibility with Android and iOS platforms, enabling detection outside of automobile contexts. Moreover, provided an extensive locally obtained physiological data set of significant utility for future accident prevention and targeted healthcare research. By curtailing detection to response time and raising predictive accuracy, offers a valuable advance in protecting the public from common accidents.

Keywords: *Accident Detection, IoT, Smart Band, Machine Learning, Mobile Application*