# SafetyDroid - Situational Awareness in Emergency: A Survey

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**Abstract:** *The majority of deaths on road are occurred due to traffic accidents. Speed, driver's carelessness, or late responses from emergency services are the main reason for lost human lives due to accidents. Many lives could have been saved if the emergency service could get accident information and reach it in time. So there is a need for an effective road accident detection system to save valuable human lives. Many efforts have been taken for the system to detect road accidents. This paper presents a state of art techniques used by the researchers for accident detection to save affected persons.*

*Keywords: Situational Awareness, Emergency System, Accident Detection, Android Application, GPS Receiver, GSM Network, Accelerometer, Location Updates.*

## I. Introduction

According to a research paper published by The Lancet Public Health journal, road injury was the leading cause of death. Approximately 1.35 million people die each year [1][2] & averages to 3,287 lives, lost every day [2] as a result of road traffic crashes. Crash injuries are estimated to be the eighth leading cause of death globally for all age groups [3].

Speeding, Driving under the influence of alcohol and other psychoactive substances, distracted driving, and inadequate post-crash care are some of the reasons road traffic crashes. The increase in the average speed of the vehicle is directly related to a crash occurring and the severity of the consequences of the crash. However, most of the time it has been observed that the deaths/severity of injuries that occurred in the road accident is due to the delays in detecting and providing first aid provision for those involved in a road traffic crash, as the delay of minutes can make the difference between life and death. Emergency response time after a crash is a vital element for saving an individual's life.

Recent advances in smartphone technologies are making it possible to detect road crashes in a more portable and cost-effective manner. GPS [4] [5] [10] [11] and GSM module [4] [10] [11] are mostly used for detecting accident location and reducing traffic fatalities. Such systems can help reduce loss due to vehicle accidents by decreasing the response time of emergency services.

## II. Literature Survey

A lot of work has been done for automatic accident detection. Different methods used by the researcher to detect an accident automatically such as accident detection using smartphones, GSM and GPS technologies, VANET, and mobile applications.

## A. Using GSM and GPS [8][10][11]

GPS (Global Positioning System) is a satellite navigation system used to identify the exact location of an incident, speed, time, and direction. The system determines the longitude and latitude of a position where an accident occurs through the GPS module. Then it sends a message which contains the position of the vehicle to the emergency department. Like the author of  implemented a fully automated system that detects the accident using vehicle sensors vehicle, controls the traffic lights, helping to reach the hospital in time. A GPS and GSM module will send the location of the accident to the main server which will rush an ambulance from a nearest hospital to the accident spot. The control of traffic light signals in the path of the ambulance is provided using RF communication that gives to minimize the time of the ambulance to reach the hospital. A patient monitoring system in the ambulance will send the vital parameters of the patient to the concerned hospital.

## B. Using Vehicular Ad-hoc Network (VANET) [9]

In, VANET is used as an accident detection technique with the help of two sensors, a crash sensor, and an airbag system. When these sensors sense an accident, the information is sent to a microcontroller-based system. The location of the accident is determined using GPS and the system sends the location of the accident to a predefined number using GSM. The VANET is used to transmit the message to the rescue team.

## C. Using Smartphones [10]

Car manufacturers like BMW or GM have incorporated a built-in automatic collision notification system. They use sensors like accelerometers and airbag deployment monitors in their vehicles to determine an accident event and send this information using built-in cellular radios to the response center.

Hamid M. Ali et al.[5] proposed a mechanism that distinguishes between the speed variation of the low-speed vehicle and walking or slowly running person. The proposed system consists of two phases; the detection phase is used to detect car accidents at low and high speeds. The notification phase, and immediately after an accident is indicated, is used to send detailed information such as images, video, accident location, etc. to the emergency responder for fast recovery.

Dnyanesh Dalvi et al.[6] presented an "Accident Prevention and Detection System" that uses smartphones to automatically detect and report vehicle accidents on time. The dynamic Time Wrapping (DTW) concept is used to detect how badly the accident has happened. It notifies first responders (the number that is stored as an emergency number) of the accident location and the owner's medical information. A concept of e-Call System is used to calls the nearest emergency Centre.

Nejdet Dogru et al.[7] analyze traffic behavior and consider vehicles that move differently than current traffic behavior as a possible accident using clustering algorithms. The system will collect necessary information from neighbor vehicles and process that information using machine learning tools to detect possible accidents.

Nicky Kattukkaran et al.[8] presented an accident detection system constantly monitor the bike and detect whether the vehicle is in normal driving posture or has fallen. When the bike fall is detected, the body condition or heartbeat rate of the driver is checked. If any abnormality is found, the Android application connected to the accident detection system, through Bluetooth, will send an alert to the nearby medical center about the accident. The system will inform the basic details of the person and the place of the accident using GPS coordinates from the mobile. The system will also inform friends and relatives of the driver, whose contact numbers are already stored in the Android application.

Taewung Kim and Hyun-Yong Jeong et al.[12] proposed an algorithm for detecting an imminent collision in general road scenes. The proposed algorithm consists of crash probability data generated from Monte Carlo simulations that consider driver behavior and vehicle dynamics, a tracking algorithm that uses an interactive multiple-model particle filter, and a threat assessment algorithm that estimates crash probabilities.

## III. Proposed Work

The most likely reason for an individual's death in an accident is lack of the first aid provision that is because of emergency services not receiving information about the accident in time. The proposed system overcomes the drawback of the existing systems by detecting vehicle accidents and report them to the nearest available to help in an emergency. Figure 1 shows the architecture of the proposed system.
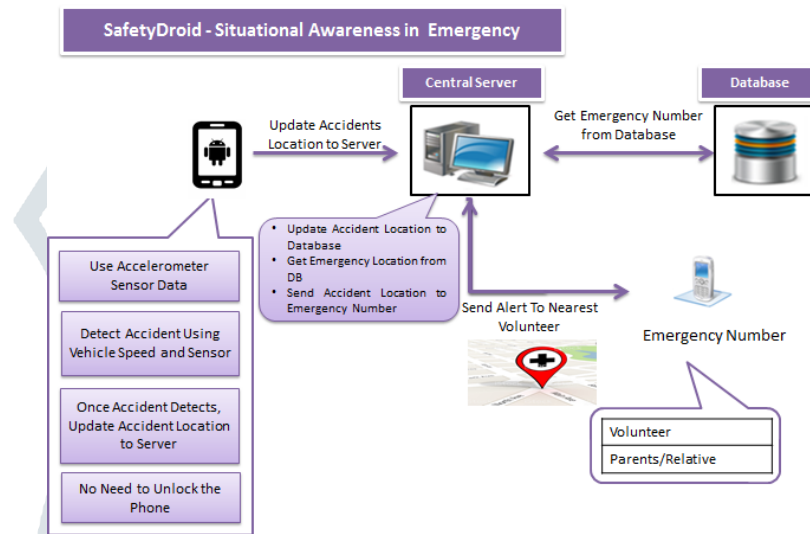


**Figure 1:** Structural Design

The proposed system Accident Detection and Alert System using Android Application proposes to utilize the capability of a GPS receiver to monitor speed of a vehicle and detect accident basing on monitored speed and send accident location to an alert service Center.

## IV. Conclusion

Road traffic injuries cause considerable economic losses to individuals, their families, and nations as a whole. These losses arise from the cost of treatment as well as lost productivity for those killed or disabled by their injuries, and for family members who need to take time off work or school to care for the injured. If an accident victim gets treatment prior, the possibility of saving the life of an individual is increased.

A lot of research has been already done on accident detection. This paper gives the available systems that can detect the accident that increases the chances to save the life of the victim. The abstract view of the system gives the exact location of the accident that the existing system may lac to provide.

# V.    References

[1] "World Health Organization", https://www.who.int/news-room/fact-sheets/detail/road-traffic-injuries.

[2] Arsalan Khan, Farzana Bibi, Muhammad Dilshad,Haider Ali, "Accident Detection and Smart Rescue System using Android Smartphone with Real-Time Location Tracking",(IJACSA) International Journal of Advanced Computer Science and Applications,Vol. 9, No. 6, 2018.

[3] Injury Prevention & Control, "Road Traffic Injuries and Deaths— A Global Problem", https://www.cdc.gov/injury/features/global-road-safety/index.html

[4] Patil Ashish N.1, Yadav Abhilash,"Accident Detection System using Android Application", International Advanced Research Journal in Science, Engineering and Technology,2017.

[5] Hamid M. Ali1, Zainab S. Alwan,"Car Accident Detection and Notification System Using Smartphone",IJCSMC, Vol. 4, Issue. 4, April 2015, pg.620 – 635

[6] Dnyanesh Dalvi, Vinit Agrawal, Sagar Bansod, Apurv Jadhav, Prof.Minal Shahakar, "ANDROID APPLICATION FOR AUTOMATIC ACCIDENT DETECTION", IJARIIE,Vol-3 Issue-2 2017.

[7] Nejdet Dogru, Abdulhamit Subasi,"Traffic Accident Detection By Using Machine Learning Method",https://core.ac.uk/download/pdf/153447891.pdf

[8] Nicky Kattukkaran,Arun George,Mithun Haridas T.P,"Intelligent Accident Detection and Alert System for Emergency Medical Assistance"2017 International Conference on Computer Communication and Informatics (ICCCI -2017), Jan. 05 – 07, 2017, Coimbatore, INDIA.

[9] V. Praveena, A. R. Sankar, S. Jeyabalaji, and V. Srivatsan, "Efficient accident detection and rescue system using ABEONA algorithm," International Journal of Emerging Trends and Technology in Computer Science, vol. 3, no. 5, 2014.

[10]      Bhandari Prachi, Dalvi Kasturi, Chopade Priyanka,"Intelligent Accident-Detection And Ambulance-Rescue System",INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 3, ISSUE 6, JUNE 2014.

[11]      A.Rajkiran1, M.Anusha,"Intelligent Automatic Vehicle Accident Detection System Using Wireless Communication",International Journal of Research Studies in Science, Engineering and TechnologyVolume 1, Issue 8, November2014.

[12]      Taewung Kim and Hyun-Yong Jeong,"A Novel Algorithm for Crash Detection Under General Road Scenes Using Crash Probabilities and an Interactive Multiple Model Particle Filter",IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS, VOL. 15, NO. 6, DECEMBER 2014.