

A Distinguished Approach towards Automated Accident Detection

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Abstract—With various advancements that have occurred in the transportation sectors it has become possible to travel from one place to another swiftly. Road transport has become very feasible due to the betterment of infrastructure and vehicles. Cars and motorbikes have become the most convenient mode of transport. As vehicles have been increasing rapidly, the number of accidents have also sky rocketed. Loss of life due to accidents has been a major issue, which has a negative impact on the economic development of the societies. The number of fatalities due to accidents have been increasing in most of the developing countries and the major cause is due to road accidents that occurs due to improper implementation of quick systems that report accidents to the emergency services for a prompt aid. The survival chances of any victim is highly reliant on how fast these services tend to arrive in order to provide the necessary aids like reporting to the nearest hospital or alerting contacts. In today's advanced scenarios, it is important to provide a more reliable system for providing aid to the people in need. Thus, a system is developed with the help of few sensors like gyroscope, accelerometer and AI sensors to accurately send SoS message to the nearest hospitals and to the kith and kin of the injured person when such events occur. Hence, saving more lives is possible using these technologies

Index Terms— Accelerometer, Gyroscope, Accident Detection, Microelectromechanical System Sensors, Emergency SOS, Modular Structure, Geotagging.

I. INTRODUCTION

Nowadays, road accidents are seen at many places and have become the root cause of death. As large number of people are buying more and more vehicles, the frequency of such accidents are increasing exponentially. Additionally, people nowadays are more careless than they were in the past. There are numerous modes of transportation available in major cities, yet few people adhere to traffic regulations, and as a result, the roads are getting narrower and more congested. Thus, such accidents tend to happen. They not only create material loss, but also human loss. Therefore, regardless of the form of transportation used to travel, people need to be considerably more mindful when doing so. Due to the rise in these incidents, even people who stroll on foot are not safe. We learn about accidents every day via family members, the news, and occasionally even firsthand. About 1.35 million people pass away due to road accidents annually, also around 20 to 50 million people tend to suffer from mild and non-fatal injuries due to road accidents which results in various disabilities because of these

injuries. According to a World Health Organization study on road accidents and fatalities that are related to a country's financial situation, poor and middle-class persons in developing countries account for the majority of fatalities from vehicle accidents. The mortal rate of developing countries is close to 21.51 per million people, which is huge when it is compared to the 11.4 per million people with greater source of income or those belonging to the evolved countries. According to statistics, developing nations account for only 50% of the world's autos, however they account for over 90% of road traffic fatalities. According to statistics, 13 persons in India lose their lives in traffic accidents every hour. But when we look at real-life cases, things can get even worse, as many accidents simply go unreported. India is now fast becoming the number one country for road traffic casualties, with an average of 13 fatalities per hour, equivalent to about 140,000 per year. Therefore, an efficient automatic accident detection system with the ability to send an automatic notification to the emergency service with the accident location is of prime importance for the betterment of society.

II. PROBLEM STATEMENT

The number of vehicles and commuters have drastically increased in the past few years, especially in densely populated countries. Commuters use different kinds of vehicles to travel to their desired locations, be it the same every day, or a new place.

Along with increasing demand of automobiles, an increase can be seen in the number of accidents as well. 1.33 million people lose their lives annually due to road accidents. This statistic is more than adequate enough to display the worldly crises of road safety & creates a requirement to enhance the road safety amenities & rescue operation system.

In majority of the cases when an accident takes place on the road, the rescue team or the respected authorities are not informed on time. Moreover, the delay that is caused by the rescue team in arriving at the site of accident & the heavy traffic congestion on the path to the accident site and the hospitals increases the risk of death for the victim. In such scenarios, each second is very precious, it's a matter of life or death for the victim.

In many cases, it would be likely that the victim would be too injured to move, rather, be unconscious. In such situations, having a system which could contact the respected authorities automatically could be a lifesaving moment. For cases of a false alarm, user should be able to cancel the prompt.

III. LITERATURE REVIEW

[1] In one of the papers, the concept of GPS receiver to get information about vehicle speed to detect an accident was proposed. The GPS system monitors and compares with previous values using a Microcontroller. Sudden deceleration over a certain limit is declared to be an accident.

[2] The author proposed the concept of the accident detection system to detect the accident by using the airbag sensor present inside cars. The other functions are taken care with the help of GPS and GSM.

[3] The author proposes that accident is detected from map matching algorithm and sends accident location to an Alert Service Center. That data is sent to the Server. The current speed is compared with the previous speed every 0.1 seconds. In this system, If the speed drops below the calculated safe threshold speed, the system detects an accident. Locate the vehicle from the map matching module and generate an accident situation if the vehicle is outside the road network. This significantly reduces false positives of accidents. The proposed system saves many accident victims with timely rescue.

[4] The author proposes that this automatic crash detection system immediately detects changes in acceleration and notifies the emergency contact via text message, providing the location and time of the accident. In this work a logic is used as a decision aid embedded in a smartphone application that analyses incoming data from sensors and makes decisions based on a set of rules.

[5] The author is making use of accelerometer, gyroscope and a sound sensor to determine the accuracy of an accident based on a mathematical formula. It had a collision index where depending upon its value you can determine whether the accident is mild, medium or severe based on which the a suitable action will be taken.

In paper [6], the project has an autonomous security system which provides situational awareness and safety. Its making the use of microcontroller, vibration device and a GSM. GSM will produce a message which will be used as a trigger, which then would be forwarded to the nearest hospital, police station, fire brigade and the SOS contacts.

[7] This paper will be making the use of RaspberryPi. Any obstacle will be sensed by the vibration sensor, and an interrupt will be sent to RaspberryPi. The GPS will pinpoint the location of the accident and forward it to a mobile number. The mobile number can be changed anytime. LED used in the circuit would display the message

reception. LED is interfaced to some of the ports of RaspberryPi which is used to view the current status of the GPS modem.

[8] This paper is making the use of Atmega320P microcontroller. The system is divided into two parts, that is the receiver and the transmitter. The transmitter will be controlling the velocity of the vehicle by using the RF transmitter. It is placed at a certain distance in that zone. The different sensors being used are intelligent sensors that can detect smoke and alcohol. The piezoelectric sensor will also be used which will be used to detect the signal when the collision occurs.

[9] The author introduced a scheme that incessantly share information associated to the location and speediness of one vehicle to other using mobile phone. Various ML (Machine Learning) algorithms are utilized to analyse the obtained information and deliver the data about conditions of the road and detection of detection. Regrettably, the outcome of this ML algorithm illustrates the worst precision in recognition of accidents.

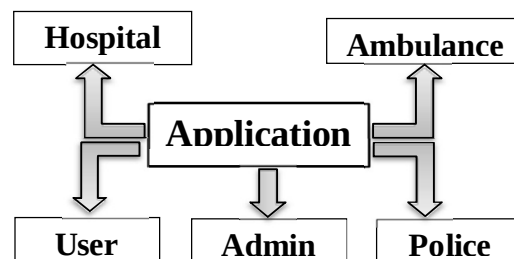
[10] The author proposes which uses module such as GPS, accelerometer, gyroscope, GSM, and auto-dialer. In this system, the MPU6050MEMS sensor is used to detect the accident by using the 3-axis accelerometer and gyroscope. And the GPS module tracks the location of the accident which is sent to emergency providers. After that, the auto-dialer feature automatically informs the victim's family about the accident. In one of the works.

IV. PROPOSED SYSTEM

This system would be built in android with a neat and clean look. It would be reading the values from the accelerometer and gyroscope sensor. With these values, it will be able to predict an occurrence of an accident.

The readings will be fine tuned for greater accuracy. A car travelling at high speeds coming to a halt within a certain time limit would trigger the accelerometer flag. The car toppling over or spinning around on a different axis would trigger the gyroscope flag.

Upon successful detection of an accident, the SOS messages will be sent out to the emergency services and close contacts automatically. It will have an option to cancel the process with a limited wait time, in case of a false alarm. Considering the anomalies in the existing system computerization of the whole activity is being suggested after initial analysis. The android application is developed using Android Studio with JAVA as a programming language. Proposed system is accessed by five entities namely, Admin, Ambulance, Hospital, Police and User. User need to login with their valid login credentials first in order to access the android application. User successful login, User can access all the modules and perform/manage each task accurately. User can perform task such as user can view and update details also involves Emergency contacts. User can start and stop tracking, show details of sensors and measures. Sensor calculations, sound meters and GPS. Assign Ambulance if accident is detected. Here user will get logs and accidents detected history. User will be Notify of the detection. User can kill the Process if its false alarm. Ambulance can login using credentials. In home Ambulance will get current Alarm Route, Details on Google Map and can get Navigation on Google Map. Ambulance will get Accident notification. Admin can login using credentials. Admin can add, update, delete and view hospital. Admin can add, update, delete and view ambulance of Hospital and for General. Admin can view users. Admin can view accidents date wise. Hospital can login using credentials. Detect Current Accident and allotted to the current hospital Details of the accident. Date wise list of accidents cases allotted to me. Hospital can add, update, delete and view ambulance. Hospital will get notification of Accident. Police can login using credentials. Police will get list of all Today's Accidents and all others date wise. Police will get accident notification.



A. Modules

1) User: Register: User can register and obtain credentials. Login: User can login using credentials. Profile: User can view and update details also involves Emergency contacts. Home: User can start and stop tracking, show details of sensors and measures. Background: Sensor calculations, sound meters and GPS. Assign Ambulance if

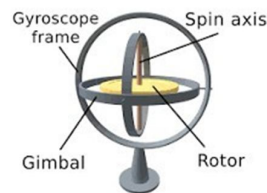
accident is detected History: Here user will get logs and accidents detected history. Notifications: User will be Notify of the detection. User can kill the Process if its false alarm.

2) Ambulance: Login: Ambulance can login using credentials. Home: Here Ambulance will get current Alarm Route, Details on Google Map and can get Navigation on Google Map. Notification: Ambulance will get Accident notification.

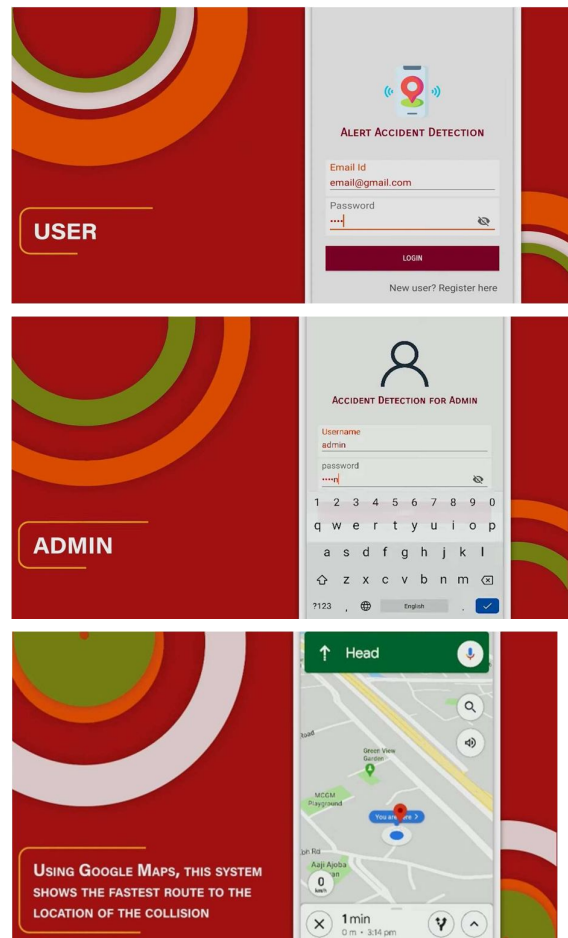
3) Admin: Login: Admin can login using credentials.

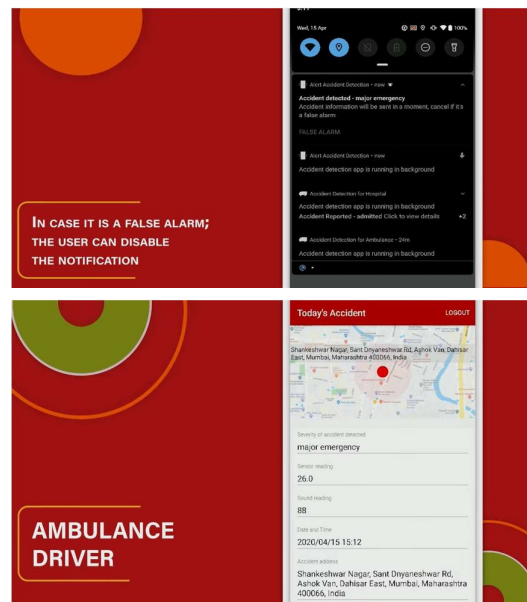
Manage Hospital: Admin can add, update, delete and view hospital. Manage Ambulance: Admin can add, update, delete and view ambulance of Hospital and for general. View Users: Admin can view users. View Accidents: Admin can view accidents date wise

4) Hospital: Login: Hospital can login using credentials. Home: Detect Current Accident and allotted to the current hospital Details of the accident. List: date wise list of accidents cases allotted to me Manage Ambulance: Hospital can add, update, delete and view ambulance. Notification: Hospital will get notification of Accident.



5) Police: Login: Police can login using credentials. Home: Police will get list of all Today's Accidents and all others date wise. Notification: Police will get accident notification.





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