



Automatic Accident Detection

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Abstract:

Smart phones nowadays comes with pre embedded sensors that can give safety to the two wheeler riders on road. The three axis accelerometer and a GPS tracking system of smart phone can give assistance to the driver while travelling. The three axis accelerometer of an Android based smart phone is used to keep check various and external road conditions that could be fatal to the driver. With real time analysis and alerts of these factors, we can increase a driver's overall awareness to maximize safety. Google Map is used to create road maps using GPS coordinates at regular intervals. In addition to this the accelerometer can be used to design and implement a fall monitor with GPS system and GSM module This paper describes, how smart phone could be used to detect accidents and provides an ambulance to certain location using Accelerometer and GPS and minimizing the delay involved while providing ambulance support by the application proposed as automatic accident detection (AAD).

Keywords: GPS, GSM, EMS, AAD, SMS.

I. INTRODUCTION

The rate of death due to road accident has increased tremendously, especially accident occurs on roads. Delay in providing Emergency Medical Services is the cause of the high rate in road traffic accidents in countries like India. Thousands of people are dying because ambulances takes too long to answer emergency calls. Human life is too precious to be lost in road accidents which are one of the major cause for fatalities in India. There is delay involved in each and every stage of the process right from detecting accident, dispatching an ambulance till the patient is safely handed over to the casualty. We wanted to automate the whole process to reduce the delays in each stage. This system is used to integrate the user and ambulance services with the use of internet to save time and life. System constitutes of client and server application when the accident detection module reports an accident by using three axis accelerometer to the cloud sever that would automatically dispatches the nearest ambulance by processing the GPS coordinates and providing specific route to the certain accident spot. The android application used by the ambulance driver assists the driver to reach the location quickly and safely. We also wanted to help two wheeler driver to use phone in very secure way so that he/she can primarily concentrate on road without any hassle.

II. PROBLEM DEFINITION

When individual met with an accident which might be a very critical situation as their lives are on stake where no one can rely on passerby or the strangers for the needful help and cooperation. So it is very important to get to the optimal solution that might be a life line for the individual.

III. LITERATUE SURVEY

Now a days Two-wheelers remained the most unsafe mode of transport, not just for rider but also for others on road. Crashes due to two-wheelers resulted in 52,500 riders died in road

accidents, which is nearly 35% of total road deaths in 2016. The transport ministry has taken some initiatives, including mandatory installation of anti-lock braking system in two-wheelers but it takes additional cost. In 2017 saw 3% decline in road accident deaths but Indian roads were equally unsafe so main purpose of everyone to reduce accident rate of two wheelers and save lives. It saves by detecting accident on time and providing emergency services.

In this framework, we work on accident detection technics by referring following papers, in [1] author proposed solution to detect accident by accelerometer. Which used raspberry pi to keep track of the accelerometer readings. In [2] GPS and GSM framework used for accident detection and send quick message to the relatives. Another work of dispatching emergency services to appropriate location is done by using Analytic Hierarchy Process (AHP) in [3]. Where the author proposed all this system fully automated using different sensor on every stage in [4]. In [5] author design system which used sensor which forming an IoT network and cloud server to store all information. In [6] framework includes a microcontroller-based low-cost Accident Detection Unit (ADU) that contains GPS and GSM modem. In [7] used low cost RF modules, a microcontroller, LCD module and accelerometer for accident detection and reporting system. Where other gives importance to victim condition by using victim analysis in [8]. In another studies HMM and Machine learning framework used for riding pattern recognition and naturalistic riding study [9].

Another framework which monitors the vehicle through an On-Board Diagnostics interface [10]. In this paper we studies all above paper and basic idea to detect accident by system which available to every two-wheeler easily and reduce delay in providing emergency services to victim. So here we came up with new idea which implement fully automated system for all process.

IV. PROPOSED WORK

This paper proposes a framework which consists of an android application, which assists the ambulance driver to the accident location.

The whole system constitutes of three main units:-

1. Vehicle unit
2. Ambulance unit
3. Cloud Server

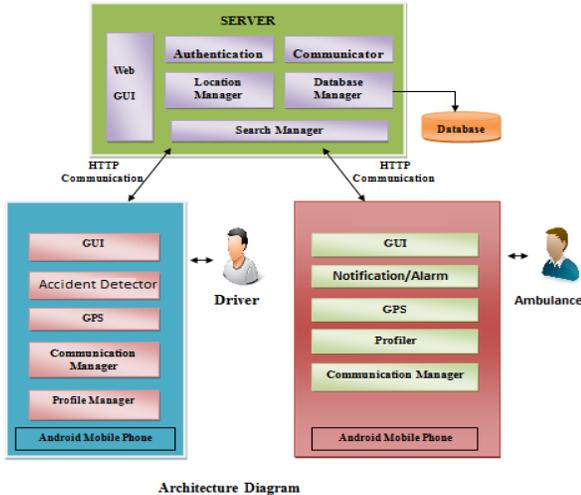


Figure.1. Architecture diagram [1]

1) Vehicle unit

Pre embedded triple-axis accelerometer in smart phone which is capable of keeping track of acceleration in all three directions. Output is obtained as it experiences a specific threshold of impact and then checking it upon the values of sensitivities as provided in the application beforehand.

Table.1. Three axis accelerometer [1]

Axis	Direction	Typical Driving
X-axis	Left/right	Turning/Lane change
Y-axis	Front/Rear	Acceleration/Braking
Z-axis	Up/Down	Road obstructions

GPS is a key technology being used in many applications. One such application of GPS would be used in tracking vehicle and monitor its position at regular intervals. Such a way provides the exact location and distance. These latitude and longitude positions would be used to determine the location of the smart phone by the ambulance driver to minimize the delay providing adequate measures to avoid any mishap.

2) Ambulance Unit

It is important to relay the information to the nearest ambulance by using shortest path algorithm and also guides the ambulance driver to accident site. The android application developed would

use Google Maps web services like traffic layer, and assists the driver to choose a quickest route available. The location of the ambulance are constantly conveyed to the server through smart phone at regular intervals. The ambulance driver should give confirmation once the patient handed over safely to casualty. These records are been saved in the database for future use.

a) Ambulance Management

The server is responsible for keeping track of all the ambulances, identifying the accident locations, dispatching nearest ambulance and finally reporting and entering the record in the database. AAD application would be used for collecting all the accident as well as ambulance locations from POST request.

3) Cloud Server

Cloud is a web service that provides secure, resizable compute capacity in the cloud. It is designed to make web-scale cloud computing easier for developers. Cloud computing is the delivery of computing services including servers, storage, databases, networking, software and many more. Company offering these computing services are called as cloud providers and typically charge for cloud computing services based on usage.

The use of the cloud technology in this project would be as following:-

- 1) Store, backup and data handling.
- 2) Host websites and blogs.
- 3) Deliver services on demand.
- 4) Analyze data for patterns and make further predictions for the future references.

Benefits of the cloud technology like cost effective, capable of processing data at high speeds, productivity, performance as well as availability at global scale give an optimal reliable way to handle the data at its best.

V. SYSTEM FRAMEWORK

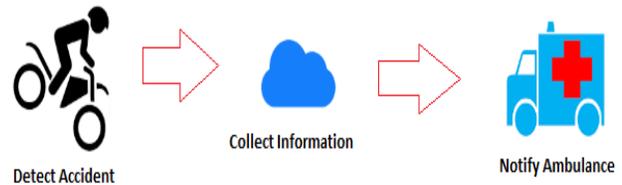
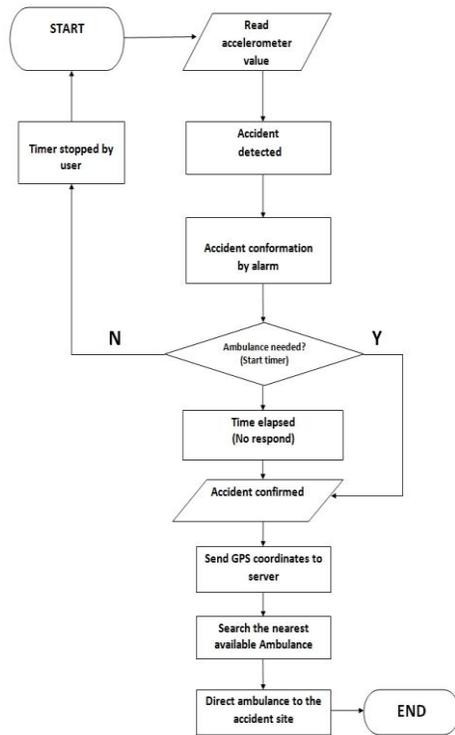


Figure.2. Working of the system [2]

The system would use an android platform device that comes with GPS, accelerometer and mobile data as prerequisites. The application has been divided in such a way that one is for the two wheeler riders and other interface would be for the ambulance drivers as both of them would be required to register and save their information in the application which would maintain their log and various information about their location at regular intervals of time. As the individual install the application in the device it will ask for the information like name, kin number for the SMS broadcasting which would inform the kin of the particular individual in the case of accident detection. The SMS would include time, date as well as the GPS coordinates with the information about ambulance and the ambulance driver which is directed to the accident site so there wouldn't be any complication for the relative as they are notified about every needed detail. Now the ambulance would reach on accident site and would take the critically injured individual for the casualty where the adequate treatment would be provided. All the

information would be saved in the databases in cloud which would be only accessible to the admin who can retrieve maintain the data log and records for the usage.

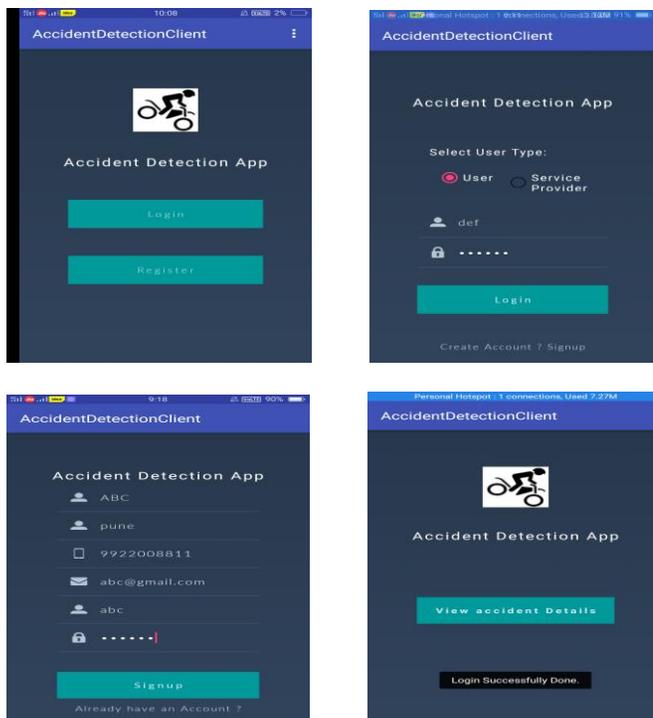
The simple flowchart for the whole framework provided as



following:

Figure.3. Flow chart diagram [3]

VI. APPLICATION INTERFACE



VII. CONCLUSION

Automation of the whole accident detection and ambulance dispatch, along with assisting the ambulance driver to the

accident site with the route by using Google map up to the site by the use of "Automatic Accident Detection", achieved here. The whole process resulted in minimizing the delay of the ambulance to approach the accident site for the treatment of the victim. Therefore size, cost and reliability is much than to install any additional component especially designed for this particular purpose of accident detection.

VIII. REFERENCES

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