

Potential Mobile Applications to Improve Road Safety in Developing Countries

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Abstract: *This paper focuses on how mobile internet is changing the face of transportation engineering and how it can further improve the road safety and decrease the number of fatal accidents. Research and innovation on the development of mobile applications have been rapidly gaining momentum around the world. Mobile applications if deployed in transportation safety can have a significant impact on the transportation systems. The aim of the paper is to provide systematic overview of the main studies and the projects addressing the use of the mobile phones and their applications to obtain the traffic data in a much economic way than the traditional ones. The paper highlights background and data retrieval from the GSM network and then leading to the main research issues connected with the use of the mobile phone data in the transportation safety. It also discusses about potential mobile applications that can be developed in the field of transportation safety through which the anticipated results highlight and address the factors and issues that influence accuracy, reliability, data quality, which can be of great aid to transportation planners, environment, and road users and to the decision makers.*

I. Introduction

In India it is very difficult to know where and why traffic accidents are occurring. There is no sense of intimation and estimation of the accidents that have occurred in the past. Which limits the research in transportation safety studies and India being ranked among the highest contributor of road accidents it is very important to address this issue. There is great need of such techniques to record and store the accident data for better data analysis and mining so as to direct the road users in the safe and the better environment. The development of mobile applications and use of mobile phones or electronics has been introduced way ahead in the stream of Intelligent Transportation System (ITS). Though this technology demands real time high quality traffic information, the undergoing pressure for improving traffic management, collecting traffic and accidents data have been evolving considerably and the access to real-time traffic information is becoming routine worldwide. The idea of collecting traffic data through mobile phone application or GPS is unique as the use of traditional on road sensors for collecting data doesn't prove to be much effective due to their limited coverage and expensive costs of implementation and maintenance. The traffic accident data collection through mobile applications would not only improve traffic management but would also help in satisfying the growing demands of the users – as they will have access to the real-time information which will definitely help with much deeper insights about the traffic patterns, record the exact number of accidents and improve the road safety. The impact of rapid Incident Detection on Freeway accidents fatalities focuses on reducing the time between the occurrences of accidents and estimates the impact of freeway incident detection systems along with providing fatality reduction benefits in an economic way. Using smartphones to record vehicular accidents and provide situational awareness to Emergency response provides solutions to the major problems in detecting traffic accidents to avoid false positives and increases preparedness to emergency responders.

Road accidents are leading to major injuries and deaths. Smartphone's manufactures nowadays have started to work upon the plethora of sensors that enables the devices to detect the context in which they are being used. Being cost efficient, good processing power, highly popular this technique gives the platform creating wireless mobile sensors network to record and detects the road accidents. The need of the automated mobile network to reduce the number of accidents is the need of the hour as it could save lives by reducing the time required for the information to reach emergency responders. Recent advances in the smartphones are making it possible for the detection of the road accidents in the most portable and the cost effective manner. The two major contributors of this paper are basically – First, is by providing the key issues in association of detecting the road accidents using on-board polling sensors. Second, how can use of the mobile applications can reduce the existing gaps in accident data recording and storage.

II. Literature Review

More complex emergency call systems have been proposed in previous literature. Some authors designed a system that collects vehicle data and sends it to a centralized database in case of an accident. Through a signal then the accidents are detected by one or more sensor systems located in the vehicle. Similarly some of the researchers have designed a system that notifies the status of the moving objects through the images of the objects and the surrounding, the data of collision and the temperature of the object and their positioning to the third party by means of the radio link and through which the information is transmitted to the insurance and roadside assistance companies wherein the collisions are then detected. Likewise some other researchers have used the technique of the and automated emergency alert system (AEAS) for the two-wheelers which includes and accident detector, inclination sensor and decision unit and also a system to intimate the third party about the speed, acceleration and braking of the vehicle. And through this the sensor records the data and detects the road accidents. There is not much literature review on this particular technique but some Europeans are working on this agenda by embedding in-vehicle eCall platform that will launch and automatic voice and data call to the pan-European emergency service in case of an accident. This service- is expected to offer if launched the information and location of the vehicle maintaining and reducing the road accidents. Some have also proposed an Incident Detection Algorithm to identify incidents, verify the nature of incidents and provide emergency services based on the nature. WreckWatch Approach has also been introduced in which the device accelerometer detects wreck utilizing device sensors to detect traffic accidents and notify first responders. Users utilize map to view wreck information and other motorists can view accident locations immediately and avoid accident locations.

The use and the analysis of the external sensors data for vehicle performance and road safety is a larger area of study. Some works been done in the form of theoretical research and development in a practical design. It makes use of the microphone, GPS, accelerometer and a Global system for the mobile communication radio for the traffic localizations. Hernandez et al. developed a prototype of an on-board unit that allows the driver to communicate with his vehicle, as well as with other available devices (PDAs, cellular, sensor networks, and so on) and with the road infrastructure in order to consume intelligent transport services.

III. Methodology

Road accidents are the leading cause of deaths and other major fatalities. Automatic crash notification (ACN) can save lives of the people by reducing the time required for the emergency responders to arrive and also detect the major accidents routes so that the driver of the particular vehicle can reroute and thus reducing the probability of the collision.

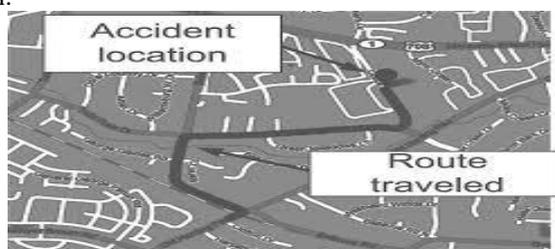


Figure 1

Modern smartphones possess a persistent internet connection allowing them to instantly detect and upload the data for the safety of the other users. Our major aim of the paper is, since smartphones almost travel with every person these days, any responsible citizen can download the designed application and record or enter the accident data witnessed thus providing reliable accident data repository. These goals can be achieved by using smartphones to capture the streams of data provided by their accelerometer, compasses and GPS sensors. The outlook as to how the proposed plan would collect the data is given in the later part of the report. Emergency responders can access the uploaded data via mobile devices en route or a standard web browser at an emergency response center. Researchers and analysts can use the data for thorough introspection of the data come up with remedial measures and actions to make roads much safer. The figure 3 below is a flowchart to show the pictorial representation on how the proposed application is anticipated to work. Once the application is loaded onto any smartphone/wireless device, the road user who witnessed the accident can record the data. The inbuilt GPS system in the mobile application shall record the geographical location of the accident, date and time of accident once the application is opened. Then the application would prompt the user to enter data as number of collisions, type of collision, number of people involved in the crash, and severity of crash. Then the data shall be stored in central data storage. Which can later be used by any researcher/planners or governmental or any transportation engineer for further studies, analysis or more.

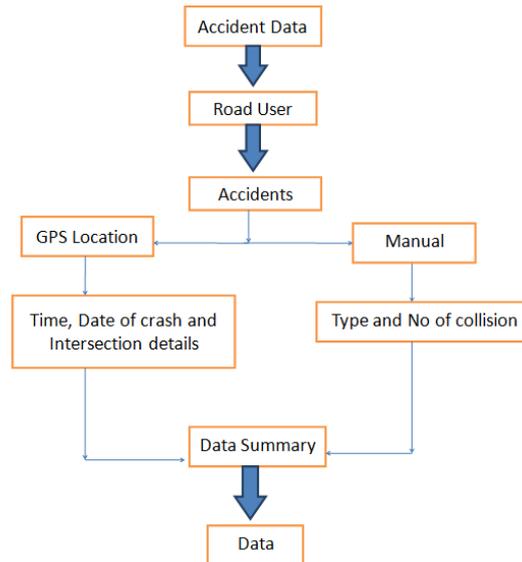


Figure 2

IV. Anticipated Results

The proposed mobile application architecture is expected to record, store and detect the accident data to provide situational awareness to the emergency responders. It shall address the various questions as to where the accidents occur, why they occur and when they occur? According to specific embodiments of the present invention, the filtered information may be further adapted such that with the help of the recorded data, researchers, planners, governments can make intelligent decisions to mitigate traffic crashes and propose sustainable solutions to improve the road travel conditions. The data shall certainly be a great boost for all the transportation engineering fraternity to overcome the data crisis.

References

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