

IDENTIFICATION OF ACCIDENT PRONE SPOTS USING MOBILE APPLICATION

Shivangi Singh¹, Vartika Sharma², Shashank Sharma³

^{1,2,3}Department of Computer Science & Engineering, ABES Institute of Technology, Uttar Pradesh, India

Abstract - Road accidents are the cause of major concern today. Not only the lives are lost, but they also cause major damage to highway infrastructure as well as risks the lives of the individual. Our application will provide help to the users who wish to complain about the fatalities, accidents and poor condition of roads. Users are provided with an interface to describe the condition of the accident site including the location and image of the spot, extent of loss and other parameters addressing the severity of the accident. The data so obtained, is stored in Google Firebase database and SQLite and the concerned authority can get complete overview of the database provided by the users from different sites of different accident prone spots. The application provides the users to report about the poor conditions of roads so that accidents can be avoided beforehand. This paper aims to identify the accident prone areas by the road users and inform it to the concerned authorities using the application. It has been estimated that India currently accounts for nearly 10% of road accident fatalities worldwide. In addition, over 1.3 million people are seriously injured on the Indian roads every year. Hence, it is important to look into the need of solving this major issue. Different conditions of road contribute to accidents. These conditions can be Potholes, damaged road, eroded road merging of rural roads with highways, diversions, illegal speed breakers, unauthorized median cuts, traffic rules disobedience. The paper explores the method that user can identify the reasons of the accident and can bring into the notice of concerned authorities so that preventive measures can be taken, thus road fatalities may decrease.

Key Words: Road Gazer, android sdk, android virtual device manager, emulator.

1. INTRODUCTION

Road safety is primary concern all worldwide considering the fact that it affects every nation, people within the nation and subsequent impact on the economy and public health of the nations across the globe. These accidents have become an alarming issue across the globe. The number of serious as well as minor injuries, human sufferings and the economic losses due caused by accidents cannot be estimated. Therefore, road safety is a major concern in the present scenario. Road deaths in India increased to 1.49 lakhs with Uttar Pradesh registering the maximum spike in fatalities. The official data on road deaths spanning 6 years shows that UP saw the maximum increase in absolute numbers of road accidents-from 16004 in 2013 to 22256 in 2018- while Tamil Nadu subsequently reduced fatalities during this period, which stood at 15563 in 2013 but came down to 12216 last year.

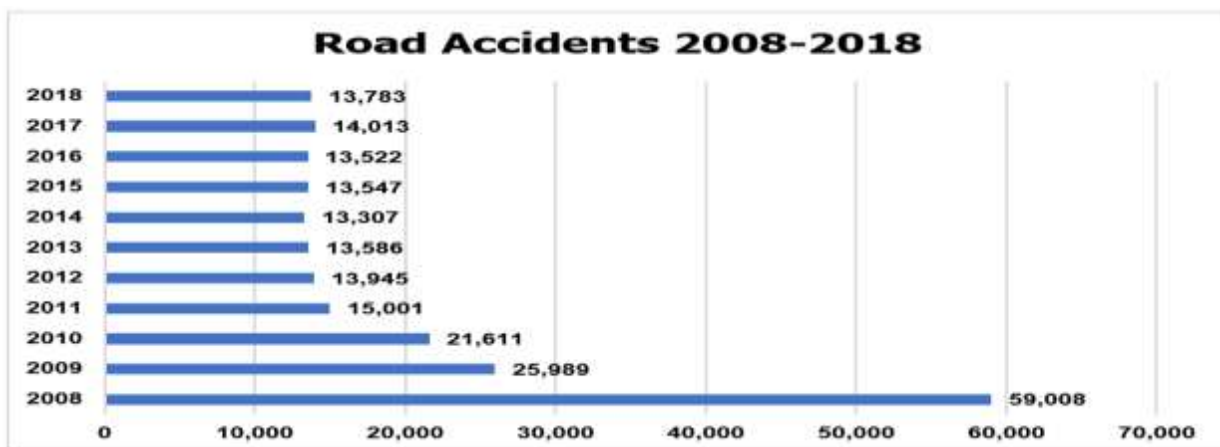


Fig -1: Road Accident Analysis

The bad condition of roads causes trouble to people who have to face the route daily, necessitating search for methods or alternatives that ensure efficient, safe, feasible and better conditions so that road fatalities may decrease. Major reasons for accidents are unruly traffic and bad condition of roads, absence of sign board, unauthorized median cuts etc. Thus, preventive measures should be taken and modern technology can be used to address the issue. The data has further revealed that the states of Uttar Pradesh and Tamil Nadu have accounted for maximum number of deaths. We feel, the solution of the problem of road accidents is multidimensional. Firstly, a mechanism is required to report the accident so that help can be provided to the people involved in accident. Secondly a mechanism to identify accident prone spots and take measures to avoid accidents in future. As of now, web and mobile applications are developed to report accidents and identification of vehicles involved. However, the tough task of accurately reporting, analyzing and helping the authorities in managing the highway infrastructure practically to avoid accidents, has not been dealt with. Therefore, Maintenance of road safety has become a major area of concern for the authorities. The probability of an accident occurring is influenced by numerous factors like roadway geometric characteristics, traffic characteristics, pavement conditions, median cuts, illegal speed breakers. In order to come up with better solutions this application is proposed so that road users can themselves register the issue so that concerned authorities can look into it and measures can be taken to improve this.

2. LITERATURE SURVEY

Over the years, different researchers have tried to address the different issues of road accidents in manner ranging from study and identification of Road Safety levels in different regions, identification of black spots based on accident severity, analysis of different parameters for predicting accident severity across different regions and development of application for reporting accidents. Chakraborty and Roy [1] researched on the road safety level in Kolkata city of India. They developed a model for predicting future accidents considering parameters like accident severity index, accident fatality rate, accident fatality risk and accident risk.

Chand and Alex [2] worked on different accident indicators and combined them to propose accident risk index and accident severity index (ASI) for all the states in India. Michael Sorensen [3] proposed a novel approach for identification of black spots based on injury severity method and compared it with frequency-rate identification. Ranking is done based on injury severity weighted accident rather than normal accident rate. Weightage is considered by taking into account factors such as accident location, a combination of vehicles involved and accident location. Finally, weightage for each factor is calculated on the basis of the socioeconomic cost of injuries. Thus, the proposal gave better results than other traditional methods as it gives more importance to the accident location with severity. Snehal U Bobade, etal [4] ranked the parameters based on severity and calculated severity index for identification of accident prone regions. In their work, parameters causing maximum accidents were assigned highest weight and hence ranked higher. The weights were then added to compute total severity. Severity index is then calculate by dividing the sum of weight ages of each parameter by total severity. The entire experiment was carried out for the data pertaining to two highways, Mumbai-Pune and Pune-Solapur.

3. Road Gazer App

In order to develop a medium through which the authorities can ensure the proper safety of road users, we follow a slogan "ALERT TODAY-SAFE TOMORROW". This application is developed using Android platform. It presents all the facilities for the user to file a complaint from accident prone spot and the analysis part includes all the facilities required by the authority to judge a complaint and analyze its severity. The application facilitates various activities like login, register, location. All the data needed by the analyzer is submitted by the android application to the database from where it is collected for analysis. The database consists of image captured by the user, text and numbers. Various Android Studio platforms such as android sdk, android virtual device manager, emulator, etc are used for testing and capturing the data.

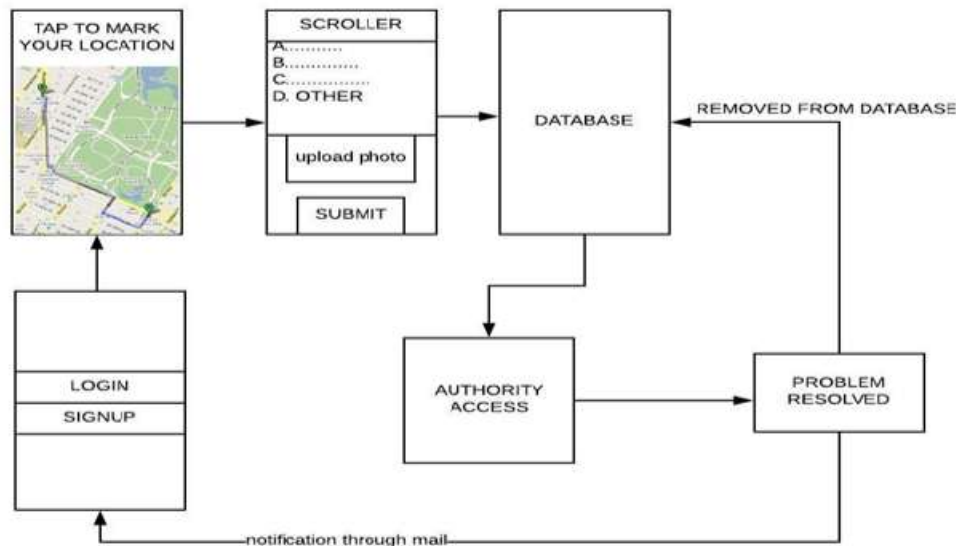


FIG -2: APPLICATION ARCHITECTURE

Module 1: An android application where any registered user can file complaints from any road within city limits or highway. This module provides two functionalities. First, it handles the complaint for accidents. Second, the complaint regarding bad road condition of roads, potholes, unauthorized median cut or user can enter any other reason if not listed is also reported. Thus, the database consists complaints registered by the user.

Module 2: This module deals with analysis of data obtained through module 1. The application is composed of two modules reported in which image of an incident, location of the incident is recorded. Further the authority can access the information from the database and once the problem is resolved then the complaint is removed from the database. It allows the authority to take action based on the severity of complaints.

4. IMPLEMENTATION

This section explains the steps from collecting the raw data from user, storing in database and creating analysis reports based on the data received. The implementation results in meaningful reports to make analysis and take decisions.

4.1 IMPLEMENTATION USING ANDROID

The preferred environment for developing Android based application is Android Studio IDE [7]. The environment provides editor for developing applications. Android uses XML representation for configuration files. The editor allows for switching between XML file representation and normal data entry through the user interface. We have used Android Studio for developing the application. We are using SQLite database for storing data. SQLite is a relational database management system contained in a C programming library in contrast to other database management systems, SQLite is not a client-server database engine. Location can be either taken from the user or he can use the online GPS system to accurately select and specify the location. Screenshot specifies the functionality of taking location from user. After login, user is provided with reporting screen which allows him to report an incident.

- The active user must be aware of the benefits of using the new system
- Their confidence in the software is built up

- Proper guidance is imparted to the user so that he is comfortable in using the application

Before going ahead and viewing the system, the user must know that for viewing the result, the server program should be running in the server, If the server object is not running on the server, the actual process won't take place.

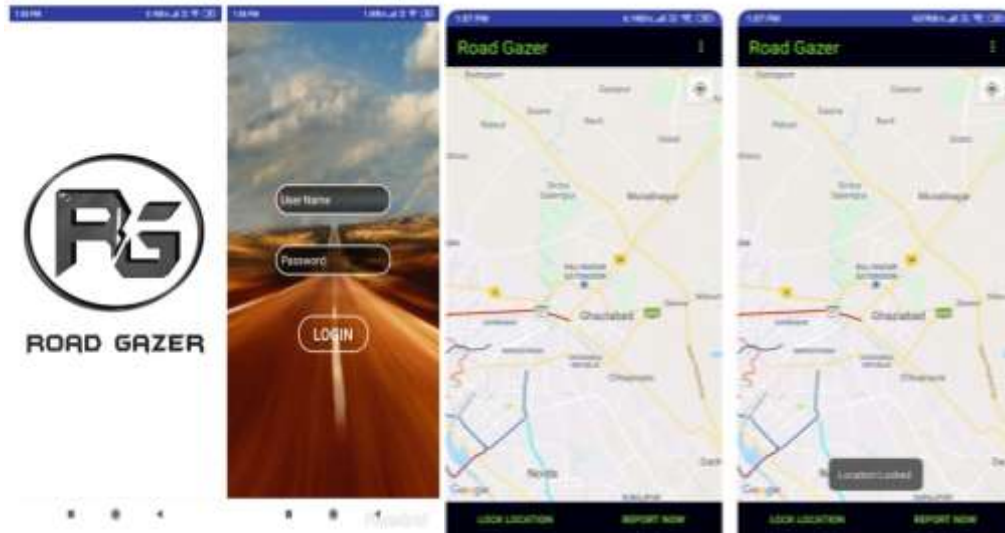


FIG -4: TITLE AND LOGIN SCREEN

FIG -5: LOCATION FUNCTIONALITY



FIG -6: REPORT SCREEN



FIG -7: INCIDENT IMAGE

5. Visualization

The data received from users is stored in database. Certain attributes from database are used to draw priorities, conclusion and create visual representation of these conclusions on dash board for the authority to take appropriate action on priority, for complaints received from users over a period of time. Moreover, reported accident sites can be seen by other application users marked at red color area on the map. The red color area seen by the users indicate that a particular area is accident prone and marked by one or more users. All the above information can then be used by the authority to draw conclusions on where to take actions on priority, to improve conditions of road and in turn, reduce the rate of road accident.

6. Conclusions

Project titled "Road Gazer" is an attempt to increase safety of the people on the road by reporting of the accidental prone areas by the road users themselves by using the Application. With this project we can decrease the number of accidents that has been increased in recent times specially in India. The application is easy to use by average smartphone user. The accidental spots are marked by the road users which can be seen to other users of the application.

Secondly the project involves Google map API which allows the user of the application to navigate through cities while avoiding accidental prone sites highlighted on the Google map. The accidental spots location with details can be seen by the highway authority which helps them to get the knowledge of bad conditions of roads and take measures accordingly.

Security is one of the major concerns of these days and effective measures are taken to make sure that the no fake person submits false report. This is done by giving access to only authenticated user with an account. The authentication is done by the admin of the application.

7. Future Scope

The service of the application is currently in India and for Indian road users but can be used world wide. Also, it's a motion which is used to motivate people to help highway authorities in improving the bad conditions of the roads. The project is currently on android platform but can also be made for IOS (iphone operating system) thus spreading to wide areas. The application will be developed so that it can analyse traffic on the roads as well.

References

- [1] Chakraborty, S. and Roy, S.K. "**Traffic accident characteristics of Kolkata, Transport, and Communications**" Bulletin for Asia and the Pacific, Vol.74, pp.75-86,2005.
- [2] Chand, M. and Alex, A.P. A comparative analysis of "**Accident Risk of states in India, Highway Research Bulletin**", pp.105-116, 2007.
- [3] Michael Sorensen, "**Injury Severity Based Black Spot Identification**"- Assessment of the Method in the Municipality of Hjørring, Annual Transport Conference at Aalborg University 2007, ISSN 1903-1092.
- [4] Snehal U Bobade, Jalindar R Patil, Raviraj R Sorate., "**Identification of Accident Black spots on National Highway and Expressways**", IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684, p-ISSN: 2320-334X, Volume 12, Issue 3 Ver.I, (May.-Jun. 2015), PP61-67.
- [5] Angelo Stephen Cardamone, Laura Eboli, Carmen Forciniti, Gabriella Mazzulla "**Willingness to use mobile application for smartphone for improving road safety**" in international Journal of injury control and safety promotion vol. 23, page1-15, August 2014.
- [6] Ron Faller, Anil Mishra, Louis Berger Group Mike Dreznes "**ROAD SAFETY APPLICATIONS REVIEW BOARD**" the World Bank in IRF EXAMINER: SPRING 2014, ROAD SAFETY APPLICATIONS.
- [7] G Arun Kumar, A Santhosh Kumar, A Ajith Kumar, T Maharajothi, "**Road quality management using mobile sensors.**" published in International Conference on Innovations in information Embedded and communication system, vol.10, page 13-25, February 2018.
- [8] Subodh B. Kharat, Sharad D. Sawant published "**Travolution: System for road safety.**" in International Conference on Intelligent Computing and Control Systems, 2017.
- [9] Prakhar Bhatt, Saransh Gupta, Prateek Singh, Preeti Dhiman, "**Accident and road quality assessment using android google map API.**" published in international Conference on computing communication and Automation, december 2016.
- [10] Francesc Soriguera, Enric Miralles, "**Drivers feedback mobile app**" in Transportation research procedia, volume 18, page 264-271, 2016.