SAFE ACCIDENT ALERT SYSTEM FOR REPORTING ACCIDENTS TO NEAREST HOSPITAL AND POLICE STATION

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Abstract- Road Accidents are fast becoming one of the major issue of deaths in Sri Lanka. In some cases, they are accounted for from exceptionally remote areas now and again there is not really any vehicular traffic on streets. There are numerous factors that reasons road traffic accidents include Drunken driving, Lack of knowledge about Road Rules and regulations, High Speed, use of mobile while driving etc. A mobile application for Analysis of the Traffic Problems and Safe Accident Alert System has been proposed to overcome from this matter. There are different types of Accident Alert Systems all around the world. But in Sri Lanka there is no proper computer-based Accident Alert System has been developed yet. This mobile application tracks the location of accident using GIS and SMS services. With the help of this system, the systems alert the nearest police stations and hospitals. And, analysis all the traffic issues and road signals. The main objective of the system is to provide help and need for the vehicle user and detects the accident if occurred and informs the respective authority through wireless technologies and find the vehicle where it is, in order to give treatment for injured people. Many lives could have been saved if the required attention was given at the time of need. Leading people to use mobile phone for many tasks of daily activities. And this situation is correlating the need of this kind of situations.

Keywords- GIS, Location tracking, Alert Message

I. INTRODUCTION

With the increase in traffic problems and accidents has become one of the major issues in Sri Lanka. According to statistics of the Sri Lanka Police, accidents have seen an increase in the recent past with the steady increase of vehicles on the country's roads. According to the Police, last year alone 2,600 fatal accidents took place resulting in 2,817 fatalities, and during the first six months of this year 1,365 fatal accidents were reported with 1,313 fatalities caused. According to Police statistics 19,916 accidents have taken place in 2016 during the same time up from the reported 18,774 accidents last year. In this project, decided to implement a mobile application to develop a computer-based accident alert system. Using Information & communication technology this problem can solve successfully and improve the environment friendliness. By using this "SAAS" (Safe Accident Alert System) mobile application anyone can inform the locations of that accident happens. Anyone can use this mobile application from anywhere by typing their name and their mobile number. And then he/she can track the locations and send it to the nearest police station and hospital. Then user will get a confirm message whether the tracked location and other information's (date and time, username, user mobile number) are send or not to the police station and the hospital.

In Sri Lanka there are many road accidents, in mainly the Colombo district. There are various reasons for these road accidents. Most of the time these accidents happen either because of recklessness of the driver or the pedestrians. (Figure 1) Sometimes they are reported from very remote areas at times there is hardly any vehicular traffic on roads. Most of the times we may not be able to find accident location because we don't know where accident will happen.
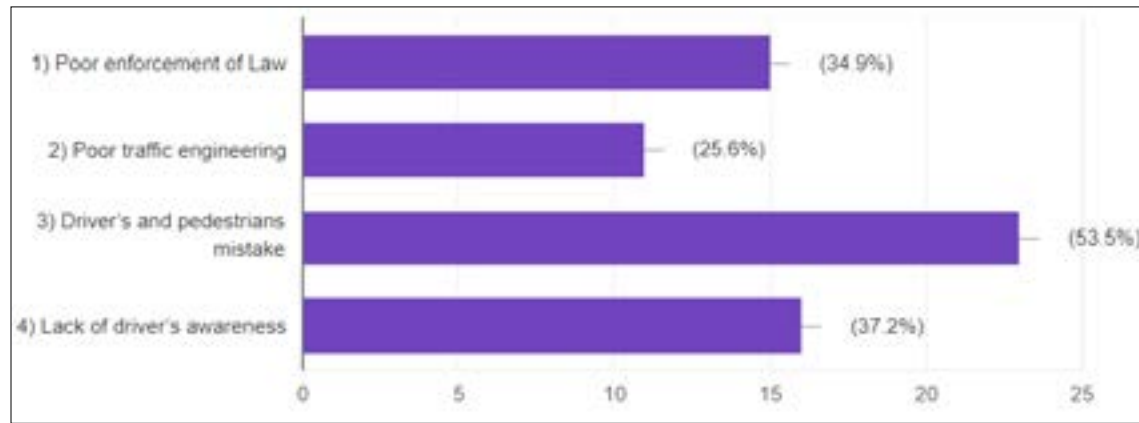
Figure 1. Bar Graph of most responsible issues for road accidents.

The purpose of the project is to find the vehicle where it is and give treatment for injured people, first we have to know where the accident occurred through location tracking and sending a message, and we have identified the following objectives.

- To critically study the existing computer-based solutions for, current issues in Traffic and Accidents in Sri Lanka.

- To design the system and develop the prototype properly.

- Testing and evaluation of the new Safe Accident Alert System.

II. LITERATURE REVIEW

Through the review, it will be thought about regarding the procedure and available practices in traffic problems and accidents.

Kaladevi, P. et al (2014) has developed a system for this issue by developing an Accident Detection System utilizing android smart phone from the accident zone. This framework has been created and executed utilizing the heart beat sensor based mobile technology integrated with the developing android smart phone. The application for accident detection which basically measures the heart beat rate utilizing heart beat sensor. In the wake of getting the flag from sensor this system sifts through the foundation commotion and recognize just the sound of the beat. At that point tally the time between each

heartbeat to get the beat rate. In the event that there is any variety from the normal heart beat range, at that point the system identifies that might be a accident or not. At that point the system will instantly transmit the area of the accident to the pre-arranged contacts through Short Message Service (SMS).

Zhang, Dahai. (2005) has presented an analysis of the traffic problems and research on the traffic strategy in group urban development. Urban group development is aimed at avoiding blind urban extension. It is a system of ordered structure, supplementary function, optimised integration and shared construction that allows harmonisation of different city mode levels horizontally and vertically. However, extending the city group space leads to increased distances between cities. In this case, it is necessary to construct high-speed access and networks. The idea of an" integrated green traffic" strategy is a sustainable urban development traffic system with 'human priority' and is proposed for the present group city which is facing various traffic situations.

Obuhuma. (2012) has presented a Use of GPS with Road Mapping for Traffic Analysis. The application of GPS in traffic analysis is proving to be the best arrangement contrasted with other existing traffic management strategies like security cameras, human investigation, and speed governors and tachographs. Mapping of situational street activity speed at any given time draws out the coveted geographic examples and connections which are principal basic leadership instruments for traffic administration. The current convoluted traffic systems, activity speed and the gigantic number of the traffic members, requires advanced and programmed techniques for information

catch as the main best solutions to traffic control. For effective execution of activity administration and control measures, not exclusively should the specialized points of view of the measure be legitimately considered, yet in addition the mix with existing foundation and approaches.

Mukesh, P.R. (2010), has developed a vehicle system that are right now being used is some type of Automatic Vehicle Location (AVL), which is an idea for deciding the geographic area of a vehicle and transmitting this data to a remotely located server. To accomplish vehicle following continuously, an in-vehicle unit and a following server is utilized. The data is transmitted to a following server utilizing GSM/GPRS modem on GSM arrange by utilizing cell phone instant message or utilizing direct TCP/IP connection with following server through GPRS. The following server additionally has GSM/GPRS modem that gets vehicle area data by means of GSM system and stores this data in a database.

Kommineni, Rakesh. (2014) has presented Vehicle tracking and accident alert system. In this system, at first the GPS ceaselessly takes input information from the satellite and stores the scope and longitude esteems in AT89s52 microcontroller's buffer. If we need to track the vehicle, we have to make an impression on GSM gadget, by which it gets actuated. It additionally gets enacted by identifying accident on the shock sensor associated with vehicle. Parallelly deactivates GPS with the assistance of hand-off. When GSM gets initiated it takes the last received latitude and longitude positions values from the buffer and sends a message to the particular number or laptop which is predefined in the program. When message has been sent to the predefined gadget the GSM gets deactivated and GPS gets activated.

Hasan et al. (2009) used the GPRS service which made their system a low-cost tracking solution for localizing an object's position and status.

III. METHODOLOGY

A. Data Gathering

Qualitative and quantitative data required for designing the requirement specification for the new system were gathered by conducting a survey.

B. Approach

In the Safe Accident Alert System process first user should login to the Mobile application by providing user name and phone number to the system. Then the mobile application will track the coordinates (longitude and latitude) of the location where user is in (where the accident happens). Then those information; User name, User mobile Number, Date and time and coordinates of the tracked and will send to the web server that is located in nearest Police station and the nearest Hospital. (Figure 1 shows the design module of it) After taking the information from the mobile application those details will be displayed on those web servers. The location of the accident will be display on a map according to the coordinates that sent from the mobile application. Then the web application will send a notification for the user whether the information send successfully or not and give a compliment for the sender for his service Each information that users send will stores in SQL server database successfully and for the work with the application it required continuous internet connection.

C. Technology Adopted

It is necessary to use new technological methodology for the system. It is crucial to use acceptable tools to develop productive system. Use on any inappropriate tools can solely ends up in develop a system with unnecessary errors and faults and use of those badly chosen technologies

Figure 2. Design module

additionally can ends up in crashed when the new system implementation. Badly chosen technologies which can be extremely advanced and complicated will enable manufacturing a system with a top quality, however these technologies may result in develop a system that spend lots of time and resources to perform a task that is anticipated by the system. It is very important to use applicable programming language and the other necessary tools to develop a productive system. Therefore, these technologies and tools can help to develop the system among a minimum development time the most objective of developing this type of an application is to produce the users more efficient work system instead of doing manual approach. Because of that we should use the most applicable tools available in the market to develop the system. Technological considerations - followed during the development of the system Efficiency and Performance Re-usability and flexibility object-oriented development support so according to the Safe Accident Alert System java and android studio used to develop the mobile application. According to that requirement system has developed by using C# and using SQL database to run on windows operating system.

• Web Application

The programming language that is going to apply as the developing language for the system development turned into significantly trusted accuracy, performance. When considering all these technologies which can be associated with the Safe Accident Alert System. The proposed system can be applied a web-based technology. The .NET Framework comprises of the basic dialect runtime and the .NET Framework class library. The common language runtime is the establishment of the .NET Framework. You can think about the runtime as a specialist that oversees code at execution time, providing core services such as memory management, thread management, while also enforcing strict type safety and other forms of code accuracy that promote security and robustness. The class library is a thorough, protest situated gathering of reusable kinds that you can use to create applications extending from customary order line or graphical UI (GUI) applications to applications in light of the most recent advancements gave by ASP.NET, for example, Web Forms and XML Web administrations programs keep running on the .NET Framework, it keeps running on a virtual execution framework called the common language runtime (CLR) and a consolidated arrangement of class libraries. The CLR is the usage by Microsoft of the common

language infrastructure (CLI) and it makes execution and improvement conditions in which languages and libraries cooperate with no imperfection. C# source code is accumulated into a middle of the road dialect that adjusts to the CLI determination. The IL code and assets, for example, bitmaps and strings are put away on circle in an executable record called a gathering. It contains a show that gives data about the get together, for example, types, adaptation, culture, and security necessities.

At the point when the C# program is executed the get together is stacked into the CLR. In view of the data in the show CLR may take different. At the point when the security necessities are met, the CLR performs just in time arrangement and change over the intermediate language code to local machine code. CLR additionally gives different administrations, for example, special case taking care of, and asset administration. The accompanying representation demonstrates the relationship of the normal dialect runtime and the class library to our applications and to the overall system. The illustration also shows how managed code operates within a larger architecture.

• Mobile Application

Android gives you the opportunity to put into impact your own device determinations and drivers. The hardware abstraction layer (Hal) presents a notable approach for creating programming hooks among the android stage stack and your hardware. The android working machine is in like manner open source, so you can make a commitment your own particular interfaces and enhancements. Android is an open source, Linux-based programming stack made for a wide array of devices and form factors. Android moreover comprises of a rigid of centre run time libraries that offer the vast majority of the ability of the java programming dialect, which incorporates some java 8 language functions that the java API framework uses.

• Database Selection

Consistent with the above eventualities most of the structures are used the square database to keep facts. It seems it is simple to control and perform. So, the database put in force on the server must able to supply efficiencies operations. Consequently, the proposed system decided on the Microsoft SQL server as server. SQL server is the

inspiration of Microsoft's data base platform, delivering challenge critical performance with in-reminiscence technology and quicker insights on any information, whether or not on-premises or in the cloud, and also Microsoft SQL Server is an application used to make computer databases for the Microsoft Windows group of servers working frameworks. Microsoft SQL Server gives a situation used to create databases that can be gotten to from workstations, the Internet, or other media as well. Database administration or DBMS, store client's information and empowers them to change the data into measurements. Those frameworks enable clients to make, supplant and remove actualities from their database.

A database is an established collection of information. Actualities allude to the attributes of people, things and exercises. Square server stores each measurement thing in its own one of a kind fields. In square server, the fields identified with a specific character, thing or event are packaged on the whole to shape a solitary finish unit of records, known as a report. Each record is comprised of some of fields. No two fields in a record will have the equivalent area name.

Throughout an SQL server database design project, the evaluation of your project wishes identifies all the fields or attributes of interest. If your commercial enterprise desires trade through the years, you outline any extra fields or alternate the classification of present fields.

D. System Architecture.

System architecture is divided into main three layers. They are Application Layer, Presentation Layer and the database Layer. (Figure 2.)
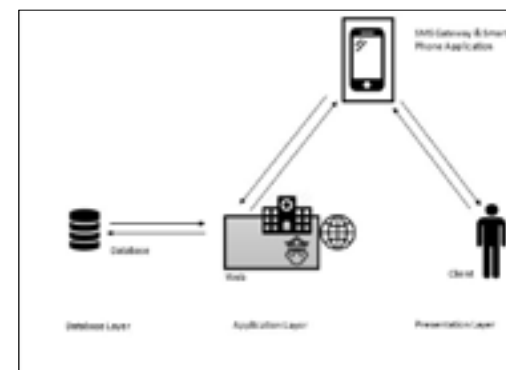

Figure 3. System Architecture

Data Layer: Data layer controls the data storage operations related processes of the overall Safe Accident Alert System. In this layer, SQL Server, has been used as the database management system. In this information layer SQL Server, has been utilized as the database administration framework. SQL Server is a light weight Database Management System that encourage with setting up information bases requirement for the product application Information will be put away in individual database which are assembled from client contributions through interfaces or by different procedures of the application layer, subsequent to controlling data at the application layer.

Application Layer: Application layer in charge of going about as the intermediate layer between presentation layer furthermore the information layer.

Presentation Layer: Presentation layer serves to information correspondence process by presenting to the users. It's give the interface to use to work with the product application. Data accumulated by presentation layer will be given to the application layer keeping in mind the end goal to control as per the given guidelines. As perspective in the presentation layer access the server and play out the tasks.

E. Modular Architecture

The discussed modules in the software architecture will be elaborated in this section to show how the modules will be dealing with the users' actions in each layer. The main modules and their sub modules are given below.

The Web application can be divide into five modules; Login and Authentication Module, Administrator Module, Confirmation Module, Map Module and the information Module

I. Login and Authentication Module

Only the authenticated users can access the system.

II. Administrator module

Administrator module is only can access by the admin. User cannot involve in this process. Admin need to be verified by the system and can change user names and

passwords of admin. Admin can get the details about users and details about locations.

III. Confirmation Module

In the confirmation module that in web application it will operate by the admin of the system. When the location of the accident will have identified, admin will send the confirmation message to the user that their process is successful.

IV. Map Module

This is the part of the web application. When user track the location and send the coordination; longitude and latitude of the location to the web server that exact location will display in a google map.

V. Information Module

This module gives the details about user who sent the accident location details. In this information module, it will record the name of the user, his/her mobile number, date and time and the location information.

The Mobile Application can be dividing into five modules; User Registration module, Message Sending Module, Tracking location Module, Confirmation Module and the information Module.

I. User Registration Module

In the mobile application, the person who uses the app should provide the user name and the mobile number of the user to track the location. All the registered member details will be shown by the system through the database interface.

II. Message Sending Module

User should be able to send message.

III. Tracking location Module

In this module, mobile application will track the location's coordinates (longitude and latitude) And send it to the server. When the location is tracked location, coordinates will display in the tracking interface.

IV. Confirmation module

If those all information will successfully receive the web server, the user will receive a text message with a compliment.

V. Information Module

In this information module, the collected information such as username, user mobile number location details and location tracked date and time will be sent to the web server.

F. Software Design.

There are two user levels in the system. They are admin and ordinary people. Ordinary People will access the android application. (Figure 4) Admin will access the web application. (Figure 5)

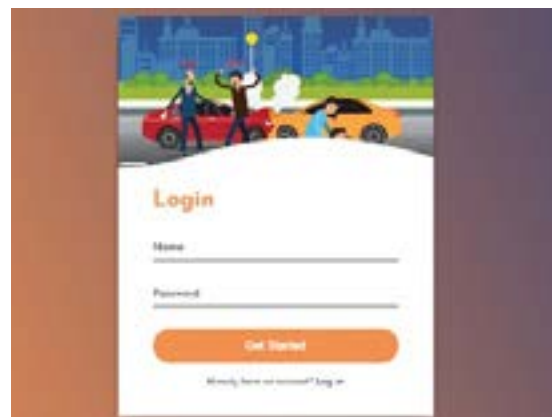*Figure 4. Interfaces of mobile application*

Figure 5. Interface of the web application

G. Functional Requirements.

- Mobile application should be able to track the location of the Accident.

- Mobile application should be able to send the particular details (user details, user mobile no, date, coordinates of accident)

- Web application should be able to get the information that sent from the mobile app.

- Web application should show the place that accident happen places on the map by using the coordinates.

H. Non-Functional Requirements.

- The Mobile application enables to access multiple users simultaneously.

- The system allows the data stored to be available for later analysis.

- The system did not allow unauthorized access to the web application.

- System protects the information of the users.

- Mobile application can be accessed anytime and anyplace which has internet connection.

- The designs will be created with appropriate themes, colours and font sizes. The mobile application need to be available all the time, and to everyone.

IV. EVALUATION

In this, we describe evaluation of our approach and the developed system while evaluating the objectives achieved how the project deviated from its original specifications and the circumstance identified during the time period of the project. This will give the idea of the measure that has been taken to handle the problem occurred and knowledge which have been gathered by supplying solutions for such issues.

Summative evaluation was used as the evaluation method to find how the system functions and whether it is up to the expected level to fulfil the clients' requirements. At the system finalizing stage this evaluation is done to evaluate the product's stability. In

summative evaluation a prototype with most stable build is shown to the client and the feedback is taken to find how far the system is success. In here the using prototype must be very much alike to the final product's functions and features.

The overall Evaluation of the product was carried to verify whether the system's final outcome meets the functional requirements of the users and the successfulness of the system tasks and the functions of each component are also evaluated here. This was done by comparing the functions of the new system also considering the functional requirements specified by the system specifications.

V. RESULT

The prototype was given to ten people and they were asked to rate the system based on the following attributes their responses have been recorded and summarized as below (Table 1).

Table 1. Summary on Used Technologies

Mobile App	Developed System
User Friendliness	97%
Accuracy	80%
Availability	75%
Cost Reduction	98%
Efficiency	95%

According to the results, more than 95% of candidates have been satisfied with this system.

VI. CONCLUSION

The results and outcomes generated in relative to the specificity of the problem domain are enlarged into wider concepts depending on logical assumptions. In this aim to clearly emphasize the outcomes and findings of the project and to determine way of these outcomes and findings can be matched in different contexts that are similar to the problems which are solved by the developed Safe Accident Alert System. Furthermore, future enhancements for the developed System have suggested finding out ways to give

in addition features to the system and using it outside the business subject in use.

The main purpose of this project is to find vehicle where it is, most of the circumstances we will be unable to discover accident location since we don't know where accident will happen. To give treatment for injured people, first we must know where the accident occurred through location tracking and sending a message. The development team implemented this system to determine its ability to satisfy the entire functional and non-functional requirement with special qualities such as flexibility, reliability efficiency and etc., to overcome the drawbacks identified in the system. The study found out that it is feasible to use the language ASP.NET in C#, SQL Server 2012 as database and java in android studio used to develop the mobile application to develop the project.

It's is a mobile application and web-enabled project, so this mobile application offers user to install the application and enter data. This is extremely useful for the client to enter the desired data through so much simplicity. The user is principally more concerned about the legitimacy of the information, whatever he is entering. In Web server admin provided the option of monitoring the records entered earlier. Data storage and retrieval will become quicker and easier to maintain because data is stored in a systematic manner and in a database. Basic Decision-making process would be incredibly improved as a result of speedier preparing of data since information gathering from data available on computer takes considerably less time than manual system.

This system allows to get information about the Accident in the relevant city. This gives efficient and cost effective. Mobile application can be access by defined user categories by verifying their username and telephone number and web server can only be access by the admin by verifying the username and password. Client machines can be Windows xp, Windows 7, Windows 9 or Windows 10. Server computer should have operating system Windows xp, Windows 7, Windows 9 or Windows 10 and should be installed Visual Studio 2012, SQL Server 2012 and tool set.

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REFERENCES

Bhumkar.S.P, Deotare.V.V, Babar R.V(2012)"Accident Avoidance and Detection on Highways", International Journal of Engineering Trends and Technology, Vol.3, Issue 2,pp. 247-252.

Hasan, Rahman K,et al (2009) 'Cost Effective GPS-GPRS Based Object Tracking System', Proceedings of the International MultiConference of Engineers and Computer Scientists 2009, Vol I IMECS 2009, 18 – 20.

John Whipple., William Arensman., Marian Starr Boler.(2009) "A Public Safety Application of GPS-Enabled Smartphones and the Android Operating System", Proceedings of the 2009 IEEE International Conference on Systems, pp.2059-2061.

Kardashyan, A. (2011) 'New Concept of the Urban and Inter-Urban Traffic', Proceedings of the World Congress on Engineering and Computer Science 2011, Vol II, WCECS 2011,19 – 21 October, San Francisco, USA.

Kommineni Rakesh. (2014)"Vehicle tracking and accident alert system"(ROLL NO :110EC0220)

KoteswaraRao.P., Haneef Babu.SK.MD.(2013) "Scening of an Accidental Alarm System of Vehicles With a Heartbeat Sensor", International Journal of Emerging Trends & Technology in Computer Science (IJETTCS) Vol. 2, Issue 2, pp. 191-194.

Matsubara.A., Tanka.S.(2002) "Unconstrained and Noninvasive Measurement of Heartbeat and Respiration for Drivers Using a Strain" ,SICE 2002, pp.1067-1069.

Obuhuma, J. I. , Moturi, C. A. (2012)" Use of GPS With Road Mapping For Traffic Analysis."international journal of scientific & technology research volume 1, issue10, november 2012 issn 2277-8616.

Kaladevi,P. et al,(2014)"Accident Detection System using android smart phone from the accident zone"2014 -223-0090-00.

Mukesh,P.R. et al,(2010)"Real Time Web based Vehicle Tracking using GPS"World Academy of Science, Engineering and Technology 61 2010

Zhang,Dahai Jin Wenzhou. , Wang,Duanyi.(2005) " analysis of the traffic problems and research on the traffic strategy in group urban development".