DECLARATION

We hereby declare that this dissertation submitted in the Award of Bachelor's degree with Honor in Computer Science entitled "**TRAFFIC SPEED DETECT AND ACCIDENT REPORT**" is our own work and effort, and that it has not been submitted anywhere for any award. Where other sources of information have been used, they have been acknowledged.

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Date…../……../2019

CERTIFICATE

This is to certify this dissertation entitled *"***TRAFFIC SPEED DETECT AND ACCIDENT REPORT***"* is a record of the original work done by **NZIMENYERA Innocent, NGABO MUGISHA Robert and MUTUYIMANA Janvier** is a partial Fulfilment of the Requirement for the Award of Bachelors with Honor in Computer Science of UR-NYARUGENGE CAMPUS, during the academic year of 2018/2019**.**

Signature……..

Supervisor**: Mr. BIZIMUNGU Theogene**

DEDICATION

To the almighty God for his protection

To our lovely parents

To our supervisor

To our brothers and sisters

To all our friends and relatives

ACKNOWLEDGEMENT

First, we heartedly thank the Almighty God for the gift of life and spirit of hard working that he always provides us especially in this period of concentrating to project work.

We are deeply indebted to give special thanks to our supervisor Mr.Theogene BIZIMUNGU whose help, stimulating suggestion and encouragement helped us in all time of the research project and writing this report. We are very grateful to him for his careful and close supervision of this project to make it successful.

Love and sincere appreciations go to our family and relatives that have trimmed our discipline to be the moral people that we are today and for their financial support to fulfill the requirement of this project.

We humbly wish to thank the Administration of the college for the Academic help they have abundantly offered.

More thanks goes to our fellow classmates for their everyday advices during this working period.

ABSTRACT

A large number of precious lives in Rwanda are lost due to road traffic accidents every day. The common reasons are driver's mistake and late response from emergency services. There is a need to have car speed detection and an effective road accident detection and information communication system in place to save injured persons. A system that sends information messages to nearby emergency services about the accident location for timely response is absolutely in need. In research literature, numerous researchers propose a number of automatic accident detection systems. These include accident detection using smartphones, GSM and GPS technologies, vehicular ad-hoc networks and mobile applications. The implementation of an automatic road accident detection and information communication system in every vehicle is very crucial. This paper presents a brief review on automatic road accident and rush driving detection techniques used to save affected persons.

Traffic Speed Detect and accident report is sensor-based application, in which it is used to detect the speed of vehicle by recording its plate number using cameras and an automatic road accident detection technique based Accelerometer sensor. This system proves highly effective in detection of over speed driving. It is not at all necessary that such accidents are results of driving under the influence of alcohol as even a person who has not consumed alcohol can drive in a careless manner to overcome this problem and decrease death rate due to accidents, introduction of new and innovative speed enforcement technology emergency services is necessary.

TABLE OF CONTENTS

DECLARATION i

CERTIFICATE ii

DEDICATION iii

ACKNOWLEDGEMENT iv

ABSTRACT v

LIST OF TABLES ix

LIST OF FIGURES x

LIST OF ABBREVIATIONS xii

CHAPTER 1. GENERAL INTRODUCTION 1

1.1. Introduction 1
1.2. Motivation 1
1.3. Background to the Study 2
1.4. Statement of the Problem 3
1.5. Objectives 3
1.5.1. General Objective 3
1.5.2. Specific Objective 3
1.6. Hypothesis 4
1.7. Scope 4
1.8. Significance of the Study/Justification 4
1.9. Organization of the study 4

CHAPTER2. LITTERATURE REVIEW 6

2.1. Introduction 6
2.2. Automatic Electronic Systems 6
2.3. Description of Components and Devices used in our System 6
2.3.1. Accelerometer Sensor and paper board box 6

2.3.2. Overview on GPS Technology 8
2.4. Mobile App 10
2.4.1. Evolution of Mobile Application 11
2.5. Web Application 13
2.6. Database 13
2.6.1. MySQL Database 14
CHAPTER 3. RESEARCH METHODOLOGY, SYSTEM ANALYSIS AND DESIGN 15
3.1. Introduction 15
3.2. Data and Information Collection Techniques 15
3.2.1. The Documentation 15
3.2.2. The observation 15
3.2.3. The interview 15
3.3. Software Development Process Models 16
3.3.1. Waterfall Model 16
3.4. Analysis of the Existing Process 18
3.4.1. Description of the existing process 18
3.4.2. Structure of the existing process 18
3.5. New Proposed System 19
3.5.1. New Proposed System Structure 19
3.6. Use Case Diagram 21
3.7. Data Flow Diagram 22
3.7.1. Context Diagram 22
3.7.2. Data Flow Diagram Level 1 22
3.7.3. Data Flow Diagram Level 2 23
3.7.4. Data Flow Diagram Level 3 24
3.7.5. Technology used 24
3.8. Database Design 25
3.8.1. Physical Data Model Diagram 25
3.8.2. Entity relationship diagram 25
3.8.3. Data dictionary 26
accident 26

admin 27

cars 27

car_owner 28

hospital 28

police 29

route 29

violation_tb 30

CHAPTER 4. SYSTEM IMPLEMENTATION 31

4.1. Web Application 31

4.1.1. Structure 31

4.1.2. Interfaces for web application 31

4.2. Mobile application structure 37

4.2.1. Structure 37

4.2.2. Interfaces for mobile application 37

CHAPTER 5. CONCLUSION AND RECOMMENDATIONS 39

5.1. Conclusion 39

5.2. Recommendations 39

REFERENCES 40

LIST OF TABLES

Table 1: Use case diagram components 21

Table 2: Data dictionary 30

LIST OF FIGURES

Figure 1: Accelerometer Sensor 7

Figure 2: Paperboard. 8

Figure 3: GSP Technology. 10

Figure 4: Phone cameras 12

Figure 5: Waterfall model 17

Figure 6: Existing process structure for speed detection.....18

Figure 7: Existing process structure for accident report 19

Figure 8: New system structure for speed detection 20

Figure 9: New system structure for accident report.....20

Figure 10: Use case diagram.....22

Figure 11: Data flow diagram level 0 - context diagram 22

Figure 12: DFD Level 1 23

Figure 13: Data Flow Diagram Level 2 24

Figure 14: Data Flow Diagram Level 3 24

Figure 15: Entity Relationship Diagram 26

Figure 16: Web application structure.....31

Figure 17: Users login page.....32

Figure 18:Admin home page 32

Figure 19: Register vehicles 33

Figure 20: Register Vehicles Owner.....33

Figure 21: Display Records.....34

Figure 22: Report for speed violation 35

Figure 23: Report for Accident happen.....35

Figure 24:General report.....35

Figure 25: Prototyping of the system.....36

Figure 26: Application structure.....37

Figure 27: Mobile application Interface.....38

LIST OF ABBREVIATIONS

CLDC **:** Connected Limited Device Configuration

DFD **:** Data Flow Diagram

ERD **:** Entity Relationship Diagram

HTML **:** Hyper Text Markup Language

HTTP **:** Hyper Text Transfer Protocol

ICT **:** Information Communication and Technology

IT **:** Information Technology

RIM **:** Research in Motion Limited

SDM **:** Systems development method

UI **:** User Interface

UML **:** Unified Modeling Language

GPS **:** Global Positioning System

CHAPTER 1. GENERAL INTRODUCTION

1.1. Introduction

The aim of this chapter is to describe the various problems, which lead us to approach of designing, and implementing a system, after keeping all these considerations in mind, we had an idea designing sensor-based application; in which it is used to detect the speed of vehicle by recording its plate number using proximity sensor with cameras and an automatic road accident report technique based on Accelerometer sensors. It is not at all necessary that such accidents are results of driving under the influence of alcohol as even a person who has not consumed alcohol can drive in a careless manner to overcome this problem and decrease death rate due to the rushing driving accidents, introduction of new and innovative speed enforcement and accident report technology is necessary.

Practically the transportation industry is rapidly developed In Rwanda where this country use that industry in people's daily life especially in Capital city Kigali, because of those activities done in people's everyday life the rate of accident happen was increasing due to the mistake of rushing driving of drivers that why we have chosen to work on **traffic speed detect and accident report,** to facilitate the vehicle owner and passengers who want to travel the different places of Kigali to reduce the problem of over speed and getting quicker emergence support in the case of accident.

1.2. Motivation

Today, no one can't hesitate to talk about the impact of using ICT in different fields within our society such as services delivery to the customers or clients, information and data storage, information and data exchange between persons, communication etc…

Same techniques are still being used whereas the migration from manual to computerized systems and applications can handle a big number of information, process in a smaller time and delivering better services in single time with less accident. It is in this regard we have decided to develop a sensor based application with monitoring web application called "**traffic speed detect and accident report**" which will help us to reduce the maximum number of death caused based rushing

driving and delay of emergence support, where have chosen Kigali city as the case study of our research project.

1.3. Background to the Study

Since many years ago, vehicles owners have been facing the problem of getting the quickest Penalties when he/she was faced the rushing driving issue. and late of emerging assistance for accident issue. In case, they are courageous to work on it themselves.

When someone meets with such a problem of accident of his/her vehicles, he/she uses to call for everyone he/she knows by asking for support, where it causes the delay in his/her journey. By analyzing the current situation and field of study, we found out that many cases happen in Kigali city as the main urban area in our country.

Kigali is the capital and largest city of Rwanda, roughly in the center of the country. According to the profile of Kigali city, most of the population are entrepreneurs, politicians, diplomats, and so many people's categories who have the capacity of owning many number of vehicles, it is a city, which always has circulation of different kinds of vehicles. Sometimes the vehicles owners need an emergency help from nearest friends where they use to ask where the police station are located or hospital for accident issue, this means that in case they don't find someone to ask, they struggle for waiting and seeking for help long period of time or loose the assistance when they can be able to do it themselves.

Our Sensor based application will be used as guiding and assistance tool by providing, which help anyone who need to solve any problem of time wasting by accident emerging facilitates. We register all vehicles, hospital and police station, which are in Kigali city by locations, where each profile of hospital should be able to receive accident notification according to the accident location and speed violation to police station.

1.4. Statement of the Problem

- The mostly problem for all drivers is the challenges they meet while any rushing driving problem occurs or when they faced the accident problem, they cannot find direct aid on time.
- The drivers abuse the speed limit because they know surely that Traffic polices do not work 24/7 and in case of environment issues. Eg. Rain
- In case of Traffic police give warning to the drivers, it should be occurring any opportunity of corruption among them.
- Currently to make decision by traffic police was difficult because the information generated from different sources.

1.5. Objectives

1.5.1. General Objective

After keeping all these considerations in mind, we had an idea of designing a model of highway over-speeding vehicle detecting circuit to control rash driving even though there are no any patrol officers around, and decrease death rate due to delay of emergence support for accident.

1.5.2. Specific Objective

The specific Objectives of this research is to develop an application, which can be used to:

- Register Hospitals, police station, Vehicles and vehicles owners within specific locational area, and implementing a sensor based application which used to detect speed and mobile app which is used by Drivers to track the nearest hospitals in case of requesting direct aid.
- Allow police station to view the report of speed violation and accidents at least one week and make decision according to our report.
- To Reduce time taken by police while they were detecting speed using Gun radar and Working 24/7
- Reduce the corruption occurring between traffic police and drivers

1.6. Hypothesis

Practically “it is possible to design and implement a sensor based application that succeeds the specified objectives”, in order to improve our professional skills and to apply the knowledge acquired from the class lectures by resolving the problems that obstacles and reflecting the development of our society.

1.7. Scope

Our research is emphasizing in Kigali city as the case study of our project, it is only with design and implementation of application which is used to detect the speed of vehicle by recording its plate number using proximity sensor, cameras and an automatic road accident report technique based on Accelerometer sensors by sending an alert to nearest police station and hospital within locational area in Kigali city. Actually, we focused on public vehicles not government and international vehicles.

1.8. Significance of the Study/Justification

This research project has many interests to both parties, vehicles owners, Passengers Government of Rwanda.

In case a vehicle has over speed problem, the owner is automatically get a notification message on his/her phone which show him/her the fault made and its penalties. Then for the case of accident, our application will send an alert to the nearest police station and hospital about emergence situation.

1.9. Organization of the study

- Chapter one introduces the research, the insights of what the system is all about, its purpose and some of its core objectives required in order for it to be highly successful
- Chapter two concentrates on reviewing and compares some of the similar systems, their relevance to this research and important tips and strategies to gain from those similar systems
- Chapter three focuses on the techniques and methodologies used to collect, analyze and processing data, as well as those used to design and implement the system in question

- Chapter four shows how the design is carried, from the database design, to process design and interface design of implemented system of Sensor based App for Traffic speed detection and Accident report technique based on low cost ultrasonic sensors.
- Chapter five tells the conclusion and recommendation for the systems users and future researchers who might want to expand this research.

CHAPTER2. LITTERATURE REVIEW

2.1. Introduction

This chapter deals with theoretical concepts and fundamentals that support this project. It is a general overview of this implemented system and provides definitions explanations and characteristics of technologies used in the development of this system. It mentions and explain some related systems that seems to work by our system.

2.2. Automatic Electronic Systems

In general, an Automatic system operates without human intervention. Instead, they operate basing on a given condition set on it early.

So, when a part of an electronic sensors is coded and the whole system works according to the instructions provided by those codes (this is to mean that the system is able to perform a desired task at a desired time basing on codes instructions) by itself, the system is taken as an automatic electronic system.

Know that all electronic systems are not necessary to be automatic when are designed for a specific purpose.

2.3. Description of Components and Devices used in our System

As all other systems are made by components and devices, which are interconnected for performing a task, our system is also comprising of: Accelerometer sensor, Proximity sensor, GPS technologies, phone cameras, paper board box and Phone Loud speaker,

They are described in detail in the following sections.

2.3.1. Accelerometer Sensor and paper board box

2.3.1.1. What is Accelerometer Sensor?

An accelerometer is an electromechanical device used to measure acceleration forces. Such forces may be static, like the continuous force of gravity or, as is the case with many mobile devices, dynamic to sense movement or vibrations. Acceleration is the measurement of the change

in velocity, or speed divided by time. In our project We use accelerometer sensor for accident report.

There are many different ways to make an accelerometer! Some accelerometers use the piezoelectric effect - they contain microscopic crystal structures that are stressed by accelerative forces, which causes a voltage to be generated. Another way to do it is by sensing changes in capacitance.

The piezoelectric effect is the most common form of accelerometer and uses microscopic crystal structures that become stressed due to accelerative forces. These crystals create a voltage from the stress, and the accelerometer interprets the voltage to determine velocity and orientation.

The capacitance accelerometer senses changes in capacitance between microstructures located next to the device. If an accelerative force moves one of these structures, the capacitance will change and the accelerometer will translate that capacitance to voltage for interpretation.

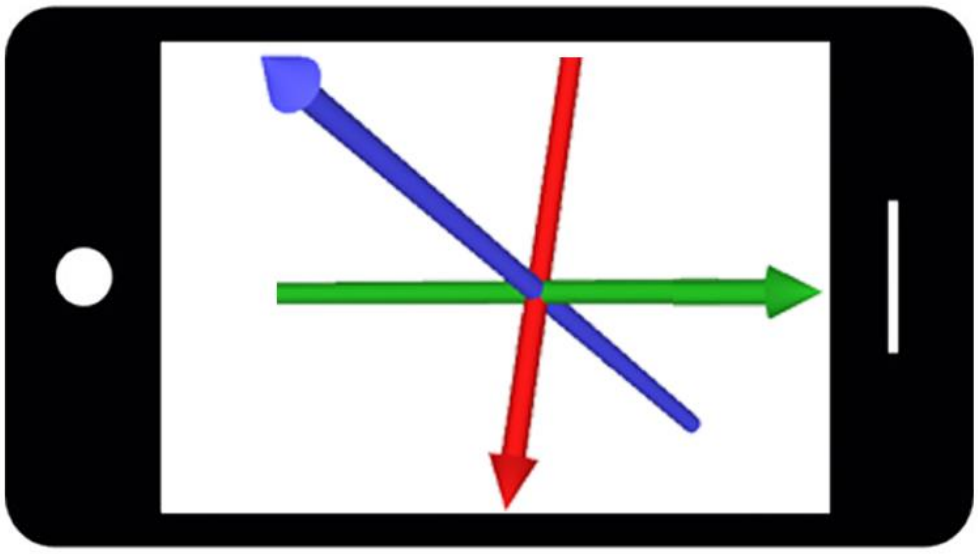


Figure 1: Accelerometer Sensor

Android-powered devices have every type of sensor. For example, most handset devices and tablets have an accelerometer and a magnetometer, for us we us Accelerometer sensor from android phone

2.3.1.2. Paper board

Paperboard is a thick paper-based material. In our project We use paperboard to caver the sensors.

Paperboard can be easily cut and formed, is lightweight, and because it is strong, is used in packaging. Another end-use is high quality graphic printing, such as book and magazine covers or postcards. Paperboard is also used in fine arts for creating sculptures. That why we have been chosen to use it for covering our project model.

Figure 2: Paperboard.

Sometimes it is referred to as *cardboard*, which is a generic, lay term used to refer to any heavy paper pulp–based board, however this usage is deprecated in the paper, printing and packaging industries as it does not adequately describe each product type.

2.3.2. Overview on GPS Technology

2.3.2.1. What is a GPS Technology?

Global Positioning Satellites (GPS) constantly broadcast signals to earth. A GPS device located inside a vehicle or asset receives these signals. The device then determines its location based on geometric calculations from the incoming satellite signals. In our project we use GPS for detect nearest hospital and police station.

2.3.2.2. GPS Overview

The Global Positioning System (GPS) is a technical marvel made possible by a group of satellites in Earth's orbit. It transmits precise signals, allowing GPS receivers to calculate and display

accurate location, speed, and time information to the user. Actually talking about GPS, Three Components are involve. These are the space segment, control segment and user segments.

A. The space segment

The space component consists of about 31 GPS satellites. The United States Air Force operates these 31 satellites, plus three to four decommissioned satellites that can be reactivated if needed. At any given moment, a minimum of 24 satellites are operational in a specially designed orbit, ensuring that at least four satellites are in view at the same time from almost any point on earth. The complete coverage that satellites offer makes the GPS system the most reliable navigation system in modern aviation.

B. The control segment

The control segment is made up of a series of ground stations used to interpret and relay satellite signals to various receivers. Ground stations include a master control station, an alternate master control station, 12 ground antennas, and 16 monitoring stations.

C. The user segment

The user segment of the GPS system involves various receivers from all different types of industries. National security, agriculture, space, surveying, and mapping are all examples of end users in the GPS system. In aviation, the user is typically the pilot, who views GPS data on display in the cockpit of the aircraft.

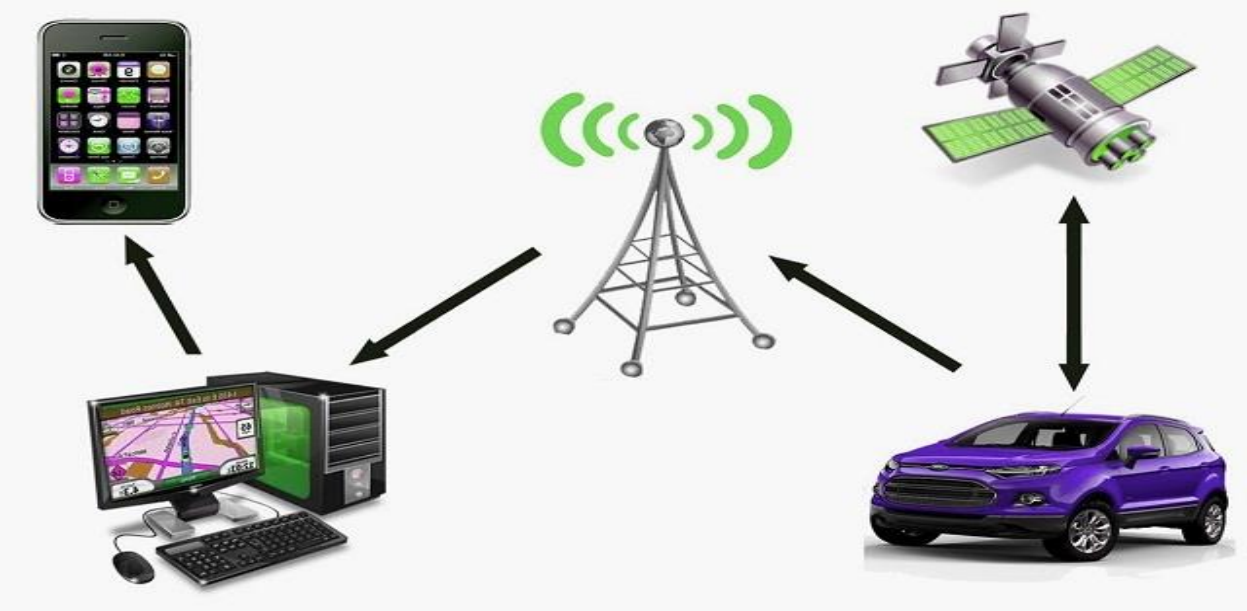


Figure 3: GSP Technology.

GPS transmit the location data wirelessly to a server so that the fleet management system can provide the location data to the end users.

- Global Positioning Satellites (GPS) constantly broadcast signals to earth. A GPS device located inside a vehicle or asset receives these signals. The device then determines its location location based on geometric calculations from the incoming satellite signals.
- Optional inputs such as a message display terminal, personal navigation device, PTO sensors connect to the device to provide additional messaging capabilities.
- The device then acts as a wireless modem and transmits location, speed, heading, and other messaging information through the cellular network.
- The incoming information is then processed and stored on servers.
- The user logs into a website to view the current and past locations and activities of vehicles and assets.

2.4. Mobile App

A mobile app is a computer program designed to run on a mobile device such as a phone/tablet or watch. Mobile applications often stand in contrast to desktop applications which run on desktop computers, and with web applications which run in mobile web browsers rather than directly on the mobile device.

Most mobile devices are sold with several apps bundled as pre-installed software, such as a web browser, email client, calendar, mapping program, and an app for buying music, other media, or more apps. Some pre-installed apps can be removed by an ordinary uninstall process, thus leaving more storage space for desired ones. Where the software does not allow this, some devices can be rooted to eliminate the undesired apps.

Mobile apps were originally offered for general productivity and information retrieval, including email, calendar, contacts, the stock market and weather information. However, public demand and the availability of developer tools drove rapid expansion into other categories, such as those handled by desktop application software packages. As with other software, the explosion in number and variety of apps made discovery a challenge, which in turn led to the creation of a wide range of review, recommendation, and curation sources, including blogs, magazines, and dedicated online app-discovery services. [1]

Mobile application development requires the use of specialized integrated development environments. Mobile apps are first tested within the development environment using emulators and later subjected to field testing. Emulators provide an inexpensive way to test applications on mobile phones to which developers may not have physical access.

2.4.1. Evolution of Mobile Application

If you go back to the history of the mobile applications, then you can clearly figure out that a few Java games, a calculator or monthly calendar were all that came under the category of mobile apps. However, IBM announced the first smart phone for the general use in 1993 that was equipped with the features like calculator, world clock, and calendar and contact book.

The BlackBerry Smartphone released in 2002 was the next major achievement in the field of mobile application development and it was marked by BlackBerry Limited, formerly known as Research in Motion Limited (RIM) and integrated with the innovative concept of wireless email. Java ME began life as JSR 68, replaced Personal Java and rapidly became so favorite that it evolved into several standards for use across PDAs, phones and other embedded devices.

Devices implement profiles, such as the Mobile Information Device Profile) which are subsets of configurations like the Connected Limited Device Configuration (CLDC). In addition, CLDC, designed for devices with total memory of 160KB to 512KB, and holds the bare minimum of Java-

class libraries needed for operating a virtual machine. Symbian grew out of the Psion EPOC OS, AND developed by Symbian Ltd – a joint venture of Psion, Ericsson, Nokia and Motorola. This the operating system was almost omnipresent and 250 million devices were running Symbian in 2009. It was Nokia that drove the development of Symbian OS, and the S60 platform was used on about all Nokia handsets with some LG and Samsung as well. [3]

A Proximity Sensor

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation, and looks for changes in the field or return signal. In our project we use A proximity to detect speed of vehicles.

phone cameras

A camera phone is a mobile phone which is able to capture photographs and often record video using one or more built-in digital cameras. It can also send the resulting image over the telephone function. In our project we phone cameras to capture the plate number of vehicles.

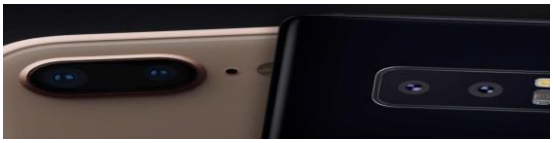


Figure 4: Phone cameras

Phone Loud speaker

The loudspeaker is a small sound driver fitted within a mobile phone, or other communication device, which is used to produce sound. Traditionally, loudspeakers on mobile phones are used to produce sound alerts for events such as incoming calls, incoming messages and alarms. In our project We use loudspeaker for alert notification

What Makes Mobile Apps so Popular

Most people have smart phones and iPhones today, so apps are easy to access and simply make your life better as a result. There are millions of mobile apps at present. For examples, apps for social networks, travel, health, banking, fitness, calendars, games, news and much more. The Apple App store adds more than 20,000 apps every month.

2.5. Web Application

In computing, a web application or web app is a client–server computer program , which the client (including the user interface and client-side logic) runs in a web browser.

In earlier computing models like client–server, the processing load for the application was shared between code on the server and code installed on each client locally. In other words, an application had its own pre-compiled client program, which served as its user interface and had to be separately installed on each user's personal computer. An upgrade to the server-side code of the application would typically also require an upgrade to the client-side code installed on each user workstation, adding to the support cost and decreasing productivity.

In contrast, web applications use web documents written in a standard format such as HTML5,bootstrap,PHP and JavaScript which are supported by a variety of web browsers. Web applications can be considered as a specific variant of client–server software where the client software is downloaded to the client machine when visiting the relevant web page, using standard procedures such as HTTP. Client web software updates may happen each time the web page is visited. During the session, the web browser interprets and displays the pages, and acts as the *universal* client for any web application.

In our project those languages facilitate rapid application development by allowing a development team to focus on the parts of their application, which are unique to their goals without having to resolve common development issues such as user management. Many of the frameworks in use are open-source software.

The use of web application frameworks can often reduce the number of errors in a program, both by making the code simpler, and by allowing one team to concentrate on the framework while another focuses on a specified use case. In applications, which are exposed to constant hacking attempts on the Internet, security-related problems can be caused by errors in the program. Frameworks can also promote the use of best practices. Such as GET after POST

2.6. Database

A database is an organized collection of data, generally stored and accessed electronically from a computer system. Where databases are more complex they are often developed using formal

design and modeling techniques. In our project we use MySQL database for organizing collection of data.

2.6.1. MySQL Database

is a relational database often used to store data for websites working in conjunction with PHP. Relational means that different tables of the database can be cross-referenced to one another. SQL stands for "Structured Query Language" which is the standard language used to interact with databases.

2.6.1.2. How do I create a MySQL database?

To create MySQL database and users, follow these steps:

1. At the command line, log in to MySQL as the root user: mysql -u root -p.
2. Type the MySQL root password, and then press Enter.
3. Type \q to exit the mysql program.
4. To log in to MySQL as the user you just created, type the following command
5. Type \q to exit the mysql program.
6. To log in to MySQL as the user you just created, type the following command. Replace user name with the name of the user you created in step 3:
7. Type the user's password, and then press Enter.
8. To create a database, type the following command. Replace dbname dbname with the name of the database that you want to create:
9. To work with the new database, type the following command. Replace *dbname* with the name of the database you created in step 7:
10. You can now work with the database. For example, the following commands demonstrate how to create a basic table named *example*, and how to insert some data into it:

CHAPTER 3. RESEARCH METHODOLOGY, SYSTEM ANALYSIS AND DESIGN

3.1. Introduction

The principle concern of this third chapter is to explain the methodology and techniques used to develop this project in order to achieve the stated objectives. This chapter also focuses on how the project was analyzed and developed.

It deals with methods and techniques that have been used in this project to collect the data. In any domain on which the research is carried out, some specific methods and other techniques that the research is referring are recommended.

3.2. Data and Information Collection Techniques

3.2.1. The Documentation

It is a technique of searching in books or other publications available in libraries or on-line (internet) that help in finding data to be useful for the topic under the study. Here we have make some documentations on previous projects and other related systems on internet where we have found out that mobile applications facilitate for simplifying some tasks and guiding process and functionalities by using your smartphone.

3.2.2. The observation

Observation is an action of an attentive follow-up of a phenomenon in order to draw a conclusion. **"**Observation is either an activity of a living being (such as a human), consisting of receiving knowledge of the outside world through the senses". By the observation, the researcher notes by his/her own eyes what is done in reality. It can bring some modifications on the results got by other techniques. We have observed the current procedures of getting support and assistance from someone even for tracking where you can found support in case of meeting with such a problem.

3.2.3. The interview

"The interviews are the most common and most satisfactory way of obtaining information about the objectives, constraints, allocation of duties and problems and failures in the existing system. This technique proved to be efficient in the development of our software while analyzing the real

situation of finance and while thinking about its future. We have interviewed some persons who have their own cars, where we found out that most of the time they meet with technical problem without possibilities of fast aid on time.

3.3. Software Development Process Models

Software process models represent a networked sequence of activities, objects, transformations, and events that embody strategies for accomplishing software evolution. Such models can be used to develop more precise and formalized descriptions of software life cycle activities. Their power emerges from their utilization of a sufficiently rich notation, syntax, or semantics, often suitable for computational processing.

3.3.1. Waterfall Model

The Waterfall model is the earliest SDLC approach that was used for software development. The waterfall Model illustrates the software development process in a linear sequential flow. This means that any phase in the development process begins only if the previous phase is complete.

There are several steps in the Waterfall Model:

- The new system requirements are defined in as much detail as possible. This usually involves interviewing a number of users representing all the departments or aspects of the existing system.
- A preliminary Analysis is created for the Existing system. The goal is to understand the requirements of the new system and to develop a system that addresses these requirements. This is done by working through the details of each requirement, studying and analyzing the current system and defining and prioritizing user's requirements
- A first prototype of the new system is constructed from the preliminary design. This is usually a scaled-down system, and represents an approximation of the characteristics of the final product.
- The users thoroughly evaluate the first prototype, noting its strengths and weaknesses, what needs to be added, and what should to be removed. The developer collects and analyzes the remarks from the users.

- With inputs from system design, the system is first developed in small programs called units, which are integrated into the next phase. Each unit is developed and tested for its functionality, which is referred to as Unit Testing.
- All the units developed in the implementation phase are integrated into a system after testing of each unit. The software designed, needs to go through constant software testing to find out if there are any flaw or errors. Testing is done so that the client does not face any problem during the installation of the software.
- Once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.
- The final step occurs after installation, and involves making modifications to the system or an individual component to alter attributes or improve performance. These modifications arise due to either change requests initiated by the customer, or defects uncovered during live use of the system. The client is provided with regular maintenance and support for the developed software.

The final system is thoroughly evaluated and tested. Routine maintenance is carried out on a continuing basis to prevent large-scale failures and to minimize downtime.

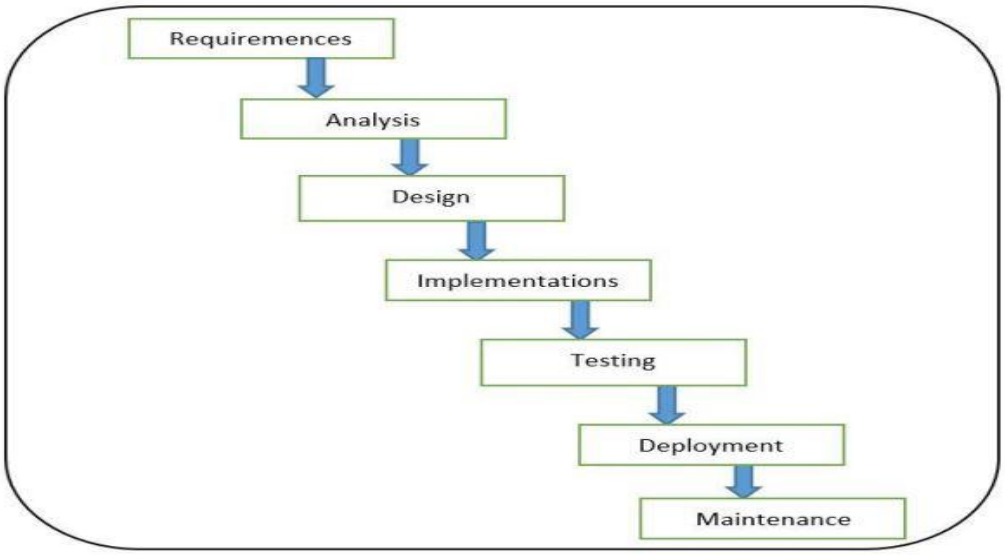


Figure 5: Waterfall model

3.4. Analysis of the Existing Process

3.4.1. Description of the existing process

Currently if someone needs a support and assistance for accident issue calls someone he/she knows who is able to support him/her or asking the surrounding people for nearest hospitals and, there is no fast aid and quickest assistance way to the persons who meet with the rushing speed problem while they are in journey, in this case the police man take long time for giving more explanation to the driver about his/her violation.

Sometime this current system and process result toke more time and Couse delaying of passengers in their journey also for accident issue increasing of death rate appear when the requester miss anyone who can help him/her either by phone call or by poor location. After a while of analyzing this existing system, we found out that it causes main exhausting problem of delaying the car and other motor vehicles owners to delay during their journey.

3.4.2. Structure of the existing process

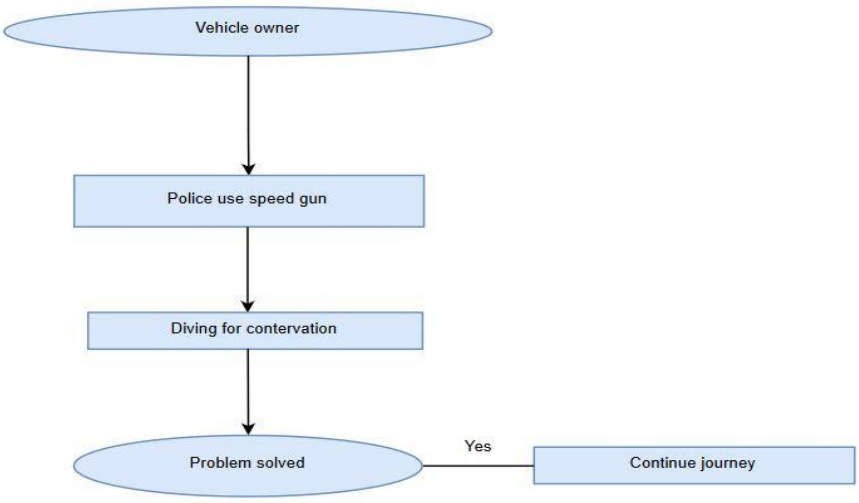


Figure 6: Existing process structure for speed detection

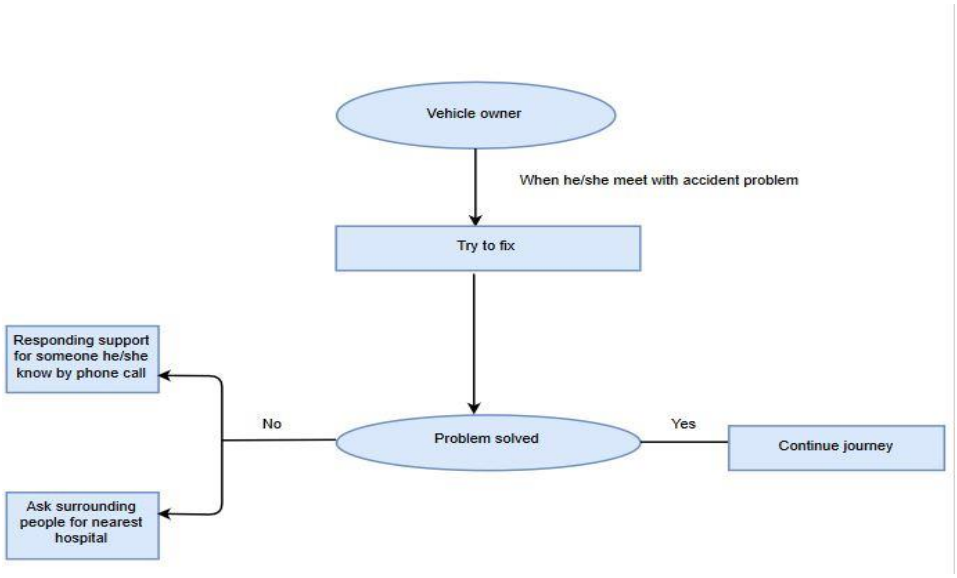


Figure 7: Existing process structure for accident report

3.5. New Proposed System

3.5.1. New Proposed System Structure

After analyzing the working of the existing process of solving those problems, we have implemented a sensor-based application, which help the Moto vehicle owners in case they meet with any accident problem and detect their speed while they are driving.

The developed sensor based application provides more features, which shows the owner of the car or other motor vehicle their rushing driving problems and give his/her the punishments without any police office.

It also facilitates him/her to track nearest hospitals, in case of accident problem without wasting time to ask for someone where she can find hospitals.

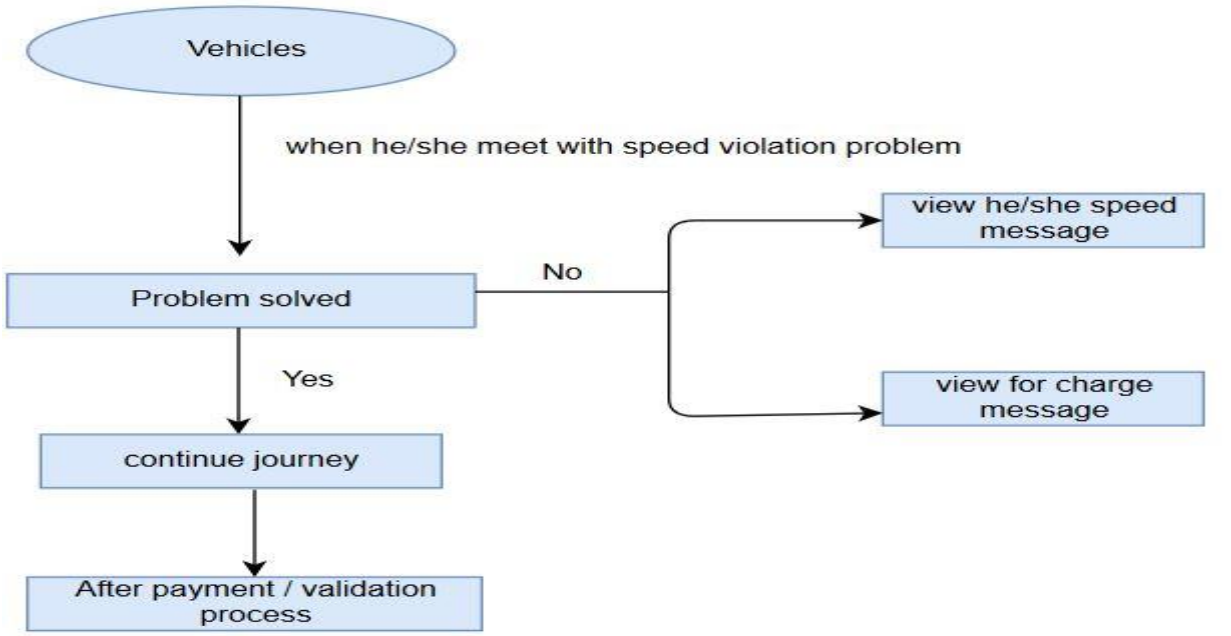


Figure 8: New system structure for speed detection

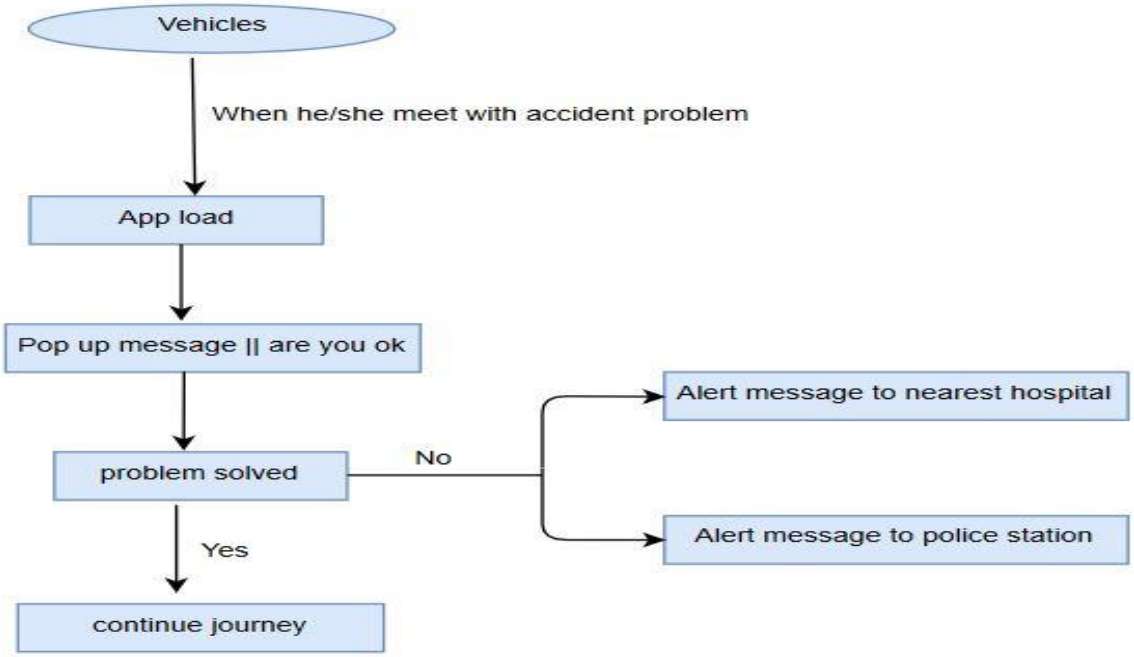


Figure 9: New system structure for accident report

3.6. Use Case Diagram

A use case diagram is a graphic depiction of the interactions among the elements of a system. A use case is a methodology used in system analysis to identify, clarify, and organize system requirements. In this context, the term "system" refers to something being developed or operated, such as a mail-order product sales and service Web site. Use case diagrams are employed in UML (Unified Modeling Language), a standard notation for the modeling of real-world objects and systems.

Use case diagram components:

		
User	**Use Case**	**Relationship**

Table 1: Use case diagram components

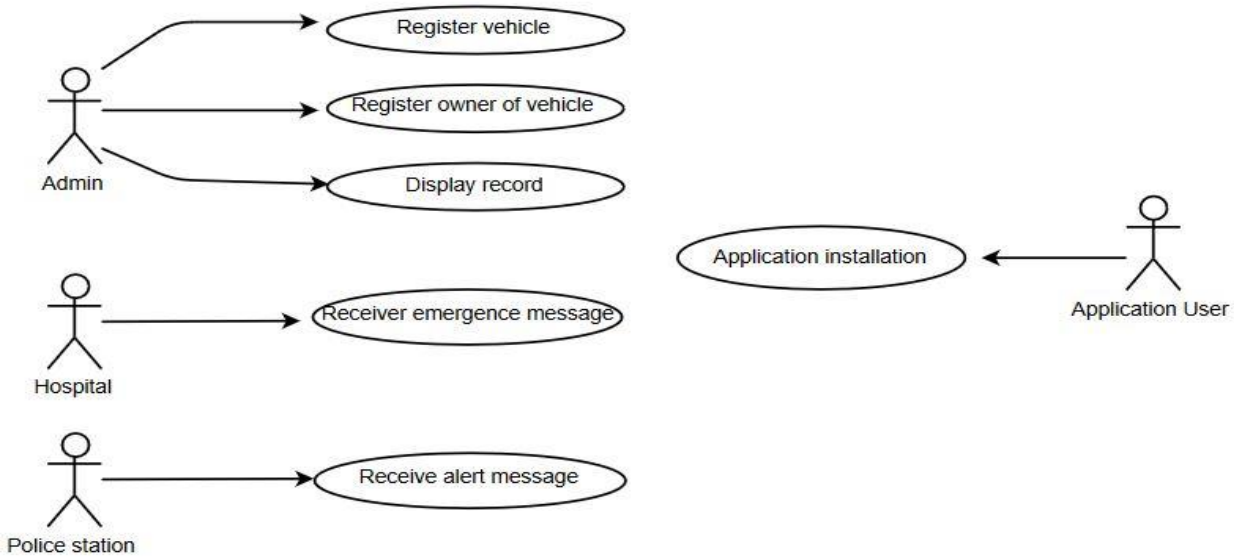


Figure 10: Use case diagram

3.7. Data Flow Diagram

3.7.1. Context Diagram

The basic sensor based App for Traffic speed detect and accident report process undergoes the following procedures as illustrated by the following context diagram.

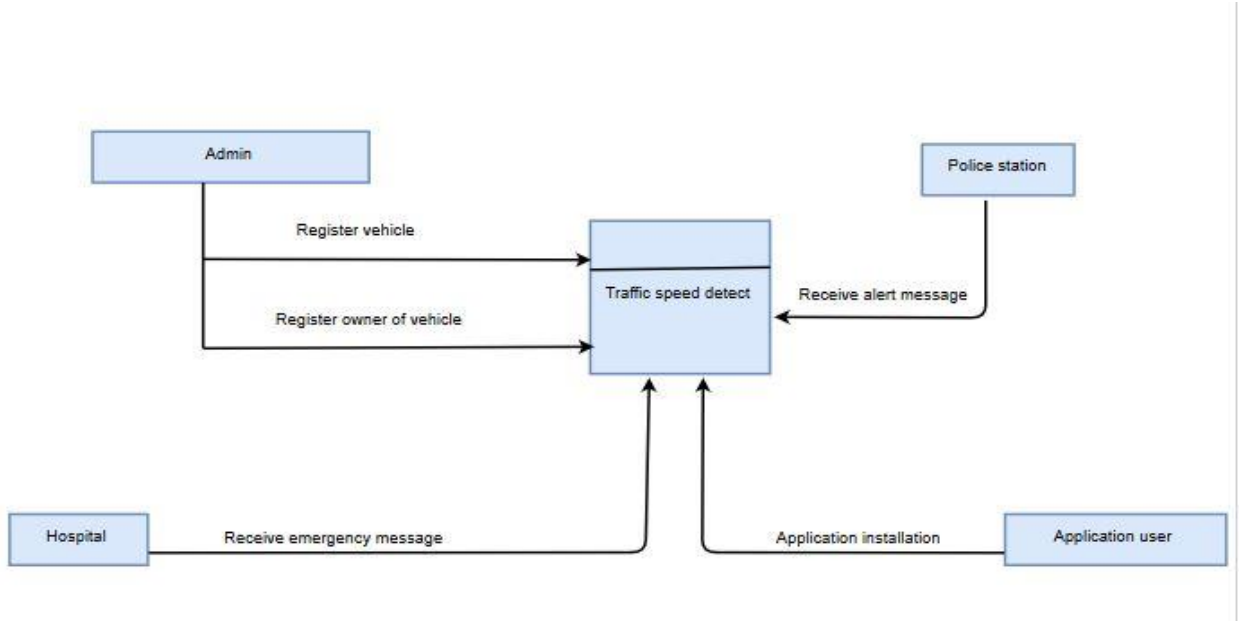


Figure 11: Data flow diagram level 0 - context diagram

3.7.2. Data Flow Diagram Level 1

Describes the processes and functionalities done by system administration

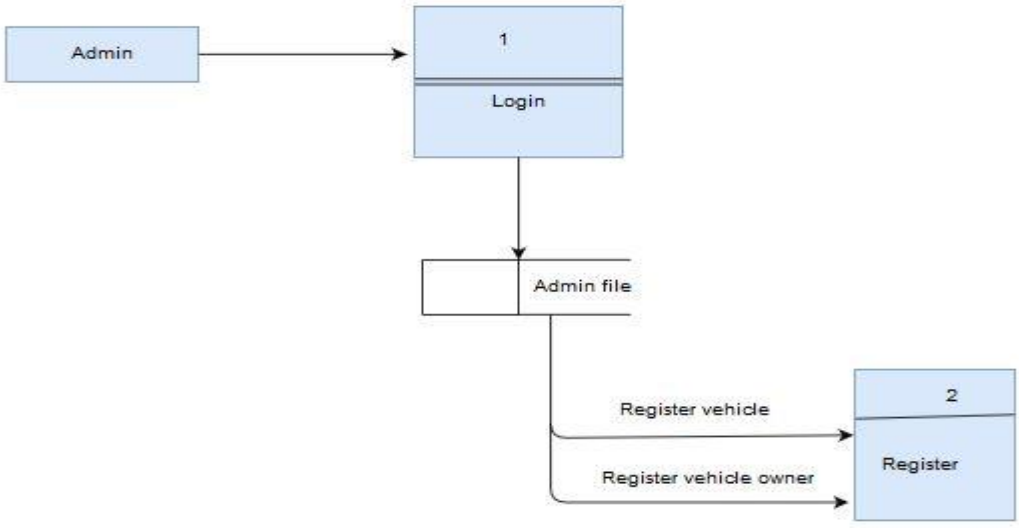


Figure 12: DFD Level 1

3.7.3. Data Flow Diagram Level 2

It describes the functionalities of Hospitals and Police station within the system

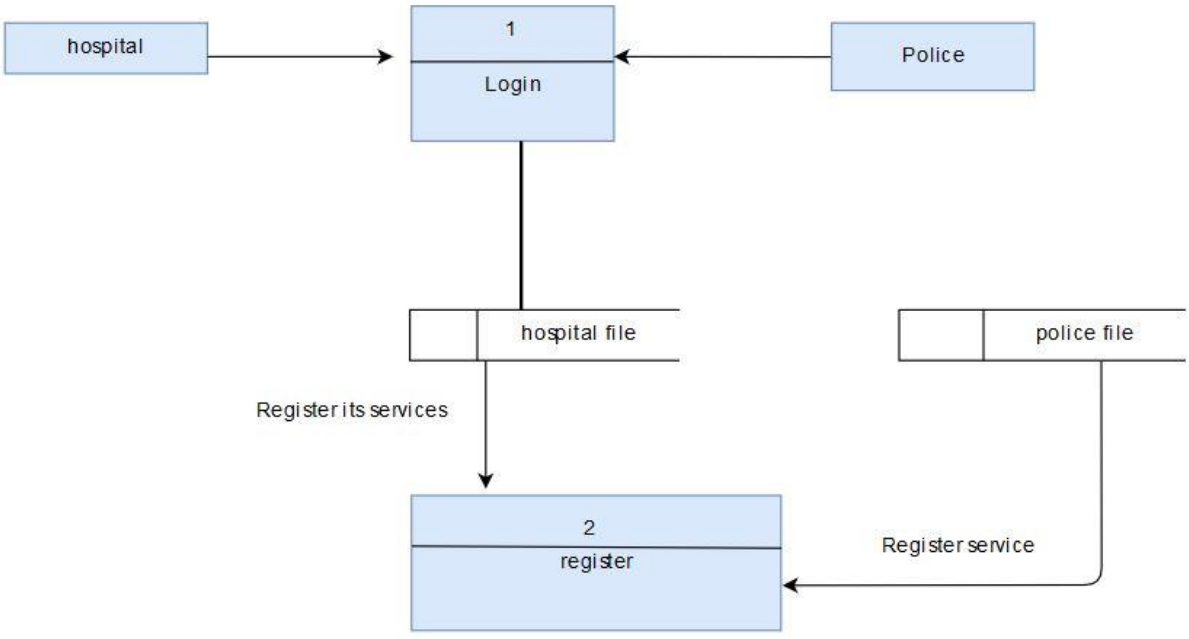


Figure 13: Data Flow Diagram Level 2

3.7.4. Data Flow Diagram Level 3

This level shows the role of application user within the system

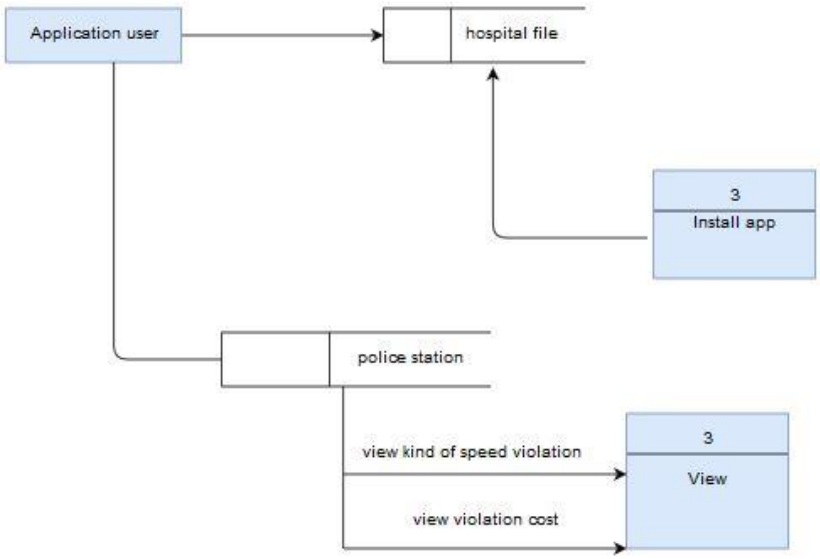


Figure 14: Data Flow Diagram Level 3

3.7.5. Technology used

3.7.4.1. Android application development

- **Java for android:** java for android for building android application in accident report by using the following utilities
  - Google map API (for measuring distance between two locations)
  - Accelerometer sensor (for detecting vehicle accident)
  - OCR (optical character recognition) this used for converting the printed text into machine encoded text`

3.7.4.2. Web application development

- For back-end development of web application the following technologies has used: PHP and JavaScript
    - Twillio API(for sending sms)
- For Front-end development of web application, the following technologies has used:HTML5, CSS3 and bootstarp

3.8. Database Design

3.8.1. Physical Data Model Diagram

This model diagram illustrates the organization of data in the database that stores data for the database system. It describes all the details and the relationship between the tables that make up the database.

3.8.2. Entity relationship diagram

Entity Relationship Diagram (ERD) is a network model that describes stored data of a system at a high level of abstraction. It shows different entities of the system and the relationship between them. It shows also the cardinality.

The diagram permits to represent the structure of the system of information for data. This means the dependencies or relations between different data. A good database must not be tolerating data redundancy.

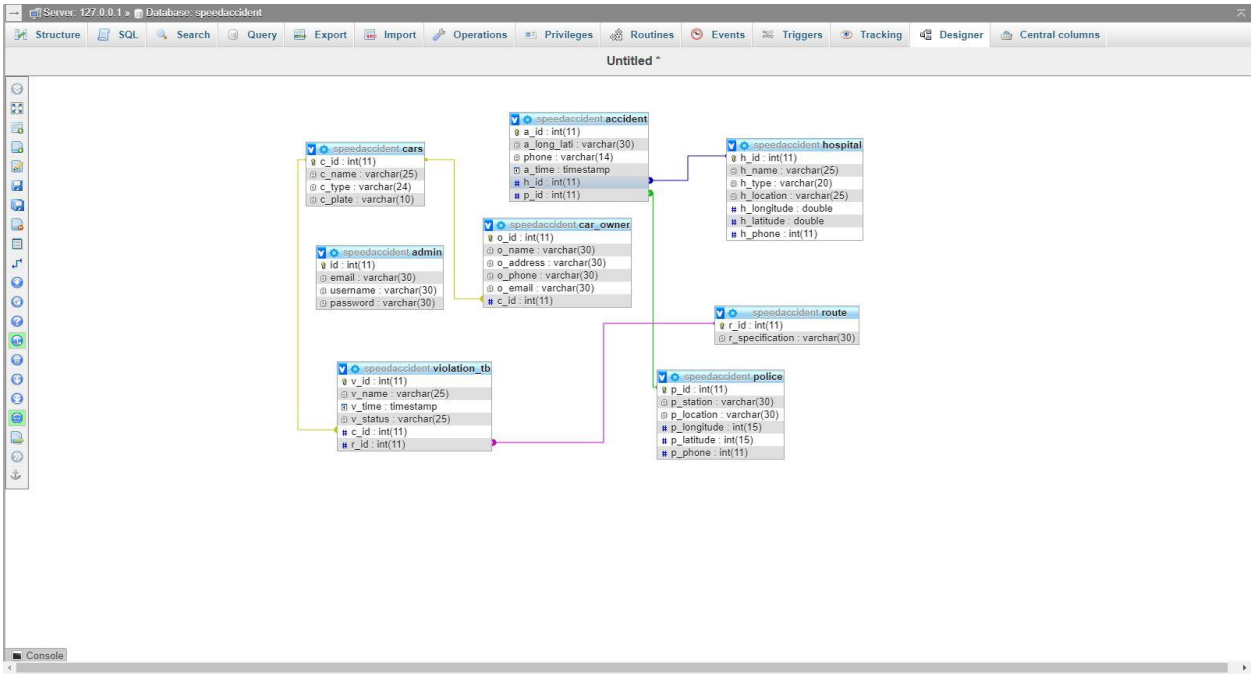


Figure 15: Entity Relationship Diagram

3.8.3.Data dictionary

A data dictionary is an integral part of a database. It holds information about the database and the data that it stores, i.e., the meta-data. Any well-designed database includes a data dictionary as it gives database administrators and other users easily access to the type of data that they should expect to see in every table, row, and column of the database, without actually accessing the database.

accident

Column	Type	Null	Default	Links to
a_id *(Primary)*	int(11)	No		
a_long_lati	varchar(30)	No		
Phone	varchar(14)	No		
a_time	timestamp	No	CURRENT_TIMESTAMP	
h_id	int(11)	No		hospital -> h_id

p_id	int(11)	No		police -> p_id

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null
PRIMARY	BTREE	Yes	No	a_id	0	A	No
hospital_accident	BTREE	No	No	h_id	0	A	No
p_id	BTREE	No	No	p_id	0	A	No

admin

Column	Type	Null	Default	Links to
id *(Primary)*	int(11)	No		
email	varchar(30)	No		
username	varchar(30)	No		
password	varchar(30)	No		

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null	Comment
PRIMARY	BTREE	Yes	No	id	0	A	No	

cars

Column	Type	Null	Default	Links to
c_id *(Primary)*	int(11)	No		
c_name	varchar(25)	No		
c_type	varchar(24)	No		
c_plate	varchar(10)	No		

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null
PRIMARY	BTREE	Yes	No	c_id	5	A	No

car_owner

Column	Type	Null	Default	Links to
o_id *(Primary)*	int(11)	No		
o_name	varchar(30)	No		
o_address	varchar(30)	No		
o_phone	varchar(30)	No		
o_email	varchar(30)	No		
c_id	int(11)	No		cars -> c_id

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null
PRIMARY	BTREE	Yes	No	o_id	3	A	No
c_id	BTREE	No	No	c_id	3	A	No

hospital

Column	Type	Null	Default	Links to
h_id *(Primary)*	int(11)	No		
h_name	varchar(25)	No		
h_type	varchar(20)	No		
h_location	varchar(25)	No		
h_longitude	double	No		

h_latitude	double	No		
h_phone	int(11)	No		

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null
PRIMARY	BTREE	Yes	No	h_id	10	A	No

police

Column	Type	Null	Default	Links to
p_id *(Primary)*	int(11)	No		
p_station	varchar(30)	No		
p_location	varchar(30)	No		
p_longitude	int(15)	No		
p_latitude	int(15)	No		
p_phone	int(11)	No		

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null
PRIMARY	BTREE	Yes	No	p_id	5	A	No

route

Column	Type	Null	Default	Links to
r_id *(Primary)*	int(11)	No		
r_specification	varchar(30)	No		

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null

PRIMARY	BTREE	Yes	No	r_id	4	A	No

violation_tb

Column	Type	Null	Default	Links to
v_id *(Primary)*	int(11)	No		
v_name	varchar(25)	No		
v_time	timestamp	No	CURRENT_TIMESTAMP	
v_status	varchar(25)	No		
c_id	int(11)	No		cars -> c_id
r_id	int(11)	No		route -> r_id

Indexes

Keyname	Type	Unique	Packed	Column	Cardinality	Collation	Null
PRIMARY	BTREE	Yes	No	v_id	0	A	No
c_id	BTREE	No	No	c_id	0	A	No
r_id	BTREE	No	No	r_id	0	A	No

Table 2: Data dictionary

CHAPTER 4. SYSTEM IMPLEMENTATION

4.1. Web Application

4.1.1. Structure

This figure describes how the web application is structured and organized for each user and page links

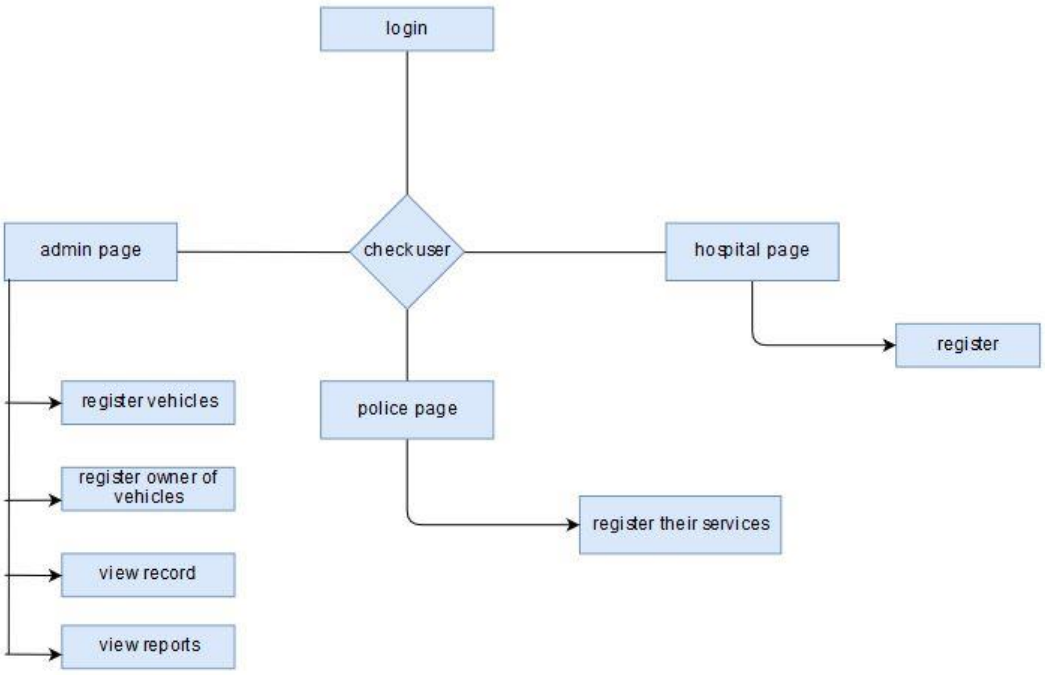


Figure 16: Web application structure

4.1.2. Interfaces for web application

4.1.2.1. Users Login Page

This welcome page of this system, where the admin of this system can make login into the system.

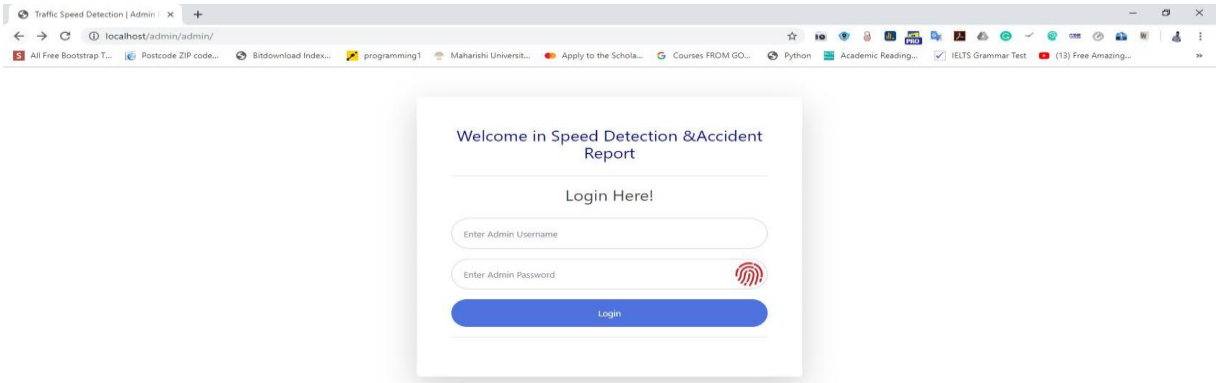


Figure 17: Users login page

4.1.2.2.Admin Home Page

This is the welcome page for system administrator, which helps to set speed limit, register moto vehicles, set punishment and view report from the system.

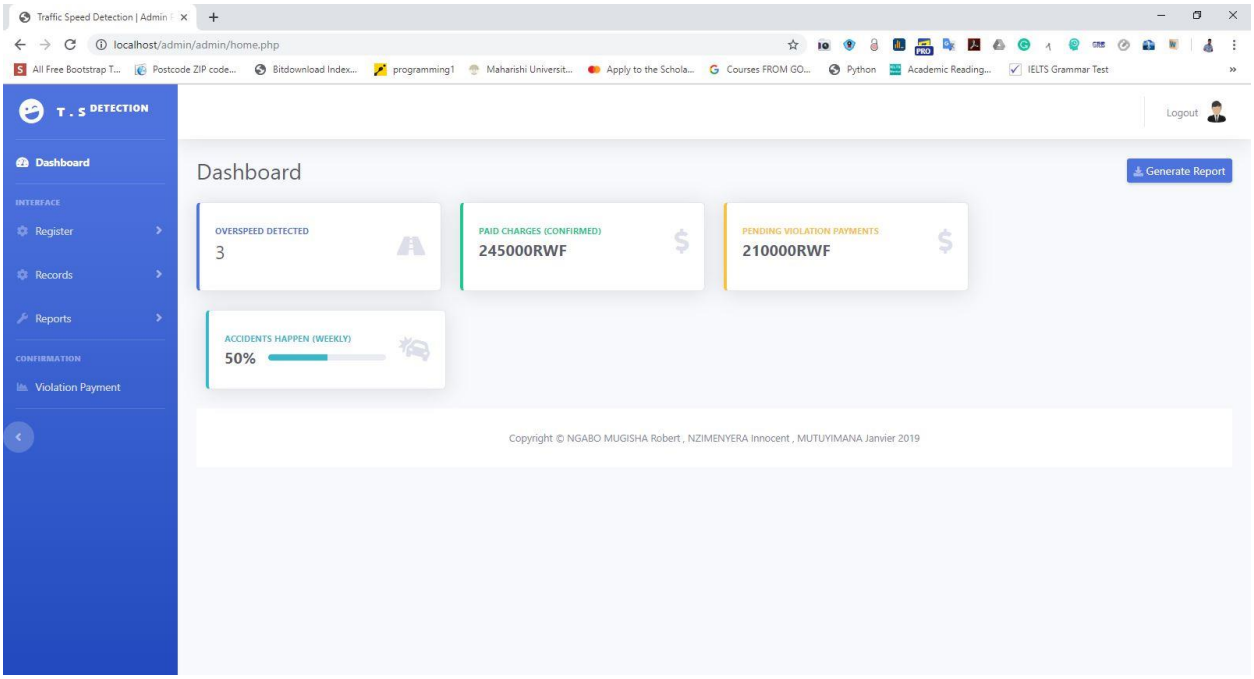


Figure 18:Admin home page

4.1.2.3. Register vehicles

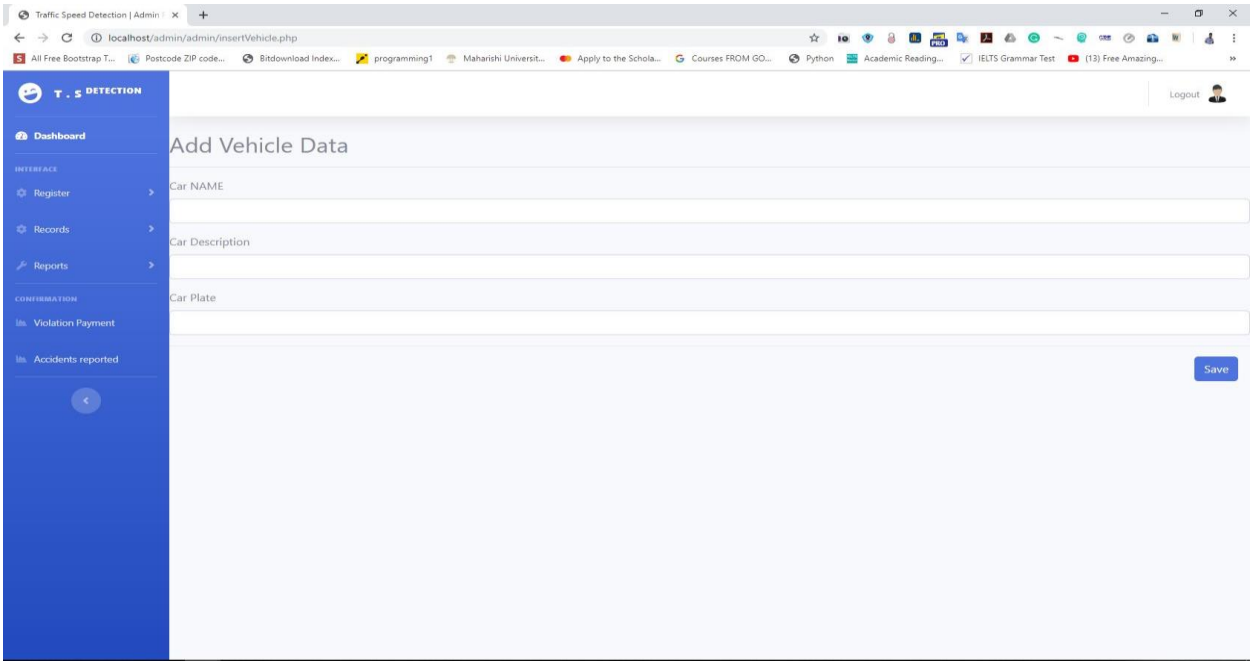
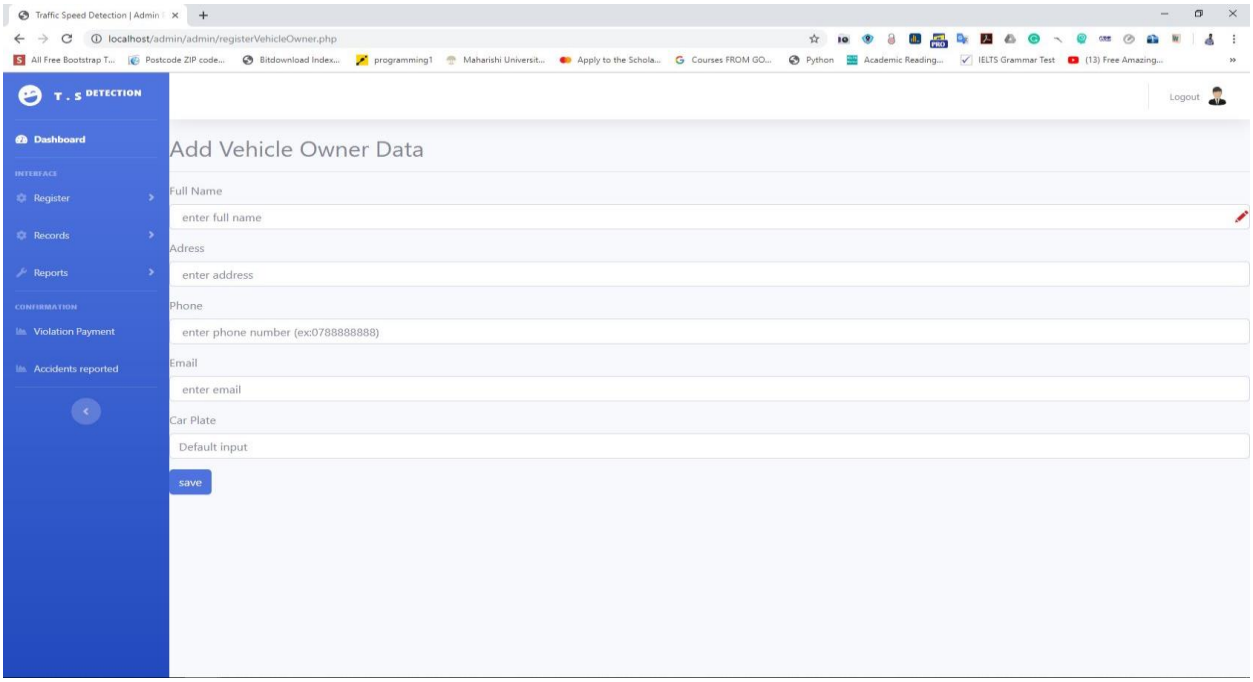


Figure 19: Register vehicles

4.1.2.4. Register Moto Vehicles Owner



,

Figure 20: Register Vehicles Owner

4.1.2.5.Display Records

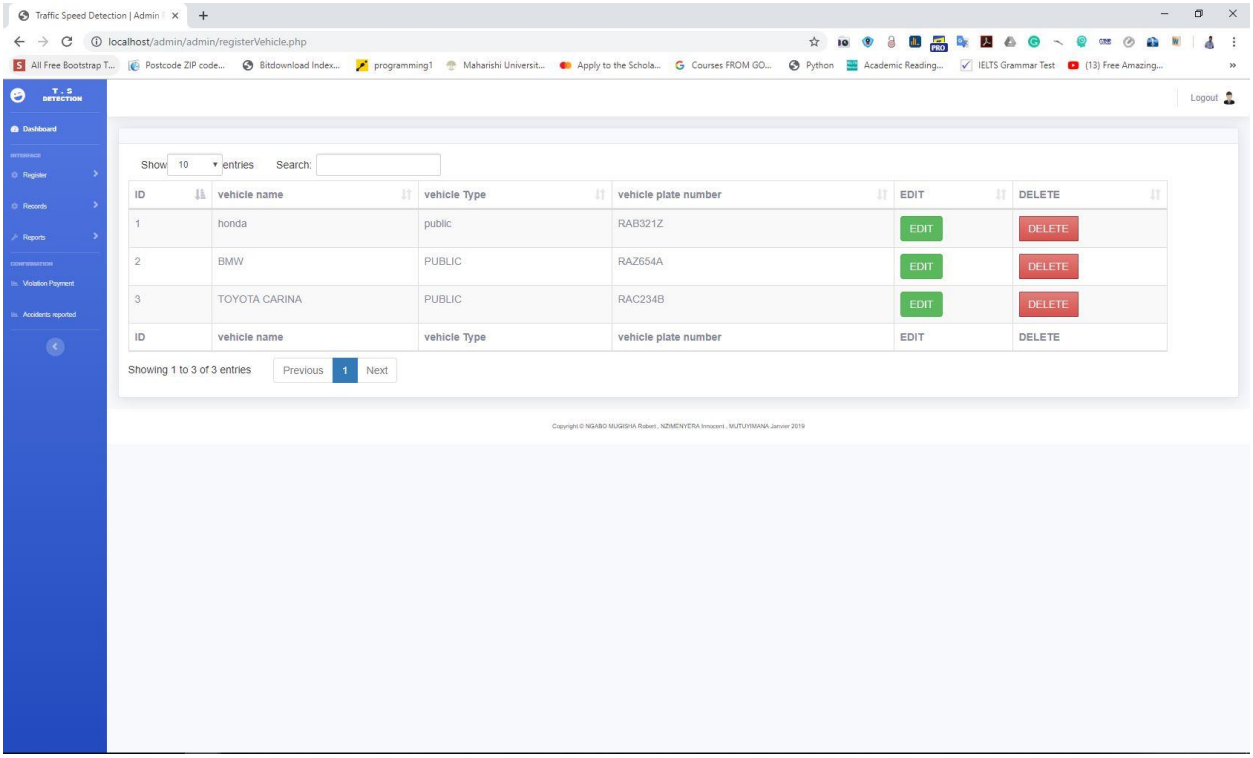


Figure 21: Display Records

4.1.2.6.Report for speed violation

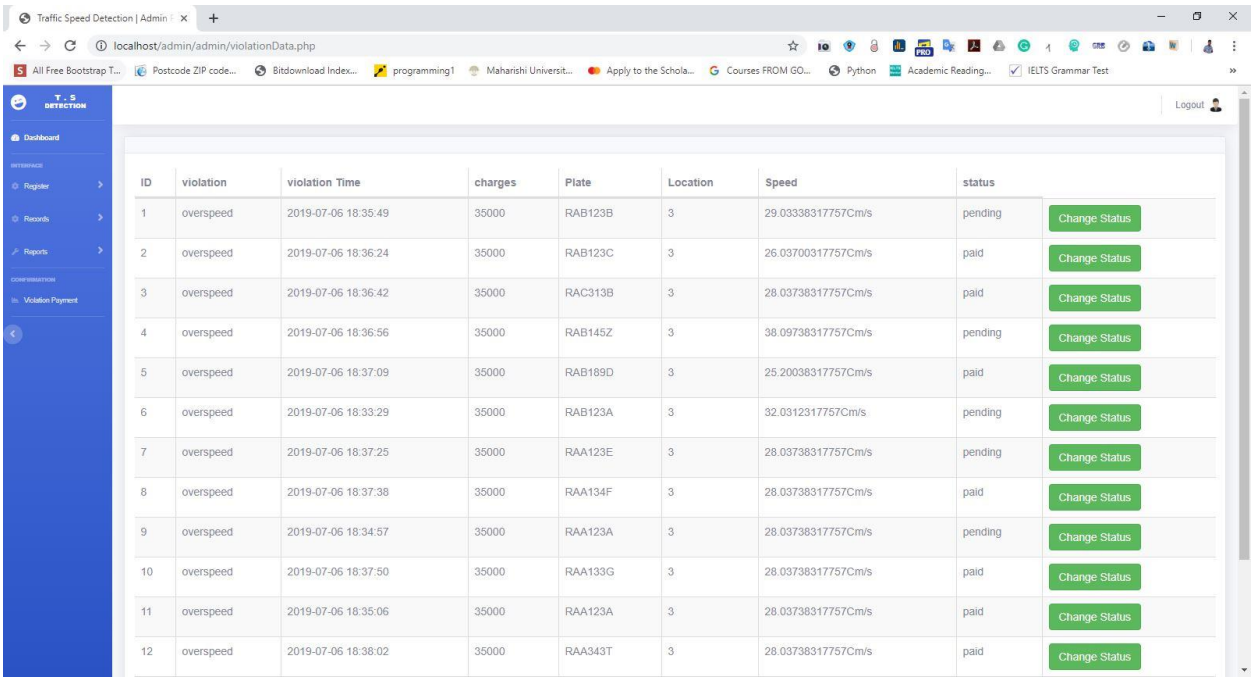


Figure 22: Report for speed violation

4.1.2.7.Report for Accident happen

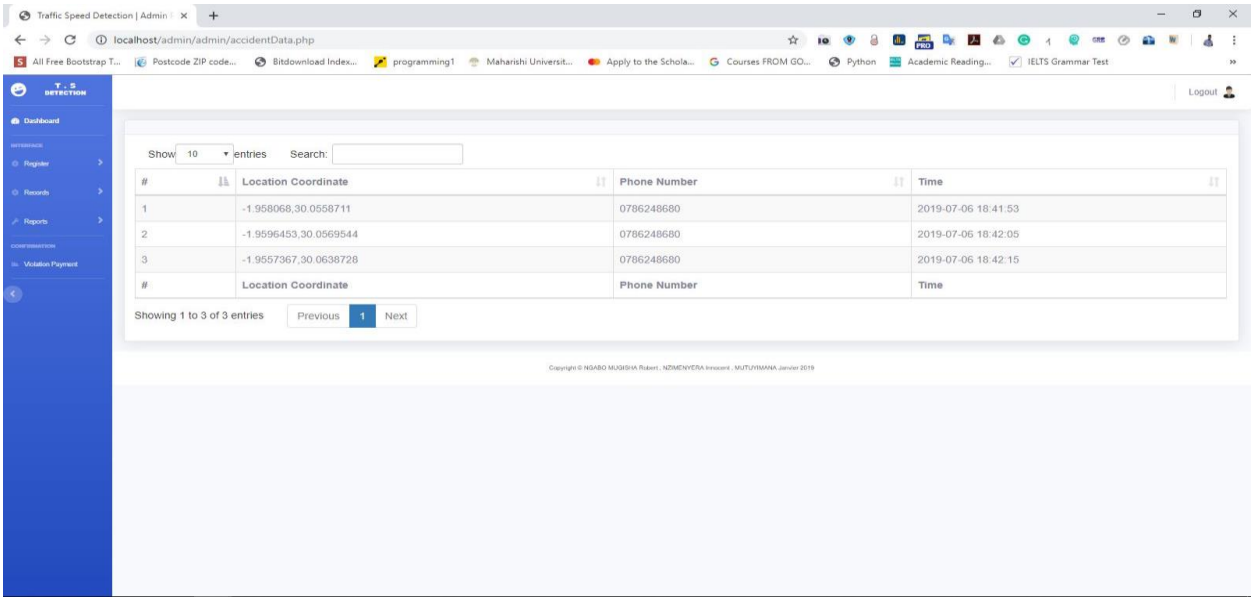


Figure 23: Report for Accident happen

4.1.2.7. General report for accident happen and over speed in pdf format

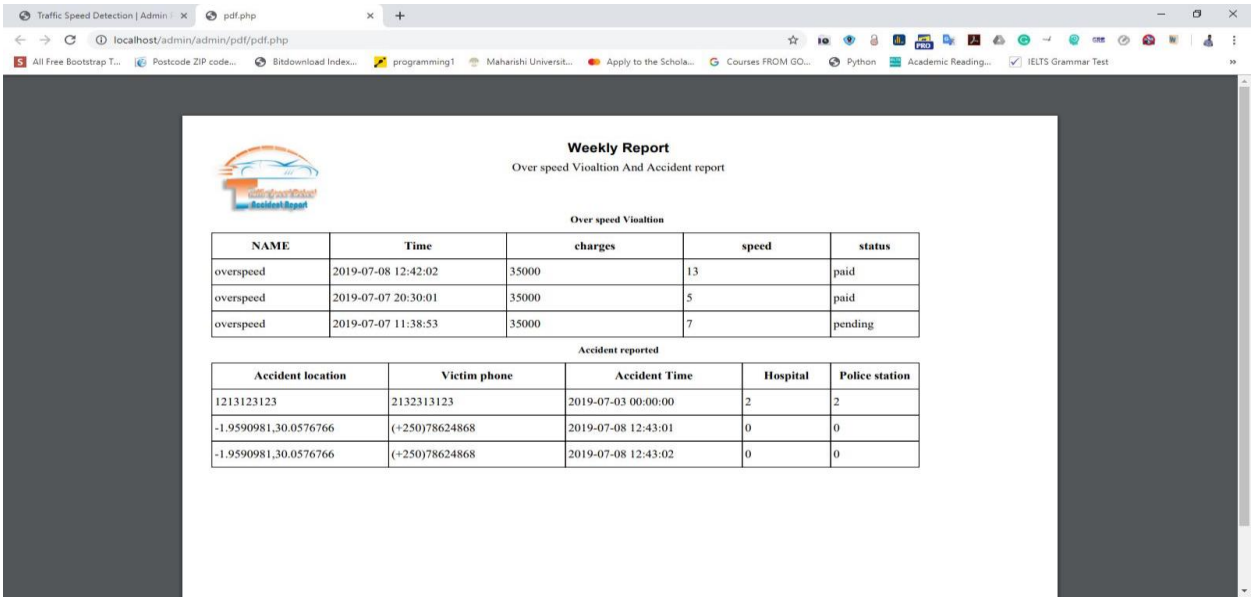


Figure 24:General report

4.1.2.8. Prototyping of the system

Figure 25: Prototyping of the system

4.2. Mobile application structure

4.2.1. Structure

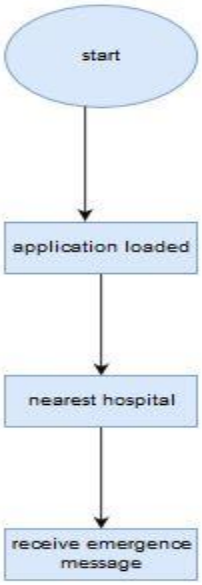


Figure 26: Application structure

4.2.2. Interfaces for mobile application

This is a welcome screen appeared to anyone who attempted to run the application which contains the information of the developers and it will send alert message to nearest hospital in case of accident happen.

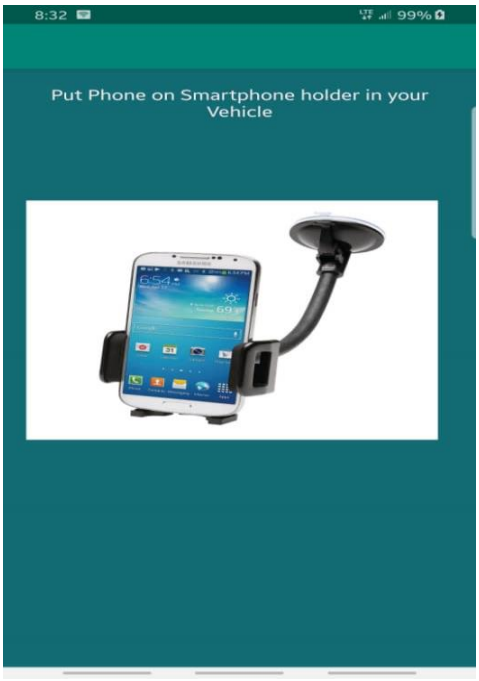


Figure 27: Mobile application Interface

CHAPTER 5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

As technology developing rapidly that is why project have developed, a project focuses about how the process of getting support of Rushing driver can be computerized. By implementing the goal of this study, which was to develop a sensor based application that used as a tool which facilitate car owners and passengers to get assistance in their daily journey.

To reach our goal, we analyzed the existing process and identified problems associated with its operating manual process. From there, we offered solutions that considered acceptable to address the issues raised. We have developed software that could improve the current process of getting support in case the car owner meet with accident problem, and which help to request the emergence from his/her friends.

This software allows the drivers to receive the short message about his/her mistake and in case of accident, it will automatically send on emergence alert to nearest hospital for requesting medical help.

Our aim is, this software can be able detect rash driving even though there are no any patrol officers around, and decrease death rate due delay of emergence support for accident

5.2. Recommendations

- Our recommendation goes to students of university of Rwanda to those Researchers especially in the Information Technology, by encouraging them to continue developing solutions to the society and contribute to the country development because that is what as IT people we have to do
- For police station, they have to use this system to solve this kind of problem
- For the users, they have to be sure with the information they have, which will not lead to the mistakes. We have finished our work by welcome and encourage whoever wants to contribute to the improvement of this work.

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