ITRAFFIC

SMART TRAFFIC IDENTIFYING SYSTEM

Project Id - 19-127

Project Proposal Report

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Sri Lanka Institute of Information Technology

Sri Lanka

13th May 2019

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(Project Proposal Report submitted in partial fulfillment of the requirement for the Degree of Bachelor of Science special (hons) in Information Technology)

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May 2019

Declaration

We declare that this is our own work and this proposal does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgment is made in the text.

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The supervisor/s should certify the proposal report with the following declaration.

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor Date

Signature of the co-supervisor Date

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1.0 Introduction

1.1 Purpose

This Software Requirement specialization provides detailed and complete description of all the functions and specifications all the component of our iTraffic application. iTraffic application is connect the drivers and other parties in the road. The document will explain the purpose and features of the system, the interfaces of it, the constraints for operate the system, how the system will react to various conditions and objectives, goals and the functions of the system.

Other than these features it contains functional and non-functional requirements and other special features. These all parts are intended primarily for customers of the application but it will also be of interest to software engineers building, testing or maintaining the software. Also, we shall predict and sort out how we hope this product will be used in order to gain a better understanding of the project, outline concepts that may be developed later, and document ideas that are being considered, but may be discarded as the product develops.

This document will explain the purpose and features of the system, interface of the system, the constraints for operating the system, how the system will be reacting to various conditions and objectives and the basic functionalities of the system.
This SRS document will be acting as a legal contact between the client and the developer and on the other perspective it will serve as a software validation document for the customer and the developer.

1.2 Scope

“iTraffic” is a mobile application designed in the aim of reducing traffic in Sri Lanka. This gives the driver the right data on the traffic jam. This app is designed specifically for drivers and passengers, who can reach this destination quickly and safely without getting into traffic. Our system is divide many areas focusing different features.

In this iTraffic system, there are four sub function.

1. Intelligent Driver Assistant.
2. Server side data manipulation and tracking process.
3. Vehicle detection and informing process.
4. Evaluate the best existing secure data transmission and storing methods.

1. Intelligent Driver Assistant.

- Create Intelligent Driver Assistant
- Create Mobile application features to work for voice commands
- Evaluate best NLP Open Source Library.

2. Server side data manipulation and tracking process.

- GPS tracker component for all vehicles GPS detection. Use this GPS tracker for detecting emergency vehicle and give an alert to the mobile application.
- Managing server side for passing data using web server API. Server side is working for entire research.
- Payment functions for app feature release. To take payment gateway for manipulating payment function.

3. Vehicle detection and informing process.

- Give ahead traffic condition to drivers by text & voice messages
- Updated the map in every 0.5 seconds with vehicle vise.
- Show alternative roads that can be used by drivers to get rid of the traffic situation if driver want.
- Three-wheelers are shown and contact with people who use public transport facilities that are confronted with traffic congestion.
- When an ambulance arrives on the road, the application will send a voice .message to the ahead vehicles.

4. Evaluate the best existing secure data transmission and storing methods.

- Compare data transmission algorithms for finding the most suitable method for the proposed application. These things will be considered when selecting the method.
- Implement the system using the selected method.
- Implement the selected security mechanism for server.
- Implementing other access control mechanisms for the system.
- Finding the best ways to protecting the confidential details of the users and compare these methods for evaluating most suitable way to protect server details from unauthorized accesses.

3.3 Definitions,Acronyms and Abbreviations

Definitions

Terms	Definition
itraffic	Name of the proposed service
Vingo	Name of the proposed Intelligent Assistant's name
Software Requirement Specification	A document that completely describes all of the functions of a proposed application and the constraints under which it will operat

Table 1 : Definitions

Abbreviations

MB	Mega Byte
GB	Giga Byte
DB	Database
MS	Microsoft
FCD	Floating Car Data
GPS	Global Positioning System
FCD	Floating Car Data
GPS	Global Positioning System
UML	Unified Modeling Language

Table 2 : Abbreviations

1.4 Overview

The main goal of this application is to reduce road traffic congestion and reach to the destination safely and quickly. Using this application drivers or passengers will be able to get their particular work correctly and efficiently.

Task of this system is to first drivers should register their vehicles using our mobile application, drivers information are store into our database after that drivers can communicate with our server. As well as some mobile app features enable after previous scenario done.
Users of our application will be able get emergency vehicle detection near their vehicles, alternative routes suggestion, weather forecast in coming junction, fuel station, suggestion, supermarket suggestion etc.

2.0 Overall Description

This system basically contain two parts. One is Software and other one is Hardware. Software part divides basically two sections as Mobile application and Web application. This hardware part creates by using Arduino circuit and it fixes to all vehicles in the country. Then that circuit gives a signal for server and server records the actual Location of that vehicle using “Map Matching” algorithm. Then map of mobile application update it and show all other vehicles. Using that data application gives an alert to driver ahead traffic congestion. If there is a huge traffic congestion in some road, then application automatically suggest alternative roads to the user using “A star” algorithm. If driver wants to share his/her location with a friend this application has that facility if friend use this app or not. This app can also use passengers who use public transport. If that user doesn’t satisfy about their transport service they can book taxi and go their destination ignoring traffic. There is a cooperate travel facility of this application. This system has web application with huge server so that server run on Linux platform and using curl to communicate with PHP. ITraffic use MySQL database because this system transmit and store huge data volume.It is dangerous to handle a mobile phone when a driver is driving. So Itraffic introduce Intelligent Driver assistant for the convenience of the driver. It can minimize possible vehicle accidents. For that feature Itraffic use Natural Language Processing technique and Identify human voice commands.Itraffic deal with high secure personal data. So Itraffic use Fastest, light weight and the safest techniques to communicate data. There are huge algorithms now a days. But here we measure those algorithms and find the best one to Itraffic. Some of them are blowfish, iceberg, TEA, AES, RC5 etc. below figure explains how Itraffic works briefly.

2.1 Product perspective

Even through there are existing proposed products in the market area, they do not address most of the problems that the proposed system is going to address. The following table shows a comparisons of features between the existing products or applications and the proposed solution in “ITraffic” application.“Waze” and “SYGIC” are existing application product in the market which has limited number of features available. Therefore “ITraffic” is offering various kind of features along with the existing features that were already available.

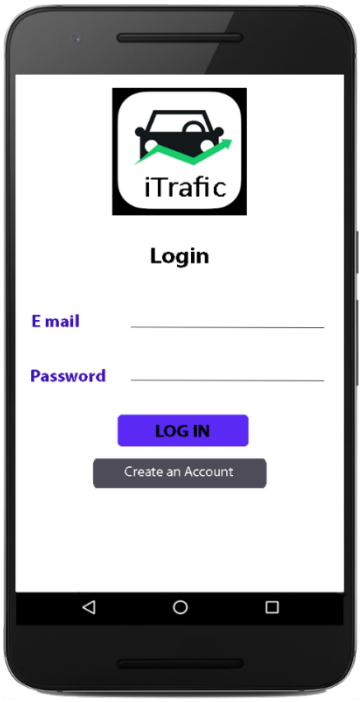
Features	**Here We go**	**WAZE**	**SYGIC**	**Proposed App**
Real time traffic details by GPS technology	✗	✗	✗	✓
Show all the alternative roads to users.	✓	✓	✓	✓
Intelligent Driver Assistant	✗	✗	✗	✓
Ahead traffic situation by GPS technology	✗	✗	✗	✓
Share friends location	✗	✓	✗	✓
Suggest Nearest Taxi service for the passengers who use the public transportation.	✗	✗	✗	✓
Send alerts to the drivers who are in ahead when an emergency vehicle coming in their road.	✗	✗	✗	✓
Ahead weather forecast	✗	✗	✗	✓
Promotion feature to shops.	✗	✗	✗	✓
Co-travel facility for users.	✗	✗	✗	✓

2.1.1 System Interface

Figure 2.1.1.1 : System Overview

2.1.2 User Interface

Figure 2.1.2.1 : Register



2.1.2.2 : Login

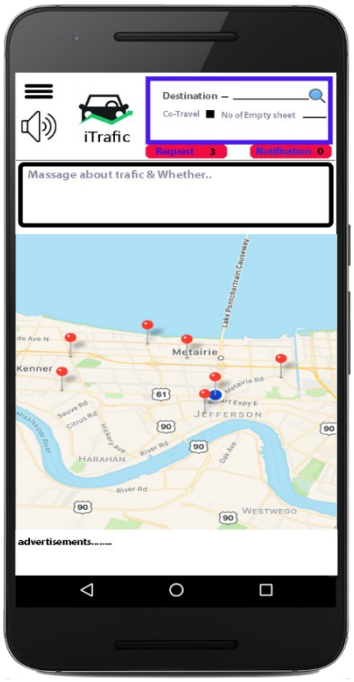


Figure2.1.2.3 :Show Alternative roads

2.1.2.4 : Weather Forecast

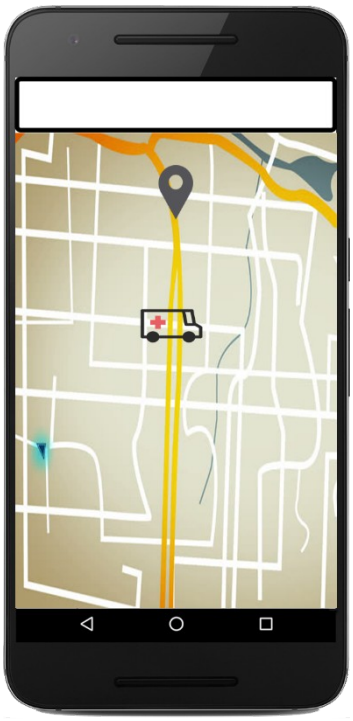


Figure2.1.2.5 : Show emergency vehicles

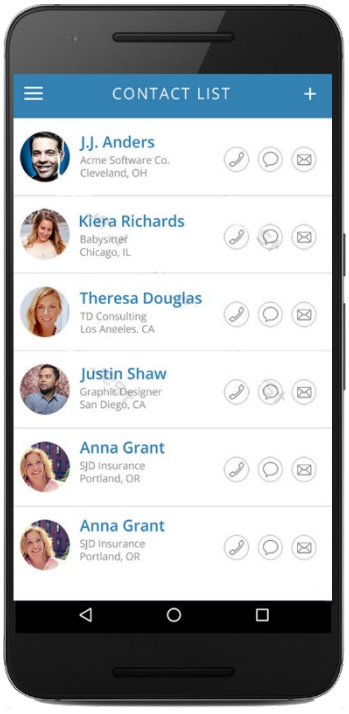


Figure2.1.2.6 : Contact list

Figure 2.1.2.7 Turn on vingo

:

Figure 2.1.2.8 Dice access to handle mobile

:

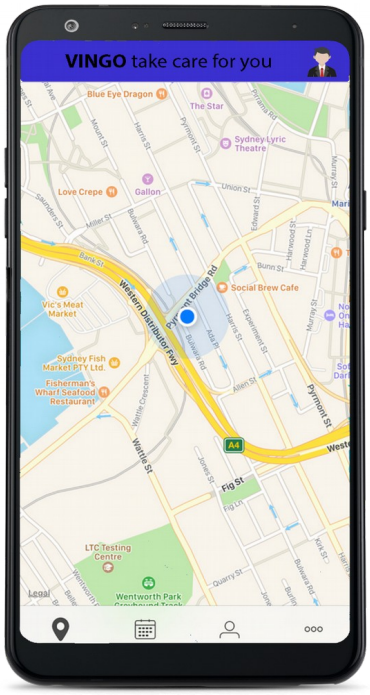


Figure 2.1.2.9 : Active assistant

2.1.3 Hardware Interfaces

- Processor: Core i3 2.4 GHz or later.
- Hard drive: 120GB or more.
- RAM: 4GB or more.
- Arduino
- Node MCU
- GSM Module
- GPS (Global Position System)

2.1.4 Software Interfaces

Several software will be running in our application to produce the expected outcome. Users will require an android device in order to work with our application. Users will have to install our application onto their mobile devices. If the minimum requirements needed for the mobile devices are satisfied then the users will be able to use our application without any issues.

- Google Colaboratory-Colaboratory is a research tool for machine learning education and research. It's a Jupyter notebook environment that requires no setup to use.

- Google Tensorflow - computational framework for building machine learning models

- Keras – Deep Learning Library
- Android Studio
- Pycharm
- Android Studio
- VS Code
- TextBlob
- CoreNLP
- NLTK
- Visual Studio Code
- Arduino IDE
- Postman - (REST api web service runner)
- GitHub

2.1.5 Communication Interfaces

Since this System runs as real time system this system network connection must be established in between the service provider and the Customer. The user's android mobile phone should support high speed data communication methods such as 3G (HSPDA) or 4G (LTE).Also this application is typically do searching, suggesting, recognizing, retrieving data from the internet through the mobile device. The mobile device should be connected before using the application. There is component called GSM module,it used to communicate with computer and GSM-GPRS module.

2.1.6 Memory Constraints

For a better performance In order to implement and run this system efficiently a specific much of RAM space and Memory space is required.

• Minimum 4 GB RAM

• 250 GB hard disk

"Itraffic" mobile application should have at least 1GB RAM and 50MB free space in the mobile device ROM to gain to best performance.

2.1.7 Operation

The proposed applications identify the traffic situation ahead of the user and suggest alternative roads that can be used for to get rid of the traffic to reach their destination.

User will need to perform and special operations in order to interact with "Itraffic" Application.

User (Drivers and passengers)

All users should be mount "GPS Tracker" on their vehicle and server get data from them.

Load map and get details about traffic, other data and get facilities.

Communicate "Itraffic" via Intelligent Assistant.

If there are any issue of the map user can report it to app.

Service Provider (Server side)

Monitoring and Maintain the server, time to time because deal with huge data volume.

Getting report about all data.

Users

First driver should register thought their mobile phone with vehicle details.

Show gps maps.

Service Provider

Confirm the registration.

Connect to main system.

Reduce the gps noise using map matching algorithm and pass data to mobile.

2.1.8 Site adaptation requirements

System should be successfully connected to the main DB server where all data of vehicles are stored. Users of this “Itraffic” app should have to mount “GPS Tracker” on their vehicle and mobile phone with necessary requirements. Next concern would be the storage where the customer need to install the application with enough space in the device.

Mobile application users can use the “ITraffic” application with minimum help of a guide and get the ultimate benefit out of it.

2.2 Product Function

2.2.1 Use Case Diagram

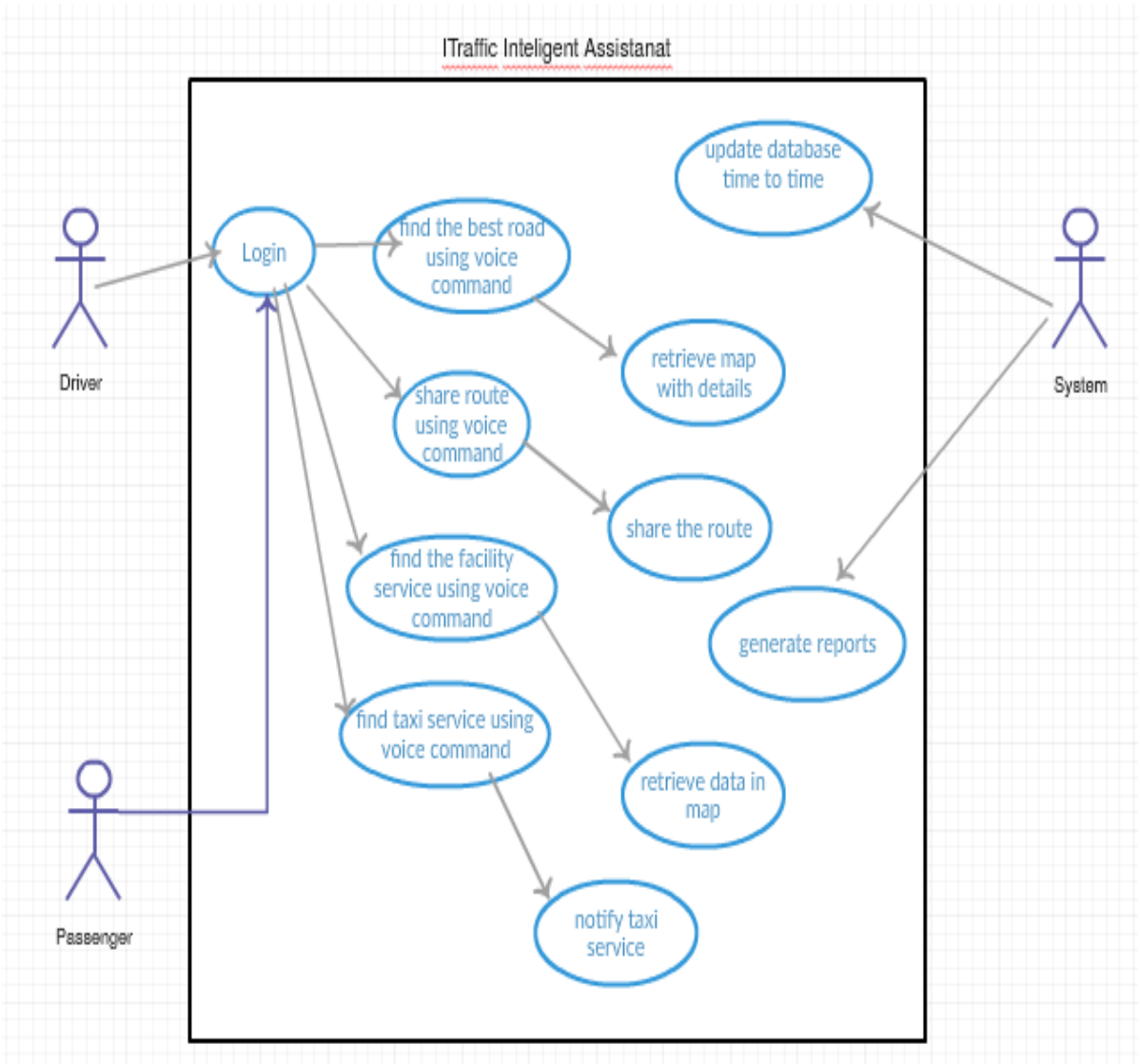


Figure 2.2.1.1 iTraffic Intelligent Assistant

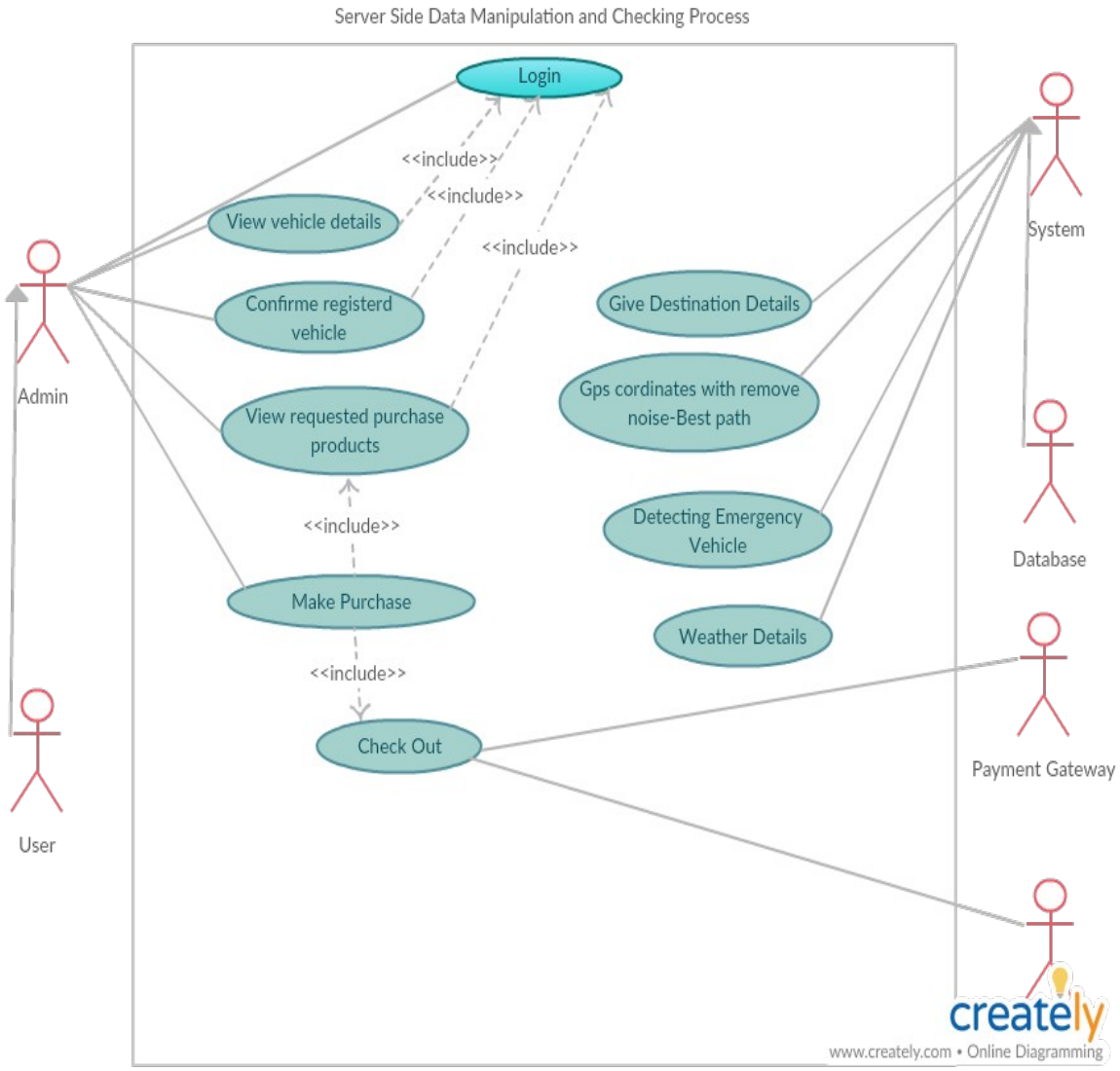


Figure 2.2.1.2 : Server side data manipulation and checking processe

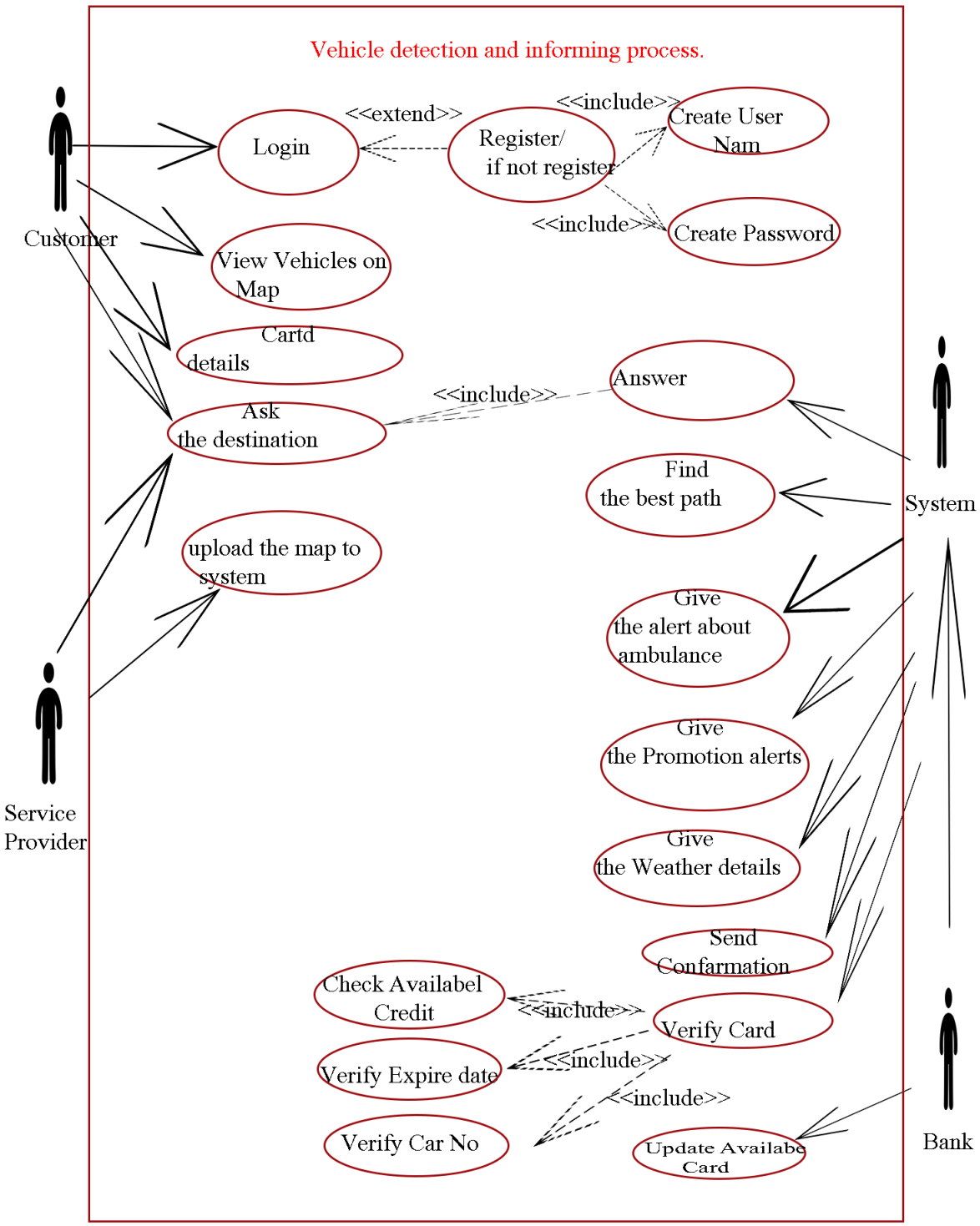


Figure 2.2.1.3 : Vehicle detection and informing process

2.2.2 Use Case Scenario

A Use Case Scenario is a description that illustrates, step by step, how a user is intending to use a system, essentially capturing the system behavior from the user's point of view.

Use Case Name	Login
Pre-Condition	Admin should be registered through mobile application
Post-Condition	Logged in admin
Actor	Admin
Main Success Scenario	After system launched,it displays home page Then there is three navigations display on home screen Click Login Admin inputs username and password Validated Click on login button
Extension	5.a.User is not validated 5.a.1.System display an error message.

Use Case Name	View Vehicle Details
Pre-Condition	Admin should log into the system
Post-Condition	Get result all vehicle details that registered.
Actor	Admin
Main Success Scenario	After system launched,it displays home page Then there is three navigations display on home screen Click login link It navigated login page Admin inputs username and password Validated Click on login button Navigate to drivers view,it on displays navigated page Give filter. Click search button
Extension	5.a.if password doesn't match system gives 'enter the username or password'

Use Case Name	Confirmed registered vehicles
Pre-Condition	Admin should log in to the system
Post-Condition	Get results of all confirmed vehicle details
Actor	Admin
Main Success Scenario	1. After system launched,it displays home page Then there is three navigations display on home screen Click login link It navigated login page Admin inputs username and password Validated Click on login button Navigate to confirmed vehicle details.
Extension	5.a.if password doesn't match system gives re-enter the username or password 8.a. If not confirmed that vehicle no longer in confirmed view.

Use Case Name	Remove noise with best path
Pre-Condition	User should log through the app.give source and destination
Post-Condition	Appear proper and best path to the map
Actor	System
Main Success Scenario	1. Use case starts when user launches the app System displays login interface. Users enter username and password. User click on login button User is validated Use case ends when user logged in.
Extension	5.a.User is not validated. 5.a.1.System displays and error message.

Use Case Name	Give destination details
Pre-Condition	User should log through the app.give source and destination
Post-Condition	Give all details of destination location
Actor	System
Main Success Scenario	➢ User should log in to the app Give source and destination location Server gives destination details
Extension	

Use Case Name	Make purchase
Pre-Condition	Admin should log in to the system then link to the view request purchase products.
Post-Condition	Get results data of confirmed purchase products,
Actor	Admin
Main Success Scenario	1. Login in to the backend system. Admin enter username and password. User click on login button User is validated Use case ends when user logged in.
Extension	5.a.User is not validated. 5.a.1.System displays and error message.

Use Case Diagram	Check out
Pre-Condition	Admin should log into the system then link to view request purchased products after that link to make purchase.
Post-Condition	Check out by payment gateway and purchased
Actor	Paypal, Payment gateway
Main Success Scenario	1. Login in to the backend system. Admin enter username and password. User click on login button User is validated Use case ends when user logged in.
Extension	5.a.User is not validated. 5.a.1.System displays and error message.

Use case Name	Login
Pre –Condition	User should be registered in the application
Post-Condition	Logged in user
Actor	User
Main Success Scenarios	1) Use case starts when user launches the app. System displays login interface. User enters username and password User click on login button User is validated. Use case ends when user logged in.
Extension	5. a. User is not validated 5. a.1. System displays an error message

Use case Name	View the map
Pre –Condition	User should be logged in to the system
Post-Condition	Real time map
Actor	User (Customer)
Main Success Scenarios	1) Use case starts when user launches the app. System displays login interface. User enters username and password User click on login button. User is validated and login to the system. Go to the map Select a service provider and go to map.
Extension	3.a. 1. User name or password does not match; the system prompts for re-enter them.

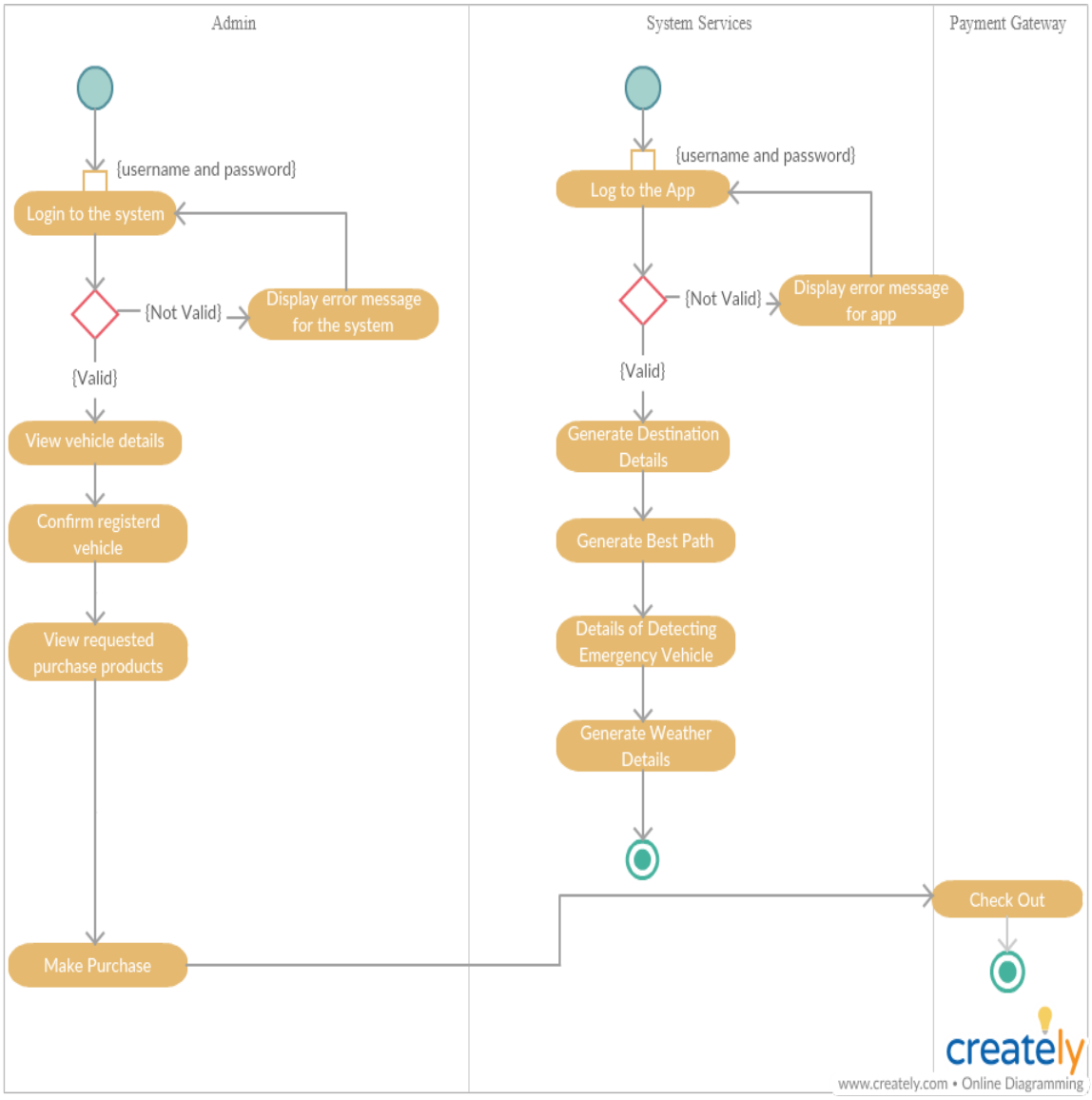
Use case Name	Ask the destination
Pre –Condition	User should be logged in
Post-Condition	Automatic reply
Actor	User and system
Main Success Scenarios	1) Use case starts when the user selects the chat finding button System opens the finding screen User asks the destination problem. System replies the answer from map Use case ends when the user exits the finding box
Extension	4.a User ask destination wrong; system prompts message saying “sorry. System can’t show the correct place”

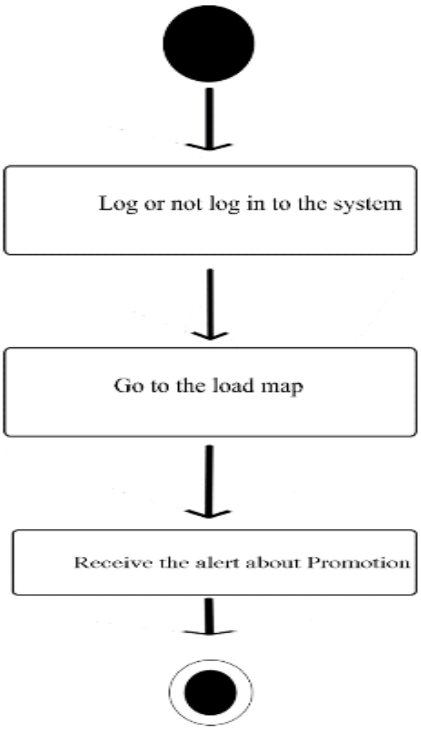
Use case Name	View the vehicles on the map
Pre –Condition	User should be logged in to the system
Post-Condition	Real time map
Actor	User, system
Main Success Scenarios	Use case starts when user launches the app. System displays login interface. User enters username and password User click on login button. User is validated and login to the system. Go to the map Select a service provider and go to map View the vehicles on the map
Extension	3.a. 1. User name or password does not match; the system prompts for re-enter them.
Use case Name	Give the Promotion Alerts
Pre –Condition	User should not be logged in to the system
Post-Condition	Not Logged in user

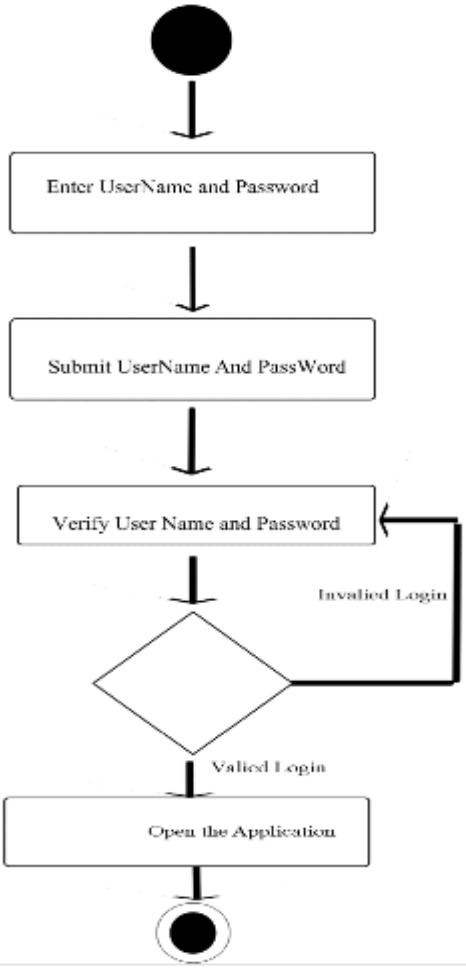
Actor	User
Main Success Scenarios	● Use case starts when user connect to the internet. If the connect to the app then System displayed the logging interfaces. User enters username and password User click on login button User is validated and login to the system. User can bye online or can stop the vehicle near the shop
Extension	3.a. 1. User name or password does not match; the system prompts for re-enter them.

Use case Name	Adding the credit or debit card to the system
Pre –Condition	customer has an authenticated iTraffic Service account
Post-Condition	Adding the debit or credit card successfully
Actor	Backend System, customer, bank
Main Success Scenarios	1) Customer selects the payment option. Select payment method card. Customer adding the card details. Prompt massage show card added successfully.
Extension	3).a. prompt massage show invalid card 3).a.1. enter the proper details of the card (expire date, card number)

2.2.3 Activity Diagram




Log or not log in to the system
Go to the load map
Receive the alert about Promotion


Enter UserName and Password
Submit UserName And PassWord
Verify User Name and Password
Invalied Login
Valied Login
Open the Application

2.3 User Characteristics

Since the user is a normal customer or service provider to a iTraffic application, he does not require any professional or special skills to use the system. But having English knowledge would be an added advantage to use the system. Also user should have little knowledge about how to use an android phone (like uploading videos to PMS).Since the system is very user friendly using it first time would be not hard for the user. So novice users can also use the system.

2.4 Constraints

Our system consist of mobile application and web application. So we should consider the constraints in order to work with better level of the quality. Memory limits limited below are needed by the application to work efficiently.

Mobile Application

- Mobile device should have android operating system to run the application.
- The android version should be 4.0 or above. And must have most recent version of the application.
- Mobile device CPU should be 1GHz or above for optimal performance. So that all the processing tasks would be done faster and user would gain the output results very faster.
- Mobile device RAM should be 1GB or above for better performance.
- Internet connection is required for the software to function properly. High bandwidth is encourage for smooth operation.
- Backend system must have minimum of 6GB RAM. Additional 2GB of GPU will be added advantageous.

Web Application.

- Should have apache server to run the web application and mysql for connect to da
- tabase.
- Internet connection is required.

2.5 Assumptions and Dependencies

Assumptions

- Should have network connection.
- Should satisfy the minimum hardware and software requirement from server side and client side.
- Should have a database with secure username and password to prevent the unauthorized access.
- Should be developed with the understanding of both the language and grammar

Dependencies

- "Itraffic" system is depending on the network and GPS connection as it should be a location based model.
- The user should provide correct details to the app for get good result.

2.6 Apportioning of Requirements

Getting data from GPS Tracker.

Getting data for server side using high secure method, manipulate that data and pass it to Mobile application.

Doing predictions in server side.

Retrieving obtained traffic data in mobile device and give massages to driver.

Intelligent Assistant activate and he does things which driver should do.

3.0 Specific Requirements(for Software Dev. Oriented Project SRS)

3.1 External Interface Requirements

3.1.1 Hardware Interfaces

- Android enable mobile phone or tablet would be required for the hosting purpose.
- Minimum processor speed of 3GHz, Ram of 512MB.
- Arduino
- GSM module
- GPS module
- Connecting wires

3.1.2 Software Interfaces

Apache OpenNLP: - The Apache OpenNLP library is an AI based toolbox for the handling of characteristic language content. It bolsters the most widely recognized NLP assignments, for example, language location, tokenization, sentence division, grammatical feature labeling, named element extraction, and lumping, parsing and co-reference goals.

NLTK: - The Natural Language Toolkit, or all the more generally NLTK, is a suite of libraries and projects for emblematic and factual common language preparing for English written in the Python programming language.

TensorFlow: - It is computational framework for building machine learning models. It provides wide variety of toolkits that allows the users to construct models at the preferred level of abstraction.It comes in-built with Google colaboratory.

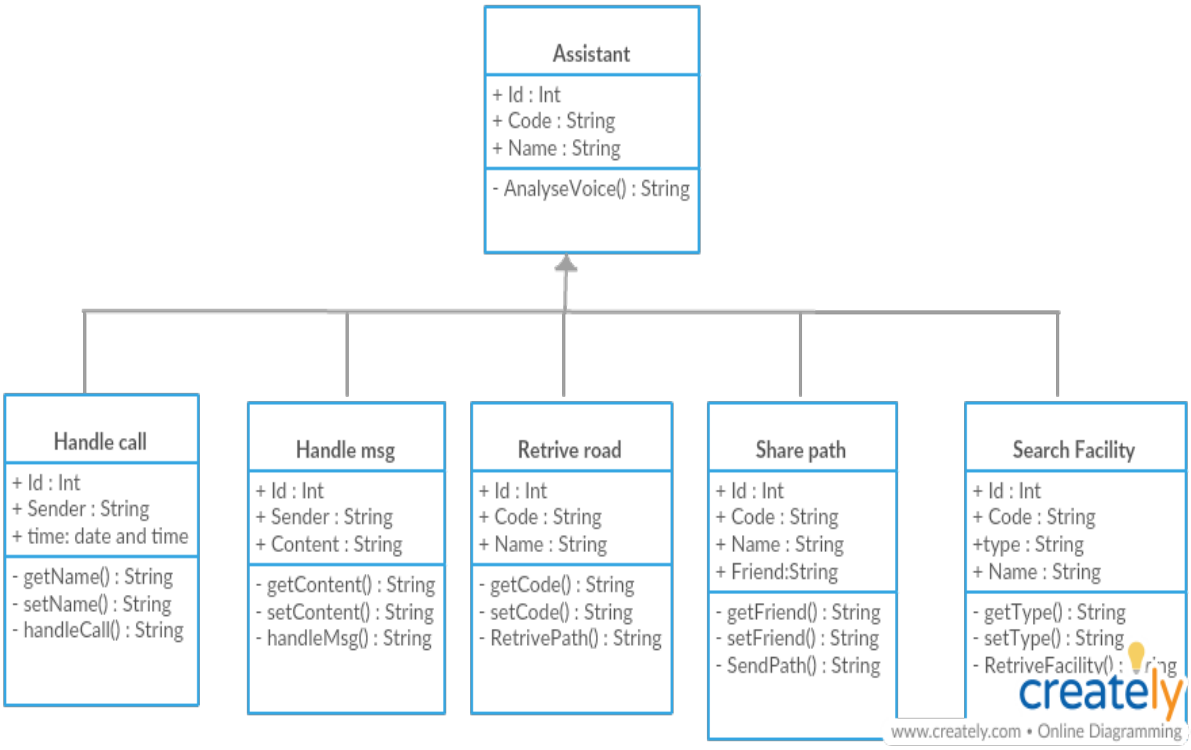
Keras: - It is a very popular deep learning library written in python. We can quickly build and test a neural network with minimal lines of code. It is capable of running on top of TensorFlow and also available in Google colaboratory.

3.1.3 Communication Interfaces

Required Connection bandwidth might differ time to time. Since large data load is travelling through the network, having a high bandwidth internet connection will help a lot for the users to use the application with use.3G-4G connection of the mobile phone will be used for data transmission between the mobile app and the database.

Wi-Fi – If the mobile data is not available, user can connect to an available Wi-Fi router to get the internet connection in order to use the application. And this will also be used for data transmission between the mobile app and the Database.

3.2 Classes/Object (For Software Dev. Oriented Projects)



3.3 Performance Requirements

Performance requirements are necessary for system design and development. There are three classes of Performance requirements.

- Response Time

Response times or processing times define how fast requests would be processed.

- Throughput

Throughput is the rate at which incoming requests are completed. Throughput defines load on the system and is measured in operations per a time unit. To calculate the throughput of the system the team will consider on the input of user details and the admin inputs when handling management.

- Concurrency

Concurrency, the number of users or threads working simultaneously, is important too. Even if users are connected, but not active, they still hold some resources. So this android application will handle multiple users up to multiple users at the same time.

- At single time any number of users can log in to the system
- Payment confirmation message to the app from the system
- Unknown or accident vehicle detection.

3.4 Design Constraints

"Itraffic" is a mobile application. Therefor while developing the mobile application main constraint is the display real state and current weather situation.

3.5 Software System Attributes

Developing a quality application is the main objective. Thus, the following factors were considered to improve the quality of the system.

3.5.1 Reliability

The system used for spatial environment identification, it must be very efficient and user friendly. The technology and system should correctly deliver the monitoring service as expected by the user over a given period of time and should not fail. To ensure that the system is reliable the development team will carry out requirement inspection to discover problems with the system specification and avoid requirement errors. As the mobile application is being used more and more, the reliability increase up to a certain extend.

3.5.2 Availability

When there is an internet connection problems application will be unavailable because the application will be unable to interact with the other functions. Battery state of mobile phone should not be in weak. Except above conditions for all other situations, application will available. "iTraffic" application has a high availability. This application is available at any time when the user installs the application in user's mobile phone. The application will be available to be used fully, as long as the back end of the application is active and returns results when requests are made by the mobile application.

3.5.3 Security

The Security of a system is an attribute which reveal ability to resist unauthorized usage while still providing its services to legitimate users and it can protect itself from external assaults. In this component any authorize user should be able to use the mobile application.

- Maintains strong server-side controls
- Sessions will contain a timeout
- Passwords should be stored in database using an encryption method
- Development team must consider about the security of the user's data.
- user pay the payment for their item list it will handle by the credit or debit card banking system it has a secure transaction methods

3.5.4 Maintainability

Maintainability is defined as the probability of performing a successful repair action within a given time. The proposed application will be easily maintained because application is developed according to the object-oriented principals and modularization. Also, the source code will be well commented and documented for any changes or modifications done in future. That means the proposed system can be maintained easily if it needs some modification without causing any damage or interrupt to other system functionalities. As well as modifications can be done through low cost solutions. It is also a somewhat important feature to having a high maintainable system. In case of a failure, a re-initialization of the program is recommended.

4.0 Other Requirements

- Reusability: The specified component should be generic such that is should be suitable for use in other applications and scenarios as well.
- Interoperability: This component should be able to operate successfully by communicating with other components of the system such as: web scraping component. Similarly, it should be also efficient to exchange information with external components when needed.
- Extensibility and Modifiability
- Adaptability