

**ITRAFFIC**  
**SMART TRAFFIC IDENTIFYING SYSTEM**

**Vehicle detection and informing process**

Project ID: 19-127

**Software Requirements Specification(SRS)**

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Sri Lanka

March 2019

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**Software Requirements Specification(SRS)**

( Dissertation submitted in partial fulfilment of the requirement for the Degree of Bachelor of  
Science Special (honours) In Information Technology)

Author: Nipun Sachinthana T.A (IT 16119390)

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Sri Lanka

March 2019

## Declaration

I declare that this is our own work and this SRS does not incorporate without acknowledgement 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 acknowledgement is made in the text.

Name	Student ID	Signature
Nipun Sachinthana T.A	IT 16119390	

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

.....

.....

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# **1 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.

In short, the purpose of this SRS document is to provide a detailed overview of our software product, its parameters and goals. This document describes the project's target audience and its user interface, hardware and software requirements. It defines how our client, team and audience see the product and its functionality. Nonetheless, it helps any designer and developer to assist in software delivery lifecycle (SDLC) processes.

The document will be reviewed frequently by the above viewers to check for any deviations with the different phases of the project and to check whether the project team has met the mentioned requirements. Any alterations in the requirements regarding the project must be included in this document. The major purpose of SRS is to obtain an overall understanding of the entire project and also any changes in the requirements regarding the project must be included in this document with necessary changes. By referring this document any developer can easily do further improvements and developments for this software product.

## 1.2 Scope

This SRS is aimed at specifying requirements of software to be developed but it can also be applied to assist in the selection of commercial software products. The standard can be used to create software requirements specifications directly or can be used as a model for defining an organization or project specific standard.

SRS document contains the purpose of the project, current state, and overview of the previous work. This document states the functionalities of software used in the project. The Unified Modeling Language (UML) diagrams such as use of Case diagram, Class diagram and Entity Relationship diagram are portrayed diagrammatically in this document. This document specifies the behavior of the system.

In this iTraffic system, There are for sub function.

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

But we will give the description of the “Vehicle detection and information process”. This part is very important for this system. Because, the vehicles are very important facts for this research. So system should be introduced the vehicles and should be identified the information to run the system. In this function , there are eight sub functions. Those are ,

- Give ahead traffic condition to drivers by text & voice messages.

Sri lanka is a developing country. So all roads are not highway and one way system. There fore lot of vehicles will come to road same time. Then roads will be tied as traffic. Then drivers will embarrassing. But this system is giving an alert to drivers about the current on traffic condition with text and voice messages.

- Give ahead whether condition to drivers by text & voice messages.

Some time, accidents will happen with vehicle by bad whether condition. Because drivers drive vehicle without current whether condition. But this system can give an alert about current whether condition.

- Updated the map in every 0.5 seconds with vehicle wise.

This system is giving current Updates map in the vehicles on road. Then drivers and passengers can take an idea about road.

- Show alternative roads that can be used by drivers to get rid of the traffic situation if driver want.

There are alternative roads that can be used to go to destination. But , if drivers drive their vehicles throw traffic then they can't change their map. Because they are in traffic. But this system will show all the alternative roads with current traffic percentage.

- Three-wheelers are shown and contact with people who use public transport facilities that are confronted with traffic congestion.

This point is very important to passengers. Lot of passengers will use common travel system in Sri Lanka. Some time they can't come to their offices on time. Because they are staying on same place at many hours. But this system can show current Three-wheelers and can contact to go passenger's destinations with using alternative roads.

- Publish promotion advertisements.

The sellers, businessmen and companies can use to sell their goods and services throw this system with publish promotion advertisements.

- When an ambulance arrives on the road, the application will send a voice .message to the ahead vehicles.
- Manage Co-travel facility for users.

### 1.3 Definitions, Acronyms and Abbreviation

FCD	Floating Car Data
GPS	Global Positioning System
UML	Unified Modeling Language

*Table 1*

### 1.4 Overview

## 2 OVERALL DESCRIPTION

The proposed system consists of a mobile application mostly focused on drivers and passengers. It will be helpful to drive vehicles on the road very safely. Our mobile application can interact with passengers, drivers and others who like. This application is connected via cloud server to connect with inbuilt RESTful server in our application and connect to the google map. In the application user can get adds and promotion in current business and shops. It can buy goods and service from this mobile application. Below figure explains how our application works briefly.



Figure 1

## 2.1 Product perspective

### ❖ Using research papers

#### ▪ Traffic congestion detection based on GPS floating car data.

They said congestion has been a major challenge to the urban traffic system. They used GPS floating car data (FCD) method to detect traffic congestion information is studied. They used data for experimentation. This data extract from traffic congestion information of a big city in China. They extract that thing through GPS data processing, map matching travel speed estimation and after that they show all those details inside the map. They said the GPS floating car technology to collect traffic information becomes more cost effective to collect traffic information in a large scale. They said compared with the traditional fixed detection devices such as (inductive loops, video cameras and radar based sensors) floating car data technique can collect traffic information more accurate and wider in real time. They said that they consider using GPS floating car data to detect traffic congestion information.[1]

#### ▪ SYGIC

Sygyic is an automotive GPS navigation mobile application for Mobile phones and tablets. It became the first company to offer navigation for iPhone and second for Android. Sygyic provide

door-to-door information for well-oriented travel, live traffic & police radar/speed camera warnings, parking places and etc. Also sygic can use online and offline, runs Android, IOS, Windows, Symbian operating systems. Sygic navigation uses 2D & 3D maps for both online and offline. Traffic information is collected from more than 400 million drivers and updated every 2 minutes. So Sygic mainly depends on driver's feedback.[2]

❖ Comparing with existing product

Even though 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 comparison of features between the existing products or applications and the proposed solution in 'iTRAFFIC' application.

Features	Here We go	WAZE	SYGIC	Proposed App
Real time traffic details by GPS technology	×	×	×	✓
Show all the alternative roads to users.	✓	✓	✓	✓
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.	×	×	×	✓

Table 2

### 2.1.1 System Interfaces

- Database connectivity interface



### 2.1.2 User Interfaces



Figure 2



Figure 3

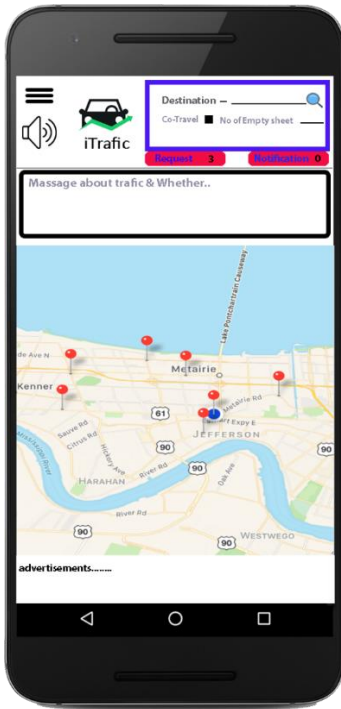


Figure 4



Figure 5

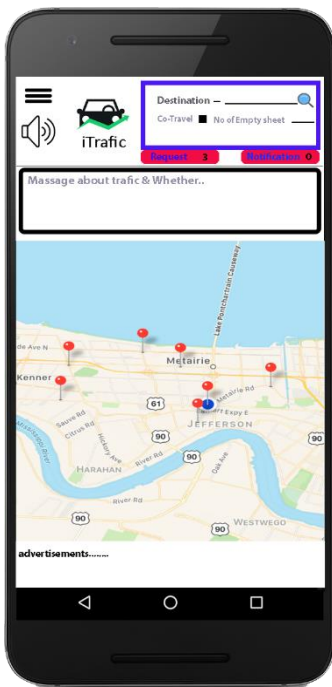


Figure 6

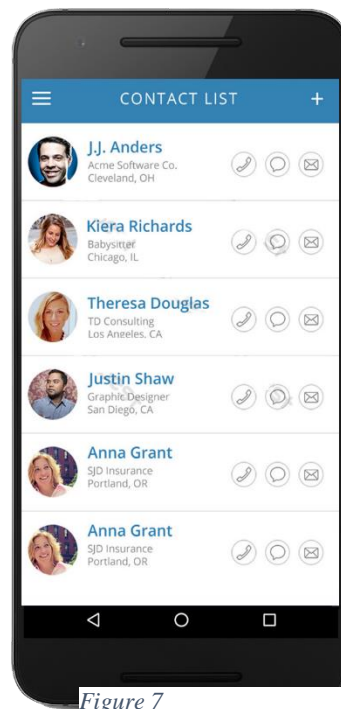


Figure 7



Figure 8

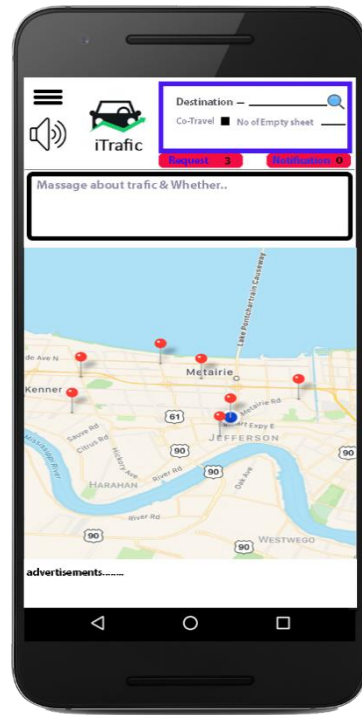


Figure 9

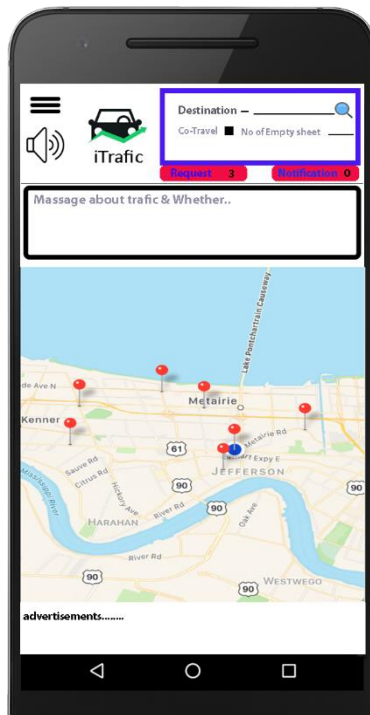


Figure 10

### **2.1.3 Hardware Interfaces**

iTRAFFIC is a mobile application. So for the development site, we need a computer to develop the To develop the web application and the system some hardware requirements must be needed. The following hardware interfaces will be used to develop the web application and the system.

#### **Developer side**

- ❖ Computer-Computer is used to develop the function mentioned above. Desktop computer or laptop may use for the development.
  - Processor: Core i3 2.4 GHz or later.
  - Hard drive: 120GB or more.
  - RAM: 4GB or more.

#### **End User Side**

- ❖ Smart phone- Android Operation System.
- ❖ For the System running Internet connection should be needed. Can use mobile data or connect to the Wi-Fi router.

### **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

### **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).

### **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

### **2.1.7 Operations**

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.

1. Main Operation-register the vehicle in the system

#### **User Operation**

##### Register

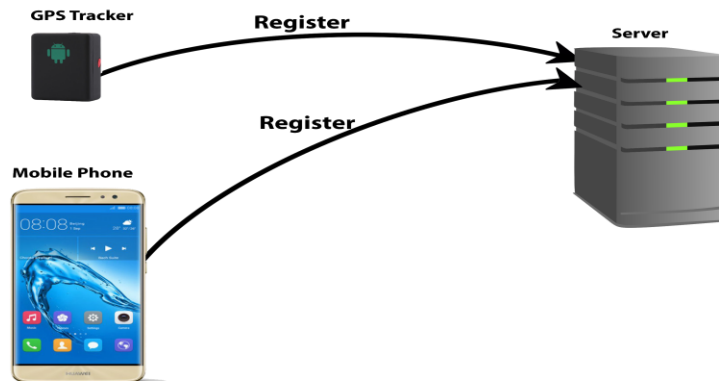
- Register the vehicle and GPS tracker
- Provide required details(name, NIC, Vehicle No)
- Register

#### **Service provider**

##### Register

- Accept the registration.

- Connect to the main system.



*Figure 11*

## 2. Main Operation- **Show vehicle on the map**

### **User Operation**

- Input the search details
- user can see vehicle locations on the map.

### **System Operation**

- vehicle GPS data sent to the server.
- server will be sending location details



*Figure 12*

### 3. Main Operation- **Show ambulance and emergency vehicle**

#### **User Operation**

- Drivers can identify that an emergency vehicle is approaching and they can give the way for it.

#### **System Operation**

- system analyzes the GPS data and send a voice message to the vehicles on the of emergency vehicle.



*Figure 13*

#### 4. Main Operation- **Trace vehicle**

##### **User Operation**

- User send a request to the finding friends.
- Accept the request from coming friends.

##### **System Operation**

- Vehicles have received trackers installed.
- Give and show the suitable best path for find the friends





Figure 14

## 5. Main Operation- **Travel as fast as possible**

### User Operation

- User send a request to the finding friends.
- Accept the request from coming friends.

### System Operation

- Vehicles have received trackers installed.
- Give and show the suitable best path for find the friends.

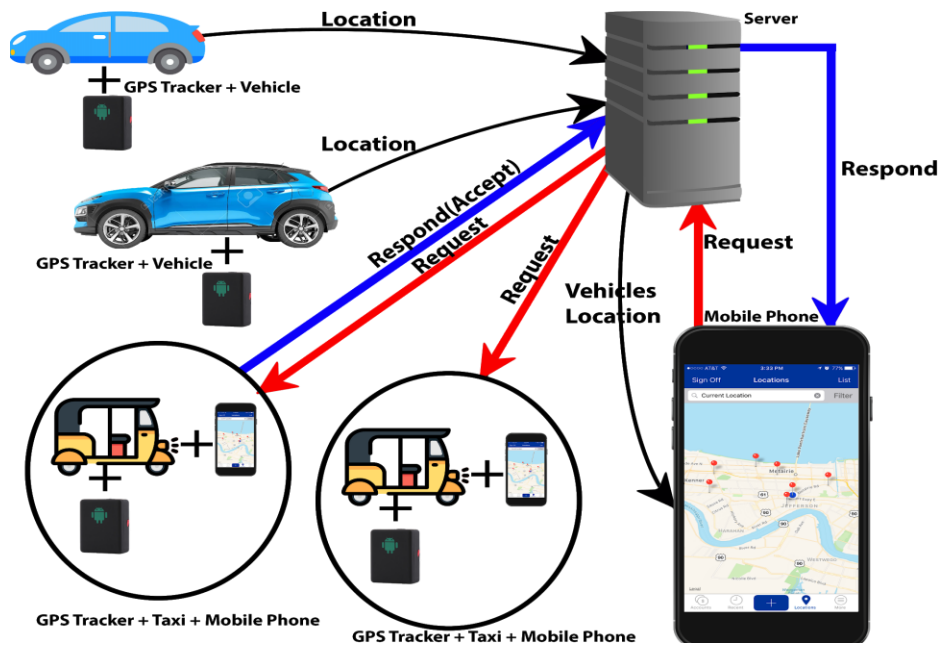


Figure 15

## 6. Main Operation- Weather forecast

### User Operation

### System Operation

- System will give the alert about bad weather condition.

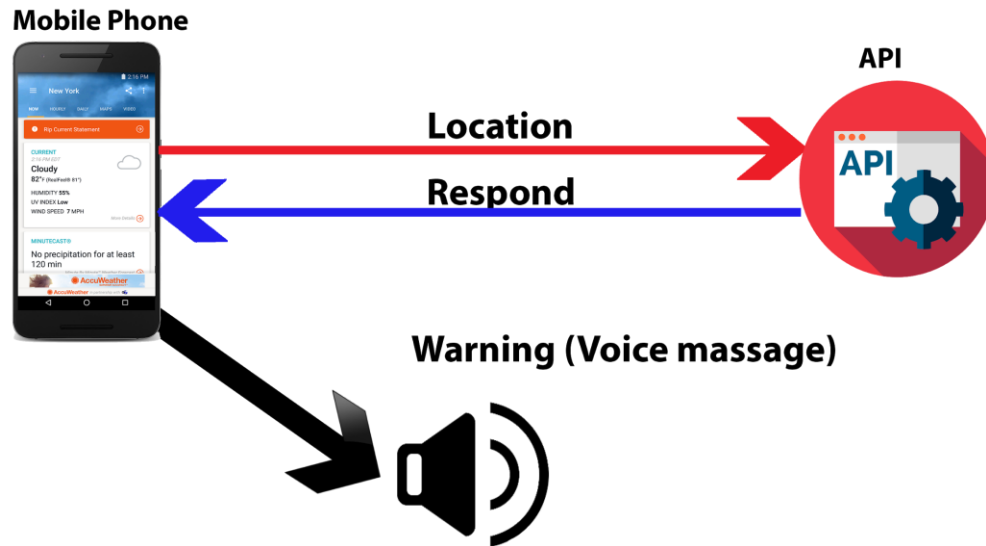


Figure 16

## 7. Main Operation- **Promotion**

### User Operation

- 

### System Operation

- System give the alert about best supermarket to the driver or passenger

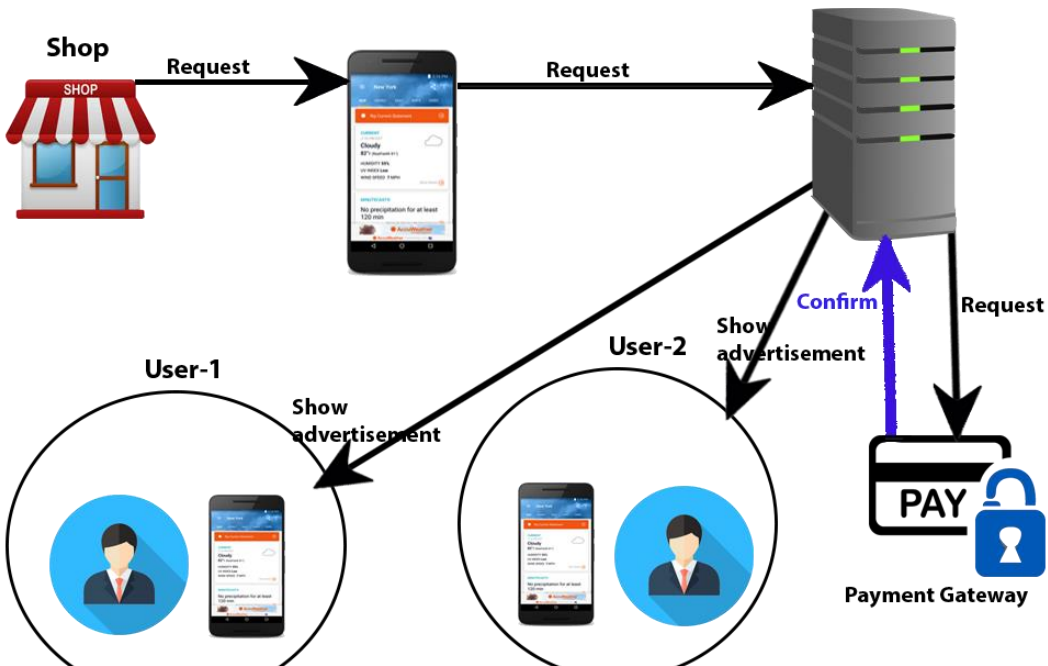


Figure 17

## 8. Main Operation- Co-travel

### User Operation

- Passengers will give the destination and beginning place to the system.
- Input the no of passengers.

### System Operation

- System will identify the best vehicle
- System will suggest the vehicle and other details to the passengers.

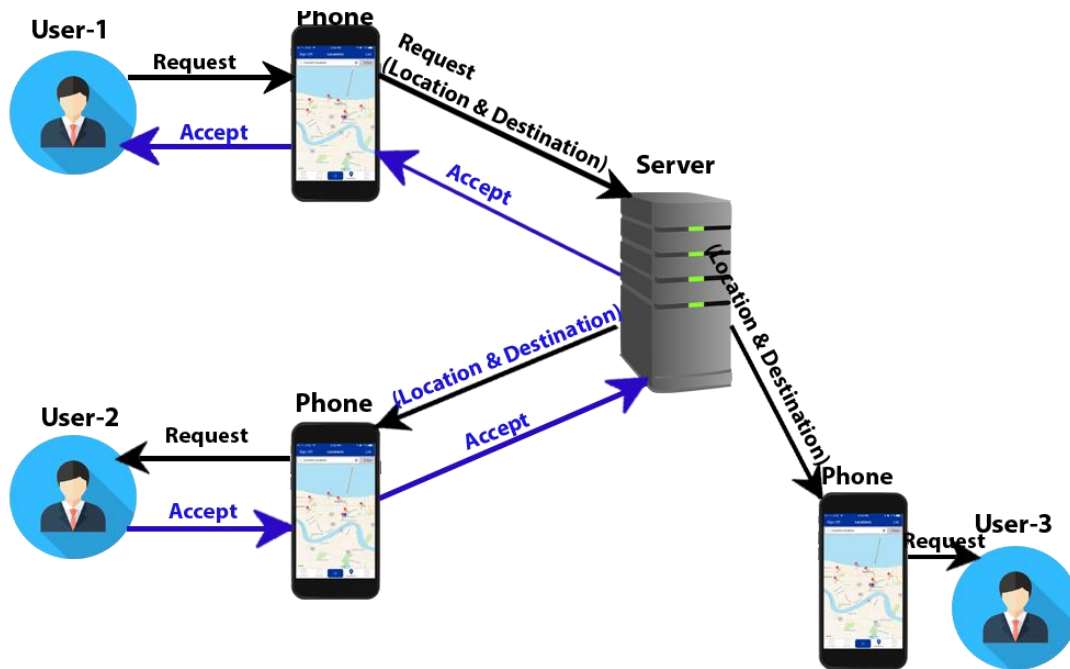


Figure 18

### 2.1.8 Site Adaption Requirements

- The user can be of any nationality the user interface must be created for English language.
- Can use any android mobile devise.

## 2.2 Product functions

### 2.2.1 Use Case Diagram

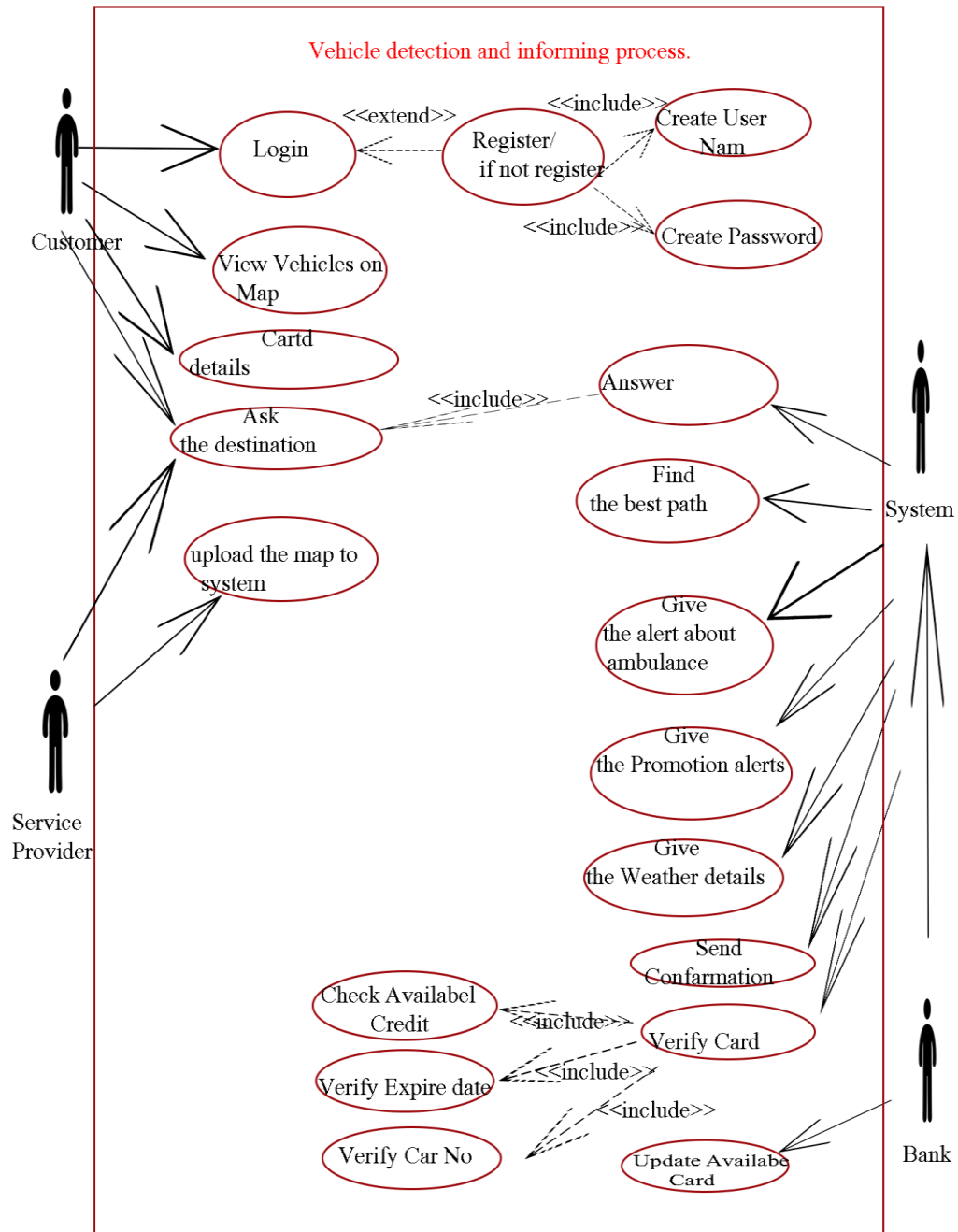


Figure 19

### 2.2.2 Use Case Scenarios

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	User should be registered in the application
Post-Condition	Logged in user
Actor	User
Main Success Scenarios	<ol style="list-style-type: none"><li>1) Use case starts when user launches the app.</li><li>2) System displays login interface.</li><li>3) User enters username and password</li><li>4) User click on login button</li><li>5) User is validated.</li><li>6) Use case ends when user logged in.</li></ol>
Extension	<ol style="list-style-type: none"><li>5. a. User is not validated</li><li>5. a.1. System displays an error message</li></ol>

Table 3

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	<ol style="list-style-type: none"> <li>1) Use case starts when user launches the app.</li> <li>2) System displays login interface.</li> <li>3) User enters username and password</li> <li>4) User click on login button.</li> <li>5) User is validated and login to the system.</li> <li>6) Go to the map</li> <li>7) Select a service provider and go to map.</li> </ol>
Extension	3.a. 1. User name or password does not match; the system prompts for re-enter them.

Table 4

Use case Name	Ask the destination
Pre –Condition	User should be logged in
Post-Condition	Automatic reply
Actor	User and system
Main Success Scenarios	<ol style="list-style-type: none"> <li>1) Use case starts when the user selects the chat finding button</li> <li>2) System opens the finding screen</li> </ol>



	<p>3) User asks the destination problem.</p> <p>4) System replies the answer from map</p> <p>5) Use case ends when the user exits the finding box</p>
Extension	4.a User ask destination wrong; system prompts message saying “sorry. System can’t show the correct place”

*Table 5*

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	<ol style="list-style-type: none"> <li>1) Use case starts when user launches the app.</li> <li>2) System displays login interface.</li> <li>3) User enters username and password</li> <li>4) User click on login button.</li> <li>5) User is validated and login to the system.</li> <li>6) Go to the map</li> <li>7) Select a service provider and go to map</li> <li>8) View the vehicles on the map</li> </ol>
Extension	3.a. 1. User name or password does not match; the system prompts for re-enter them.

Table 6

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	<ol style="list-style-type: none"> <li>1) Use case starts when user connect to the internet.</li> <li>2) If the connect to the app then System displayed the logging interfaces.</li> <li>3) User enters username and password</li> <li>4) User click on login button</li> <li>5) User is validated and login to the system.</li> <li>6) User can bye online or can stop the vehicle near the shop</li> </ol>
Extension	3.a. 1. User name or password does not match; the system prompts for re-enter them.

Table 7

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	<ol style="list-style-type: none"> <li>1) Customer selects the payment option.</li> <li>2) Select payment method card.</li> <li>3) Customer adding the card details.</li> <li>4) Prompt message show card added successfully.</li> </ol>
Extension	3).a. prompt message show invalid card

	3).a.1. enter the proper details of the card (expire date, card number)
--	--

*Table 8*

### 2.2.3 Activity Diagram

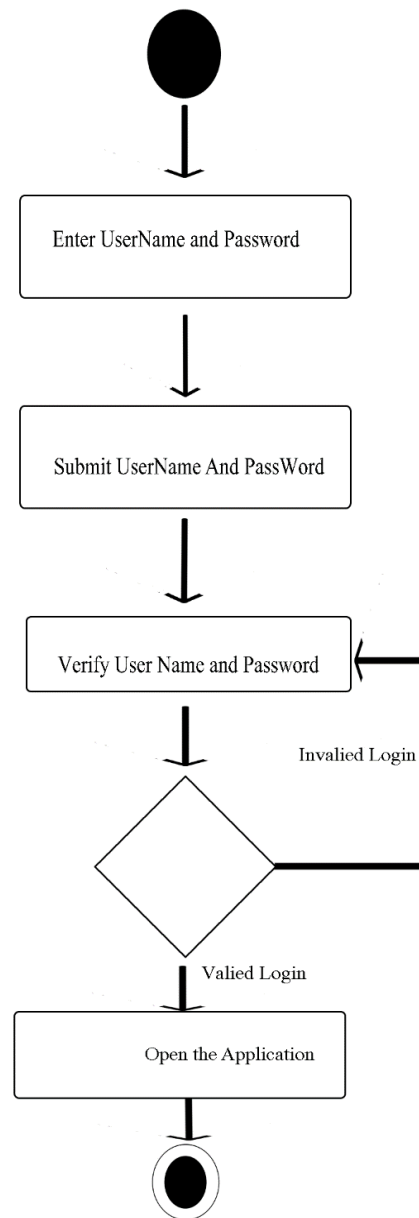
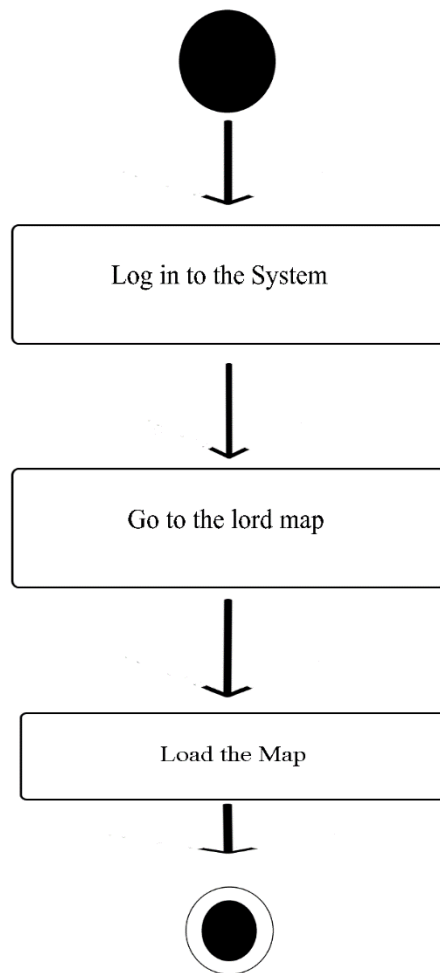


Figure 20



*Figure 21*

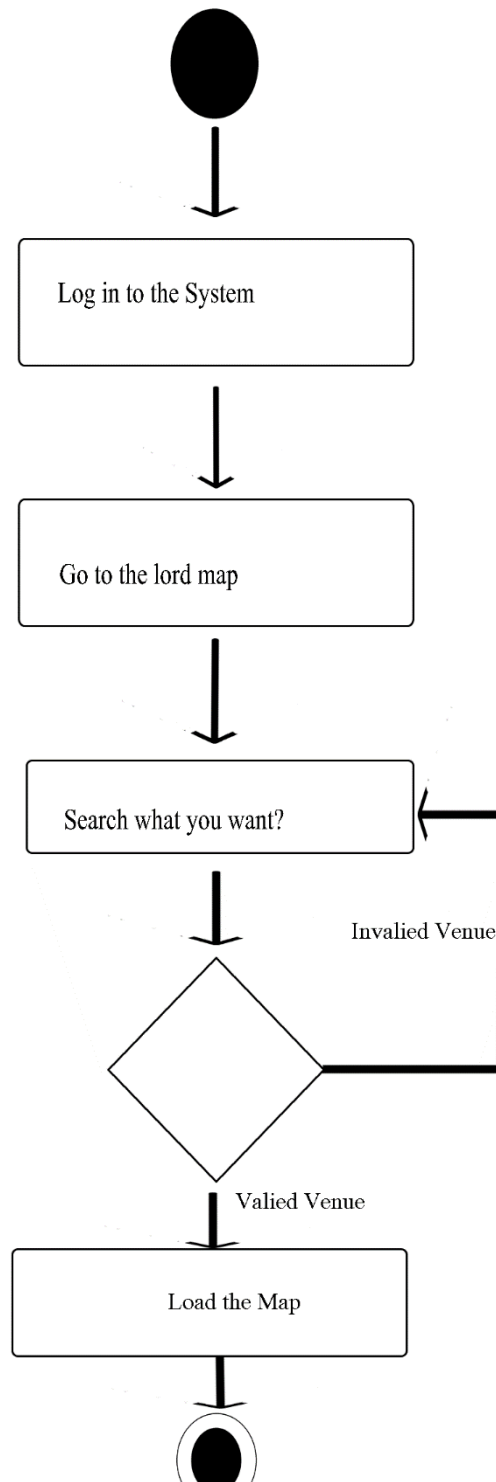
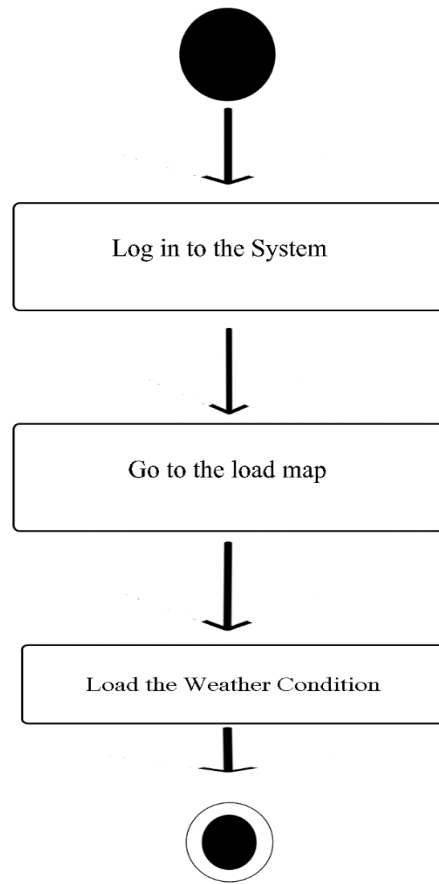


Figure 22



*Figure 23*



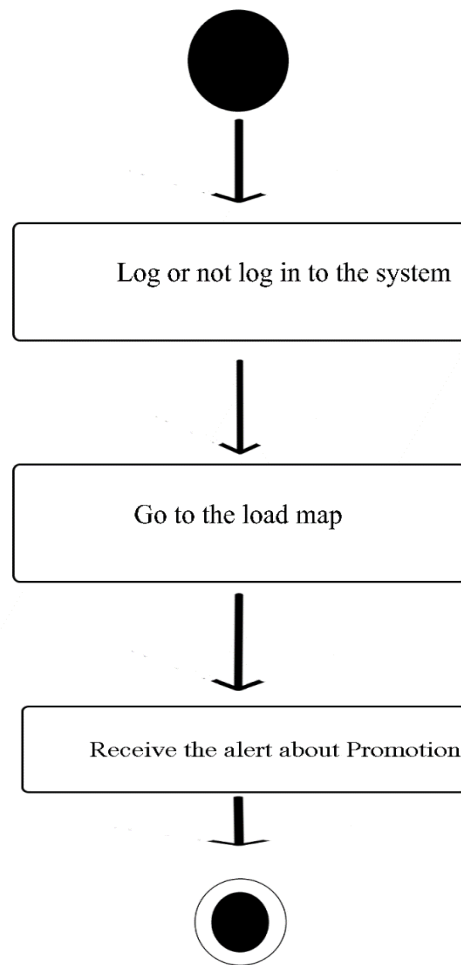


Figure 24

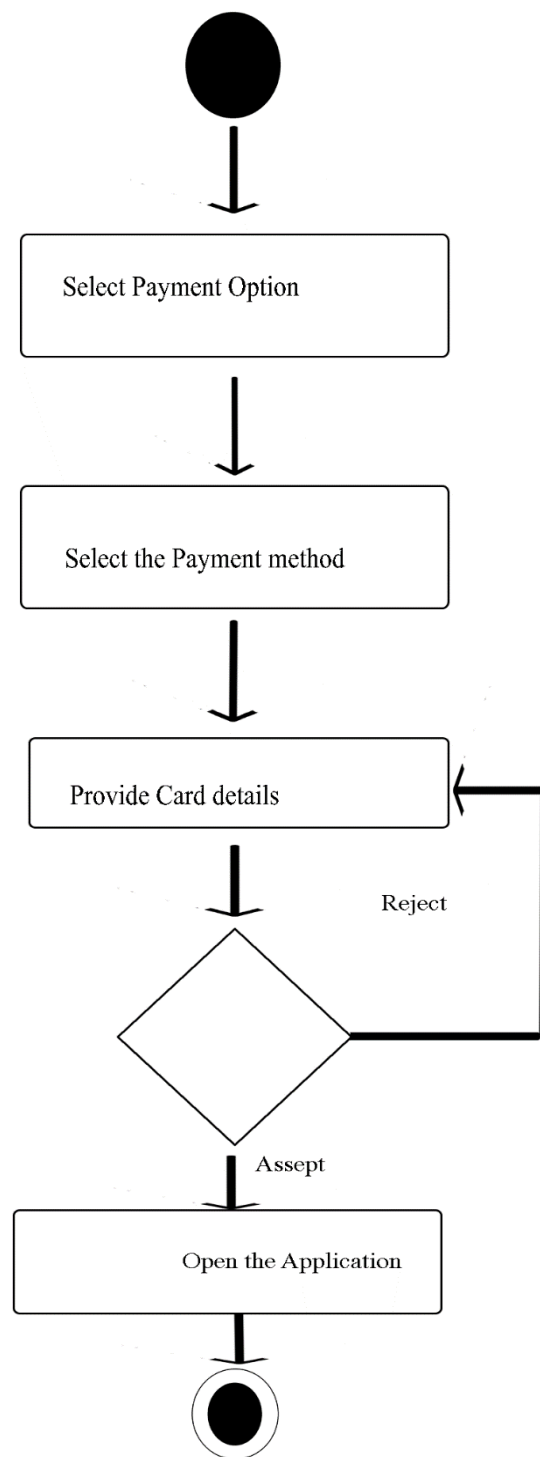


Figure 25

### **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**

This system consists of mobile applications. Therefore mobile application constraints should consider. In order to work with better level of quality bellow mentioned memory limits are needed by the application. Also the backend process of video classification involves heavy computational tasks.

#### **Mobile application**

- Mobile phone 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 phone 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 phone RAM should be 1GB or above for better performance
- Internet connection is required for the software to function properly. High bandwidth is encouraged for smooth operation.
- Backend system must have minimum of 6GB RAM. Additional 2GB of GPU will be advantageous

## **2.5 Assumptions and dependencies**

- The internet connectivity can be established with ease on request
- The entire hardware and software requirement should meet the client and server.
- The database should be secured with passwords and username from unauthorized access.

## **2.6 Apportioning of Requirements**

# **3 SPECIFIC REQUIREMENTS**

## **3.1 External Interface Requirements**

### **3.1.1 User Interfaces**

- Figure(2) – Once a user launches the app, have to login to the system by providing user name and the password.
- Figure(3) – If the user haven't registered, User can select the sign up button and they should register.
- Figure(4) – User can see the ahead the traffic condition.
- Figure(5) – Use can see the current and future weather conditions.
- Figure(6) - User can see the alternative roads in this interface.
- Figure(7) – User can make a connection with driving Three wheelers in this interface.
- Figure(8) – If the ambulance will be coming , User can see it in this interface.
- Figure(9) – User can connect to co-travelers near the road.
- Figure(10) – System give the alert to the user, if the supermarket will give the promotion.

### **3.1.2 Hardware Interfaces**

- Android enabled mobile phone or tablet would be required for the hosting purposes
- Minimum processor speed of 3GHz, Ram of 512 MB .

### **3.1.3 Software Interfaces**

- TensorFlow: It is a 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.

### **3.1.4 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 ease.

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/Objects

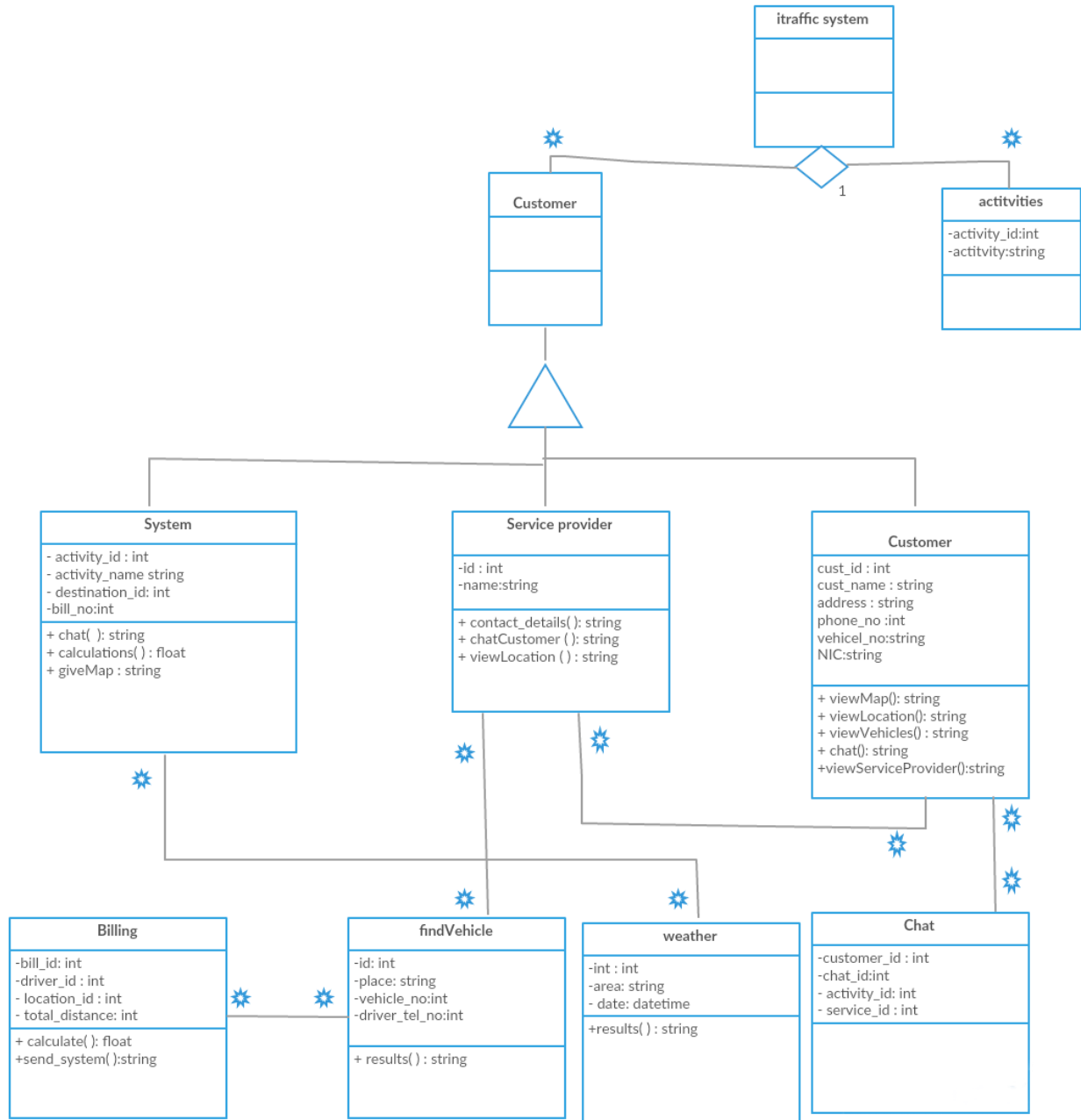


Figure 26

### 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

### 3.4 Design Constraints

iTraffic is a mobile application. Therefore 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.

### **3.6 Other Requirements**

- Reusability: The specified component should be generic such that it 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 & Modifiability
- Adaptability

## 4 REFERENCES

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