ITRAFFIC

SMART TRAFFIC IDENTIFYING SYSTEM

Vehicle detection and informing process

Project ID: 19-127

Software Requirements Specification(SRS)

Author: Kavindu Geesara (IT 16008106)

Bachelor of Science Special (Honors) Degree in Information Technology
Department of Information Technology
Sri Lanka Institute of Information Technology
Sri Lanka
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(Dissertation submitted in partial fulfilment of the requirement for the Degree of Bachelor of Science Special (honours) In Information Technology)

Author: Kavindu Geesara(IT 16008106)

Ms. Shashika Lokuliyana

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Name of the Supervisor

Bachelor of Science Special (Honors) Degree in Information Technology

Department of Information Technology
Sri Lanka Institute of Information Technology
Sri Lanka

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Declaration

I declare that this is my own work and this document 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 my knowledge and belief it does not contain any material previously published or written by another person expect where the acknowledgement in made this text.

Name: kavindu Geesara Paranavithana Signature:

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1 Introduction

1.1 Purpose

This software requirements specification document's purpose is to provide a detailed description of all the requirements and processes of the feature "Intelligent driver Assistant" in the project "Itraffic". This document will provide a detailed description about the user requirements and the system requirements.it will also give a detailed description about the functional and non-functional requirements.

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

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.

"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.

- 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.

“Intelligent Driver Assistant” feature is basically focused on the drivers. It is dangerous to use this app when a driver drives his car. It is also dangerous for the driver to use the phone for general purposes. For example, a driver receives a text message from his or her driver when he / she drives it. This allows reading and answering very dangers, because then the likelihood of breaking in the mental integrity of the victim is at a very high level.

1.3 Definitions, Acronyms and Abbreviations

Definitions

Table 01 – Definitions

Terms	Definitions
Itraffic	Name of the proposed system
Vingo	Name of the proposed Intelligent Assistant’s name
Software requirement specification	A document completely describes all of the functions of a proposed application and the constraints under which it will operate.

Abbreviations

Table 02 – Abbreviations

MB	Mega byte
GB	Giga byte
DB	Database
MS	Microsoft

1.4 Overview

The main goal of this application is to give clear idea up to their destination. In addition, there are additional methods that can be used to minimize traffic congestion. The traffic congestion, its weather information, the by-pass information on the destination and other data are provided to the driver. These data can be used to ensure that drivers and passengers can safely reach their destination without traffic.

Here, a gps tracker is built primarily for each and every vehicle. This can be used to find

information on every vehicle. This system is basically designed to introduce itself to a country that helps to ensure security. The correct and always up-to-date data is used to update the roadmap. If someone use public transport and he or she think it is not quick method to reach their destination, then he or she can find nearest taxi using this application. If user like, when he or she reach their destination and will be able to provide a transport facility for another person from their private vehicle that feature includes in this application. Also Supermarkets can publish their advertisements in this application. Then driver can get idea about super markets, Fuel stations and etc. As well as this app includes an Intelligent Assistant for handle this application using driver's voice command. The data exchanged here is very confidential, so the data can be used to prevent the data being exited by using the most advanced data preservation method.

Users of this application will be drivers who are looking to reach their destination quickly, passengers who are looking to reach their destination quickly and government. The most important part is this application is government can use this application for security purpose. Because from the server side user can studying behavior of any vehicle. Because all vehicle must be registered.

This document will describe the details of the software requirements, functionalities, constraints, limitations and additional features of the application that we will be implementations.

2 Overall Descriptions

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 Interfaces

Figure 01- overview of the system

2.1.2 User Interfaces

Figure 2 Turn on vingo

Figure 3 Give access to mobile

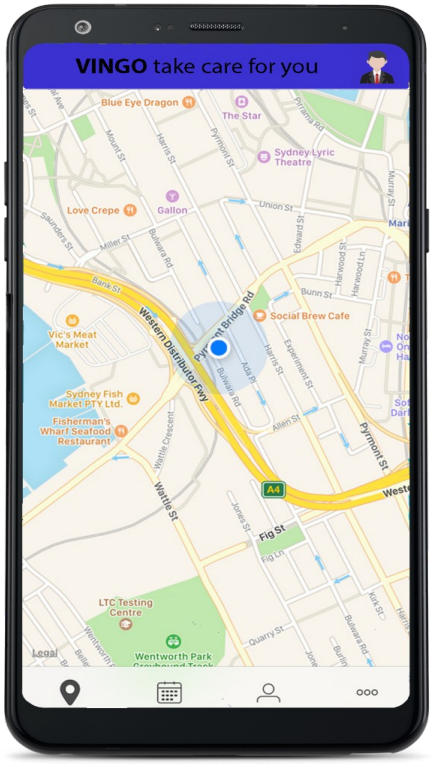

Figure 4 Vingo interface

2.1.3 Hardware Interfaces

There is a specific hardware equipment call “GPS Tracker” manufacture by Ardunio circuit. And mobile application should be an android mobile phone or android tablet because our application is supporting only android device. Because this hardware equipment highly support for android. The minimum requirements that are needed for a device to run this application without any difficulty are as follows.

- Processor – Quad core and 1GHz
- RAM – 1 GB
- ROM – 512 MB

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 device. If the minimum requirements needed for the mobile devices are satisfied then the users will be able to use our application without any issues.

This applications required to build Itraffic are as follows.

- Android Studio
- VS Code
- TextBlob
- CoreNLP
- NLTK

2.1.5 Communication interfaces

Itraffic is based on finding, recognizing and retrieving data from the internet through the GPS Tracker and mobile devices. This mobile device should be connected to the internet before using this application.3G/HSPDA/Wi-Fi type of good connection will needed for users to work efficiently with our application.

2.1.6 Memory constraints

“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 Operations

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.

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 Functions

2.2.1 Use case diagram

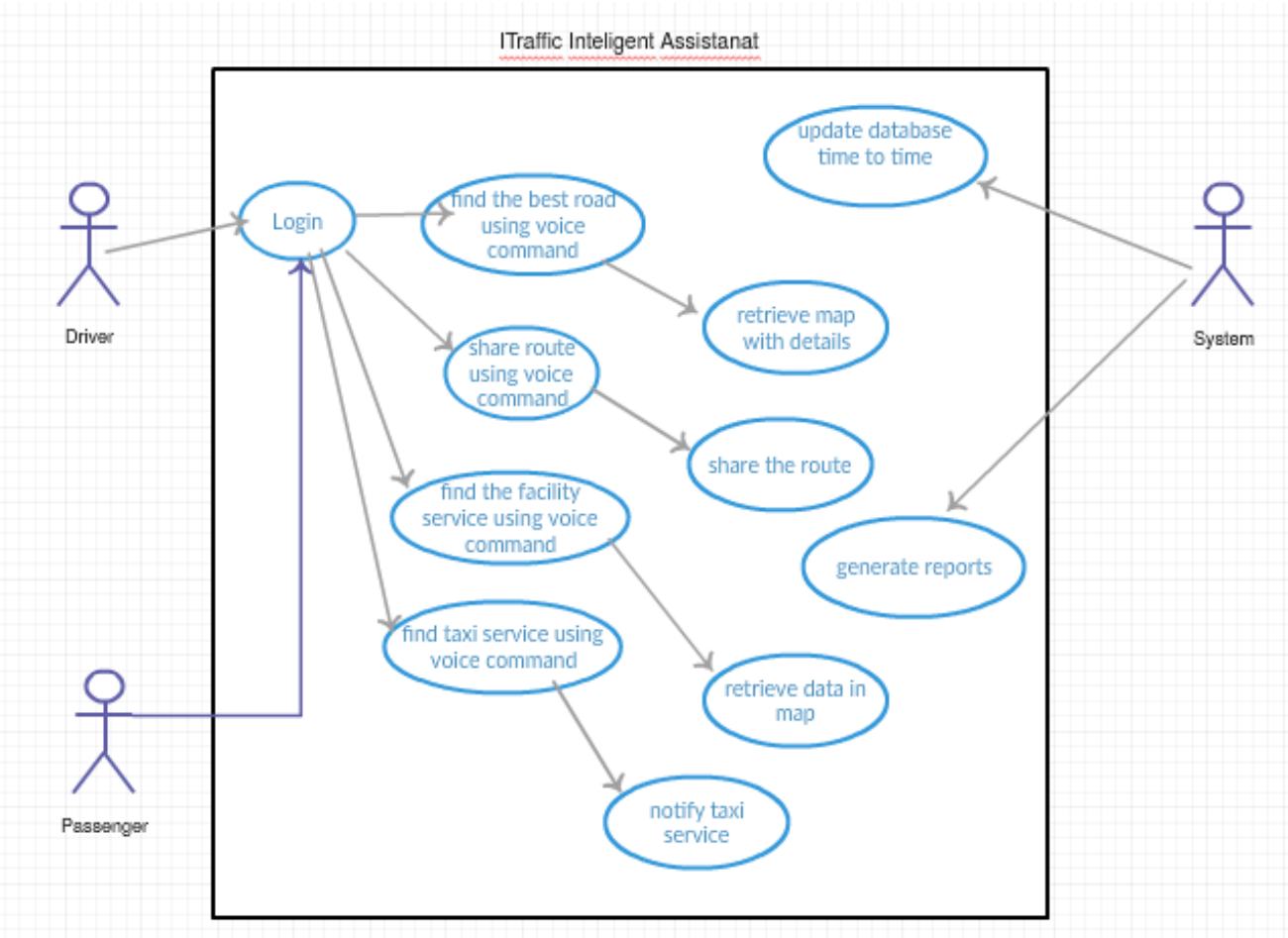

Figure 05- Use case diagram

2.3 User Characteristics

Since the user is a normal customer or service provider to “Itraffic” application, he does not require any professional or special skills to use the system. But having English Reading and talking skill would be an added advantage to use the system. Also user should have little knowledge about how to use an android device. Since the system is very user friendly using it first time would be not hard for the user.so Aging users also can use this “ITraffic” application easily.

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 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.

2.5 Assumptions and dependencies

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

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 specific requirements

3.1.1Hardware Interfaces

- Android enable mobile phone or tablet would be required for the hosting purpose.
- Minimum processer speed of 3GHz, Ram of 512MB.

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 / Objects

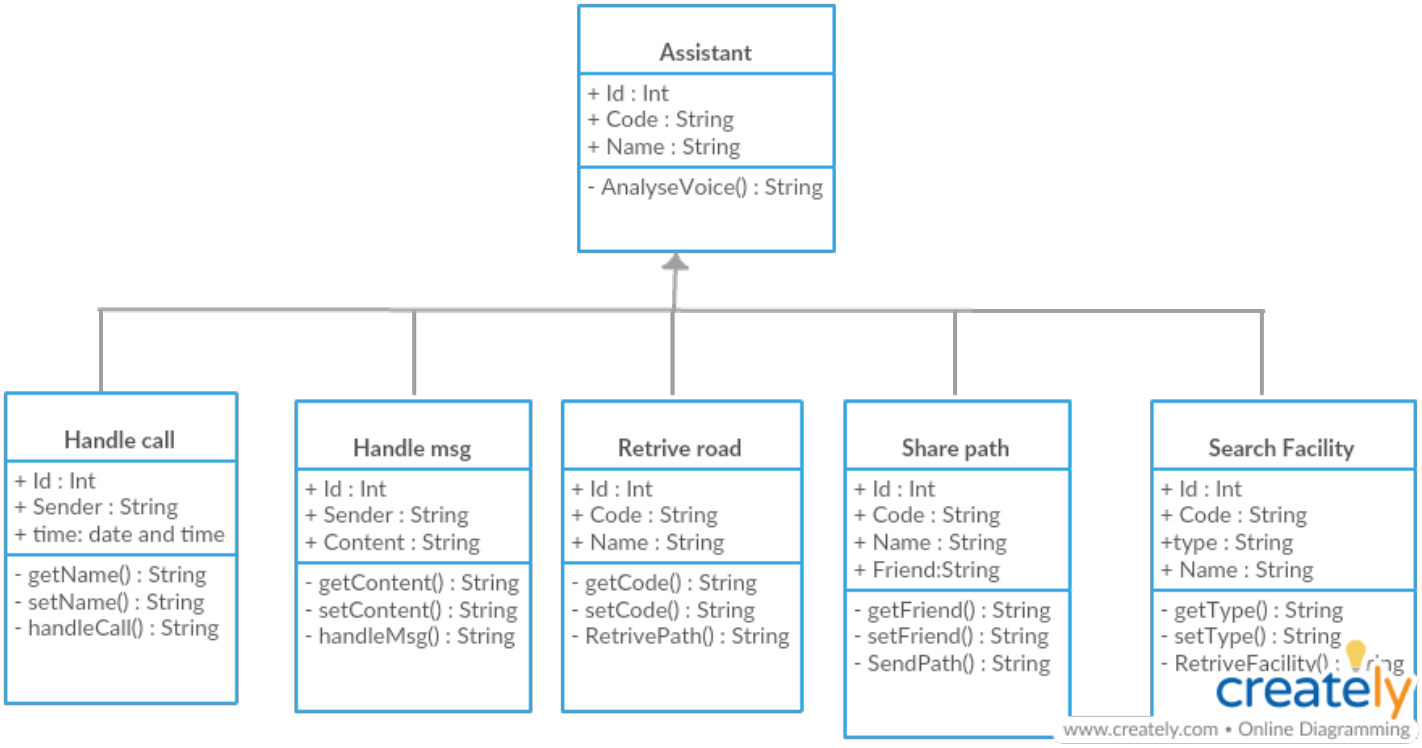

Figure 6: Class diagram

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 completed. Throughput defines load on the system and is measured in operations per a time out. 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 at the same time.

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 requirements 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 be available. ”Itraffic” application has a high availability. This application is available at any time when the user install the application in user’s mobile phone. The application will be available to 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 the system is an attribute which reveal ability to resist unauthorized usage while still providing its service 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.
- Password should be stored in database using an encrypted 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 principles and modularization. Also, the secure code will be well commented and documented for any changes or modification done in future. That means the propose 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, re-initialization of the program is recommended.

3.5.6 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