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# Software Requirements Specification

for

## Traffic Assistant

Version 1.0

Prepared by

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**Course:** CSC 1304 Practical Skills Development

**Date:** July 18, 2017

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## 1 Introduction

This project's aim is to build an Android mobile application (Traffic Assistant) that will simplify the work of traffic police officers. Using this mobile application, the officer will be able to take a picture of the driver's permit and their car number plate. The officer will then be able to scan for the ID number or the car registration number from the captured pictures. They will then be able to look up these numbers from a database to reveal the driver's criminal record and determine whether the car has been involved in any criminal cases in the past.

This section clearly identifies the scope and the audience the mobile application is intended for.

### 1.1 Document Purpose

This document gives a detailed description of the requirements for the Traffic Assistant application (TAP). It will illustrate the purpose and complete declaration for the development of the application. It will also explain system constraints, interface and interactions with other external applications.

### 1.2 Product Scope

The Traffic Assistant application employs OCR technology to extract a car's registration number or the ID number from one's driving permit. These details are looked up in a proprietary database to determine the driver's criminal record and whether their car has been involved in any criminal cases in the past. Database design and management are currently not in the scope of this project. However, a dummy database will be needed to demonstrate the effectiveness of the information retrieval.

TAP's main objective is to make the work of traffic police officers easier and this explains why it will be intuitive and user-friendly. Traffic officers in Uganda will be able to install the app on their phones and use it to beat traffic crimes instantly.

### 1.3 Intended Audience and Document Overview

This document is intended for the developers, Uganda Police Force and the CSC 1304 course facilitator. The document describes how Traffic Assistant was conceived and clearly explains the interface, functional, performance, security and safety requirements of Traffic Assistant. All readers are advised to at least read through the introduction, the client should also go through section 2 but the developers and the course facilitator are required to read through the entire document.

### 1.4 Definitions, Acronyms and Abbreviations

Term	Definition
Administrator	Someone who is given specific permission for managing and controlling the system
Android	A mobile operating system developed by Google
Android studio	An integrated development environment for building android mobile application
Application store	An installed mobile application which helps users to find and download applications from the internet that are compatible with

	their mobile phone platform
JSON	JavaScript Object Notation, a syntax for storing and exchanging data between a browser and a server
IEEE	Institute of Electrical and Electronics Engineers
OCR	Optical character recognition (OCR) is a technology that enables one to extract text out of printed documents, captured images, etc.
User	Someone who interacts with the mobile phone application
PHP	A server-side programming language used for the efficient delivery of dynamic web pages and services
TAP	Traffic Assistant Application
Tesseract	Tesseract is a well-known open source OCR library that can be integrated with Android apps such as Traffic Assistant.
TIFF	Tag Image File Format
Traffic police officer	Someone in charge of controlling traffic. In Uganda, they are usually dressed in white uniform
Web server	A computer that runs software to serve web pages and other documents over the internet

## 1.5 Document Conventions

The IEEE formatting standard was followed, Times New Roman, font size 12 was used throughout the document for text. The Traffic Assistant application (TAP) is frequently referred to as “the system.”

## 1.6 References and Acknowledgments

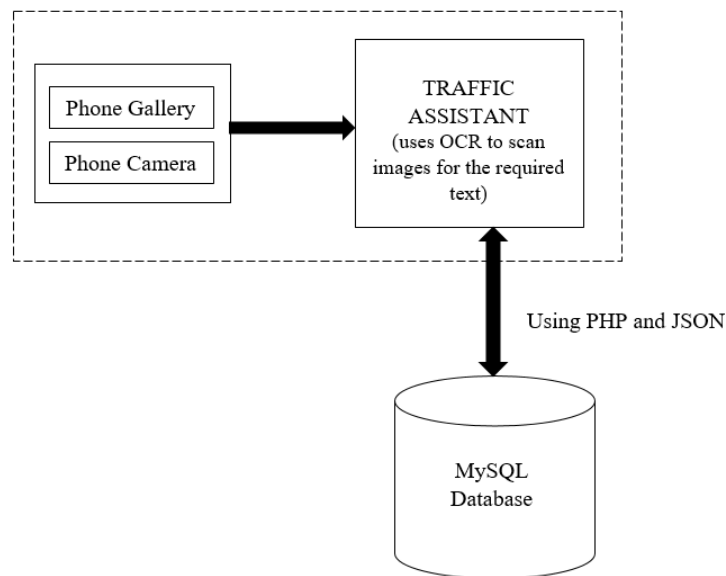
[1] IEEE Software Engineering Standards Committee, “IEEE Std 830-1998, IEEE Recommended Practice for Software Requirements Specifications”, October 20, 1998.

[2] Wikipedia. (2017,07,10). Use case [online]. Available:  
[http://www.wikipedia.org/wiki/Use\\_case](http://www.wikipedia.org/wiki/Use_case)

# 2 Overall Description

## 2.1 Product Perspective

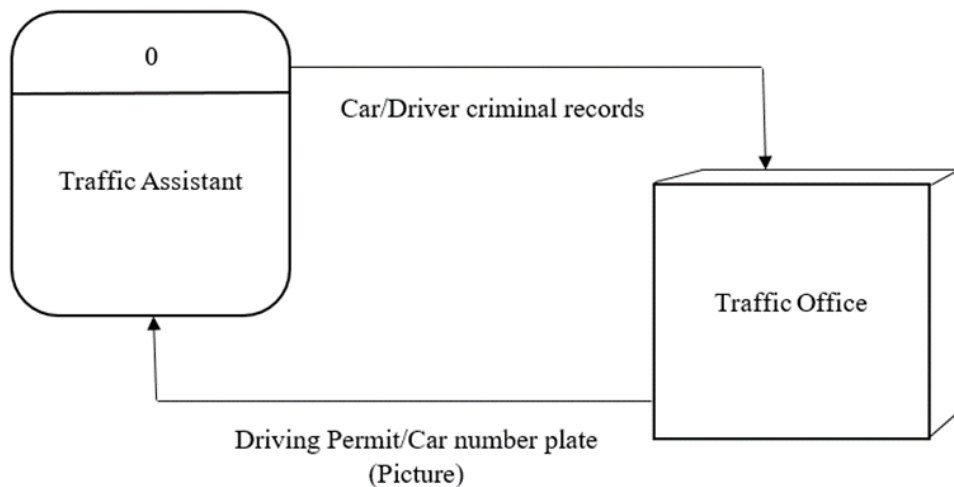
This is a new product as well as a substitute for other existing but slightly similar mobile applications such as Automatic Number Plate Recognition Software (ANPR) that also run on Android and perform OCR on car number plates. Traffic Assistant uses the Tesseract library to implement OCR, it also interacts with a web server to retrieve driver and car related information from the database.



## 2.2 Product Functionality

Using Traffic Assistant, traffic police officers will be able to:

- Determine the driver's criminal record
- Tell whether a specific car has ever been involved in any criminal case
- View a visual report on traffic related cases (to be implemented in version 2.0)



## 2.3 Users and Characteristics

There are basically 2 types of users that will interact with the system: traffic police officers and the system administrators. Each of these user types has got distinct functional requirements.

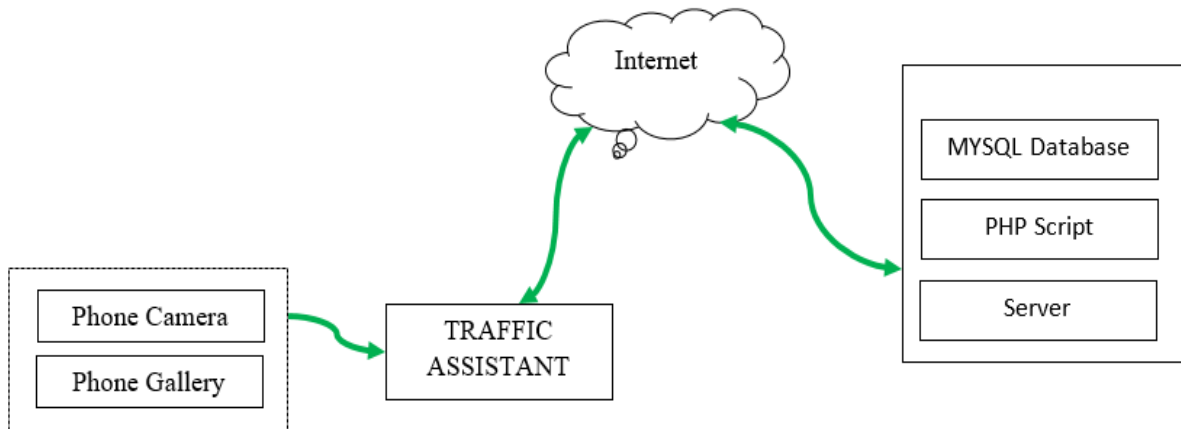
**Traffic police officers:** They will be able to add pictures of any driver's permit or even car number plate. The system will then be able to provide them with criminal details associated with the car number plate or the driving permit ID scanned out of the previously submitted pictures. They don't

need technical skills but should be comfortable with the android operating system to effectively interact with the application. The application design is intuitive enough to make it easy for the traffic officers to interact with it.

**System Administrators:** They update the database with any criminal cases forwarded from the Uganda police force. They should have the required technical skills.

## 2.4 Operating Environment

Traffic Assistant application will run on Android powered phones with Android 4.0 (IceCreamSandwich) or higher versions. The phones should have a good camera with at least 5 megapixels. The application will also be able to run on Android powered tablets. TAP will interact with a MySQL database through JSON and PHP.



## 2.5 Design and Implementation Constraints

The application requires phones with a good camera, at least a 5-megapixel sensor with variable focus lens (fixed-focus cameras, common in cell phones and hand-held devices, will usually produce images unsuitable for OCR)

The OCR process can take place on the smartphone or in the cloud. Since the app will perform OCR without internet connection, the OCR engine will be launched on the device itself. But OCR libraries tend to occupy much space, being necessary to download each of the languages to recognize, and this may limit us if we want to integrate more languages like Kiswahili.

The client (Uganda Police Force) holds complete control over their database, this implies the application's effective performance will only be guaranteed if the database is well managed.

Android cannot connect directly to the MySQL database server. Therefore, we need to create a simple web service that will pass the requests to the database and will return the response.

The prerequisite to using tess-two is that the device should be running Android 2.3 (Honeycomb) or a higher version.

Tesseract does not guarantee similar quality for the different image formats, it normally provides the best output with TIFF.

OCR doesn't work well with the flash turned on, so the users will be required to turn off the flash when photographing documents.

## 2.6 User Documentation

The application will have a help section which users will refer to anytime they need to know how to perform a specific task. Video tutorials will also be uploaded to the developers' YouTube channel. Users can as well refer to the README.md file on our GitHub account (<https://github.com/jrukundo256/Traffic-Assistant-Application>).

## 2.7 Assumptions and Dependencies

Assumptions:

- Traffic officers have android powered phones with good cameras, at least 5 mega pixels
- The Uganda Police Force has a MySQL database where it stores traffic related cases.
- The information kept in the database is correct and updated regularly.
- The traffic police officers have access to a reliable Internet connection since the application fetches information from the database over the Internet.

Dependencies:

- The system uses the Tesseract library to implement OCR.
- The application also makes use of the camera functionality to take pictures of driving permits and car number plates.

# 3 Specific Requirements

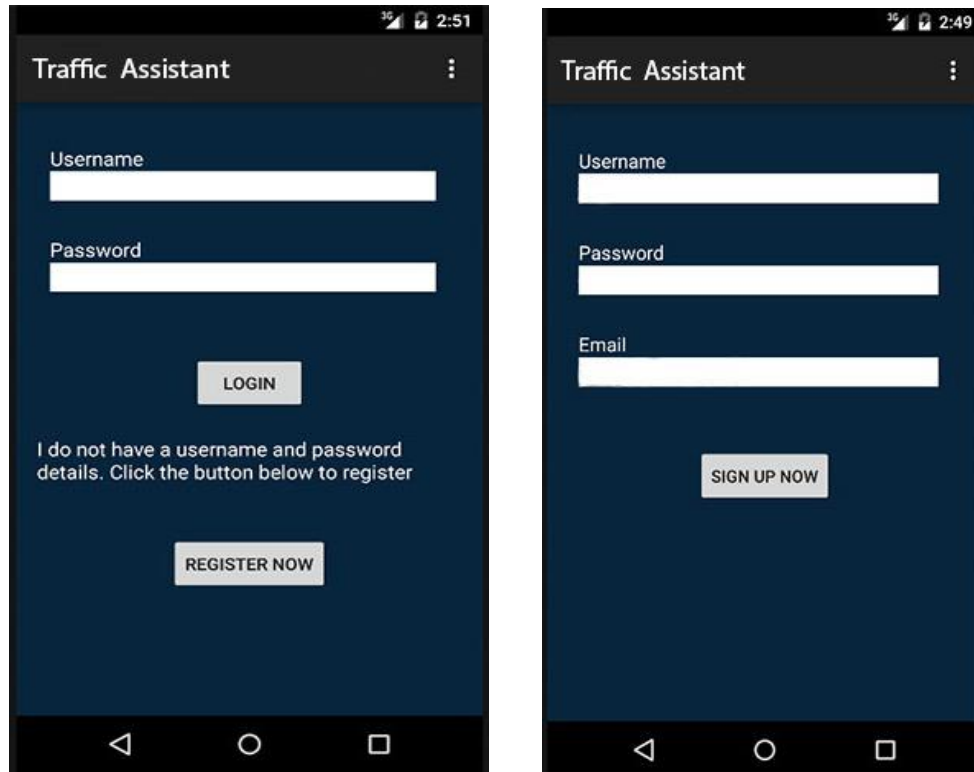
## 3.1 External Interface Requirements

### 3.1.1 User Interfaces

Since the Application requires the user to first login i.e. for security reasons, a first-time user will be required to register with their email, username and password. Apart from the login and registration interfaces. There will also be an interface to display help information as earlier on communicated in subsection 2.6. The user will also interact with another screen to capture and extract text out of

images. This text will be used to retrieve specific information from the database. The last user interface will be for displaying results from the database.

No specific GUI standards were followed, though we still maintained the vital GUI design practices and most importantly, we used our users as the standard.



### 3.1.2 Hardware Interfaces

The application's interaction with the phone camera and the hardware connection to the database server are both managed by the underlying operating system on the mobile phone and the web server.

### 3.1.3 Software Interfaces

Traffic Assistant operates on Android operating system version 4.0 and above. It's through the operating system that it interacts with the phone gallery and the MySQL database. TAP also employs the OCR library to perform optical character recognition. The system receives images from the phone gallery or camera and extracts text out of them, this text is then transmitted to the webserver. The communication between the application and the webserver is established using JSON and PHP. Information retrieved from the webserver (criminal records) is finally displayed in the application.

### 3.1.4 Communications Interfaces

The users fill up the necessary forms to register or login into the application. These details i.e. the email and username are encrypted before they are passed on to the database. Email communication



is required if the user forgets their password, that way they will be able to reset it. The HTTP protocol is pertinent in communicating with the web server. Communication between the various parts of the system is still handled by the underlying operating systems.

## **3.2 Functional Requirements**

### **Functional Requirement 1:**

TITLE: Install Traffic Assistant Application

DESCRIPTION: The application is clearly not available for any one to use. The Uganda Police Force will have complete control over it. They will be responsible for determining who they offer it to.

DEPENDENT ON: None

### **Functional Requirement 2:**

TITLE: Updates

DESCRIPTION: When a new version of the software is released, it will be submitted to the Uganda Police force through their directorate of ICT. He will then ensure each traffic officers receive the updated version.

DEPENDENT ON: **Functional Requirement 1**

### **Functional Requirement 3:**

TITLE: Register and login

DESCRIPTION: Right after installation, the user is prompted to register for security concerns. Traffic officers will be required to sign up using their preferred username, email and password. After that they will be required to use their username and password to login into the application

DEPENDENT ON: **Functional Requirement 1**

### **Functional Requirement 4:**

TITLE: Scan images

DESCRIPTION: The user should able to capture images and extract the required text out of them

DEPENDENT ON: **Functional Requirement 3**

### **Functional Requirement 5:**

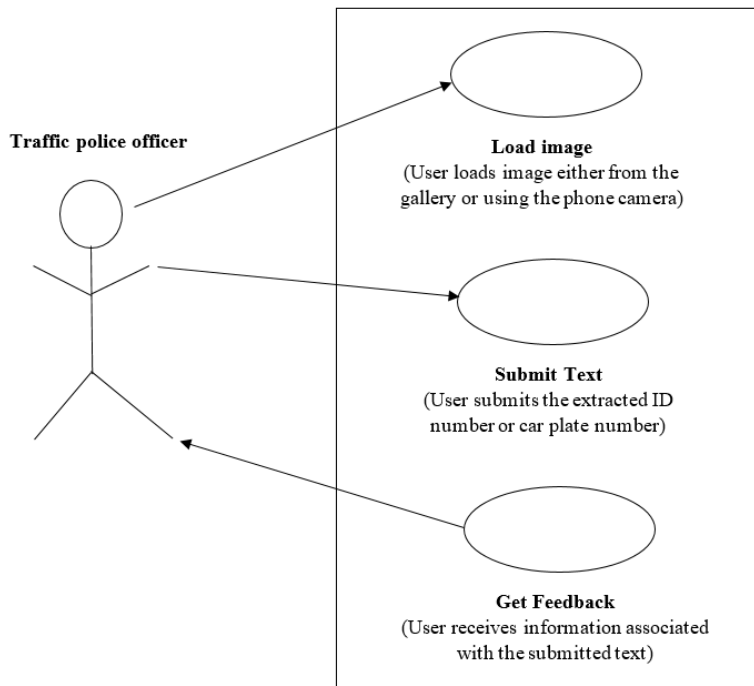
TITLE: Determine driver and car criminal records

DESCRIPTION: The user should be in position to submit the extracted text that will be used to retrieve the required information from the database. This information will be displayed for the user to see.

DEPENDENT ON: **Functional Requirement 4**

## **3.3 Behaviour Requirements**

### **3.3.1 Use Case View**



## 4 Other Non-functional Requirements

### 4.1 Performance Requirements

- The application should open or respond within two seconds of launching in order to quicken the work of the traffic police officers.
- TAP must be operational 7 days a week, 365 days a year
- The system should be able to create an error log file containing details like the type of error, its description and the time it occurred
- The system should have at least a 95% accuracy in extracting text out of the images. This is vital if the system is to effectively operate as intended.
- The system should avail a provision to reset passwords.

### 4.2 Safety and Security Requirements

- User identity authentication using usernames and passwords
- The system automatically logs out a session after a specified period of time in idleness.
- User data safety in the database
- Criminal records is only available to traffic police officers and the system administrators.

### 4.3 Software Quality Attributes

#### 4.3.1 Reliability

The application should work as intended provided the user has got an internet connection. This is to be achieved by using the best OCR technology.

#### 4.3.2 Scalability

It should be able to handle any immense increase in the number of users without any compromise in performance issues.

#### 4.3.3 Correctness

The application should provide no room for mix ups otherwise traffic officers will be misled. This is to be achieved by making sure the information kept in the database is corrected and updated regularly.

## Appendix B - Group Log

MUNUTES FOR THE PS-I7-11 PROJECT MEETING HELD AT BLOCK B COSIS MAKERERE  
ON 10<sup>th</sup> JULY 2017 AT 2:15PM TO DISCUSS PROJECT APPROACH AND TASK  
ALLOCATION TO MEMBERS.

### ATTENDANCE

#### MEMBERS PRESENT

1. AMPAIRE SHALLOTE (GROUP LEADER)
2. GATALE ELIJAH
3. RUKUNDO JONATHAN
4. MUGISHA WILLIAM

#### MEMBERS ABSENT

NONE

#### MEMBERS ABSENT WITH APOLOGY

NONE

### AGENDA

1. OPENING PRAYER
2. COMMUNICATION FROM THE GROUP LEADER
3. REACTIONS
4. CLOSING PRAYER

### MINUTES

#### MINUTE 1: OPENING PRAYER

The opening prayer was said by **Elijah Gatale** who prayed for the successful completion of the PS-I7-11 PROJECT.

#### MINUTE 2: COMMUNICATION FROM THE GROUP LEADER

The group leader introduced the different tasks that were to be accomplished to come up with a fully functioning application among which included designing interfaces, database, the optical character reader and integrating those sections.

The group leader also suggested that each member would take up one role and it was made mandatory to complete it.

The group leader also suggested that each member would contribute to at least a section in the SRS. The different sections would later on be integrated to come up with the final copy. But she left it as an open decision for the group members to agree on a decision.

#### MINUTE 4: REACTIONS

Members were asked to choose specific roles that they wanted to take on

Ampaire shallot made it clear that she was more interested in coming up with user interfaces for the traffic assistant application.

Mugisha William who is very familiar with databases assured members that it would not take him long to come up with a functioning database for traffic assistant application.

Elijah Gatale decided to concentrate on implementing the Optical Character Reader

Rukundo Jonathan was comfortable integrating those different sections.

Members were happy with the decisions made and suggested that a Whatsapp group and Github repository be created right away.

#### MINUTE 5: CLOSING PRAYER

The closing prayer was led by Gatale Elijah who prayed for God's mercy and favour upon the group.