# Requirements Specification for Mobile-based Virtual Traffic Lights

| Version | Date | Operation | Object | Author |
|---------|------|-----------|--------|--------|
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# 1.Introduction

## 1.1 Aims

This document describes the overall functional structure of the entire system, and then detailed description of the functional requirements are illustrated. The description of the functional requirements adopts the prototype diagram, which gives a very intuitive prototype diagram and detailed functional description. These texts and graphics are designed to describe the needs of users in detail and accurately, and at the same time, they create conditions for users to more easily understand the description of these needs.

This document explains in detail the requirements and specifications of this software product. These specifications are the basis for design and the main basis for writing test cases and system testing. At the same time, the document is also used as the basis for project delivery and acceptance.

## 1.2 Targeted Readers

This document is aimed at multiple audiences:

（1）Project Manager: The project manager can understand the function of the expected product according to the document, and design the system accordingly.

（2）Designer: Analyze the requirements and design the system, including the design of the database.

（3）Developer: Develop the system, and write user manual.

（4）Tester: Perform functional testing and non-functional testing of software products

according to this document.

（5）Sales person: Understand the functions and performance of the product.

（6）User: Understand the expected product function and performance, and discuss and negotiate the entire requirement with analysts.

## 1.3 Operating Hardware

The VTL application is installed on the iPhone Smart Phones, the vehicle data is collected from sensors within the iPhone Smart Phone, then the data is sent to the server through web socket. Then the server stores data in Redis database. The Server broadcasts instructions to all vehicle clients through web socket.

# 2.Requirement Analysis

In this project, an Android application will be developed. The working flow of this application is based on the VTL approach. When individuals drive vehicles crossing intersections and they have installed this application on their mobile phones, the information of the vehicles, such as position, speed and velocity, will be detected and sent to the cloud server; then these vehicles will be instructed to pass the intersections without conflicts.
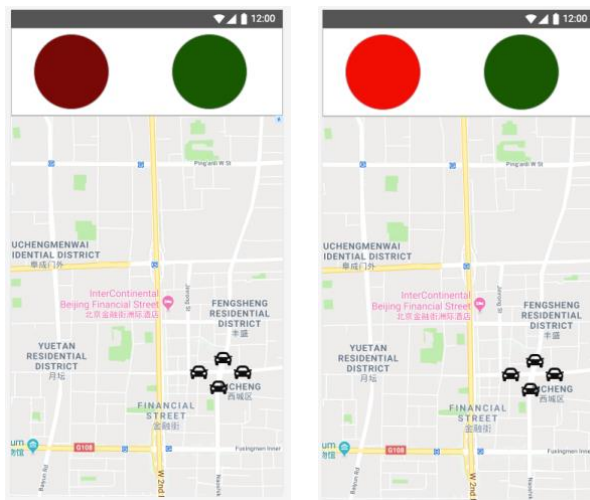
# 3.Functional Module

## 3.1 Login
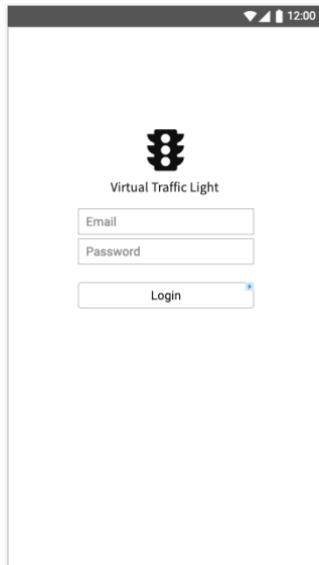
The user enters his or her email address and password. Then click Login button, if the email and password are right, navigate to the home page. If the email and password are wrong, show the hint 'invalid email or password'.

## 3.2 Stop at the Intersection



When the car is far from the intersection, both the green light and the red light are off. When the car is approaching the intersection and there are other cars approaching in the other direction, the red light is turned on. Then the user stops the car at the intersection.

## 3.3 Cross the Intersection
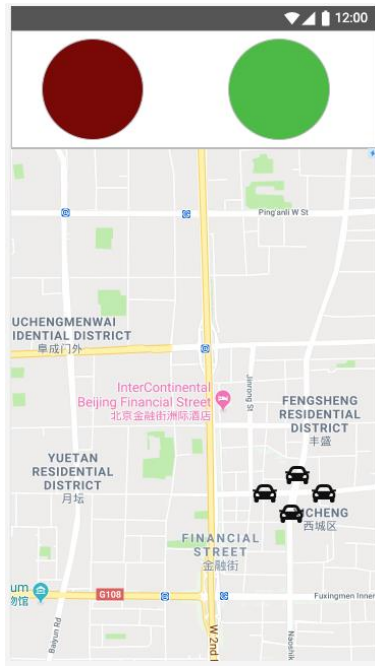
When the car is approaching the intersection and there are no other cars approaching in the other direction, the green light is turned on. Then the user drives the car crossing the intersection.

# 4. Nonfunctional Requirements

## 4.1 Performance Requirements

In normal network environment, the traffic light signals are returned from the server within three seconds.

In abnormal network environment, the red light is on until the network is normal.