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# **Software Requirements Specification**

**for**

## **Automatic Traffic E-challan Generation Using Computer Vision**

**Version 1.2 approved**

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## Revision History

| Name                       | Date      | Reason For Changes                                    | Version |
|----------------------------|-----------|---|---------|
| Purpose, Intended Audience | 1-10-2018 | We assumed audience as end user instead of developer. | 1.0     |
| Sequence Diagram           | 3-10-2018 | We forgot 2 modules : Input,End user                  | 1.1     |

# **1. Introduction**

## **1.1 Purpose**

The purpose of this document is to explain the product scope, system details that is being developed and give a general idea about its various modules and general functionality of how the system will perform under various conditions.

## **1.2 Document Conventions**

For primary Headings: Font Size: 18 Font: Times

For secondary Headings: Font Size: 14 Font: Times

For text: Font Size: 11, Font: Arial

## **1.3 Intended Audience and Reading Suggestions**

The purpose of this document is to make the developers aware of the system being developed, the working of the system, its various modules and the limitations, the system will face under various conditions.

## **1.4 Product Scope**

The purpose of are system is to automate e-challan generation when vehicles cross zebra crossing during traffic signal. The system is based detection of the vehicles that have broken the rule, license plate detection of the vehicle breaking rule and effective challan generation. We will have a database server the has information of all the vehicle registered. Above all, we hope to provide a smooth, easy and hassle-free system for the traffic authority.

## **1.5 References**

- 1] License Plate Detection and Localization in Complex Scenes Based on Deep-Learning IEEE 2018
- 2] Characters Feature based Indian Vehicle License Plate Detection and Recognition. IEEE 2017
- 3] Deep Learning System for Automatic License Plate Detection and Recognition IEEE 2017

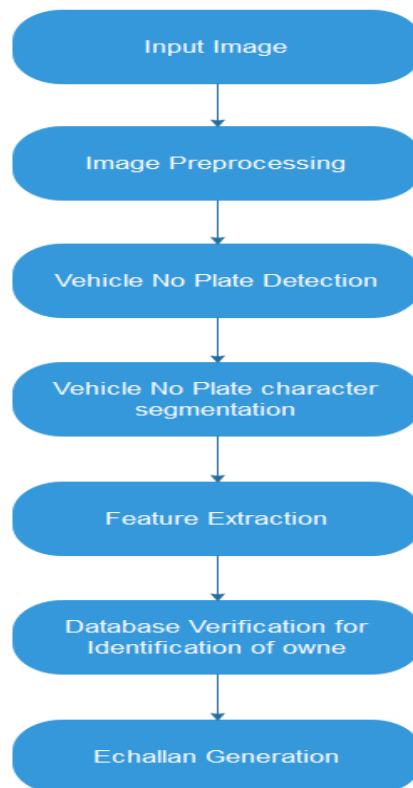
## 2. Overall Description

### 2.1 Product Perspective

The product is designed to update the existing system of challan generation which includes two people who manually check if rule is broken and then generate challan.

- 1) Image Preprocessing: Cropping the image above the zebra crossing and removing noise to make it ready for license plate detection.
- 2) License Plate detection: Multiple License plate from vehicles that have broken the rule will be detected.
- 3) Feature Extraction: The alphabets and numbers on the number plate are extracted and recognized.
- 4) Database Verification: The obtained registration number is searched in the database for owner name.
- 5) E-challan Generation: An e-challan will be generated in the name of the owner.

### 2.2 Product Functions



## **2.3 User Classes and Characteristics**

There are two types of users that interact with the system: owner of the vehicle who breaks the rule, traffic authority who monitors the system. Each of these two types of users has different use of the system so each of them has their own requirements.

The owner of the vehicle will get a message or email regarding the challan generation along with the image of when his vehicle broke the rule, location, date and time.

The traffic authority will monitor the system for any errors during its operation, and take respective action to shut the system down during failure.

## **2.4 Operating Environment**

Operating System: Linux or Windows

Platform: Python

Api for Vehicle Details: [parivahan.gov.in/rcldstatus](http://parivahan.gov.in/rcldstatus)

Api for Sms: way2sms

## **2.5 Design and Implementation Constraints**

Hardware limitations can be minimized by using a good resolution camera. The system must use a good network connection to constantly access the api for owner information and sending sms. The processor must be fast to process multiple traffic locations information at the same time. Two apis that are being used i.e. way2sms and [parivahan.gov.in/parivahan/rcldstatus](http://parivahan.gov.in/parivahan/rcldstatus) must be up and running constantly for system to work efficiently.

## **2.6 Assumptions and Dependencies**

Image is taken without any interference such that it is not blur, corrupted etc. and taken in normal climatic conditions.

Api for vehicle details is available 24/7 and gives instant results.

Api for sms sending to vehicle owner is available 24/7.

### 3. External Interface Requirements

#### 3.1 User Interfaces

The traffic authority personal and administrators interact with the system through a web-portal, an administrator should also be able to log in to the web-portal where he/she can administer the system.

Vehicle No:

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Vehicle No : XXXXXXXXXXXX

Challan 1:

Challan No : XXXXX  
Date & Time  
Fine: Rs. XXX

Challan 2:

Challan No : XXXXX  
Date & Time  
Fine: Rs. XXX

Total Fine : Rs. XXX

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After Clicking on Particular Challan:

Challan No : XXXXX

Date & Time

Fine: Rs. XXX

Vehicle No: XXXXXX

Mobile No : XXXXX

Place: XXXXXXXX

Proof:

Image of Rule Violation



### 3.2 Hardware Interfaces

Traffic Camera will be used for capturing Image.

### 3.3 Software Interfaces

| Software Used    | Description   |
|------------------|---|
| Operating System | We have chosen windows os for its best support and user friendliness.                                       |
| Python           | To implement the project we have choosen python language for its more interactive support and its features. |
| Api for vehicle  | parivahan.gov.in/rcldstatus   |
| Api for sms      | way2sms   |

### 3.4 Communications Interfaces

- 1) Api for vehicle details( parivahan.gov.in/rcldstatus)  
This api is used to get owner information of the vehicle from its registration number
- 2) Api for sending sms(way2sms)  
This api is used for sendin sms to owner regarding rule violation and fine generated.

## 4. System Features

The system being developed has two main features:

- 1) Detecting the vehicles that have violated the rule.
- 2) Generating e-challan for the vehicles that have broken the rule.

### 4.1 Detecting of rule violation

#### 4.1.1 Description and Priority

When the signal is red the vehicles that have violated the rule have to be detected, this is a high priority requirement.

#### 4.1.2 Stimulus/Response Sequences

- 1) Image is taken when signal goes red.
- 2) The image taken is cropped from the zebra line.
- 3) Noise is filtered out of the image.
- 4) The vehicles in existing image have broken the rule.
- 5) Traffic authorities receive all the registration number of vehicles that have broken the rule.

#### 4.1.3 Functional Requirements

REQ-1:

A high resolution camera should be used to take the image, when signal goes red.

REQ-2:

The image taken should be filtered to remove noise, and it should be cropped to detect vehicle.

### 4.2 Automatic E-challan Generation

#### 4.1.1 Description and Priority

Once the traffic authorities receive the registration number, the system will automatically generate challan for all the vehicles, this is high priority.

#### 4.1.2 Stimulus/Response Sequences

- 1) System will get all the registration number of vehicles that have violated the rule.
- 2) Using the government api for finding vehicle information, system will get owner information of all the registration numbers detected.
- 3) Once owner information is found, using way2sms api message about rule violation and fine is recorded.

#### 4.1.3 Functional Requirements



REQ-1:

The registration number detected by system should be correctly detected by the system.

REQ-2:

The government api for owner information should be running 24/7 and respond quickly for the system to be efficient.

REQ-3:

The way2sms api should be running 24/7 and send message to respective owner .

## **5. Other Nonfunctional Requirements**

### **5.1 Performance Requirement**

All the vehicles that have violated the rule at particular signal have to be detected instantly and without any errors in normal climatic conditions is a particular hardware requirement that has to be meant.

- 1) Camera used should take image exactly when signal goes red.
- 2) Image should be sent to system quickly and without any faults.
- 3) System should recognize number correctly.
- 4) The apis necessary should be running constantly to get vehicle information and send e-challan information.

### **5.2 Security Requirements**

The user data obtained from apis should be stored securely and should not be misused to generate wrong challans. The rules regarding the rules of api should not be violated.

### **5.3 Software Quality Attributes**

The system should be robust as multiple request to process rule violation may occur at the same time in a particular region.

The system must be reusable in different regions by making the system adapt to various different hardware interfaces.

The system must be reliable and run 24/7 under any circumstances

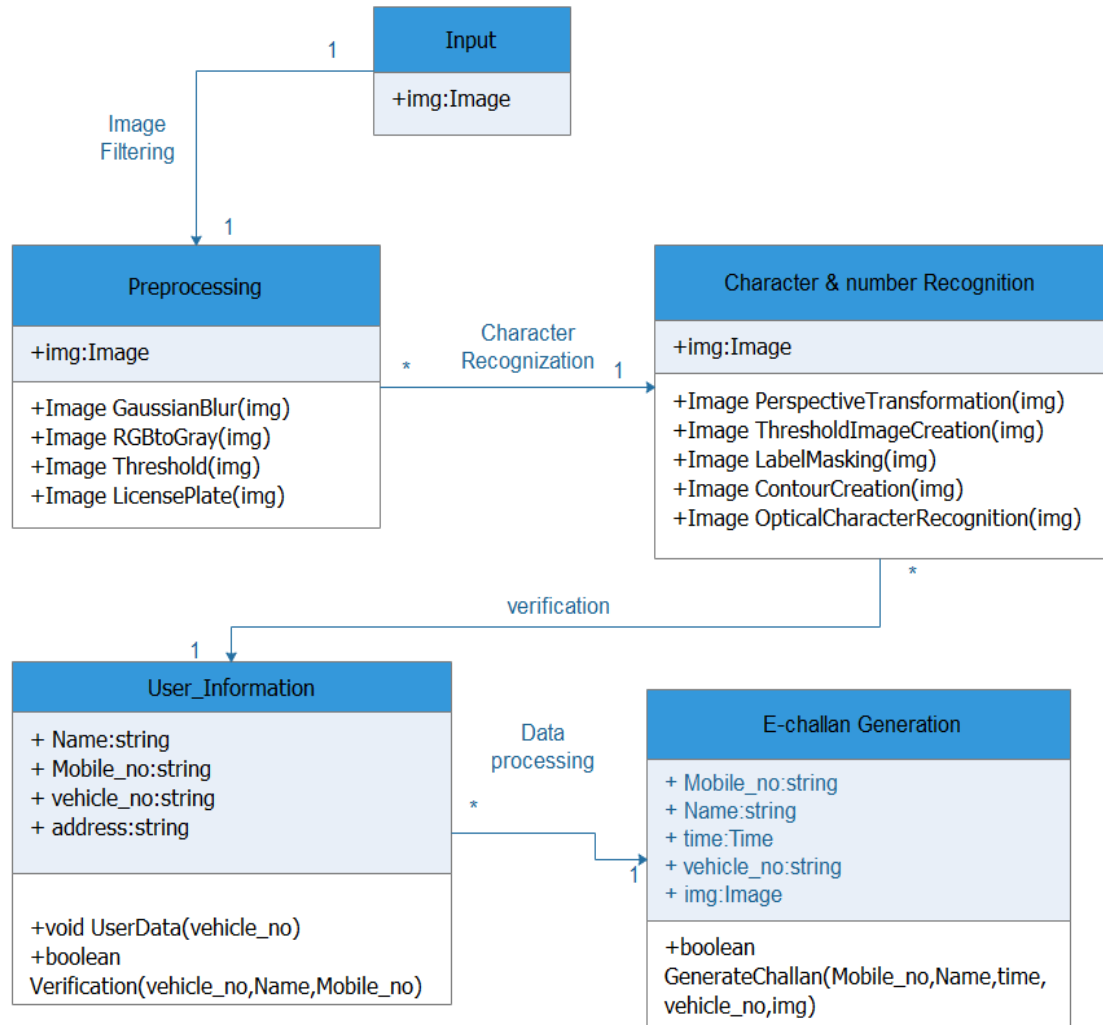
## **Appendix A: Glossary**

API - Application Program Interface

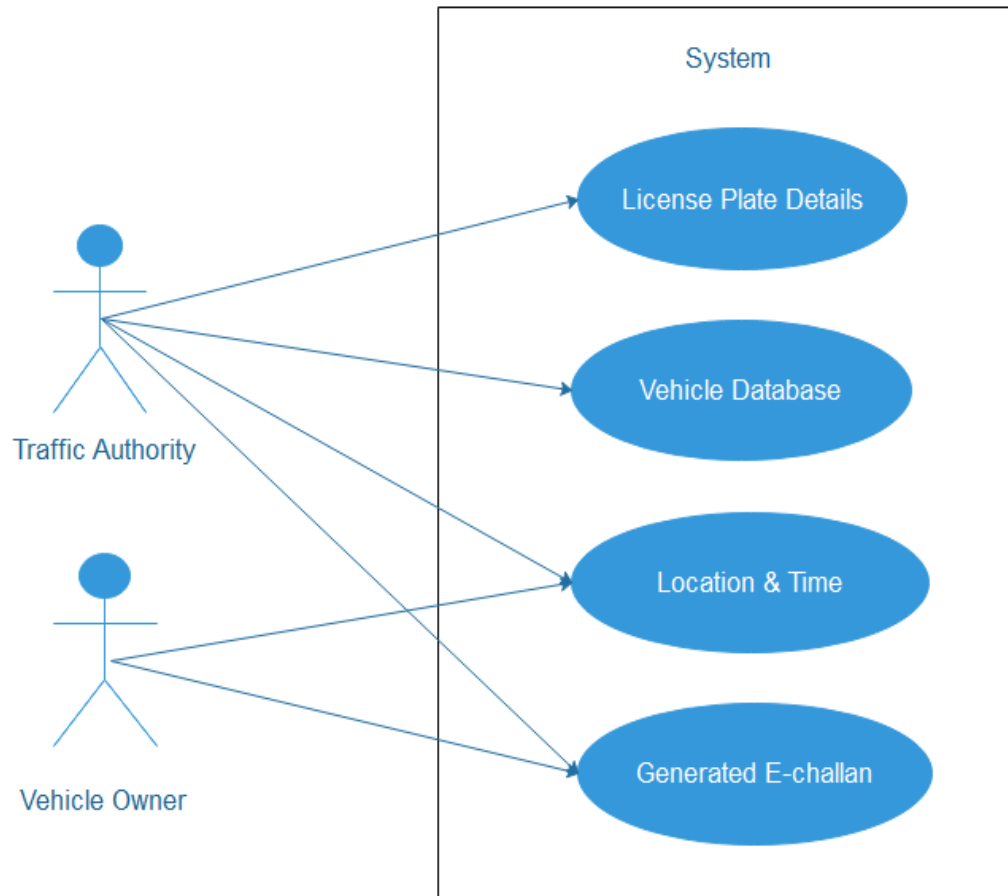
OS - Operating System

## Appendix B: Analysis Models

### Class Diagram



## Use Case Diagram



## Sequence Diagram

