

# Vehicle Number Plate Recognition using Image Processing

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**ABSTRACT:** The vehicle number plate recognition system plays a crucial role in traffic control and helps to avoid traffic incidents/crimes. In this system, vehicle numbers are identified and later they are used to retrieve vehicle owner details for verification purposes. This system is used for capturing the vehicle number and obtaining the owner's information from a pre-registered database. Thus, the image processing technique is used to recognize the number plate and the recognition process helps display the owner's detail. Here the visual contents are used to recognize alphabets and numeral characters of the vehicle license number. This system is implemented using a mobile application. The main objective of the project is to find the owner details digitally without doing it manually.

The User can log in to the application and has to register the vehicle registration details, license number, and also his/her contact details too. The user can also add the sub-owner and has the right to remove them. The Client can access the application for scanning the number plate and can check whether the owner's details are valid or not valid. If the details are not registered in the application, then the immediate message will be sent to the user with the specified vehicle details as an SMS from the Client. The admin is the superuser of the application. He/she can supervise all the activities through the same application.

## I. INTRODUCTION

The number plates are considered as a distinguishing proof of vehicle owners throughout the globe. Vehicle Number Plate Recognition systems are utilized with the aim of secure traffic control and other security applications like movement control of vehicles to limited regions and restrict the wanted vehicles. Experimentation of number plate recognition has been encouraged for a long time as it is a difficult job to accomplish. The vehicle number plate recognition system investigates a picture to distinguish the nearby areas of each character of the number plate. Since a plate can exist anyplace while taking the photo, it is hard to scrutinize every pixel of the image. When the vehicle reaches the inspection point, the number plate can naturally be detected at the

nearest point and cross-checked with the database. The Vehicle Number Plate Recognition (VNPR) system for the Indian number plates is very inconvenient as compared to the number plates in other countries. It is because there is no standard model for the number plates issued by the government. The size of each number plate varies from person to person. Also, the image recognition task is very troublesome due to the amount of light perceived by the image, which causes difficulty in image acquisition. In the VNPR system, a graph-detection approach is employed which includes acquiring a photo of the vehicle, extracting the required region of use, then character segmentation, and finally extraction of the real characters. Image processing methods use a significant abundance of contrast in the images. Thus, an altered pixel can often be revived as the mean value of adjacent pixels.

## II. LITERATURE SURVEY

- The authors implemented the Vehicle Number Plate Recognition System (VNPR) whose accuracy was found to be roughly 85%. The implementation of VNPR showed great control and helped in accurate vehicle identification.
- Authors developed an efficient method for extracting the vehicle number plate, to find the missing or stolen cars, distinguishing the vehicle in traffic, and conjointly for the parking arrangement systems. The vehicle needs to be stationary and thus the image is captured from a hard and fast angle parallel to the horizon. Alphanumeric Characters are used for the popularity of characters on number plates.
- The authors proposed a fast technique for vehicle number plate recognition (VNPR) and present three primary advances to be specific, Character division, optical character recognition (OCR), and format coordinating.
- Creators proposed VNPR (Vehicle Number Plate Recognition) framework to spot the vehicle number plate. The framework initially would catch the vehicle's picture because it reaches the checking area. The processed picture is then extracted with the help of the division procedure to acknowledge the characters, optical character acknowledgment is

used. This is often widely utilized as an area of securing the system.

- Authors built up a proficient approach to open wellbeing, intelligent transport system, and productive administration of traffic movement. They need to propose two strategies for extraction of permit number plates and contrasting them and other existing techniques. The Extracted number plate sections are then divided into various characters separately by utilizing a boundary-based technique.
- The author proposed the theory to acknowledge the stolen autos. Segregation and locating the associated components for localizing the number plates are done by utilizing simple yet effective operations. It had been tried on multiple tests with a precision of more than 90% for four-wheeler's license plates.
- The authors introduce the system that uses VNPR technology. it's very helpful for traffic police to hunt out the tiny print of a car breaking the traffic rules. VNPR is been utilized to store the photographs caught by the cameras and therefore the content from the amount plate. Infrared lighting is employed in capturing systems to enable it to require the photo throughout the day at any time. An intense flashlight can be incorporated into the cameras so that the picture is enlightened.
- The authors display a viable approach in light of the complex operations alongside the sting detection strategy. This approach is improved to section and segmented every letter and number as a neighborhood of the number plate by using the bounding box technique. Further, after segmenting numbers and characters, a template matching procedure is used to perceive the numbers and characters.
- The processing methods employed by the author take 0.5 seconds and 0.3 seconds respectively. However, papers with algorithms having accuracy greater than 90% haven't mentioned the time interval required between them.
- There's always trouble between the computational time and therefore the efficiency with which the algorithm works. With the existence of these image processing algorithms, the utilization of those techniques has been found amongst the current works of literature.

### III. SYSTEM ANALYSIS

#### Existing System

This system recognition method in which the vehicle plate image is obtained by the digital cameras and the image is processed to get the number plate information.

#### Disadvantages:

- The algorithms used for detecting the image are time taking.
- The existing system is built for checking the vehicle's owner details manually.
- The filtering technique is first converting the normal image into a black and white image then extract the characters if any.
- If the image is too compact then the number plate may not be clear.

#### Proposed System

In the proposed system, the user can add the details and remove the details by using the application. The image processing system is used to measure the affecting area and to determine the difference in the captured image. The admin will control the overall operation. SMS will be sent to the user for verification. The project contains three modules: The user module, the Client module, and the admin module. These are the type of accounts through various people can log in to the application as per their requirement and rights provided to them.

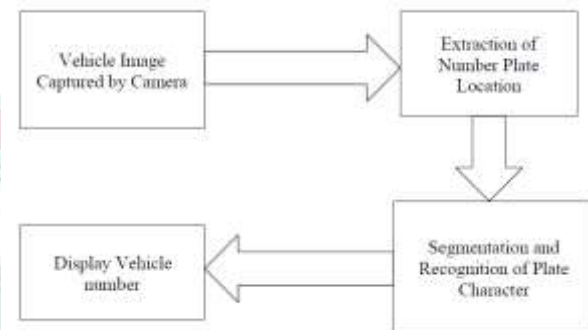


Fig 3.1: General system block diagram.

#### User Module:

This module is for customers. They need to register their vehicle number plate, driving license, name, and other personal details. This will create their account in the system. They can log in and edit their details too. They can add the beneficiaries too i.e. A father can add details of their family, friends, and relatives. So that someone else (friends/family) driving the owner's vehicle does not get too much hustle in the traffic check. Their details will be stored in the system database and can be contacted with the same details in certain situations.

#### Client Module:

This module is for the concerned authorities who use the application for license plate recognition like the traffic police. They can use the application for scanning the license plate to get the vehicle as well as owner and beneficiary details. In the traffic check, they can verify if the rider is the owner/beneficiary of the vehicle or not.

#### Admin Module:

This admin is the superuser of the application. This module is used to supervise all the activities in the

application. It has the right to add/remove clients. It can do all the activities which an admin can perform.

#### Advantages:

- This system is fully done by using the mobile application.
- It detects the details of the owner details.
- SMS will be sent to the user for verification.
- An immediate notification will be sent to the user if the details are not valid.

## IV. SYSTEM REQUIREMENT AND SPECIFICATIONS

#### Hardware requirements

- Processor: Intel I5
- RAM: Min 4 GB
- Hard Disk: 500 GB
- Camera: Mobile Camera

#### Software Requirements:

- Operating System: Windows 10
- Technology Used: Android 9
- IDE: Android Studio
- Tools used: Android SDK

## V. SYSTEM DESIGN

After capturing the image of the number plate user will approve it and the image will be sent into the system database for further processing. Pre-processing is commonly availed for working with images at the lowest level of extraction. Here both input and output are saturated images. Extraction of the Number plate region is a crucial stage in the smart vehicle number plate recognition system. A practical license plate extraction algorithm is based on boundary detection and mathematical analysis is presented. After conducting various trials, the algorithm can detect the area of the license plate rapidly with a 94% average accuracy of detecting the license plate region. Character segmentation is a process that requires breaking the image containing a sequence of characters into sub-images of individual symbols. It is one of the decision processes in a system that is done for optical character recognition. The decision that the pattern isolated from the image is that of a character or some other distinguishable unit, can be accurate most of the time. It is often inaccurate, and it contributes improve to the efficiency of the system. A character is a sequence that resembles one of the symbols the system is already designed to identify. But to determine such an affinity, the sequence must be segmented from the document image. Each phase depends on the other, and in complicated instances, it is contradictory to seek a sequence that will match a member of the system's recognition alphabet of symbols without consolidating detailed knowledge of the composition of those symbols

into the procedure. Verification of the Recognized character is done using a message that is received by the user that contains a one-time password (OTP) valid for one entry only that too for a limited amount of time. When the user requests to see the result of the processed image, verification of the license number will be done and the mobile number registered with the same will be sent to the OTP. Now the user can enter the received OTP in the application to see the Owner details.

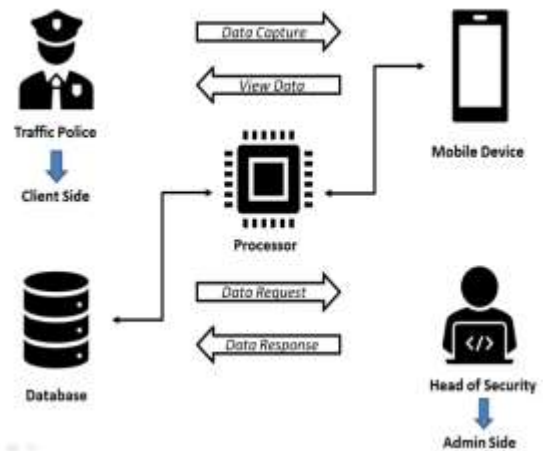


Fig 5.1: Architecture Diagram.

## VI. CONCLUSION

In this Vehicle Number Plate Recognition Project, the program can detect the number plate region from the image captured which consists of vehicle number followed by character segmentation, and then character recognition is done. The project is conceptualized keeping in mind the automation of the number plate recognition system for security reasons that could replace the current system of manual entry. This project will be useful in recording the number plate of a vehicle although it has got its limitation of image processing and other issues. In the future, the recognition of number plates should be possible from video processing as well.

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