# Automatic Number Plate Detection for Vehicle Parking Area

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**Abstract:** *Automatic number plate recognition is a mass surveillance method that uses optical character recognition on images to read the licence plates on vehicles. There are numerous ANPR systems available today. These systems are based on different methodologies but still it is really challenging task as some of the factors like high resolution cameras, non-uniform vehicle number plate, language of vehicle number and can affect a lot in the overall recognition rate. Automatic number plate recognition (ANPR) is an image processing technology which uses number (license) plate to identify the vehicle. The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate. The system is implemented on the entrance for security control of a highly restricted area like military zones or area around top government offices e.g. Parliament, Supreme Court, College Parking Area, Residential Parking Area etc. The developed system first detects the vehicle and then captures the vehicle image. Vehicle number plate region is extracted using the image segmentation in an image. Optical character recognition technique is used for the character recognition. The resulting data is then used to compare with the records on a database so as to come up with the specific information like the number plate is registered or not, region etc. The system is implemented in Android. It is observed from the experiment that the developed system successfully detects and recognize the vehicle number plate on real image.*

**Keywords:** ANPR, Segmentation, Recognition, Optical Character Recognition (OCR)

## I. INTRODUCTION

Automatic Number Plate Recognition has become part of our lives and promises to stay in future, integrable with proposed transportation technologies. ANPR are also called by the name of ALPR (Automatic License Plate Recognition).The concept of Autonomous Vehicles is offering many possibilities of changing fundamental transportation systems. It is no longer just the camera on the roadside or at the barrier to the car park. The various researchers have proposed various techniques for every step and an individual technique has its own pros and cons .Currently In this project, a Digital Image Processing-based prototype is developed. Actions such as Image Acquisition, enhancement that is pre-processing, Segmentation of the license plate and then application of OCR (Optical Character Recognition) is applied to store the number on text form. The plate number is displayed as text on the terminal using the principal of OCR .The main reason is that the ANPR system recognizes the registered number plate with no additional transponder requirements, as compared to the Ultra High Frequency—Radio Frequency Identification(UHF-RFID) systems. A typical ANPR system goes through the general process of image acquisition (input to the system), number plate extraction (NPE), character segmentation (CS) and character recognition (CR).The number of any vehicle once obtained as text, can be displayed, saved in the database or can be searched through the entire database for the details. In this project, Images taken by using cameras displays the output of vehicle plate. A Digital Image Processing-based prototype is developed. Authorities find it very hectic on a busy day to log the vehicle numbers manually in a parking lot. So, in order to make the entire process autonomous, we can install this system , take a picture of it and store the number in the database so as to fine the respective information of the vehicle. The system can be used in parking so as to take the picture of the vehicle and log the vehicle number in the database. This technology reduces the unnecessary hectic manual work required on any busy day, saves the labor cost and is far more efficient than humans. The number of any vehicle once obtained as text, can be displayed, saved in the database or can be searched through the entire database for the details. This project is so versatile that it can be used as an entire application once converted to a software or can be used as a part of any big project.

## 1.1 Objectives

- Reduce the manual work and time consuming task.
- To maintain the record of vehicle for parking area.
- Low resolution camera and low processing power of smartphone is used to capture the image.

## II. METHODOLOGY

The proposed system will recognize unauthenticated vehicle by using automatic number plate recognition system. Record of authenticate vehicle in residential areas will be stored on the database. Whenever the vehicle arrives at the parking system application is going to use, by using camera takes the image and extracts the number from number plate. The metamorphosis of data from cameras into a new dimension is an attempt to provide vision to computer to learn activities carried out by computer. It mainly focuses on real time image processing to recognize vehicle number plate. The recognized number on the plate is matched with the recorded database. If the number does not match the vehicle is denied entry as an un-authenticate, and buzzing the alarm .If vehicle number plate wants to register into the database for that a registration form is created, by using this form vehicle number plate is registered.

## III. MODELING AND ANALYSIS

The ANPR system consists of following steps:

1. Vehicle image capture.
2. Pre-processing.
3. Number plate extraction.
4. Character segmentation.
5. Character recognition

Typical ANPR system consists of five steps these are Image Acquisition, License Plate extraction, character segmentation, and character recognition.

## 3.1 Image Acquisition

The initial step is the Acquisition of an image i.e., getting an image using the phone camera. These Caught images are in RGB format so it can be further process for the Number Plate Extraction. The database system contains the personal information of the vehicle proprietor and a few plate vehicle images, abbreviations and acronyms.

## 3.2 Pre-Processing

Captured RGB image is appeared in fig2.The captured image is influenced by many elements like: Optical system distortion, system commotion, lack of presentation or over the top relative motion of camera or vehicle and so forth result is the degradation of a captured vehicle image and the unfriendly influence to the further image processing. Therefore before the main image processing, pre-processing of the captured image ought to be taken out which include converting RGB to grayclamor evacuation, and border enhancement for brightness.

## 3.3 Plate Segmentation

Number plate segmentation assumes an imperative role in ANPR system. The essential thought after region growing is to remember one or more criteria that are quality for the wanted region. Subsequent to establishing the criteria, the image is looked for any pixels that satisfy the necessities. At whatever point such a pixel is experienced, its neighbours are checked, and if any of the neighbours likewise parallel the criteria, both the pixels are measured as have a place with the same region. We get individual character and number image by using, vertical and horizontal scanning technique.

## 3.4 Segmentation

Character segmentation is a bridge between a number plate extraction and character recognition. In this, different characters on a number plate area are segmented. Various reasons such as lighting variance, plate frames and rotation are those which hinder the segmentation work. A segmentation method is also known as a boundary box analysis. By this method, characters are assigned to connected components and these are extracted using the boundary box analysis. The

segmentation process is completed upon reduction of noise in the image.

**3.5 Character Recognition**

This is the most essential and basic phase of the ANPR system. It displays the techniques that were to order and then perceive the individual characters. The classification is based on the extracted features. These features are then arranged using either the statistical, syntactic or neural methodologies. Distinctive strategies were used for character recognition, letters and characters in the paper. Finish the identification by calculating the likeness of features. For the comparable characters, make the second identification with the technique for highlight point matching Another methodology is that Once the lines in an extracted vehicle number plate are separated, the line separationprocedure ispresently connected segment savy so individual character can be separated. The separated individual characters are then stored in separate variables. The extracted characters taken from number plate and the characters on database which we have stored are presently coordinated. The characters image is match up to our given database and the best resembling is considered. For character recognition the optical character recognition (OCR) is used to look at the every individual character against the complete alphanumeric database. The OCR really uses relationship strategy to match individual character and finally the number is recognized and stored in string format in a variable. The character is then contrasted and the database for the vehicle authorization. The resultant signs are offered according to the consequence of comparison.
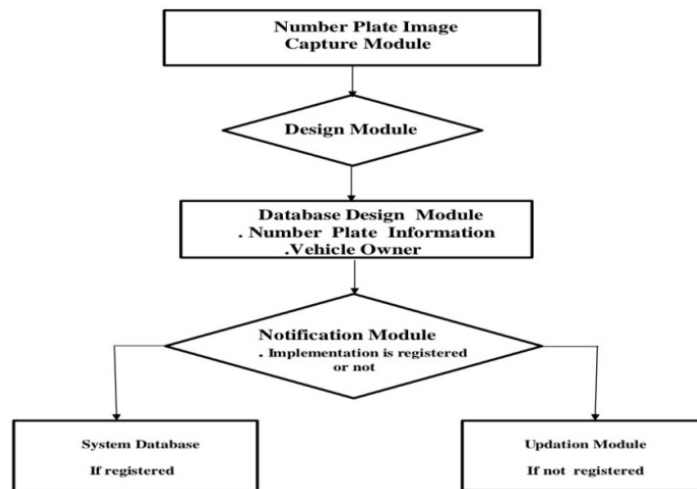


**IV. RESULTS AND DISCUSSION**

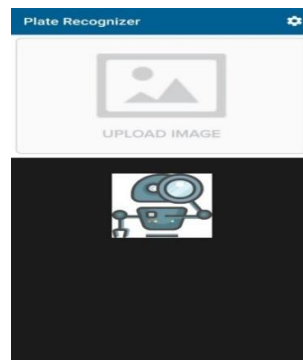The whole scenario has been implemented on Android Studio.



**Figure a:** (upload image picture)

As shown in the fig a. When you open the Automatic Number Plate Detection application ,this interface will be displayed first, where you will get the option of " Upload Image" for application to detect whether the vehicle is an authenticated vehicle or not. By clicking on upload image you will move to the next interface.
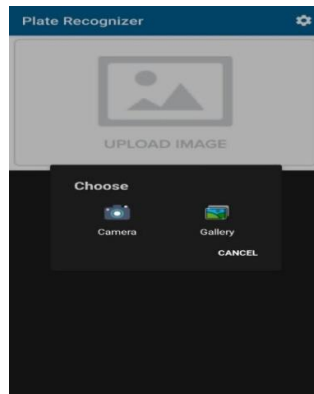
**Figure b:** (camera &gallery picture)

As shown in the fig b. This application allows you to take an image of vehicle number plate of which you want this application to detect, two options will be displayed on the screen i.e. "Camera" and "Gallery" by clicking on camera option you can use your phone camera to take of picture of the vehicle number plate or else you can select a picture from the gallery by using the gallery option.



**Figure c:** (captured picture)

As shown in the fig b. by clicking on the gallery option to select an image ,This Vehicle number plate image interface will be displayed on screen of the application fig c.
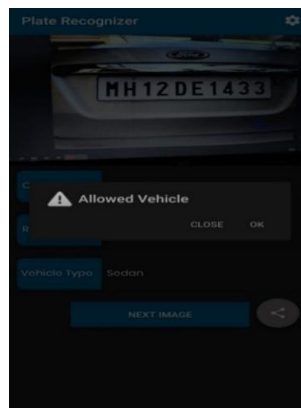


**Figure d:** (Allowed vehicle picture)

As shown in the Fig d. It displays that the Vehicle number plate is an "Allowed Vehicle" that means /Justifies that the vehicle is an authenticated vehicle. In other words, this particular vehicle is Allowed by this application.
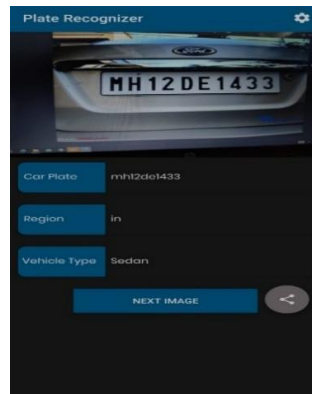
**Figure e:** (Details of Allowed vehicle picture)

As shown in the Fig e. As the vehicle number plate is an authenticated vehicle, It will display the details of the particular vehicle on the screen like "Vehicle type" ,"Vehicle plate ", and the "Region" of the vehicle.
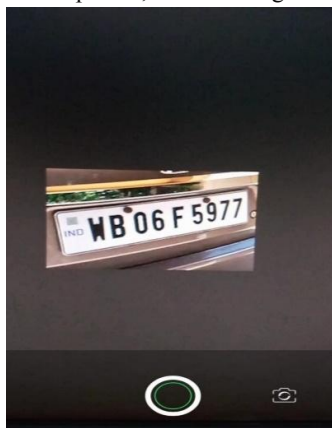


**Figure f** (Non allowed vehicle number plate picture)

We can check this application with another vehicle number plate image Fig f , By clicking on the "Next Image" from the last interface Fig e , You will get back to the First Interface shown in the Fig a. where you will get the option of " Upload Image " again and then by repeating the same procedure of selecting the image from Camera or gallery option Fig b.
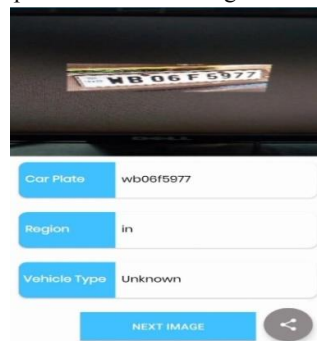


**Figure g:** (Unknown Type vehicle picture)

As shown in the Fig the Vehicle Type is "Unknown" that means this particular vehicle will be recognized as an unauthenticated vehicle. In other words, this vehicle number plate is not been registered in the database (Sqlite) of this automatic number plate application. So when a vehicle is not registered in this application, for those vehicles a registration form will be displayed on the screen of the application for the user to register it.
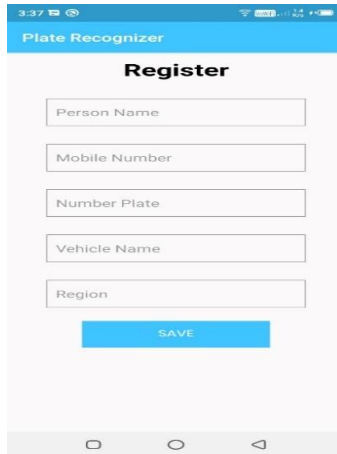
**Figure 4.8:** (Registration Page)

## V. CONCLUSION

In this paper, the automatic number plate recognition system using vehicle Number plate is introduced. ANPR systems play an important role in the growth of the smart transport network. Recognition use the image processing technique. For potential recognition systems, the choice is to use high-resolution cameras (i.e. the phone camera).There is a need of such kind of Automatic Number Plate Recognition system in India as there are problems in parking area to do the manual work . Most of major cities have implemented it but we still need more of such things. Government should take some interest in developing this system as this system is very economical and Eco-friendly if applied effectively. Future research in ANPR still faces several challenges; For instance, there is a need to concentrate on more robust algorithms for non-standardized formats, irrespective of regions. Also, all proposed/designed algorithms need to be tested for real time scenarios rather pre-acquired images. In addition, high resolution, allowing robust algorithms to reduce processing times and increase recognition capabilities.

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