

**Automatic Vehicle Number Plate Recognition System**

Y.K.Praneeth, Sahil.C.Dhumavat, Prof. Rashmi Thakare

Abstract— *The goal of our project is to design an intelligent device that can detect the number plates of the vehicles which can be used to identify vehicles across the nation without the intervention of human beings. There are many applications for vehicle number plate detection. They range from complex security systems to simple day-to-day applications such as parking systems. Most of the times the recognition of the number plate is done manually. To make this process less complicated we can make this process automatic by using image processing by MATLAB programming. Vehicle number plate detection has complex characteristics due to the effects of smog, fog, rain, irregular lightings, velocity of the vehicle, conversion of numbers to other languages and number of vehicles in the scene. In this project of number plate detection the spectral approach can be used for acquiring the image, extraction of the region of the number plate, character segmentation by extraction techniques. All the steps of this process are considered to achieve an efficient and automatic identification of numbers. The usefulness and efficiency of the proposed system is being demonstrated.*

Keywords— *Image processing, Extracting techniques, Place detection, character segmentation.*

I. INTRODUCTION

The Automatic number plate detection is a method which uses optical character recognition on images to read the number plates of vehicles. They can be used by police forces and as a method of electronic toll collection on pay-per-use roads.

License plate recognition (LPR) is a basically a method for the automatic vehicle identification system. It is an image processing technology used to identify the vehicles by detecting and reading the number plates. Real time use of this system plays a major role in automatic monitoring of traffic rules and maintaining law enforcement on public roads.

They can also be used for monitoring many traffic activities, such as red light obedience. Number plate recognition can be used to store the images captured by the cameras as well as the text that is extracted after the processing of the image of the license plate, with some configuration to store a photograph of the driver. These kinds of systems use infrared lighting to allow the camera to click the picture of the vehicle at any time of the day. The main aim of this type of surveillance system is to locate the standard number plate, segment characters and recognize them of a particular vehicle.

II. IMAGE CAPTURE OF THE VEHICLE



DETECTION OF THE VEHICLE

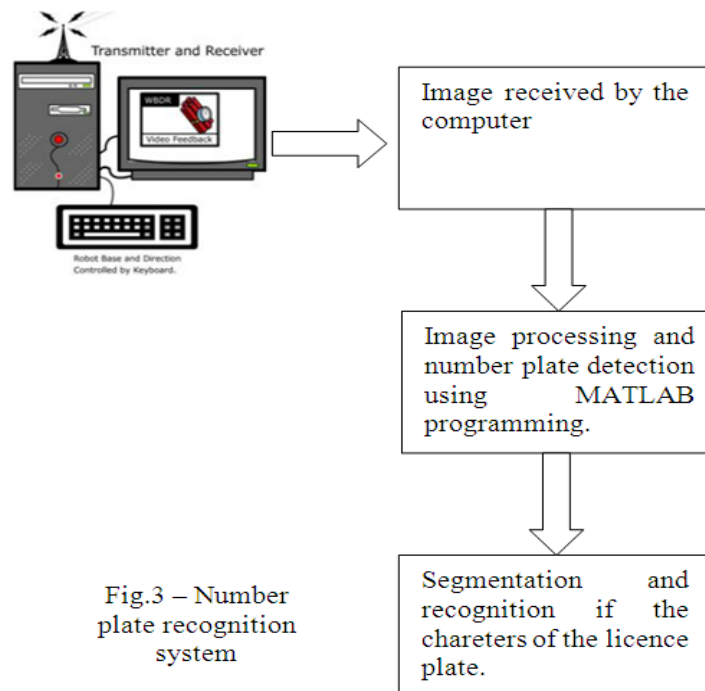
In the NPR system we are using an IR sensor for sensing or detecting the vehicle which is standing in front of the toll gate.

When there will be a vehicle in front of the toll gate then the IR sensor will give an input signal to the microcontroller which will in turn activate the camera which has been placed. The camera will click the picture of the vehicle and then it will forward the image to the computer for the extracting of the number from the image. As soon as the vehicle is detected the LCD will display a message of Vehicle Detected.



Fig 2. - Lcd displaying on the detection of a vehicle in front of toll.

III. PROCESSING OF THE IMAGE



The system is divided into two parts:-

1. The camera and transmission system
2. The controller room computer with MATLAB programming for image processing.

The steps involved in the detection of the number plate are:

- Vehicle Image Captured By Camera:
 - ✓ The camera captures the image of the vehicle whose number plate has is to be detected. Infrared lightings are used in most cases so as to capture the image of the vehicle at any time of the day.



- Extraction of the Number Plate region from the whole image:
 - ✓ Here the number plate is extracted by firstly converting the captured RGB Image to the Gray Scale Image. This conversion from RBG to gray scale is necessary to increase the processing speed for the license plate extraction.
 - ✓ A mathematical morphology is used to detect the region and Sobel operators are used to calculate the threshold value of the image. After this step we get a dilated image. Then a function called imfill is used to fill the holes in the image to get a clear binary image.



- Segmentation and Recognition of characters on the license plate:
 - ✓ Here a technique known as bounding box can be used for the process of segmentation. It is used to measure the properties of the image region such as the size of the plate as it the utmost important and a basic step for the recognition of the number plate.
 - ✓ Then the segmented image is multiplied with a gray scale image to get the number plate of the vehicle.

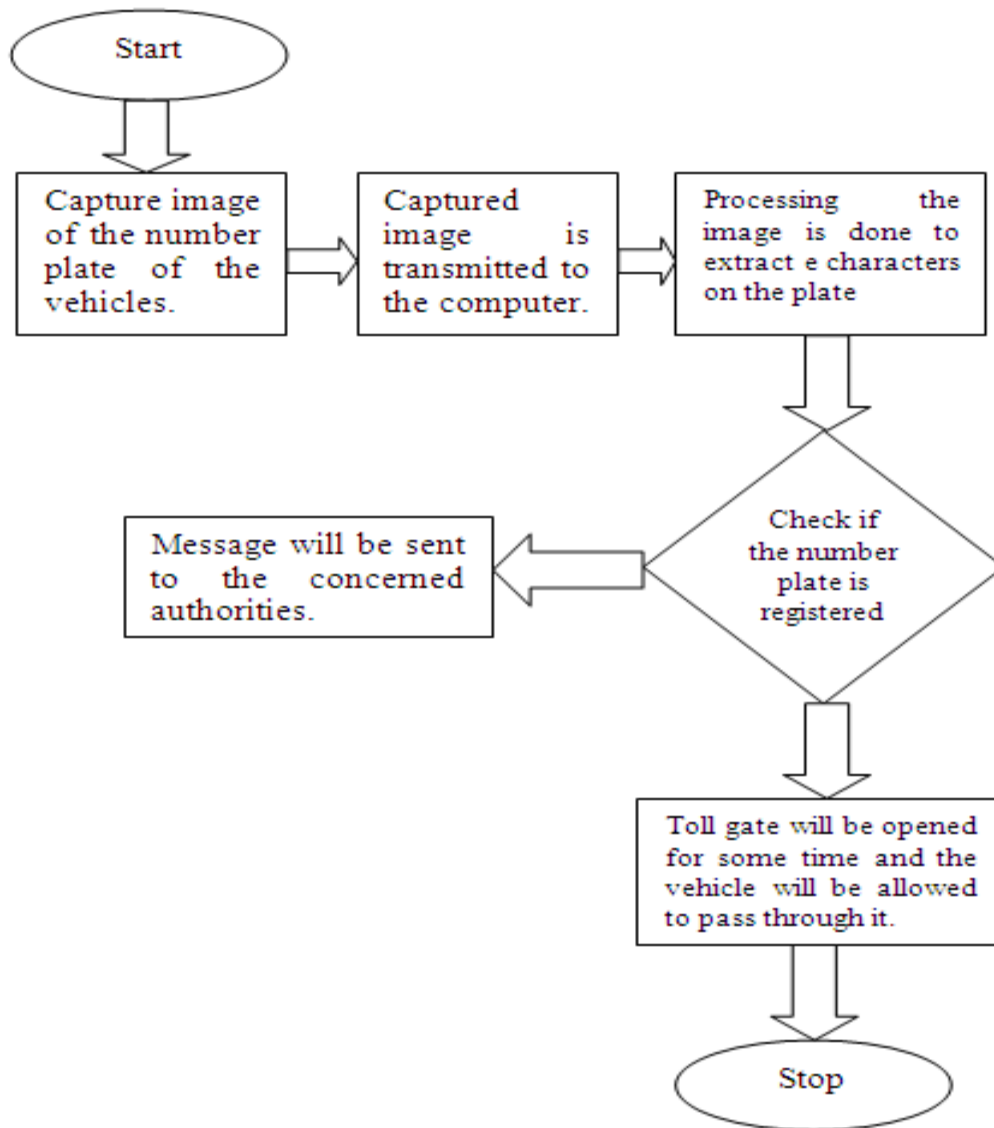
M H 1 2

D S 6 3 8

- Vehicle Number plate displayed on the computer screen:
 - ✓ After the above steps are successfully implemented, the number plate is displayed in MATLAB window. In general number plates are in rectangular shape, hence it is necessary to detect the edges of the rectangular plate. Sobel operator is used to calculate the threshold value, that detects high-light regions with high edge magnitude and high edge variance.
- Character Segmentation:
 - ✓ Segmentation is one of the most important processes in the number plate recognition, because all further steps rely on it. If the segmentation fails, a character can be improperly divided into two pieces, or two characters. The bounding box technique and the character segmentation process work hand in hand. Once a bounding box is created over each character and numbers presented on number plate, each character & number is separate out for recognition of number plate.

MH 12 DS 638

IV. FLOWCHART



CHARACTER RECOGNITION & DISPLAY OF THE RESULT:

It is employed for the purpose of conversion of images into characters. Now to detect the vehicle and open the toll the extracted alphanumeric text is compared with each individual character against the complete database using template matching. The matching process moves the template image to all possible positions in a larger source image and computes a numerical index that indicates how well the template matches the image in that position. The gate is thus opened if the number plate is valid and if the number plate is not valid or the extracted image does not match with the database then a text message will be sent immediately to the police officer. In this case the gate would not open. Both the results if the number is valid or it is not will be displayed on the lcd which is been installed.

V. ACKNOWLEDGMENT

It is my great pleasure in expressing sincere and deep gratitude towards my guide Mrs. Rashmi Thakre, Assistant Professor Electronics & Telecommunication Engineering Department for her valuable guidance and constant support throughout this project and also to pursue additional studies. We take this opportunity to thank Head of the Department

Mrs. M. P. Sardey and all staff members of department of Electronics & Telecommunication Engineering AISSMS IOIT, Pune, for their cooperation in many ways. The motivation factor for this work was the inspiration given to me by our honorable principal Dr. P.B.Mane. Lastly we are thankful to those who have directly or indirectly supported for our work.

CONCLUSION

In this paper, we presented hardware and software designed for the recognition of vehicle license plate. Firstly we extracted the plate location, then we separated the plate characters individually by segmentation and finally applied template matching with the use of correlation for recognition of plate characters. This system is designed for the identification of vehicle license plates.

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