

Vehicle Monitoring System



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Abstract: In the fastmoving world, it is nearly impossible to check and verify the details of each and every vehicle manually. So, in order to untangle this problem, we came up with vehicle monitoring system. The prime idea of our project focusses on drawing out the vehicle registration number from the number plates captured using the camera and process the captured number plate image using various algorithms and eventually store the processed data. This data can be used for monitoring the vehicles in parking lots. Management of cars in parking lots requires a lot of human intervention. Parking lots have been installed with cameras, but none of them serve the purpose. They are just installed for video surveillance and none of them solve the problem. Previously, i.e. in the mini project part, we proposed an Automatic Vehicle Plate Recognition system, which captures the vehicle image, processes the number plate and gives out the details of the vehicle. With the help of this module, we propose a system which can be used in parking lots to monitor the vehicles entering and exiting the lot. We can even run a background check on vehicles using the number plate details and alert the police department in case if the vehicle is suspicious.

Keywords: vehicle registration number, vehicle monitoring system, human intervention, video surveillance.

I. INTRODUCTION

In the modern world, a System where the vehicle number plates were detected automatically was used frequently in places such as parking lots, traffic signals etc to monitor the vehicles. Here, the installed cameras capture the vehicle images, let them be moving or static both are captured. The captured image is processed using certain algorithms, which produce best results, and the details like name of the person who owns the car, the date along with time at which the vehicle crossed the camera or approached the spot etc are displayed in the monitors which are operated by certain group of people.

Manuscript received on March 15, 2020.

Revised Manuscript received on March 24, 2020.

Manuscript published on March 30, 2020.

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The algorithms which are generally suitable for identifying the details of the vehicle are Optical Character Recognition (OCR), Probabilistic Neural Network (PNN), Fuzzy system and Radial Basis Function (RBF).

But out of the bunch of algorithms available to get the fruitful results, we prefer the Optical Character Recognition (OCR) algorithm to extract the alphanumeric characters in the number plate of the vehicle. The main reason behind employing the OCR algorithm is owing to the fact that this algorithm produces high accuracy compared to the remaining lot of algorithms. In this project, we took a digital image and applied the algorithm and measured the accuracy of the result it produced. The obtained result is verified with the actual number plate. There are a set of tasks to perform in this system. The foundational step is to detect the vehicle and engulf the picture of the vehicle through a high-resolution camera. After capturing the picture of the vehicle, we extract the number plate of the vehicle in the image captured by using algorithms and other techniques. The next step is to get the alphanumeric characters on the number plate image which was obtained in the previous step. We use OCR technique to get each character. But the main flaw of this system is due to the reason that many people do-not use the standard license plates prescribed by the government. Each number plate has its own uniqueness in its own way like the size of alphabets, numbers, fonts, etc. This technique is only applicable for number plates which are affixed by following proper norms.

II. RELATED WORK

• Optical Character Recognition (OCR):

OCR, which means optical character recognition, is a modern technology tool which is used to recognize the text enclosed within an image. This technique processes the text by locating the characters and identifying them namely numbers, letters and symbols. In this project, after the vehicle plate image is extracted, we apply this technique to the number plate where it recognizes the alphanumeric characters present in the number plate. The recognized text is stored in the database.



Figure-2.1 – OCR RECOGNITION [3]

- **RFID:**

We use RFID tags (radio frequency identification tags) to detect vehicles approaching. The RFID tag stores the details like vehicle registration number, type of the vehicle, etc. Whenever a vehicle approaches the point, the tag activates itself and senses the vehicle and activates the camera. At present, we are only having two types of tags namely battery-functional and passive. In case of the former type, battery-functional, we install a battery in the tag. But in latter, passive one, it impulses only when an electromagnetic energy is explored.

Radio Frequency Identification is an operation that is used for providing different types of tags which is used for providing an easy transaction process for the Vehicle owners through these tags these are used to represent the cars registration tags that are linked to Vehicle Registration plate. These tags are provided to every vehicle for providing unique identity for vehicles and easy transaction of money through banks.

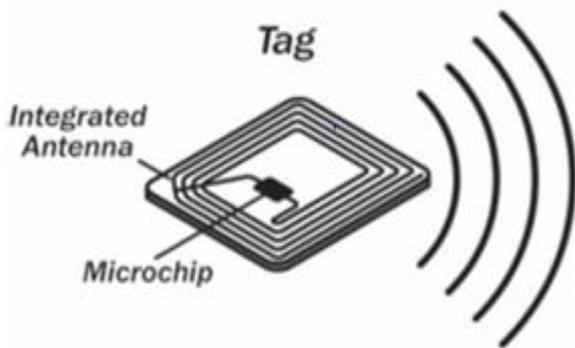


Figure-2.2 – RFID TAG [1]

- **Collection of Images:**

We collect images captured using our high-resolution cameras installed at several places and obtain the images. The obtained images are then examined carefully so that we get the desired output.

- **Pre-processing of Image:**

The obtained picture will be in the form of RGB. We need to convert this obtained image into gray image which will be used for further processing. This will help to select the specified region where the vehicle plate is present and in-turn decrease the contours used.



Figure-2.3 – Pre-Processing Of Image [4]

- **Filtering of Image:**

The previously examined image is then undergone several filtering techniques to get the accurate results and remove any distractions like noise, distortion etc.



Figure-2.4 – Filtering Of Image [3]

- **GPS and GPRS based Vehicle registration plate recognition:**

The GPS is used to track the vehicles through the Global satellite Positioning. The GPS is used to note each vehicle exact location and providing some emergency services like nearby Fuel filling station, nearby Restaurants etc. The GPS is also used in tracking the vehicle when the vehicle is stolen. GPS and GPRS provide the user with necessary settings that is used to monitor our location and the target location for easy travelling.

$$a = \sin^2\left(\frac{\phi_2 - \phi_1}{2}\right) + \cos(\phi_2) * \cos(\phi_1) \sin^2\left(\frac{\lambda_2 - \lambda_1}{2}\right)$$

$$d = 2 * R_E * a \tan 2\left(\frac{\sqrt{a}}{\sqrt{1-a}}\right)$$

where ϕ_1, λ_1 is used for present locations latitude and longitude variables and λ_2, ϕ_2 are used for target location latitude and longitude variables in the above equation.

III. METHODOLOGY

Capturing image:

In this we capture the image of the cars on which we use image processing technique to store the vehicle license plate. Here we can take the image of the car from front side or back side for which we would like to use the image processing technique.

Converting of BGR image to GRAY (Color Inversion):

The purpose of color inversion is to alter the image color values to higher values so that the image is transformed into GRAY image that has high accurate values and high brightness.



Edge Detection (Hough Transformation):

It is the process of identifying the sharp edges when the image has brighter colors. It takes the point at which the image brightness changes sharply. It takes the part of the image that forms a closed area combining all the points that are formed at the end of the sharp change in the brightness of the image. Hough Transformation is one of the process that is used to find the strong and sharp differences in illumination of the picture and is used to maintain the certain sides to form a closed horizontal and vertical dotted areas in an sharp rectangular manner.

Vehicle Plate Recognition:

In the above process the area closed in the image after Hough Transformation is the number plate affixed to the vehicle. Now the number plate of the vehicle is identified.

Optical Character Recognition (OCR):

Optical Character Recognition is a process that involves examining the text of the document or image translates the characters into code that is used for processing is also mentioned as an text recognition method provides the sharp resolution of the document or image to the corresponding text.

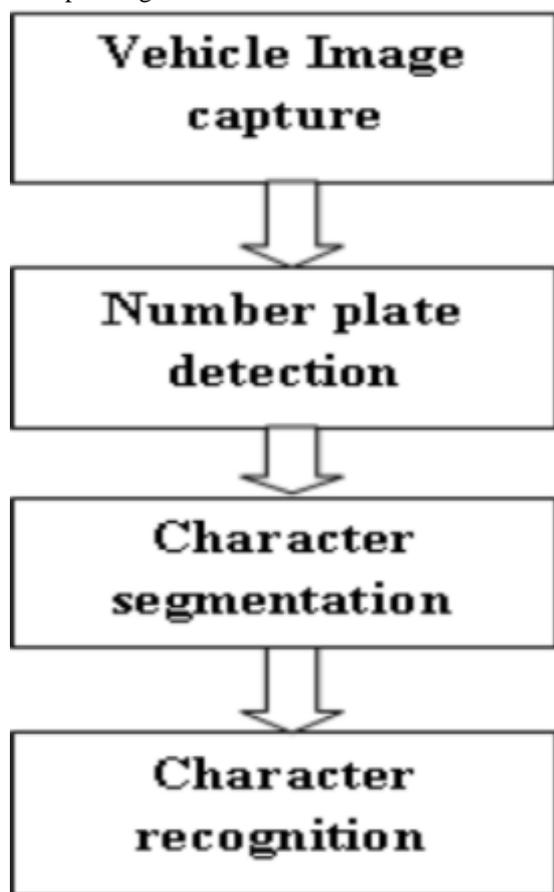


Figure 3.1 – Conventional ANPR System [5]

At the beginning, we obtained the information of vehicle using the vehicle plate recognition technique. In the foremost step, we unfolded the details of the owner of the vehicle and took a note of the time at which the vehicle surpassed the specified junction

IV. RESULTS



Figure 4.1 – Captured Image



Figure 4.2 – Rgb To Gray



Figure 4.3 – Edge Detection



Figure 4.4 – Hough Transmission



Figure 4.5 – Hough Transformation



Figure 4.6 – Extracted Number Plate

The License Plate number is :-
AP39CB9009
 The vehicle entered at :
2020-03-01 21:04:46

Figure 4.7 –Displayed Result

V.CONCLUSION AND FUTURE WORK

We have developed a system which is capable of capturing the image of a vehicle which is in static or in running and process the captured image. In this paper, we took a sample image of a car and applied several techniques. The major techniques which were applied are filtering technique, morphology and trimming technique. We used OCR algorithm to get the alphanumeric characters from the picture of the plate affixed to the vehicle. The characters which were extracted using the OCR algorithm showed an accurate output and retrieved the exact details about when the vehicle crosses the camera. The display interface was also well designed so that the output can be visible clearly and accurately and displays all the needed information. The final output of this gives us the complete picture about who owns the car, when did the car arrive, when the car left, how long did the car recide in the parking lot etc.

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