# AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM 

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#### Abstract

Automatic number plate recognition is done using the Automatic License Plate Recognition [ALPR] system. The manual work of humans to watch the movement of vehicles in and out of the organization is reduced by using ALPR. In this system, first the image of the license plate is captured and then that image will be processed. The letters present on the image of license plate are changed into the texts using Optical Character Recognition [OCR]. An android application is also used in this system. When the vehicle enters the parking area or any organization, immediately the vehicle license plate number and the vehicle entering time will be updated in the android application and an email will also be sent to the corresponding authenticated person. So, it is easy to find the incoming and outgoing vehicle and record details about them for future use.


## I. INTRODUCTION

An embedded system usually contains an embedded processor. Embedded system is used in many appliances that have digital interface such as microwaves and cars. Some embedded systems include an operating system. These systems are embedded into some device for some specific purpose other than to provide general purpose computing. A typical embedded system is shown in Fig


## II. EXISTING METHODOLOGY

1. In the existing system manual toll collection system is used.
2. It is slow as it ceases the vehicle flow as each vehicle approaches the toll booth for cash transfer and entry into the database. Then used the Radio frequency-based vehicle Identification method. This leads to various issues like fuel wastage, time wastage and air pollution.
3. 

## III. PROPOSED METHODOLOGY

The proposed system uses the camera to identify the number plate of a vehicle. There is no need to wait at a toll plaza, or at any parking lots. This system reduces the manpower, time and fuel. Guide toll series are toll collection structures without giving receipts. This approach is genuinely very inefficient. The states of congestion and inefficiency brought on government to plot and put into effect Electronic Toll Collection (ETC) a device that could eliminate out these issues and facilitate comfort for all who involved inside the manner of toll collection at once or circuitously. These systems collect statistics on the idea of visitors, and then they will classify the cars and accumulate the expected quantity of fare. Electronic/automated toll series structures are very popular these days. They do not require guide intervention for their working. In ETC wherein toll is collected and also numerous toll boot son which these toll collection systems are in built .There is not any transparency supplied by means of these structures. Transparent structures play a vital role in toll series such that there might be no corruption regarding toll.

The proposed machine on this paper is obvious to suitable toll collection and as a security in parking lots. The invested quantity is charged from the motors passing on that newly built highway. This is called a toll tax. The personal organization concerned inside the manufacturing of the infrastructure is free to charge residents.

A registration code reputation device is usually comprised of four tiers, inclusive of automobile picture gain, license plate area and segmentation, person segmentation and standardization, character recognition, etc. The license plate region and segmentation are a vital research topic of LPR. Because of various illumination conditions and diverse complex backgrounds, sectioning license plate speedy and as it should be from license pictures is a recognized trouble. The exceptional of finding operation will immediately influence the accuracy and the speed of the complete machine. The experimental outcomes to expose a farimproved performance of the proposed approach beneath complex backgrounds and one of a kind illumination situation are provided.


## IV. RASPBERRYPI

The Raspberry Pi is cheaper, credit-card sized computer that is plugged into a computer monitor or TV, and uses a standard keyboard and mouse.
When the Pi is received it is taken out of its protective anti-static bag and place it on a flat, non-conductive surface.

## Connecting a Display

A display is connected before using raspberry Pi . The Pi supports three different video outputs: composite video, HDMI video and DSI video. Composite video and HDMI video are readily accessible to the end user, while DSI video requires some specialized hardware.

## Composite Video

Composite video is available through the yellow-andsilver port which is at the top of the Pi known as an RCA phono connector and is made for joining the Raspberry Pi to older LCD devices.

As the name suggests, the connector creates a composite of the colors found within an image-red, green and blue-and sends it down a single wire to the display device, called Cathode ray tube. A composite video connection starts the Pi. Composite video connection has more interference and run at limited resolution on the screen at once.


## HDMI Video

A better-quality picture can be obtained using the HDMI (High-Definition Multimedia Interface) connector, the only port found on the bottom of the Pi Unlike the analogue composite connection, the HDMI port provides a high-speed digital connection for pixel- perfect pictures on each computer monitors and high-definition TV sets. Using the HDMI port, a Pi can display images at the Full HD 1920x1080 resolution of most modern HDTV sets.

## DSI Video

The printed circuit board is a small ribbon protected by a layer of plastic. The output video on the Pi is above the SD card slot. This is for a video standard known as Display Serial Interface (DSI), which is used in the flat-panel displays of tablets and smart phones.

## Connecting Audio

In Raspberry Pi’s HDMI port, audio is simple, when properly configured, the HDMI port carries both the video signal and a digital audio signal. This means a single cable is connected to a display device to both sound and pictures.
1.

## V. WORKING OF THECAMERA

A webcam could be a compact camera that may be connected to the pc to broadcast video images in real time (as they happen). rather like a photographic camera, it captures light through a little lens at the front employing a tiny grid of microscopic light-detectors built into an image-sensing microchip (either a charge-coupled device (CCD) or, more likely nowadays, a CMOS image sensor).

The image sensor and its circuitry convert the image before of the camera into digital format-a string of zeros and ones that a computer knows the way to handle. Unlike a photographic camera, a webcam has no built- in chip or nonvolatile storage card: it does not must remember pictures because it's designed to capture and transmit them immediately to a computer. that is why webcams have USB cables commencing of the rear. The USB cable supplies power to the webcam from the pc and takes the digital information captured by the webcams image sensor back to the computer-from where it travels on to the net.

## VI. PICTURE INTO DIGITALFORM

While taking a digital photo or staring into the webcam, light zooms into the lens. This incoming "picture" hits the image sensor, which breaks it up into individual pixels that are converted into numeric form. CCDs and CMOS chips, the 2 types of image sensor, try this job in slightly alternative ways. Both initially convert incoming light rays into electricity, very similar to photoelectric cells (used in things like "magic eye" intruder alarms or restroom washbasins that turn on automatically once you put your hands under the faucet). But a CCD is actually an analog optical chip that converts light into varying electrical signals, which are then passed on to 1 or more other chips where they're digitized.


Fig. Image to digital form

By contrast, a CMOS chip does everything in one place: it captures light rays and turns them into digital signals all on the one chip. So, it's essentially a digital device where a CCD is an analog one. CMOS chips work faster and are cheaper to create in higher number than CCDs, so they're now utilized in most low-cost mobile phone cameras and webcams. But CCDs are still widely utilized in some applications, like low-light astronomy.

## VII. WORKING PRINCIPLE

The hardware of the project contains a Raspberry pi 3 model B, a sensor and a camera. The connections are made between the raspberry pi, camera and therefore the detector. The camera is employed to capture the image of the amount plate. The raspberry pi is connected with the sensor for metal detection. the full hardware kit is connected to the PC. the following process is to open the installed application called VNC viewer. VNC could be a sort of interface between the Raspberry pi and the pc. VNC viewer supporting the raspberry pi on the pc and also the pc by itself should both be connected to the identical WIFI. The IP address of the Raspberry pi and therefore the IP address of the mobile hotspot should be connected throughout to continue the method. After the Connection between the Raspberry and therefore the monitor, there will be a blinking of green light. If there's no proper connection, red light is blinked by the raspberry pi. After this process the Raspberry pi desktop is opened.

The coding language used here is Python. Python is employed here because it's one in every of the foremost accessible programming languages available because it's simplified syntax and not complicated, which supplies more emphasis on linguistic communication. thanks to its simple usage, python will be easily written and executed much faster than other programming languages. It also uses low memory for storing. Next step is to run the program and after the sensing element senses the metal the camera starts to capture the quantity plate. ALPR is Automatic Number-Plate Recognition may be a technology that uses optical character recognition on images to read vehicle registration plates to form vehicle location data. The developed system first detects the vehicle so captures the vehicle image Vehicle number plate region is extracted using the image segmentation in a picture. API keys could be a unique identifier won't to authenticate a user, developer or a calling program to an API. These are wont to track and control how the API is being employed, as an example to stop malicious use or abuse of the API. After stepping into the VNC viewer, the coded program within the folder is created to run. A registered email id is given within the program by the user for receiving the output.
just one email id is linked in our program to avoid the time delay of the output. The output is sent to the registered email id. within the program we are going to be manually some number plates. Only those number plates which is already fed within the code will receive the output as authorized vehicle with date and time. If the other car place numbers which we have not fed within the program is captured by the camera then the output are going to be shown as unauthorized vehicle with date and time API. If there's no vehicle the detector doesn't sense any metal leading it to point out the output as no vehicle.


## IMAGE ACQUISITION

In Image acquisition, the popularity system acquires a scanned image as associate input image. The image ought to have a selected format like JPEG, BMT etc. This image is non inheritable through a scanner, camera or the other appropriate digital device.


Fig. Schematic diagram of the recognition system

## VIII. SEGMENTATION

In the segmentation stage, a sequence of image is rotten into sub-images of individual image. within the projected system, the method input image is divided into isolated pictures by distribution variety to every image employing a labelling process. This labelling provides info regarding variety of pictures within the sequence. every individual image is uniformly resized into pixels for classification and recognition stage.


Fig Block diagram of segmentation

Image segmentation strategies are performed on the extracted image regions to get rid of the background encompassing text pictures. These strategies sometimes assume that the grayscale distribution is bimodal which pictures a priori love either the white half or the blackhalf. Great efforts are therefore dedicated to playacting higher binarization, combining international and native thresholding, M-estimation or straightforward smoothing. To eliminate the non-image regions in every binary image, an easy connected part analysis step is utilized by setting constraints on size, height and breadth magnitude relation then on. However, these strategies are unable to filter background regions with similar grayscale values to the photographs.
2.

## IX. RESULTS AND DISCUSSION SCENARIO1:

## Registered number plates:

Step 1:
The image of the number plate is captured using the camera.


Fig 5.1 Captured Image
Step 2:
In processing, the digital image of the number plate is converted into text format


Fig 5.2 Image to text form.
Step 3:
After processing a mail will be sent to the authorized person including the details of the vehicle.


Fig. 5.3 Mail image - Registered Number plate.

## Scenario2

Unregistered Number Plates:

Step 1:

The image of the unregistered number plate is captured using the camera.
Step 2:
Similarly, the digital image is converted into text.


Fig. 5.5 Image to text form
Step 3:
In this case, a mail will be sent to the authorized person mentioning it as unregistered Vehicle and the number plate details of the vehicle.

## Unregistered Detected:

KA04N0094 on 2021-03-22
08:16:45.053717 inbox

K

$$
\begin{aligned}
& \text { keerthika.1704041@0... Yesterday } \\
& \text { to bcc: me }
\end{aligned}
$$

Fig 5.6 Mail image - Unregistered number plate

## X. CONCLUSION

The system uses a camera at the side of a monitor interfaced to a Raspberry Pi. The system perpetually processes incoming camera footage to discover any trace of variety plates. On sensing variety plate before of the camera, it processes the camera input, extracts the quantity plate half from the image. this is often terribly helpful for automating toll booths, machine-controlled signal breakers identification and looking for traffic rule breakers.

Here the projected Raspberry Pi primarily based vehicle variety plate recognition system that mechanically acknowledges vehicle variety plates victimization image process. Processes the extracted image victimization OCR and extracts \{the variety or the amount or the quantity\} plate number from it. The system then shows the extracted variety on AN alphanumeric display. within the useful vehicle variety plate Raspberry pi is that the key part in process module that keeps on monitors vehicles by interfacing camera in this applicable space. victimization that camera, Raspberry pi extracts the quantity. Recognition system victimization Raspberry vehicle plate Recognition are often accustomed recognizing the vehicles in several places like Toll Gates and Traffic signals. the long run of this method is incredibly wide. during this straightforward internet camera, sporadically, pictures are often taken and sent on the web. E-mail causation is additionally doable on raspberry pi victimization the smtp library operate gift already. By combining of these options, this will be an entire production watching system or are often used as a building automation and system.

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