



Raspberry Pi Vehicles Number Plate Recognition

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abstract- The objective of the project is to automatically capture images of the vehicle's number plate when it passes through the system, using raspberry pi technology. The process of Recognizing vehicle number plates can be quite challenging, but it is an important system. This system can be utilized to automate toll booths, detect traffic signal rule violations, identify traffic rule breakers and conduct insurance checks, making it incredibly useful.

Key Words: Raspberry pi, Number plate, Optical Character Recognition, Character Segmentation, Image Segmentation.

1. INTRODUCTION:-

Developing an efficient vehicle number plate recognition system is a challenging but crucial task for automating toll booths, recognizing automated signal breakers, and identifying drivers who break traffic rules. In this proposal, we present a vehicle number plate recognition system that utilizes Raspberry Pi technology and advanced image processing techniques to automatically recognize number plates. The given system continuously analyzes incoming camera footage to identify any number plates. Upon detection of a number plate, the system uses OCR to extract the alphanumeric content of the plate from the image and displays it on a screen. This fully functional vehicle number plate recognition system leverages image processing to detect the plate and is completely automated. The system utilizes digital image processing techniques for its operation. This endeavor is focused on gathering fines and insurance in an astute manner. While some countries employ expensive automated systems for fine and insurance collection, we have established a cost-effective monitoring system. This system involves a fully automated number plate recognition process that automatically detects, recognizes, and identifies number plates. The captured image is processed using image processing techniques, and the recognized number plate can also be used for other requirements, such as insurance and fine checks, and is then sent through email.

2. LITERATURE SURVEY:-

This paper proposed the Electronic Toll collection System based on RFID which has advantages of less cost, small size and high reliability. It is very suitable for practical applications with the rapid development of national economy, total mileage of expressway and vehicle population near constantly increase in china, accordingly, expressway network has becoming more complex [1].

This paper proposed that, the double chance algorithm as an approach to car license plate extraction. The first algorithm extracts the line segments and group them based on set of geometrical conditions, using real life data base collected by speed enforcement camera, they obtained a high success rate of 99.5%, through double chance approach with verification [2].

This paper proposed a method to detect Korean vehicle plates from black box videos. It works in two stages: The first stage aims to locate a set of candidate plate regions and the second stage identifies only actual plates from candidates by using a support vector machine classifier. Internet services that share vehicle Black Box videos need a way to obfuscate license plates in uploaded video because of privacy issues [3].

The objective of this paper is to complete automatic recognition system using OCR, they have used to the existing closed circuit, television or road rule for informant cameras or ones specifically designed for the task. The images of vehicles license plate is captured and is processed by segmentation of character and is verified by Raspberry pi processor authentication proposed [4].

3. PROPOSED SYSTEM:-

Due to security concerns, they do not permit unidentified automobiles, as is common in many sectors. Industries place a high priority on security, hence a system is needed to assist in the identification of a strange vehicle at a gate. The ability to read licence plates from moving vehicles is a challenging but crucial mechanism in today's society. This is highly helpful for automating toll booths, automatically identifying signal breakers, and catching traffic regulation violators. Therefore, we suggest a Raspberry Pi-based car number plate recognition system that can read number plates automatically.

The system makes use of a Raspberry Pi with a camera circuit interface. Incoming camera footage is processed by the system to look for or identify any signs of license plates. When a number plate is in front of the camera, the system continues to process the camera input and separates the number plate portion from the supplied image. utilizes ALPR to process the recovered image and pulls the number plate number from the input. Consequently, we proposed a Raspberry Pi3-based vehicle number plate recognition system. In this method, the camera is crucial in taking photos of the license plate. Here, the vehicle number plate characters are recognized using the ALPR (Automatic Number Plate Recognition) method. When a number plate is located in greater detail, verification occurs because the raspberry is linked to the cloud server and the characters of the vehicle number are sent to the cloud.

4. DESIGN & IMPLEMENTATION:-

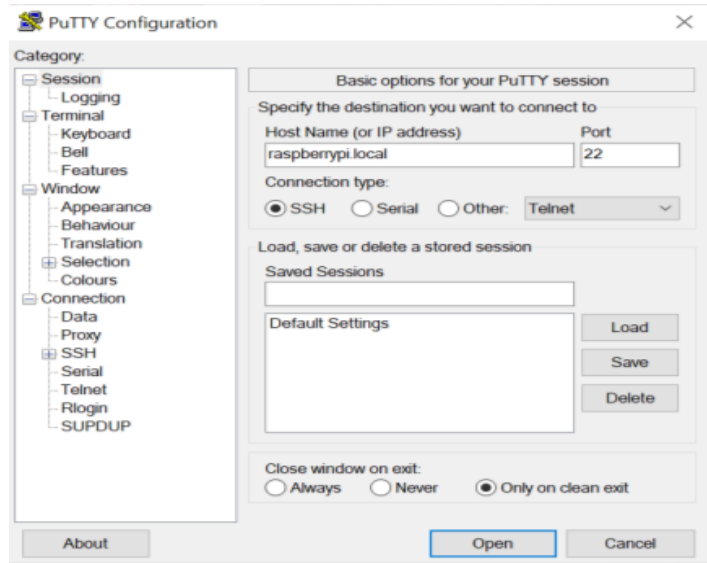
The objective of this project is Usage of image authentication technology, Capturing of Vehicle number plate details using camera, unauthorized authentication and alerting through an email.

For Windows OS

Step 1) Download Putty Configuration

Host Name: raspberry pi.local

Connect with RP



Step 2) Log in to RP and get IP address.

Login as: pi

Password: zxcvbnm

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pi@raspberrypi ~
└─$ login as: pi
pi@raspberrypi:~$ pi@raspberrypi.local's password:
Linux raspberrypi 5.15.76-v7+ #1597 SMP Fri Nov 4 12:13:17 GMT 2022 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Jan 3 00:21:46 2023
pi@raspberrypi:~$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 169.254.210.211 netmask 255.255.0.0 broadcast 169.254.255.255
    inet6 fe80::5f2b:c927:4a45:f40b prefixlen 64 scopeid 0x20<link>
    ether b8:27:eb:66:ad:5d txqueuelen 1000 (Ethernet)
    RX packets 38 bytes 5220 (5.0 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 70 bytes 10104 (9.8 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 30 bytes 2980 (2.9 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 30 bytes 2980 (2.9 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

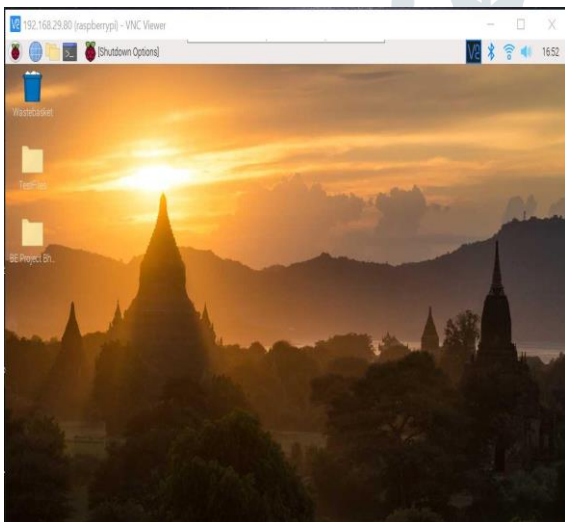
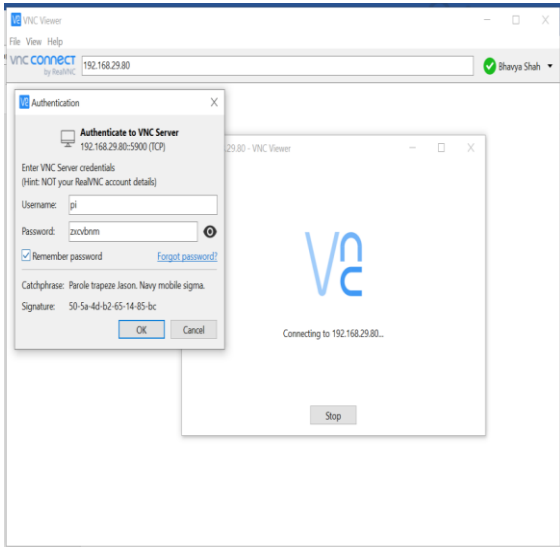
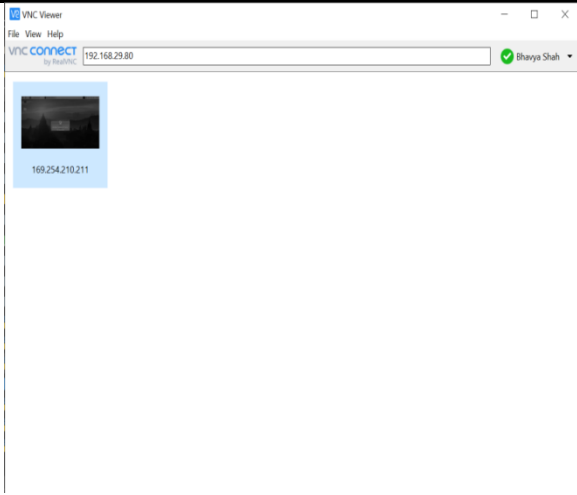
wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.29.80 netmask 255.255.255.0 broadcast 192.168.29.255
    inet6 fe80::117e:963a:c4ad:86ac prefixlen 64 scopeid 0x20<link>
    inet6 2409:201f8:50bf:5559:rolodri:f3db:5c88 prefixlen 64 scopeid 0x0<glo
    ether b8:27:eb:33:f8:08 txqueuelen 1000 (Ethernet)
    RX packets 313 bytes 70738 (69.0 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 386 bytes 42764 (41.7 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

bal>

```

Step 3) Download VNC Viewer

Past IP address from Step 2



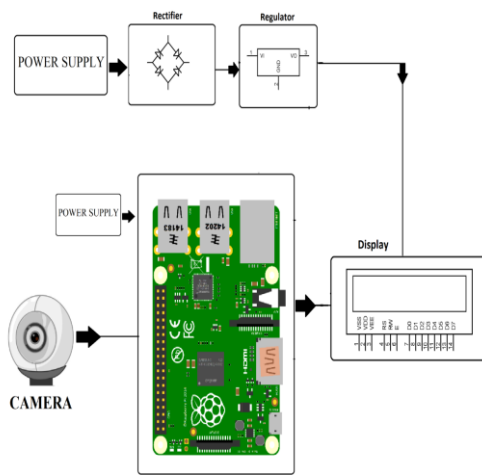


Fig 1: Block diagram

Above figure shows that the block diagram of recognition of vehicle number plate using Raspberry pi .In this system Raspberry pi 3 is the heart of project and we have installed Linux operating system some important library and packages have installed to convert image to text like open CV OCR. Raspberry pi is Soc device. Here we interface camera to Raspberry pi on a port where we interface camera. The camera is performing main role in this system. When vehicle comes in range with ultrasonic sensor automatically the image of number plate get capture and shows detail of the vehicle on screen and send an email to the person for taxes and insurance.

In this project ,DC power supply is used that supplies the constant DC voltage to its load. It provides DC power of 5v. It supports up to 2.5A of current which is plenty through the four USB ports on the board. Following are the hardware which are used for developing the proposed system.

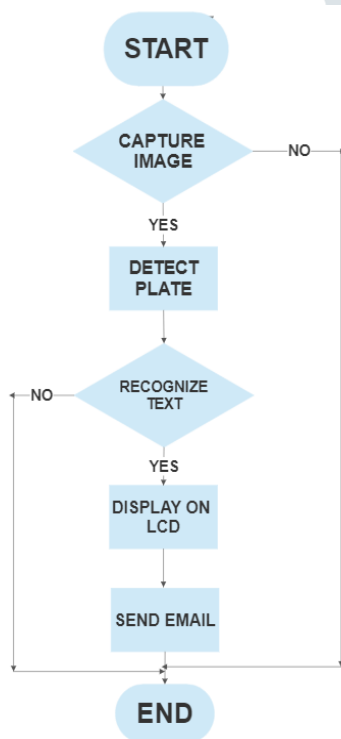


Fig 2: Flowchart

5. COPONENTS AND SOFTWARE

1) **Raspberry Pi 3:** Raspberry pi is an credit card sized single board computer which was firstly developed in UK by raspberry pi foundation. Raspberry pi has total 40 pins in which 27 pins is of GPIO (General purpose input and output) and remaining 13 pins are used for VCC and GND. It is the minicomputer which it has inbuilt operating system, but it requires inbuilt SD card for booting and long term storage. Due to this drawback one can use desktop computer.

2) **Camera:** In this project, raspberry camera is used to capture the image . This camera is able to capture an image of 5Mp.

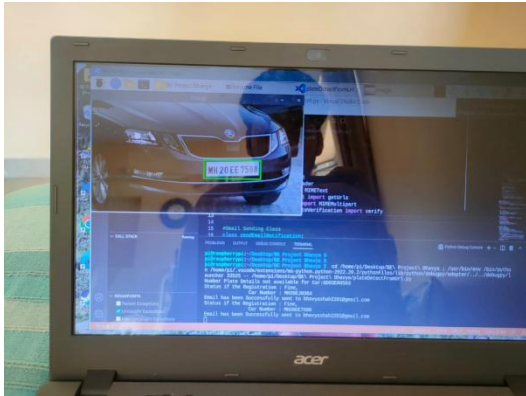
1. Resolution of camera 5 Megapixel

2. It is capable of 2592*1944 pixel static images and also supports 1080P30, 720P60 and 640*480P 60/90 video.

3) **PUTTY Configuration:** PUTTY is a free implementation of SSH (and telnet) for PCs running Microsoft Windows, You will find PUTTY useful if you want to access an account on a Unix or other multi-user system from a PC

4) **VNC Viewer:** VNC Viewer is used for local computers and mobile devices you want to control from. A device such as a computer, tablet, or smart phone with VNC Viewer software installed can access and take control of a computer in another location.

6. OUTPUT:-



7. REASULT:-

The text is transformed into characters and presented on the screen in this project utilizing OCR technology. The system's capabilities set it apart from the competition, especially when the cost of the application needs to be kept within acceptable bounds. This helps with the identification and detection of license plates on moving objects. A Raspberry Pi is used in the arrangement, and a camera is connected to it. The device continuously searches incoming video from cameras for indications of number plates. A number plate in front of the camera triggers an analysis of the camera input and the removal of the number plate section from the image.

8. CONCLUSION:-

This paper is useful for identifying and detecting car license plates. Here, the emphasis is on identifying the positions of the characters, which can be done using OCR technology. There are various methods used to accomplish this. In the future, it will be possible to employ cloud computing, which will be highly beneficial for permanently keeping the data.

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