Recognition of vehicle number plate using Raspberry pi

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Abstract- The aim of the project is to recognize the number plate of vehicle which passes through system and capture image by camera automatically by using raspberry pi. When number plate is recognized at that time gate will be opened and when number plate is not recognized gate will remain closed. In this system, open CV and OCR(optical character recognition)platform are used. To capture vehicle number plate on gate we have to use ultrasonic sensor which will be helpful for the calculating the distance between camera and vehicle.

Keywords: **Raspberry pi, Ultrasonic sensor, Servo motor, Open CV, OCR (optical character recognition), Image processing.**

I.INTRODUCTION

Automation is the most frequently spelled term in the field of electronics. Due to automation, revolution has occurred in the existing technologies. This paper makes use of an onboard computer, which is commonly termed as Raspberry Pi2 processor. It acts as heart of the project. This onboard computer can efficiently communicate with the output and input modules which are being used. The Raspberry pi is a credit-card sized single board computer which was firstly developed in UK by the Raspberry pi foundation. Basically, the operating system for the detection of vehicle number plate using Raspberry pi is the Raspbian JC. For the recognition purpose, Raspberry pi model3 is used. Raspberry pi is a SOC (system on chip) device has inbuilt 1.2 GHz BCM 2837 Arm Cortex processor. The arm cortex processor is 64 bits. Raspberry pi has 1GB Ram. The overall average power is ranging from 1.5 to 6.7 watt. Raspberry pi has 40 digital input output pins in which 27 pins are GPIO (General Purpose Input Output). It has operating system which is installed in external SD card for booting and long term storage. Here in this system raspberry pi is the heart of the project. In many industries unknown vehicles are not allowed. There security is very important for them our system is going help to recognize number unknown vehicle on gate. The same system can be used in such areas where security is the most important. The recognition of vehicle number plate is working in four steps. The first one is image acquisition, second is license plate extraction, third one is license plate segmentation, and last one is character recognition. OCR is the process which converts image into text.

Section two gives information about literature survey, paper objective is explained in section three, Practical design and hardware implementation is introduced in section third, Conclusion is defined in section five.

II.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 remain 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].

The system aims at designing system which captures the image of vehicle number plate and these details were used to Raspberry pi processor for authentication. The system also alerts the authorities when any unauthorized image of number plate is detected using buzzer alarm system. In this case number plate recognition can be indicated even through LED indicators. When any vehicle passes by system, the image of number plate is capture by camera. The image of number plate details are fed as input to the Raspberry pi

processor. The main objective of this paper is to provide researchers an analytical inspection of Automatic License Plate Recognition research by assorting the existing techniques according to the attributes they used. System based on number plate validation to control gate, LCD acknowledgement and Email notification. The paper present the algorithms for localization of yellow color license plate using morphological operation, character segmentation using histogram and intensity projection and optical character recognition using template matching. The traffic monitoring system by registration number identification is nowadays developed as solution for traffic monitoring with the help of technology. In this case the vehicles jumping the signals will be detected by laser and LDR sensor and there images captured by camera. The recognized registration number of vehicle will be stored. Also it provides SMS alerting system to the monitoring person whenever no of vehicle exceeds broking signal.

III.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 buzzer alarm, Number plate recognition indication even through LED indicator.
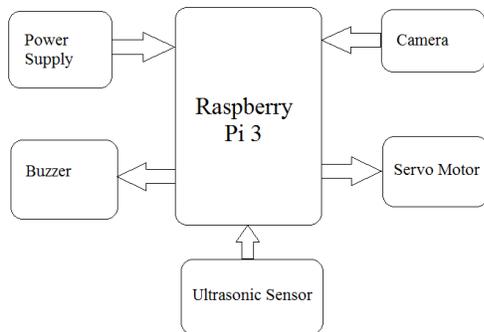

Fig 1: Block Diagram of proposed system

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 openCV 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 converts into text using OCR and open CV. Then compare the text into exiting number plate. If number plate gets match servo motor opens the gate else buzzer blows to in built

operator that vehicle is unknown. Figure 4.2 shows the execution of recognition of vehicle number plate using Raspberry pi
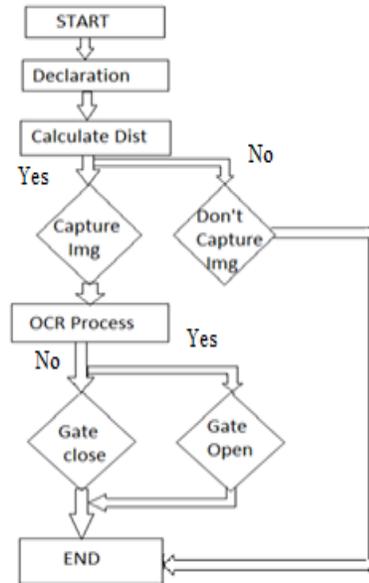

Fig 2: Flowchart of proposed system

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

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.

Specification of BCM2837 (ARM Cortex):

1. SoC – Broadcom BCM2837 64bit ARMv8 quad core Cortex A53 processor @ 1.2GHz with dual core VideoCore IV GPU @ 400 MHz supporting OpenGL ES 2.0, hardware-accelerated OpenVG, and 1080p30 H.264 high-profile decode. Capable of 1Gpixel/s, 1.5Gtexel/s or 24GFLOPs with texture filtering and DMA infrastructure

2. System Memory – 1GB LPDDR2

3. Storage – micro SD slot

4. Video & Audio Output – HDMI 1.4 and 4-pole stereo audio and composite video port

5. Connectivity – 10/100M Ethernet, WiFi 802.11 b/g/n up to 150Mbps and Bluetooth 4.1 LE (BCM43438 module)

6. USB – 4x USB 2.0 host ports (with better power management, allowing higher power peripherals), 1x micro USB port for power

2) Buzzer:

Buzzer is an electrical device that makes a buzzing noise and is used for signalling. It produces noisy sound irrespective of the voltage variation applied to it.

1. Provides 3 to 27 volt.

2. Provides sound in the range 2 to 4KHZ

3) Ultrasonic Sensor:

Ultrasonic sensor is an device that can measures the distance to an object by using sound waves.It measures distance by sending out a sound wave at specific frequency and listening for that sound to bounce back. In this project ultrasonic sensor is used to calculate distance from 2cm to 400cm.Ultrasonic sensor is used to calculate to distance which works on 5v. It has 4 pins that is eco, trigger, ground and VCC. Here eco pin transmit ultrasonic sound waves.

Model- HC-SR04

1. Working voltage 5 volt

2. Static current less than 2mA

3. Sensor angle not more than 15 degrees

4. Detection Distance 2cm to 400cm

4) 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.

5) Servo Motor:

A Servo Motor is a rotary actuator or linear actuator that allows precise control of angular or linear position, velocity and acceleration and trigger receives ultrasonic signal by using formula, here 34300(cm/sec)=Sound speed. Servomotors are controlled by sending a PWM (pulse width modulation) using controls wire. It rotates 0 to 180 degree. It mostly used in Robotic Arm, solar tracking system and Automatic door and gate opener.

1. 3 pole ferrite, all nylon gear.

2. Top ball bearing

3. Operating voltage 4.8 to 6.0 volt

4. Operating speed 0.12sec/60degrees

5. Output torque 1.6Kg/cm

Fig 3: Servo Motor

The distance can be measured by using $34300 = \frac{2\text{Distance}}{\text{Time}}$

Hence it can be stated as $17150 = \frac{\text{Distance}}{\text{Time}}$

IV. REASULT

In this project using OCR technique, the text is converted into character and displayed on the screen. If the number is recognized then only gate will be opened. The following figure shows output window displaying number plate.
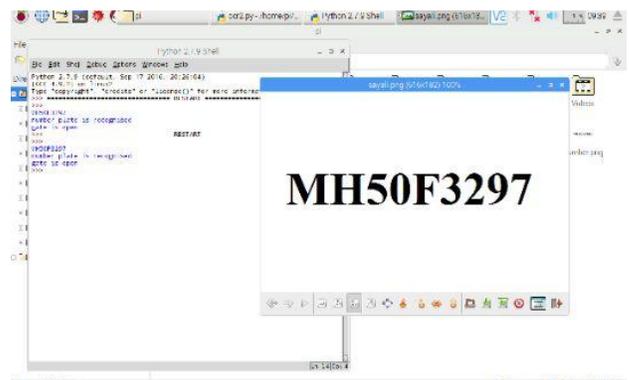
V. CONCLUSION

The performances of the system make it a valid choice among its competitors especially in those situations when the cost of the application has to be maintained at reasonable levels. This paper is helpful for the identification and detection of vehicle number plate. Here the focus is given to detect position of the characters and it can be done by using OCR technique. There are several approaches taken to achieve this. In future, the cloud computing can be used, which will be very helpful for storing the data permanently.

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