



Accurate Vehicle Number Plate Recognition and Real Time Identification Using Raspberry Pi

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ABSTRACT—

An individual car can be recognised by its number plate number, which is a distinctive identify. Vehicle plate recognition software aids in the recording of a vehicle plate number, the extraction of the numbers from the plate, and the verification of the car owner's information. Law enforcement officials have a difficult time locating and fining illegal vehicles on the road as the number of car owners in a nation rises. In this work, we demonstrate a Raspberry Pi-based system for automatic licence plate recognition.

A camera was added to aid in the capture of the photos of licence plate numbers, and it is connected to a Raspberry Pi processor for authentication. The system can fully automate licence plate recognition by extracting numbers from the acquired plate image using Open Computer Vision (Open CV) and Optical Character Recognition (OCR). The system outperformed the majority of the baseline studies taken into consideration, according to experimental data from many tests conducted in various settings and circumstances.

Introduction

Automation is believed to be the most frequent term in most area of electronics and intelligent systems. Due to automation, a revolution has occurred in the existing technologies. Identifying vehicles automatically has become necessary due to its several applications; for example, traffic surveillance, access control, parking fees and toll payments, ticket issuing, theft control, vehicles document verification. The task of identifying vehicle's plate number using automatic recognition techniques can be seen as an important research area of the modern automation system and intelligent transportation system which has been widely studied for several decades [1]. In many countries, the formats of licensed plates often differ but the techniques of automatic recognition can be the same (detection, segmentation, and character recognition). According to [2] edge-based methods seem to be popular and widely accepted. The second task after detection is character segmentation, where the captured characters are segmented according to their height and width values. Projection method is believed to be a highly effective method of character segmentation used for most plate number recognition. Character recognition is the last stage and once the license plate is well segmented in-line with the frame of the license plate into a separate of blocks. Different methods can be used to achieve this, such as; template matching [corner detection algorithm Neural Networks Raspberry Pi etc. In this study, raspberry pi is the heart of the system. In many industries environment, unknown vehicles are not allowed. Security is of high importance hence this study will help to recognize the plate number of vehicles approaching at the gate by allowing security officials to automatically verify the plate number of vehicles entering and exiting seamlessly. Thus, confirming the identity of the owner and the vehicle's particular through the system stored information. The recognition of the vehicle number plate is in four steps. The first is image acquisition, second is license plate extraction, third is license plate segmentation, and last is character recognition

Methodology

The challenges faced by traffic law enforcement agents in Nigeria to bring unlawful vehicles to justice formed part of the reason for this study. We seek to eliminate the challenges using our vehicle recognition system which uses Open CV [24] and OCR in capturing identifying the vehicle plates.

The system makes use of an onboard computer, which is commonly termed as Raspberry Pi. The 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 interfaced with 2MP Pi Camera and a 3.5" Touch Screen for display.

The Vehicle Plate image is captured with the help of the interfaced 2MP Pi Camera and it's being stored in an SD card memory for pre-processing and recognition. After the pre-processing is done by the initiation of the OpenCV, the characters on the plate are recognized using the Optical Character Recognition (OCR) and the corresponding characters found on the plate are displayed.

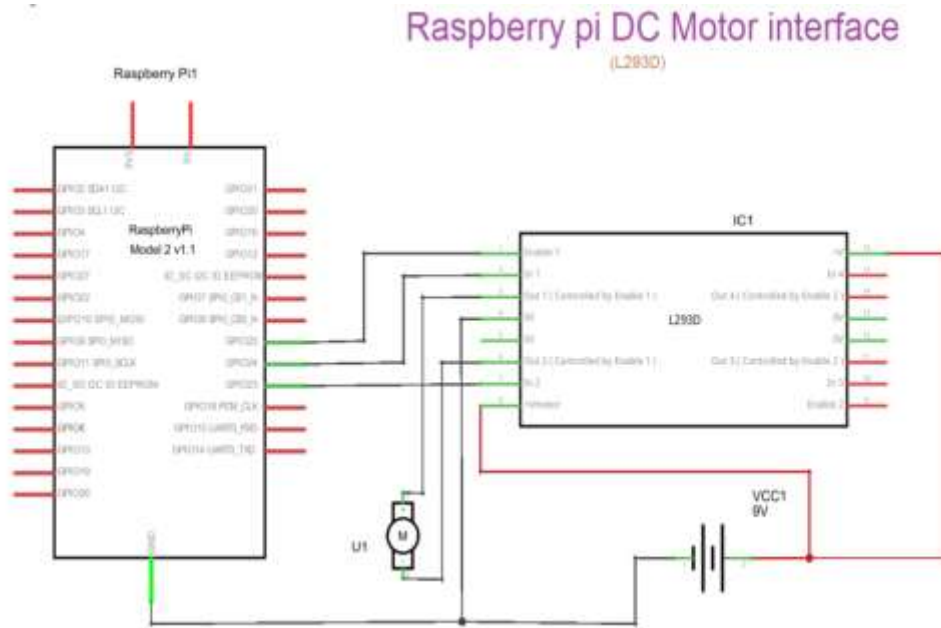


Fig. Circuit Diagram of Raspberry pi DC Motor interface

Connect GPIO 23 to IN2 of IC L293D and connect GPIO 24 pin to IN1 of IC L293D, then connect GPIO 25 pin of Raspberry pi to Enable 1 of motor driver L293D. Output out1 and out2 are connected to the DC motor terminals, separate DC power supply (9V) is connected to the Motor driver IC. Gnd (ground) pin of L293D and Raspberry pi is connected commonly with DC power supply, You can use power supply to motor driver IC from Raspberry pi if you are using 5V or lower than 5V DC motor.

Hardware used for project



Raspberry pi is a credit card sized single board computer which was developed in UK by raspberry pi foundation. Raspberry pi have 40 pins out of which 27 pins is of General-purpose input and output (GPIO) 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.

Camera:



This camera is able to capture an image of 5Mp and Resolution of camera 5 Megapixel. It is capable of 2592*1944-pixel static images and also supports 1080P30, 720P60 and 640*480P 60/90 video. □□□

Buzzer :



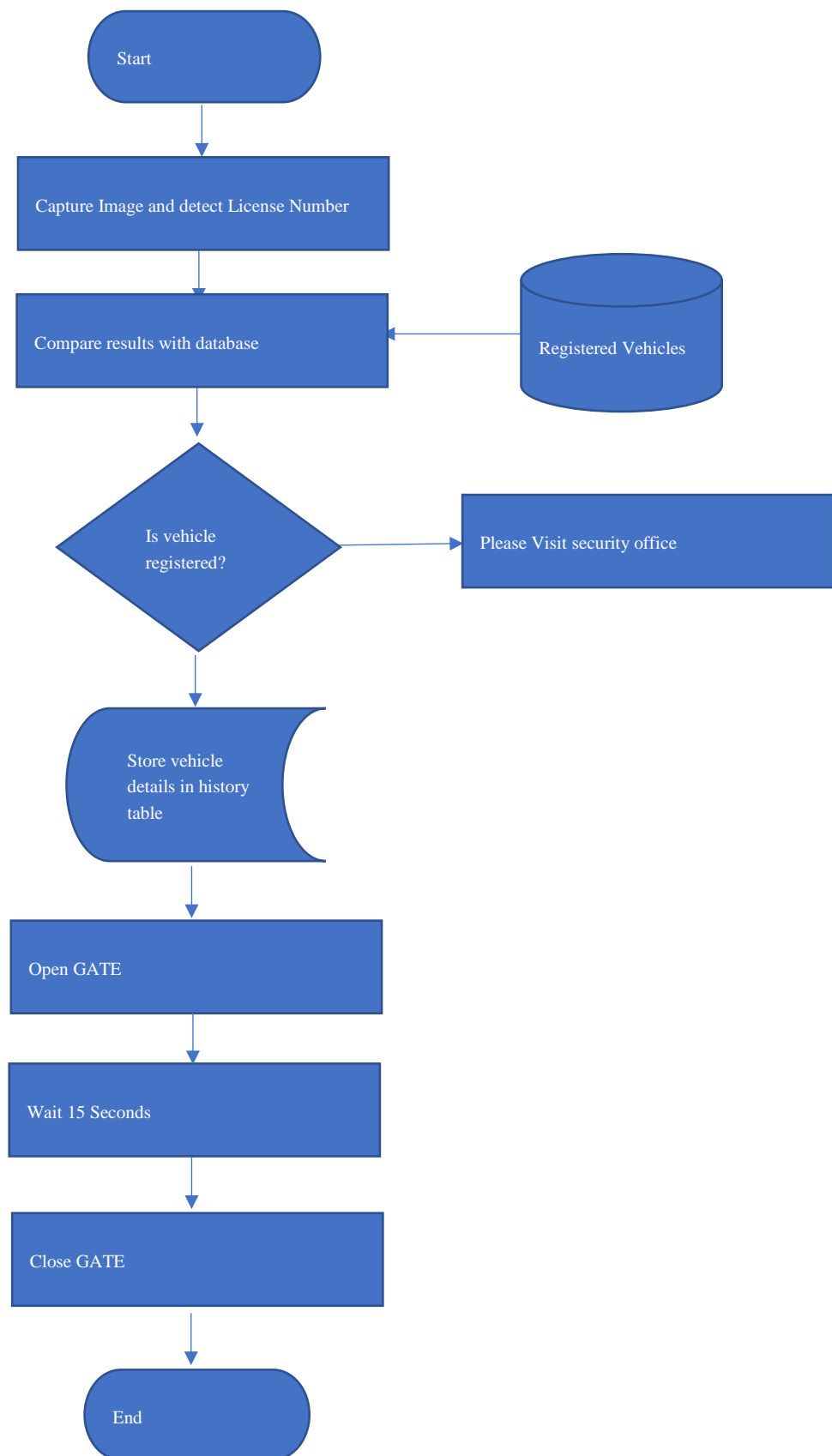
Buzzer is an electrical device that makes a buzzing noise and is used for signaling. It makes noisy sound irrespective of the voltage variation applied to buzzer. It Provides 3 to 27 volt and sound in the range 2 to 4KHZ

Dc Motor :



The main principle in controlling a DC Motor with Raspberry Pi deals with the Motor Driver. A Motor Driver is a circuit or IC that provides the power (or rather the current) to the motor for smooth as well as safe operation. Even a small 5V DC Motor draws a high initial current of around 300 – 400 mA.

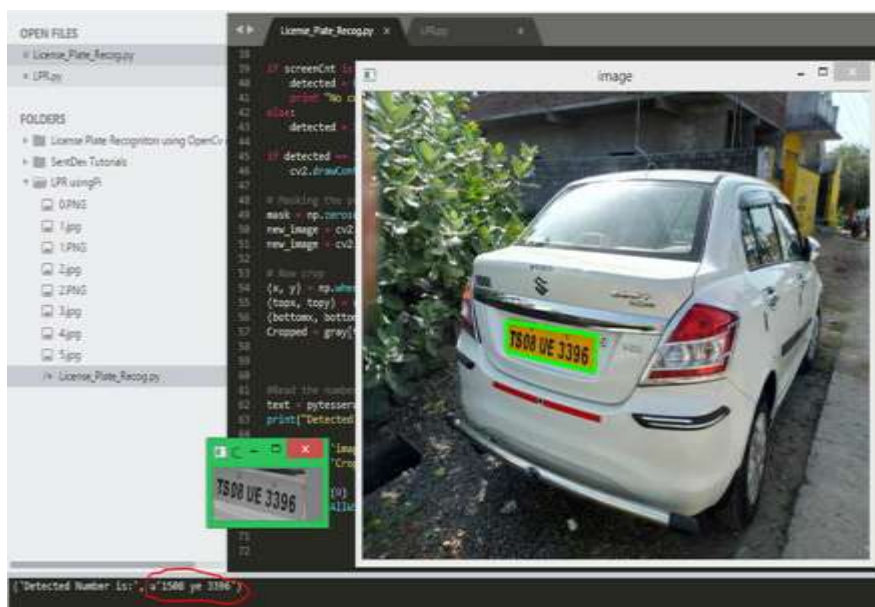
Flow Chart :



4. Result



Fig.7 Overall System Implementation



CONCLUSIONS

This system which is able to capture the image of the number plate of a vehicle and these details of number plate were verified with the predefined details present on cloud using Raspberry Pi processor for authentication. The system alerts the authorities when any unauthorized image of number plate was detected through camera using buzzer. License plate extraction method is designed for real-time license plate extraction. Input to the system is an image which contains the license plate, acquired by a pi camera which is connected to raspberry pi3; and its output is the license plate region. After camera recognizes the number plate the information is sent to cloud through wifi module. System checks and authenticates vehicle number plate. If there is any unauthorized number plate of vehicle is observed then buzzer will blow automatically. Experimental results show the proposed system using Raspberry pi can authenticate the system successfully.

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