

# Raspberry pi based License plate extraction from still images

V.Varalakshmi

M.Tech Student of AVR & SVR College of Engineering and Technology, Ayyalur metta, Nandyal, AP, India.

Guide Name: **Immanuel**

Assistant Professor, ECE dept., AVR & SVR College of Engineering and Technology, Ayyalur metta, Nandyal, AP, India

## Abstract

*In this paper we propose a completely automated license plate recognition system. The project aims at designing a system which automatically captures the image of the number plate of a vehicle and these details were verified using Raspberry Pi processor for authentication. The system also alerts the authorities when any unauthorized image of number plate was detected using buzzer alarm system. When the authorized vehicle was detected then the system operates the gate using DC motor.*

Index terms: ARM-11Raspberry Pi Processor; USB camera; Dc motor; Buzzer alarm

## I. INTRODUCTION:

In past or earlier days more traditional means of license recognition access control were used. Automatic number plate recognition ALPR system is a mass surveillance method that uses optical character recognition on images to read vehicle registration plates. They can also be used at an existing closed-circuit television or road-rule for enforcement cameras, or ones specifically designed for the task. They are used by various Police forces and as a method of electronic toll collection on pay-per-use roads and cataloging the movements of traffic or individuals.

ALPR can be used to store the images captured by the cameras as well as the text from the license plate, with some configurable to store a photograph of the driver. These recognition Systems

commonly use infrared lighting to allow the camera to take the picture at any time of the day. ALPR technology tends to be region-specific, owing to plate variation from place to place. Concerns about these systems have centered on privacy fears of government tracking citizens' movements, misidentification, high error rates, and increased government spending.

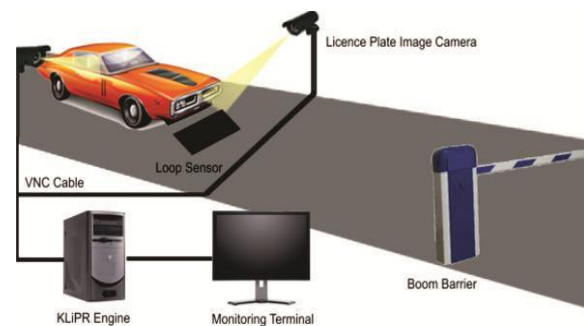


Fig.1 ALPR based system

Main useful for following applications-  
Access Control based management of Vehicles.

Parking Management Solutions.

Highway / Border monitoring system for vehicles.

Vehicle Monitoring through automated real time alerts for Unauthorized / Barred / Stolen vehicles.

Traffic and Parking flow surveys. Vehicle monitoring at toll booths.

## II. RELATED WORK:

Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. This project makes use of an onboard computer, which is commonly termed as **Raspberry Pi** processor. It acts as heart of the project. This onboard computer can efficiently communicate with the output and input modules which are being used.

Aforementioned identification or recognition process using raspberry pi processor will change slightly between different products and systems. These Standard systems are comprised of a USB camera for the automated information resource of the License plate adds a new vital dimension to decision-making for Access control at toll gates and traffic junctions. License plate recognition system can be easily integrated with any physical access control device like boom barriers and sliding gates for seamless access. To perform this task, **Raspberry Pi** processor is programmed using embedded „Linux“.

**Linux** is a Unix-like computer operating system assembled under the model of free and open source software development and distribution.

The defining component of Linux is the Linux kernel, an operating system. The **Linux Standard Base (LSB)** is a joint project by several Linux distributions and is based on the POSIX specification, the SingleUNIX

Specification, and several other open standards, but extends them in certain areas.

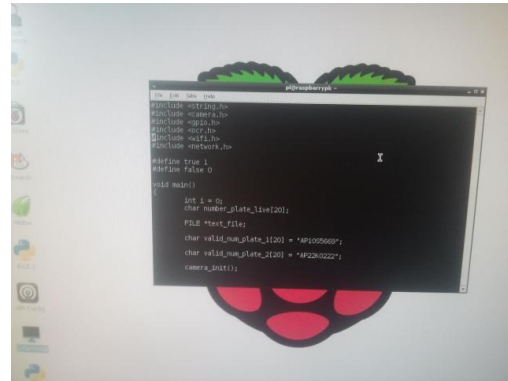


Fig.3 Embedded Linux programming screen shot

## III. PROPOSED METHODOLOGY:

In this paper we are presented automatic license plate recognition ALPR and toll gate operation system using ARM1176JZF-S 700 MHz processor. We make use of this device to construct voting machine. The device which is able to perform the task is a **Raspberry Pi** processor. When any vehicle passes by the system, the image of the number plate of every vehicle is captured using camera. The image of the number plate details are fed as input to the **Raspberry Pi** processor. The Processor takes responsibility to check the authentication details of every vehicle. Once the vehicle details are recognized then the processor operates the gate using DC motor. The system also alerts the user through buzzer alarm whenever it detects an unauthorized image of number plate was detected.

The present system uses an onboard mini computer named as ARM1176JZF-S 700 MHz processor which consists of number of input and output ports, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. The input and output port of the micro processor are interfaced with different input and output modules depending on the requirements. The current system uses USB camera as input module interfaced with the arm-11 processor, and the DC motor operation for toll gate open or close and buzzer alarming unit as

output modules. In other words BCM2835 system on a chip acts as a communication medium for all the modules involved in the project.

using Raspberry Pi processor

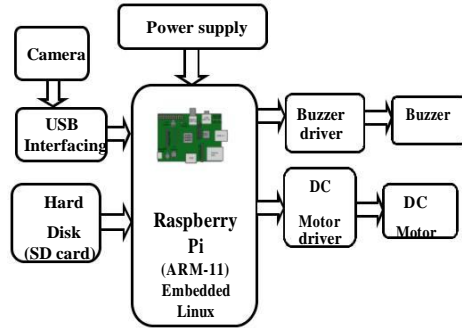


Fig 2. Block diagram of License plate recognition system

### a. Raspberry Pi processor:

In the Proposed ALPR system we used the **Raspberry Pi** is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long-term storage.

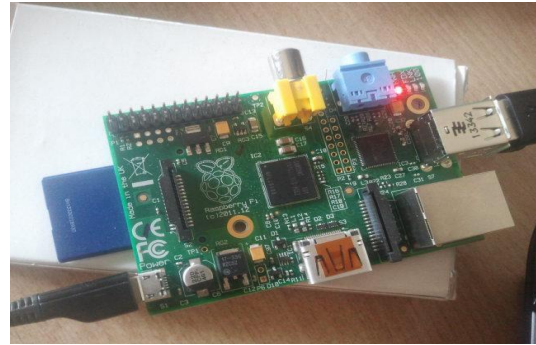


Fig.2 Raspberry pi processor

### b. USB camera

A **webcam** or USB camera is a video camera that feeds its image in real time to a computer or computer network. Unlike an IP camera which uses a direct connection using ethernet or Wi-Fi, a USB camera is generally connected by a USB cable, FireWire cable, or similar cable. The common use as a video camera for the World Wide Web gave the webcam its name. Other popular uses include security surveillance, computer vision, video broadcasting, and for recording social videos.

Webcams are known for their low manufacturing cost and flexibility, making them the lowest cost form of video telephony. They have also become a source of security and privacy issues, as some built-in webcams can be remotely activated via spyware.

and beepers which include alarm devices, timers and also based on confirmation of user inputs such as a mouse click or keystroke.



Fig4. USB camera

#### c. DC motor:

This motor is used to produce the electrical energy to mechanical energy, and very typically through the interaction of magnetic field and current carrying conductors. The reverse process can produce electrical energy to mechanical energy accomplished by an alternator. Basically the DC motors have two features one is rotating part that is called armature and the stationary part that includes coils of wire called the field coils.



Fig.5. DC motor

#### d. Buzzer

The paper related to finger based voting system uses a buzzer module for audible alerts when any wrong finger print was detected. The buzzer or beeper is an audio based signaling device. It is mainly designed as mechanical, electromechanical, or piezoelectric. There are many typical uses of buzzers



Fig.6. Buzzer

#### IV CONCLUSION:

The existing ALPR recognition system of license plate is an Integrating feature of all the hardware components been used and developed in it with Arm-11 Raspberry pi processor. The Presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working unit for an automatic license plate recognition system has been designed perfectly. Secondly, using highly advanced IC's like ARM1176JZF-S 700 MHz processor, Linux operating system technology with the help of growing technology, the project has been successfully implemented with a unique idea. Thus the project has been successfully designed and tested.

The project "Automatic license plate recognition ALPR" was designed such that the system captures the image of the number plate of a vehicle and these details of number plate were verified with the predefined details using Raspberry Pi processor for authentication. The system also alerts the authorities when any unauthorized image of number plate was detected through camera using buzzer alarm system.

This project can be extended using a GSM module and 3G technology. GSM intimates the authorities and the owner of the vehicle if the license plate recognized was unauthorized and 3G technology is used to have a photograph of the person who with unrecognized number plate based vehicle which helps a lot in security issues. The project can be extended using high efficiency GPS receiver which can give the location of the number plate recognition details in case of emergencies. The vehicle location and also tracking can be done using this project idea.

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