Real-Time Number Plate Recognition Using Raspberry PI

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Abstract - **The project presents a real-time license plate recognition system using connected component analysis and a template matching model for accurate identification. Automatic license plate recognition (ALPR) is the extraction of vehicle license plate information from an image. The objective of this project was to recognize the number plate of the vehicle which passes through the system and capture its image by a camera automatically using raspberry Pi4. When the number plate is recognized, the light turns green. When the number plate is not recognized, the light turns red. Open CV and OCR (optical character recognition) platforms are used in this system. Automation is one of the most frequently used terms in electronics, because of which revolution has occurred in the existing technologies. This paper uses a microcontroller, which is commonly termed a Raspberry Pi4 processor. It acts as the heart of the project. This microcontroller can efficiently communicate with the input and output modules used. It was firstly developed in the UK by the Raspberry Pi foundation and is the size of a credit card. Security is essential nowadays, and our system will help recognize the number plate of vehicles when they arrive at the gate. The same system can be used in areas where security is of utmost importance. The recognition of the vehicle number plate works in four steps. The first one is image acquisition, the second is license plate extraction, the third one is license plate segmentation, and the last one is character recognition. Furthermore, OCR is the process that converts an image into text.**

keywords - **Number Plate Recognition**

I. INTRODUCTION

Automation is the most frequently spelt term in the field of electronics. Due to automation, a revolution has occurred in the existing technologies. This paper makes use of an onboard computer, which is commonly termed as Raspberry Pi4 processor. It acts as the heart of the project. This onboard computer can efficiently communicate with the output and input modules which are being used.

Vehicles in each country have a unique license number, which is written on their license plate. This number distinguishes one vehicle from the other, which is useful especially when both are of the same make and model. An automated system can be implemented to identify the license plate of a vehicle and extract the characters from the region containing a license plate. The license plate number can be used to retrieve more information about the vehicle and its owner, which can be used for further processing. Such an automated system should be small in size, portable and be able to process data at a sufficient rate.

In India, vehicle number plates do not follow a standard language, font or size. Due to the variations in the representation of number plates, vehicle number plate extraction, segmentation and recognition are crucial. This demonstration considers vehicle number plates which can contain English characters and numbers only. The system works satisfactorily for a wide variety of circumstances and different types of vehicle plates. The system is implemented and executed in Python OpenCV and performance is tested on genuine images.

II. LIMITATION OF EXISTING METHOD

The car plates appear in different types of character styles, either single or double row, different sizes, spacing and character counts. Due to such kind of variations even localizing or detecting these plates becomes a tedious process. In the existing system, foreground estimation is done by Gaussian mixture model then proposing a real time and robust method of license plate extraction based on block variance technique. License plate extraction is an important stage in license plate recognition for automated transport system. The Extracted license plates are segmented into individual characters by using a region-based approach. The recognition scheme combines adaptive iterative thresholding with a template matching algorithm.

2.1 EXISTING SYSTEM DISADVANTAGES

- The existing method cannot work properly on degraded images with a complex background.
- Low accuracy.
- Noise content was high.
- They do not take into consideration of the noise or the image normalization in the input image.
- These methods do not show high contrast image for the output image.
- Manual assessment is subjective, time consuming and expensive.

In these methods, selection of features and classification strategy is difficult and challenging.

• Poor and Inaccurate segmentation result.

2.2 PROBLEM STATEMENT

First, it is necessary to locate and extract the license plate region from a larger scene image. Second, having a license plate region to work with, the alphanumeric characters in the plate need to be extracted from the background. Third, deliver them to an OCR system for recognition. In order to identify a vehicle by reading its license plate successfully, it is obviously necessary to locate the plate in the scene image provided by some acquisition system (e.g. video or still camera). Locating the region of interest helps in dramatically reducing both the computational expense and algorithm complexity. For example, a currently common 1024x768 resolution image contains a total of 786,432 pixels, while the region of interest (in this case a license plate) may account for only 10% of the image area. Also, the input to the following segmentation and recognition stages should be simplified, resulting in easier algorithm design and shorter computation times.

III. PROPOSED SYSTEM:

This project is on the development of new approaches for extraction of license plates. The proposed algorithm is based on video acquisition, extraction of plate region, segmentation of plate characters and recognition of characters. Extraction of plate is a difficult task. In this project, a simple license plate extraction method is presented. The method is basically based on the Edge Detection algorithm including four major stages, which are RGB to gray-scale conversion, Gaussian Blurring, morphological operations and extracting the accurate location of the license plate. Mean squared error method is used for recognition of characters.

3.1 PROPOSED METHODOLOGIES

• Video acquisition
• Gaussian Blur
• RGB to gray scale conversion
• Sobel edge detection
• Morphological operations
• Localization
• Character segmentation
• Character recognition

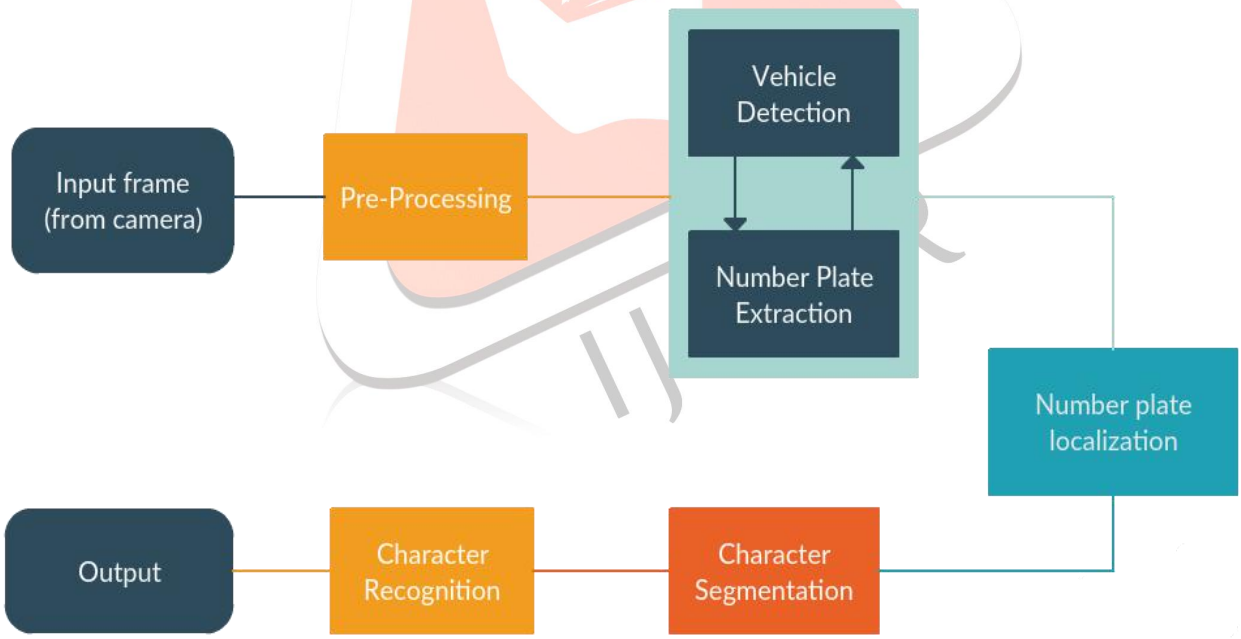
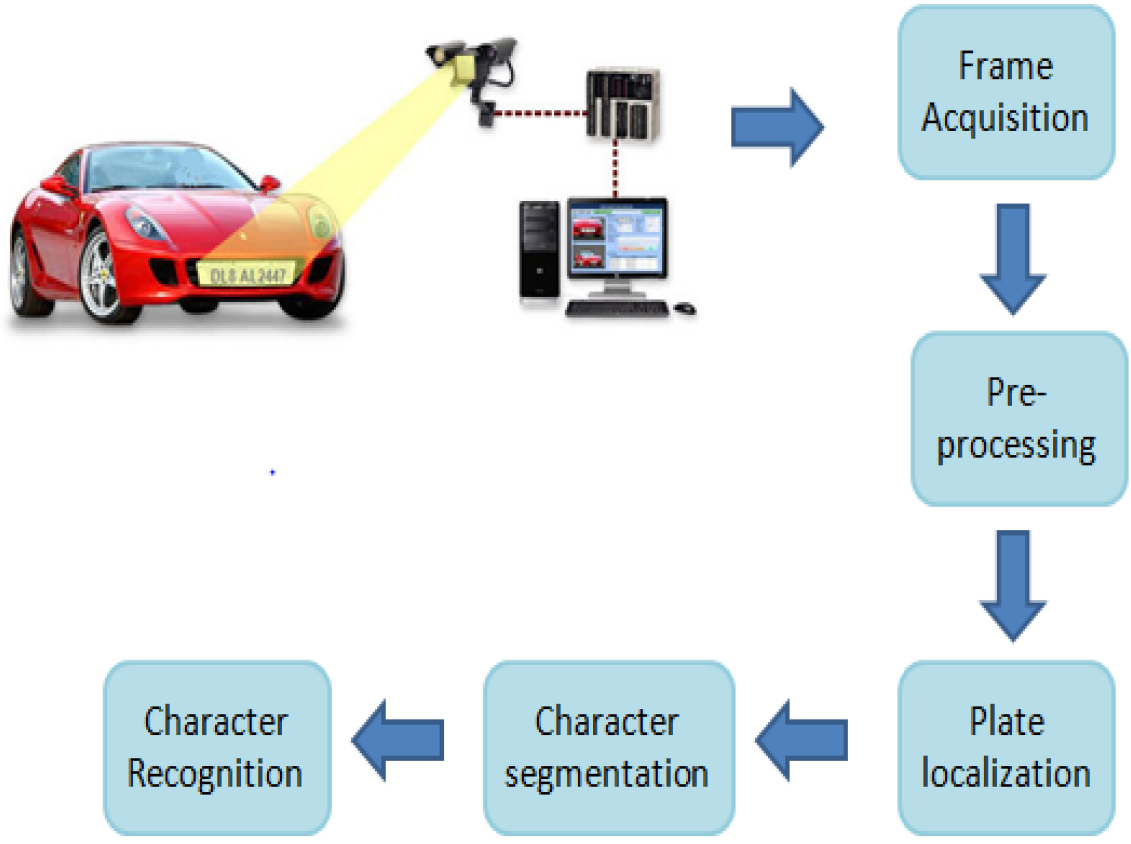


FIGURE 1

3.2 ADVANTAGES OF PROPOSED SYSTEM

• Our proposed method shows better performance compared to existing.
• It is simple, robust, and involves minimum parameter tuning.
• Accurate segmentation result of license plate characters.
• The noise content is removed.



3.3 OBJECTIVES

The main objective in this research project is to experiment deeply and find alternative solutions to the image segmentation and character recognition problems within the License Plate Recognition framework.

To develop a system in python which can perform detection as well as recognition of car number plate.

- Find a method with acceptable results for the correct location of the area of the license plate.
- Build a system that determines the characters of the license plate that is localized from a video frame.
- Recognize each character we have extracted above by mean squared error method.

IV. SYSTEM TESTING

System Testing (ST) is a black box testing technique performed to evaluate the complete system the system's compliance against specified requirements. In System testing, the functionalities of the system are tested from an end-to-end perspective.

System Testing is usually carried out by a team that is independent of the development team in order to measure the quality of the system unbiased. It includes both functional and Non-Functional testing.

Test Case description	Input	Expected output	Output	Status
Video is given as input for recognizing characters of license plate		53NPRR	Python 2.7.12 Shell File Edit Shell Debug Options Window Python 2.7.12 (v2.7.12:d33 Type "copyright", "credits >>> ========== RESTAR License plate number is : 53NPRR >>>	Pass
Video is given as input for recognizing characters of license plate		63LDLG	Python 2.7.12 Shell File Edit Shell Debug Options Windo Python 2.7.12 (v2.7.12:d3 Type "copyright", "credit >>> ========== RESTA License plate number is : 63LDLG >>>	Pass
Video is given as input for recognizing characters of license plate		JGH5337	Python 2.7.12 Shell File Edit Shell Debug Options Win Python 2.7.12 (v2.7.12: Type "copyright", "credi >>> ========== RES License plate number is JGH5337 >>>	Pass
Video is given as input for recognizing characters of license plate		JGG2373	Python 2.7.12 Shell File Edit Shell Debug Options Winc Python 2.7.12 (v2.7.12: Type "copyright", "credi >>> ========== REST License plate number is GG2373 >>>	Fail

V. OUTPUTS:

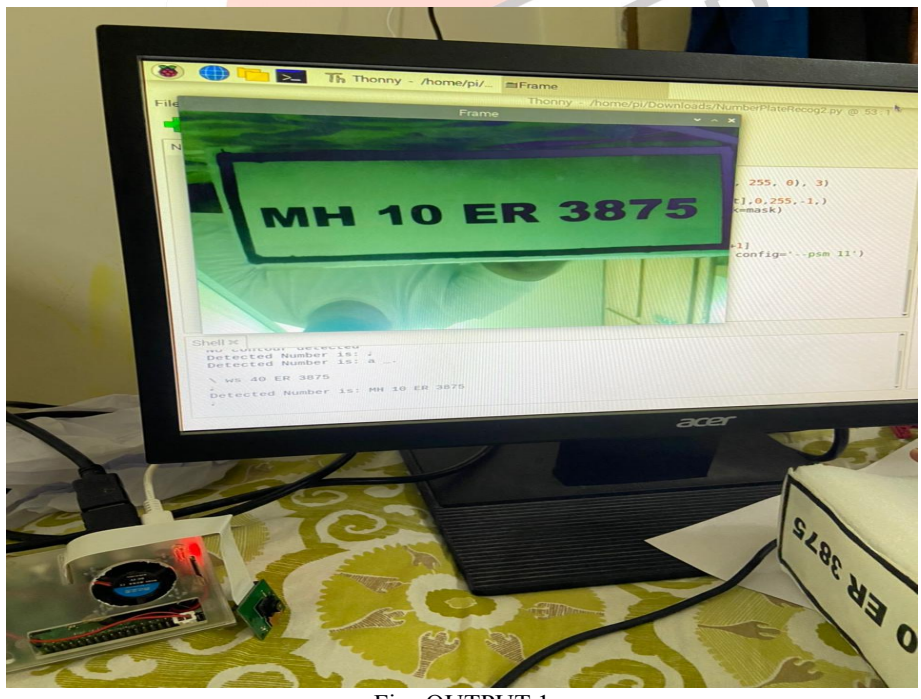


Fig:-OUTPUT 1

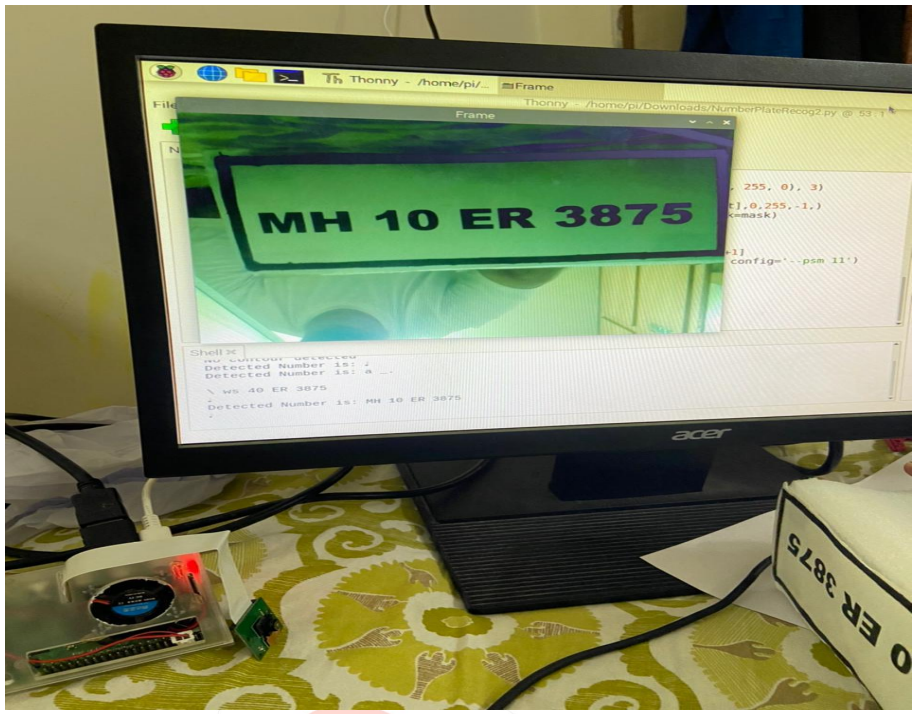


Fig:-OUTPUT 2

VI. REFFRENSES:

[1] Hong Yamin. The two generation License Plate Segmentation and Recognition photo identification [J]. Journal of Lanzhou industry college, 2013,06:18-22.

[2] Zhao Xingwang, Li Tianyang, Wang Liang, Zhou Jing. The two generation License Plate Segmentation and Recognition number recognition system of [J]. computer and modernization based on digital equipment, 2014,06:132-136.

[3] Fu Ronghui. The research and design of vehicle license plate recognition system in traffic management system [J]. International Journal of Signal Processing, Image Processing and Pattern Recognition, v 9, n 3, p 445-456, 2016.

[4] YingyonZou, JianZhai, Yongde Zhang, Xinyan Cao, Guangbin Yu, Juhui, Chen. Research on algorithm for automatic license plate recognition system[J]. International Journal of Multimedia and Ubiquitous Engineering, v 10, n 1, p 101-108, 2015.

[5] Tao Hong, Gopalakrishnam A.K. License plate extraction and recognition of a Thai vehicle based on MSER and BPNN[J]. Proceedings of the 2015 7th International Conference on Knowledge

[6] Dong Jingwei,Sun, Meiting,LiangGengrui,JinKui. The improved neural network algorithm of license plate recognition[J]. International Journal of Signal Processing, Image Processing and Pattern Recognition, v 8, n 5, p 49-54, 2015.

[7] QuZhong, Chang Qing-li, Chen Chang-zhi, Lin Li-dan. An improved character recognition algorithm for license plate based on BP neural network[J].Open Electrical and Electronic Engineering Journal, v 8, n 1, p 202-207, 2014.