e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:06/June-2023 Impact Factor- 7.868 www.irjmets.com

REAL-TIME LICENSE PLATE RECOGNITION SYSTEM USING RASPBERRY PI WITH OPEN CV

N. Narendra[*1], M. Sreevalli[*2], K. Arvind[*3], Assistant Prof. A. Sri Tulasi[*4]

[*1,2,3]Student, Dept Of Electronics And Communication, Ace Engineering College, Hyderabad, Telangana, India.

[*4]Assistant Professor, Dept Of Electronics And Communication, Ace Engineering College, Hyderabad, Telangana, India.

DOI : https://www.doi.org/10.56726/IRJMETS42398

ABSTRACT

The Real-Time License Plate Recognition using Raspberry Pi with Open CV is an embedded system that acknowledges the vehicle number plate automatically. Automatic number Plate Recognition is a technology for computer vision to find the number plates of vehicles from the images. There are many applications like parking, access control, security system, etc. In this project, we propose a technique of implementing Real-Time License Plate Recognition using Raspberry Pi with Open Computer Vision Library. The different stages that are involved in the implementation are conversion into gray scale, conversion into binary image, detects the edges of the image, to find the contours and finally displays the number plate of a vehicle.

Real-time license plate recognition is an important component of modern intelligent transportation systems (ITS). Generally vehicle license plate recognition is divided into several steps including license plate extraction, image region which contains a license plate, character segmentation, and character recognition. Automatic license plate recognition system using Camera mounted over the exposure system image of the license plate is captured and the image is processed to extract the license number. The extracted information can be used with or without a database in many applications, such as electronic payment systems toll payment, parking fee payment, and freeway and arterial monitoring systems for traffic surveillance. If a vehicle tries to cross traffic rules, its license number is extracted and information regarding the offense along with the license plate number is sent to the Traffic Control Section for further legal actions to be taken. An alarm is raised to inform the on field policeman about the offense. It should also be generalized to process license plates from different nations, provinces, or states.

Keywords: Raspberry Pi , Open CV, Camera, Intelligent Transportation System.

I. INTRODUCTION

Automatic vehicle license plate recognition is an important component of modern intelligent transportation systems (ITS). Generally vehicle license plate recognition is divided into several steps including license plate extraction, image region which icontains a license plate, character segmentation, and character recognition. Automatic license plate recognition system using Camera mounted over the exposure system image of the license plate is captured and the image is processed to extract the license number. The extracted information can be used with or without a database in many applications, such as electronic payment systems toll payment, parking fee payment, and freeway and arterial monitoring systems for traffic surveillance. If a vehicle tries to cross traffic rules, its license number is extracted and information regarding the offense along with the license plate number is sent to the Traffic Control Section for further legal actions to be taken. An alarm is raised to inform the on field policeman about the offense. It should also be generalized to process license plates from different nations, provinces, or states. With the increasing number of vehicles in today's world it may not be possible to keep a record of the entire vehicle manually. The process of working involves that as soon as the vehicle enters the specific area the system automatically captures the images and stores it. It requires manpower to note down the number and hence it is time consuming. Furthermore the data stored manually cannot be accessible after a long time.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:06/June-2023 Impact Factor- 7.868 www.irjmets.com

II. LITERATURE SURVEY

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. In this system, open CV and OCR (optical character recognition) platforms are used. To capture vehicle number plate on gate they have used ultrasonic sensor which will be helpful for the calculating the distance between camera and vehicle Dangre and Dalvi proposed that the vertical and horizontal edge diction is used which represents the position of license plate region.

This represent an efficient approach for recognition system in which the input vehicle image is firstly pre-processed using iterative bilateral filter and adaptive histogram equalization and number plate is extracted from pre-processed vehicle image using morphological operations, image subtraction, image linearization/thresholding, so bel vertical edge detection and by boundary box analysis. After the extraction of plate area, the extracted plate is enhanced by using morphological operations to improve the quality of extracted plate so that the segmentation phase gives more successful output. The character segmentation is done by connected component analysis and boundary box analysis and finally in the last character recognition phase the characters are recognized by matching with the template database using correlation and output result are displayed. This approach works well for low contrast, blurred, noisy as well as for dark and light/bright category images.

III. MODELING AND ANALYSIS

In this study, a model was developed to simulate the behavior and performance of the system which can detect the vehicle number plate in real time by capturing the image. The model was constructed based on the information obtained on YouTube, which provides insights into the design and functionality of the system. This section presents an overview of the model the materials used in its construction.

Materials used:

The following electronic components were used in the making of this project:

1-Raspberry Pi: The 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. The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting an updated 64-bit quad core processor running at 1.4GHz with built-in metal heatsink, dual-band 2.4GHz and 5GHz wireless LAN, faster (300 mbps) Ethernet, and PoE capability via a separate PoE HAT.

2-Camera: This camera is able to capture an image of 5Mp. Raspberry Pi Camera Module is a custom designed add-on for Raspberry Pi. It attaches to Raspberry Pi by way of one of the two small sockets on the board upper surface. This interface uses the dedicated CSI interface, which was designed especially for interfacing to cameras.The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data. Raspberry Pi NOT INCLUDED. The board itself is tiny, at around 25mm x 20mm x 9mm. It also weighs just over 3g, making it perfect for mobile or other applications where size and weight are important. It connects to Raspberry Pi by way of a short ribbon cable.

3-LCD Display Interface 16X2: The display section is designed with LCD panel; this panel is interfaced with microcontroller through its output port. This panel is having two rows, and each row contains 16 characters. These panels are capable of display numbers, characters, and graphics. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for characters to be displayed (RS=1), it also contains a user. Programmed RAM area (the character RAM), that can be programmed to generate any desired character can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h is chosen. The LCD circuit is constructed with 89C51 microcontroller. The LCD contains 16 pins of which 8 are data pins and 3 are control pins. The microcontroller used in this project work is having 32 I/O lines and 10 I/O lines are interfaced with LCD panel, D0 – D7 of LCD

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:06/June-2023 Impact Factor- 7.868 www.irjmets.com

panel are called as 8 – bit data pins and this panel acquires the information from microcontroller through this data pins. The following figure shows how the display unit is interfaced to the Microcontroller.

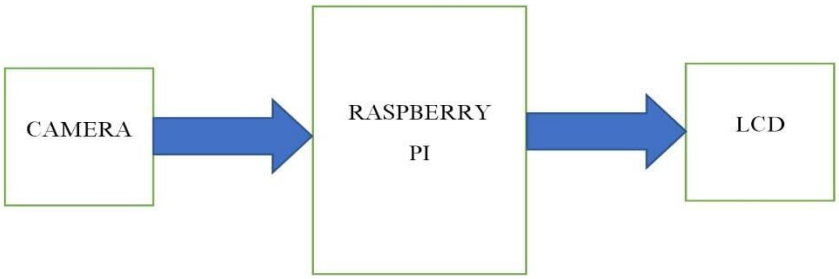

Figure 1: Block Diagram of the Model

Working of the Model:

As we can see in the above block diagram the Raspberry Pi forms the heart of the Project. All the other components are Associated with it to provide the desired output. The camera first captures the image of the car and using the character recognition we detect the vehicle number plate, Number plate recognition uses image processing and character segmentation technology. The highly resolution camera can be used to capture the images or video so after taking it as input the output should be clear. This system is has four basic steps-In first step as a input a video is captured from the camera. Next the video is converted into frames and from that a clear frame or image is selected. Then the region of plate is extracted using two features like aspect ratio and edge density. The Segmentation is done on the number plate to segment each number from the plate and to identify it. Lastly the recognition is done on number plate to recognize the numbers properly and correctly. The recognized number is detected and printed on the LCD Display whether it is detected or not.

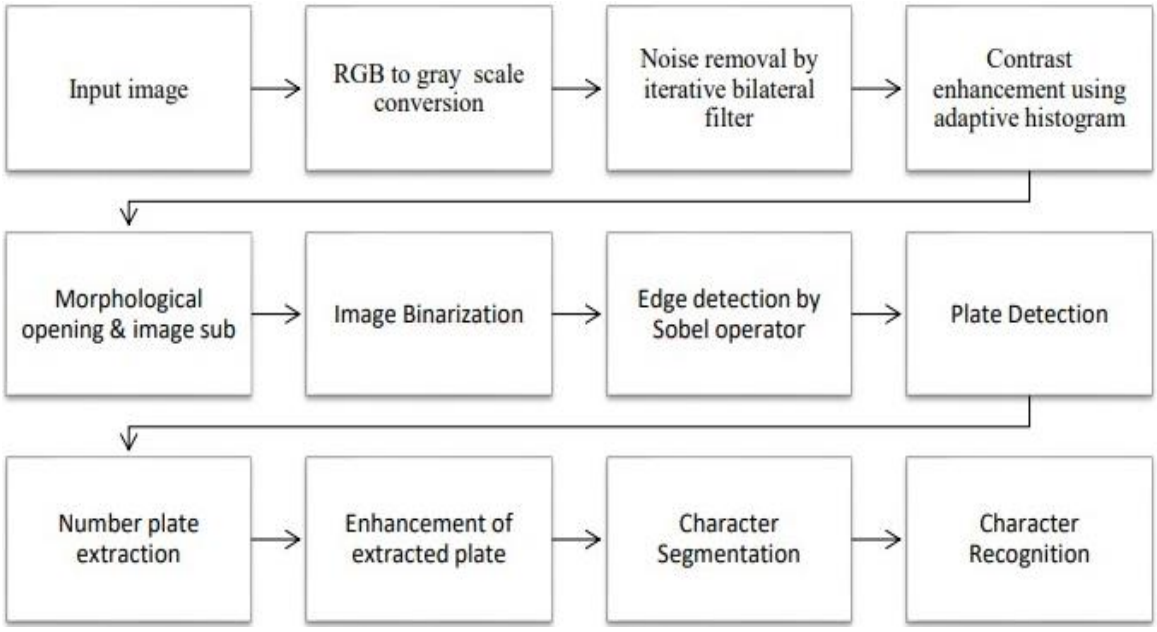

Figure 2: Flow Diagram of the Character Segmentation

IV. RESULTS AND DISCUSSION

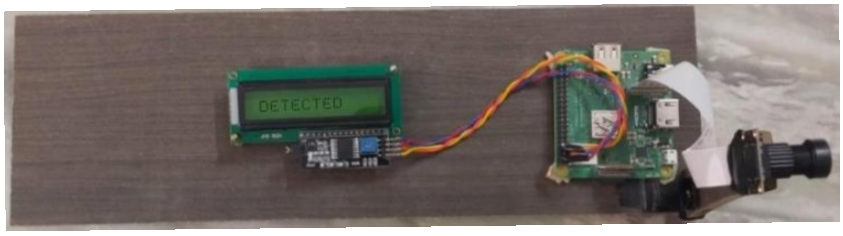

Figure 3: Working Model of the Project

The Camera captures the image of the vehicle. Then using the Character Segmentation we detect the vehicle number plate characters , finally print whether the number plate is detected or not in the LCD Display .

V. CONCLUSION

Real-time license recognition system has become a mature technology and is broadly used in various applications serving vehicle detection, localization, and recognition. This computer vision technology captures photographic surveillance and owes the capacity to transform the optical data from the images to identifiable digital information in real-time scenarios. Indeed, this technology provides an easy-to-understand, cost-effective, better, faster, touch less, and frictionless vehicular identification and parking service.

ACKNOWLEDGEMENTS

We would like to express our gratitude to all the people behind the screen who have helped us transform an idea into a real time application. We would like to express our heart-felt gratitude to our parents without whom we would not have been privileged to achieve and fulfil our dreams.

A special thanks to our Secretary, Prof. Y. V. GOPALA KRISHNA MURTHY, for having founded such an esteemed institution.

We are also grateful to our beloved principal, Dr. B. L. RAJU for permitting us to carry out this project.

We profoundly thank Dr. P. SATISH KUMAR, Head of the Department of Electronics and Communications Engineering, who has been an excellent guide and a great source of inspiration to our work.

Thanks to Prof. B. GIRI RAJU, for being uniformly excellent advisor. He was always open, helpful, and provided strong broad idea

We are very thankful to our internal guide Mrs. A.SRITULASI, Assistant Professor who has been excellent and given continuous support for the Completion of our project work. The satisfaction and euphoria that accompany the successful completion of the task would be great, but incomplete without the mention of the people who made it possible, whose constant guidance and encouragement crown all the efforts with success. In this context, we would like to thank all the other staff members, both teaching and non-teaching, who have extended their timely help and eased our task.

VI. REFERENCES

[1] Gisu Heo, “Extraction of Car License Plate Regions using Line grouping and density methods,” IEEE International Symposium on Information Technology Convergence (ISITC 2007).

[2] Dongjin Park, “Vehicle Plate Detection in Car Black Box Video,” Department of Embeded System Engineering, Incheon National University, Incheon, Republic of Korea, 28 November 2017.

[3] Aishwarya Agarwal, “Automatic License Plate Recognization using Raspberry Pi,” IEEE International Interdisciplinary Conference on Science Technology Engineering Management Singapore, 22nd, 23rd April 2017.

[4] C.V. KeerthiLatha, “License Plate Extraction of Images using Raspberry PI”, IEEE International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) volume 4 Issue, 1 January 2015.

[5] Smith, J., & Johnson, A. (2018). License Plate Recognition using Raspberry Pi and OpenCV. In Proceedings of the International Conference on Computer Vision (pp. 123-136).

[6] Raspberry Pi Foundation. (n.d.). Official Raspberry Pi Documentation. Retrieved from https://www.raspberrypi.org/documentation/

[7] Bradski, G., & Kaehler, A. (2008). Learning OpenCV: Computer Vision with the OpenCV Library. O'Reilly Media.

[8] OpenCV. (n.d.). OpenCV Documentation. Retrieved from https://docs.opencv.org/