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Number Plate Detection and Parking Allotment

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Abstract: ***In present day scenario the security and authentication is very much needed to make a safety world. Beside all security one vital issue is recognition of number plate from the car for Authorization. In the busy world everything cannot be monitor by a human, so automatic license plate recognition is one of the best application for authorization without involvement of human power. In the proposed method we have make the problem into three fold, firstly extraction of number plate region, secondly segmentation of character and finally Authorization through recognition and classification. For number plate extraction and segmentation, we have used morphological based approaches whereas for classification we have used Neural Network as classifier. The proposed method is working well in varieties of scenario and the performance level is quite good.***
Keywords: ANPR; Character Segmentation; Neural Network, etc.

I. INTRODUCTION

With the increase in the number of automobiles, it has become increasingly challenging to track them and almost impossible to identify the owners of these vehicles in case of violation of any traffic law. This has led to increase in traffic congestion, and with it comes traffic problems. Several cases of kidnapping, hit and run, robbery, smuggling, and on-road fatalities are continuously reported, and this is because these vehicles cannot be easily recognized especially moving at high speed. This has led to the need to develop a system that can tackle these issues. Vehicle plate number recognition system was invented by the British in 1976 at the police scientific development branch in the UK. Prototype systems were already in full flow by 1979, and initial contracts were awarded for mass productions and industrial use. The earliest systems were deployed on the A1 road and at the Dartford Tunnel. However, it gained more recognition in the last decade due to the advancement of the digital camera and the increase in computational speed. The first written down case of VNPR being used to solve a crime case occurred in November 2005, in Bradford, UK. In the early 1990s, significant advancement in technology led to the redesign of vehicle plate number recognition system from limited, highly expensive, fixed base applications to simple easy to install mobile ones.

Vehicle plate number recognition system has broad applications and is not limited to traffic control. It can be used in parking; it recognizes a vehicle when it enters a gate and stores the information on a database and when the vehicle is leaving it matches it up with what has already been stored. It is also used in access control to grant access to only vehicles of authorized personnel.

Although vehicle plate number recognition system has been regularly addressed on paper, it has not been completely actualized in real-life scenarios due to certain constraints. We live in a digital age with new technologies springing forth every day, and as a result, only minimal human effort is required to get things done and life is generally simplified. Due to the digitization of our everyday life images taken from a camera become very useful as these images can be processed to extract important information from them. Integrating vehicle plate number recognition system into intelligent transport systems makes it possible to automate motorway toll collection, analyze traffic, and improve law enforcement. The need to integrate information and technology into all aspects of human life has led to the demand for processing of vehicles as a valuable resource information communication. This is because an information system without any form of data on it is unrealistic. There has always been a need to identify vehicles by their plate number in a real environment and use the information in real-life applications. Due to this, various techniques and vehicle recognition systems have been developed for various applications such as traffic control, automation, and security.

II. LITERATURE SURVEY

1) Paper Name: OCR and RFID Enabled Vehicle Identification and Parking Allocation System

Author: Asmita Jondhale

Abstract: The available parking management systems require human efforts for recording entries of coming and leaving vehicles from parking in sheets. For huge parking it is difficult to keep track of the information. Use of Radio Frequency Identification known as RFID technology reduces human efforts and Optical Character Recognition known as OCR, enabled system will provide an automated system for parking management.

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And also it will provide the control over the access of parking space by the use of boom barriers. For huge parking it will be an effective system. Parking can be a commercial one or can be a Very Important Person (VIP) parking. Depending on the usage system can be used. Vehicle cannot be parked in parking if it is not registered. OCR acts as a solution for vehicles which are not registered. To keep track of the happenings in parking cameras are used. Places where automated systems are required, the proposed system is an answer. System combines the two strong technologies RFID and OCR.

2) Paper Name: OCR-based Chassis-Number Recognition using Artificial Neural Networks
Author: Parul Shah, Sunil Karamchandani, Taskeen Nadkar
Abstract: The automatic detection and recognition of car number plates has become an important application of artificial vision systems. Since the license plates can be replaced, stolen or simply tampered with, they are not the ultimate answer for vehicle identification. The objective is to develop a system whereby vehicle identification number (VIN) or vehicle chassis number is digitally photographed, and then identified electronically by segmenting the characters from the embossed VIN. In this paper we present a novel algorithm for vehicle chassis number identification based on optical character recognition (OCR) using artificial neural network. The algorithm is tested on over thousand vehicle images of different ambient illumination. While capturing these images, the VIN was kept in-focus, while the angle of view and the distance from the vehicle varied according to the experimental setup. These images were subjected to pre-processing which comprises of some standard image processing algorithms. The resultant images were then fed to the proposed OCR system. The OCR system is a three-layer artificial neural network (ANN) with topology 504-600-10. The major achievement of this work is the rate of correct identification, which is 95.49identification.

3) Paper Name: Improved OCR based Automatic Vehicle Number Plate Recognition using Features Trained Neural Network
Author: Bhavin V Kakani, Sagar Jani
Abstract: Significant research and development of algorithms in intelligent transportation has grabbed more attention in recent years. An automated, fast, accurate and robust vehicle plate recognition system has become need for traffic control and law enforcement of traffic regulations; and the solution is ANPR. This paper is dedicated on an improved technique of OCR based license plate recognition using neural 4 network trained dataset of object features. A blended algorithm for recognition of license plate is proposed and is compared with existing methods for improve accuracy. The whole system can be categorized under three major modules, namely License Plate Localization, Plate Character Segmentation, and Plate Character Recognition. The system is simulated on 300 national and international motor vehicle LP images and results obtained justifies the main requirement.

4) Paper Name: Analysis of OCR based detection of vehicle license plates with implementation on ARM based embedded model
Author: Ashwini Ashok Patil, Dr. Sachin D. Ruikar
Abstract: The primary use of detection of Vehicle license plates is for security purpose. It can be used for monitoring systems in high security areas. Most of these systems are implemented with Matlab and image processing tools already. Now-adays, Python is becoming more popular in image processing. It has its own advantages over variety of fields. This paper proposes a license plate detection system with a new approach, which includes software stack related to Python and hardware based on ARM architecture.

5) Paper Name: Moving Vehicle Detection with Convolutional Networks in UAV Videos
Author: Youyang Qu, Liang Jiang, and Xinping Guo
Abstract: Moving vehicle detection from unmanned aerial vehicles (VA V) is becoming an increasingly important research topic in trafiic monitoring, surveillance and military applications. Owing to the low-quality of VA V videos and the movement of the platform, vehicle detection is achallenging task. Existing algorithms that are generally designed for stationary cameras are ineffectively under this situation. This paper proposes an accurate moving vehicle detector. Significant contributions include a real-time, high detection rate approach for motion detection with image registration, candidate targets detection and vehicle screening using convolutional neural network. Experiments on a variety of data sets show the successful detection of moving vehicle under varying conditions. Currently the detection rate for vehicle 5 is up to 90% and the average false alarm rate is less than 10%.

III.SYSTEM DESIGN

The block diagram consists of Raspberry Pi 3 B+, IR Sensor, Webcam, Servo Motor, Buzzer and Power Adapter. Firstly, IR sensor detects the object. If object is detected by IR sensor, it will give input to the camera to capture the image. Camera will capture the image and it is preprocessed to the Rpi. The system will extract the features from image using openCV library. This will extract the number plate and by using OCR, we can segment the text from image.

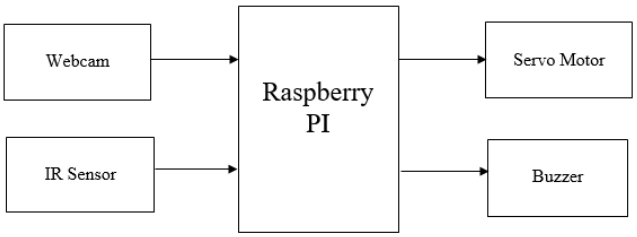


Fig 1. Block Diagram

Further this text will be compared with the stored database of authorized number plates. If it is matched with the database, system will give input to servo motor. Else Buzzer will get ON.

Following figure shows the flow of system:

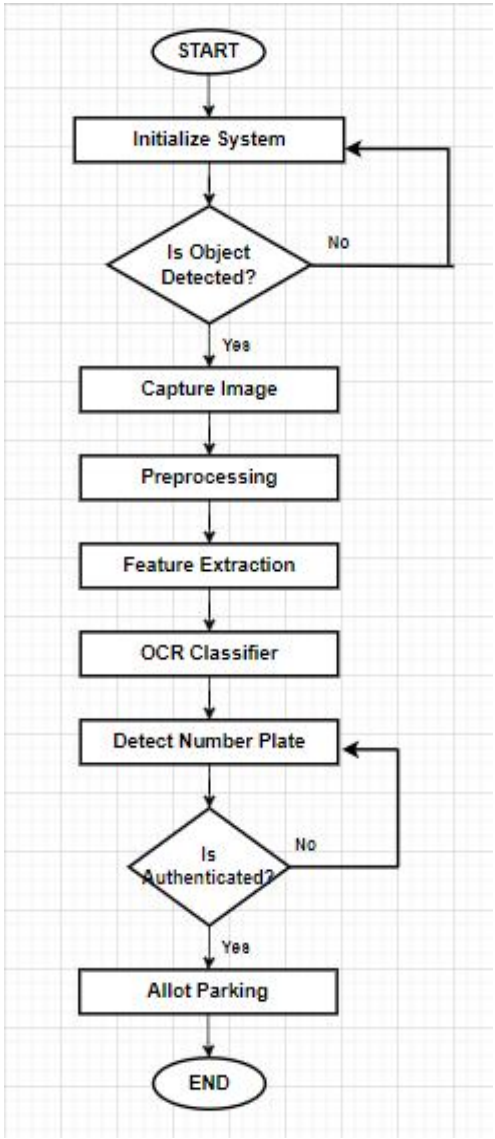


Fig2. Flowchart

IV. RESULTS AND DISCUSSIONS

After successful assembling of the hardware parts and the configuration of the software components, the functionality of the system was tested on a built model. The IR sensor was used to detect the moving cars. Once detected, the camera was triggered to capture the image of the plate number.

The camera was placed in such a way that the rear of the car will be captured so that its plate number can be captured and verified with an existing database. After this was complete, the captured image was made to undergo image processing and optical character recognition. This is made possible by the OpenCV codes written with Python. Once the text was extracted, it was displayed on a web page. The system will check the extracted text with database. If number plate text is matched with database, it will show authenticated message on web page.

A. Hardware Assembly of Project

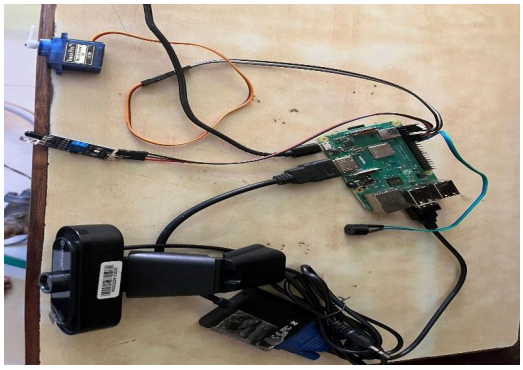


Fig 3. Hardware Assembly

The results obtained are as shown below.

1) Snapshot of code

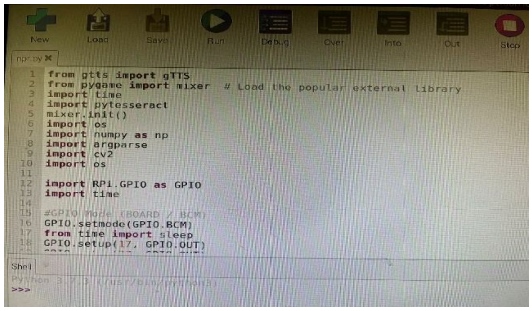


Fig 4. Code Snapshot

2) Result

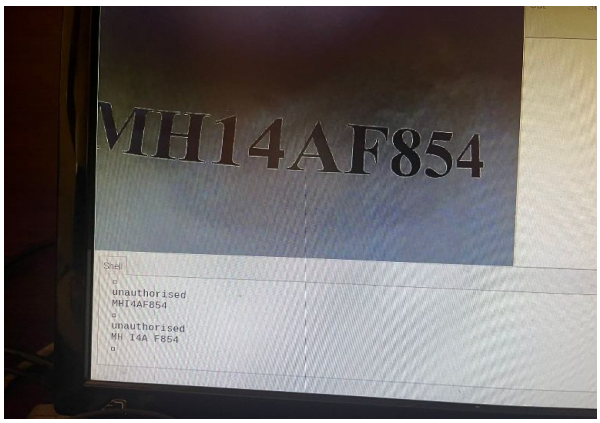


Fig 5. Result

V. CONCLUSIONS

Number plate detection and parking allocation systems are becoming increasingly popular due to their ability to optimize parking management processes, reduce congestion, improve traffic flow, and enhance security. These systems are also cost-effective and can help maximize revenue while improving the overall customer experience. As technology advances, these systems are expected to become even more advanced and provide even greater benefits.

By automating the process of parking allocation, these systems can also help reduce labor costs, which can have a significant impact on the bottom line for parking lot operators. Additionally, the ability to accurately track parking usage and occupancy can help maximize revenue, while also improving the overall customer experience. Thus, number plate detection and parking allocation systems are a valuable tool for parking lot operators and cities looking to create smart parking solutions.

VI. ACKNOWLEDGMENT

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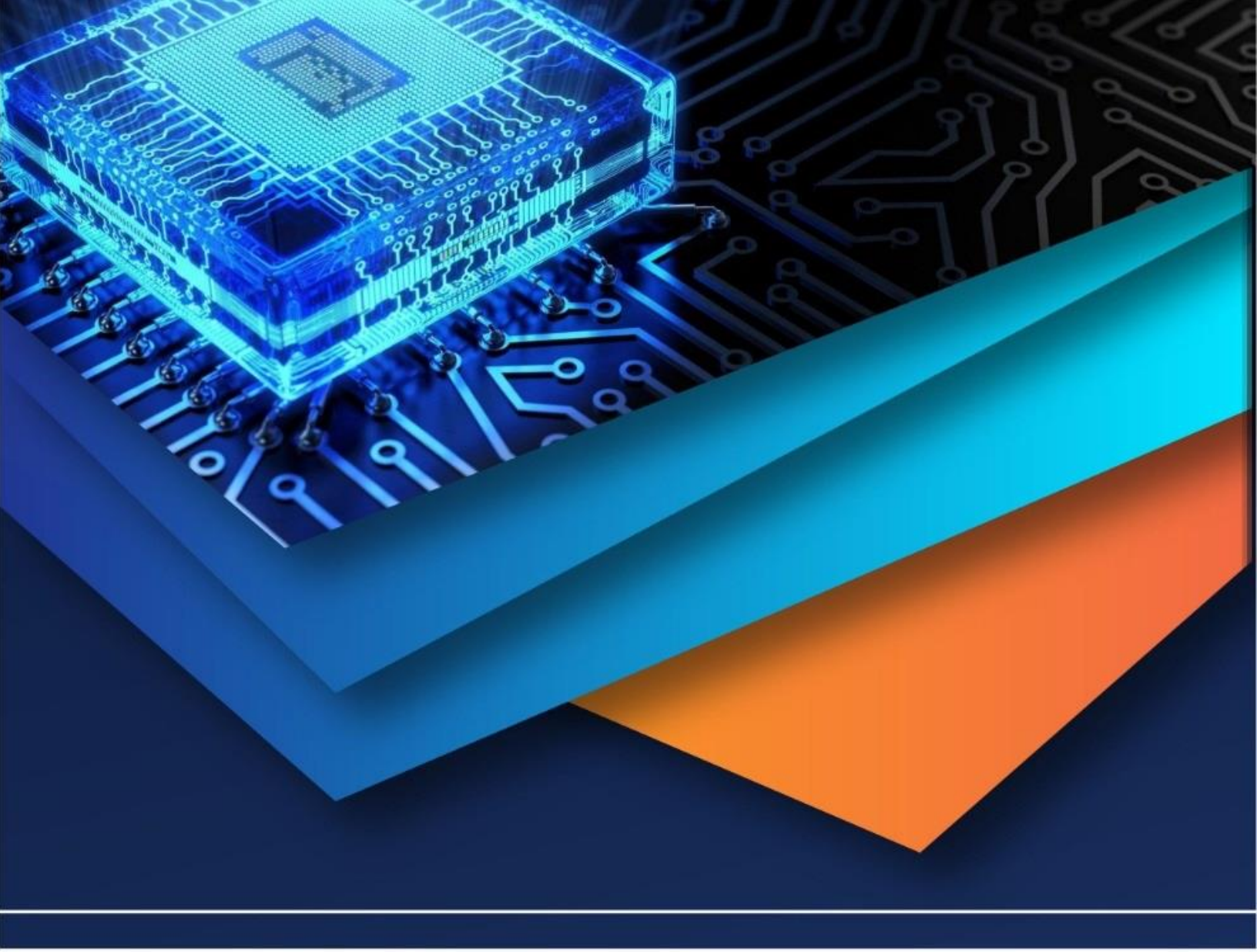
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