

Number Plate Recognition for Automatic No-Parking with Zero Tolerance

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Abstract— Recent technologies for modern life it is more necessary to provide security to the aspect of this automated system are design to various applications for security and monitoring. Traffic violation has been recognized as a major case for road accidents it the majority occurs in the developing countries. This is due to the fact that the rules are not properly enforced by appropriate authorities but the task no-parking area left largely to the humans, so this paper is proposed to identify the vehicle parked in no-parking area. In this study, number plate numbers are automatically recognized using a real-time embedded system that utilizes automated no-parking detection and vehicle plate number recognition (VNPR). The system's primary objective is to utilize image processing to identify vehicles that are breaking traffic laws based on their license plate numbers. The camera was activated in order to take pictures of the number plate number and store it on the Raspberry Pi. The Raspberry Pi processes the image once it has been captured in order to extract the numbers on the image. The numbers on the capture imaged were check in database and fetch contact details for send alert or warning to owner. If implemented, the technology can be utilized to enhance traffic management in developing smart cities.

Index Terms — ANPR, Image processing, IOT, Raspberry pi, Ultra-sonic sensor.

I. INTRODUCTION

In the current era of information technology, the use of automatic system is becoming more and more widespread. But in the traditional monitoring and security system were left largely on the man power so all the activities were performed by manpower is slower and requires human presence all the time at site location is impossible. Manpower used for monitoring and security purpose it will cause drawbacks such as monitoring 24x7 with full attention and information should delayed to the authorized person etc. In the advance technologies the modern life cause demand for advance security and monitoring system. While

certain models can be configured to store a picture of the driver, automatic number plate recognition can be utilized to record both the text from the number plate and the photos taken by the cameras. Infrared lighting is frequently used in systems to enable the camera to capture the photo at any time of day[2]. It is necessary to use ANPR technology to adjust for plate variations from location to location. Industries all around the world are implementing fully automated systems at a rapid rate. Control systems are replacing manual operators and fully automated machines are replacing human labor. Less personnel and smarter machines mean less operating and labor costs while increasing the quality of the products or services offered. Using OpenCV and optical character recognition, this system recognizes and reads vehicle license plates automatically. To find the license plate, it uses OpenCV's contour function[7]. Finally, the license plate numbers are read using optical character recognition. A license plate picture that was found in a vehicle image is the first output that was acquired. That has given the next process input. Optical character recognition (OCR) is then used to retrieve the number plate's alphanumeric data. OpenCV first detects, normalizes, and enhances the picture of the number plate[7]. In this research, a straightforward image processing method is suggested for the detection and identification of vehicles parked illegally in no-parking zone. This involves camera unit, computer machine and ultra-sonic sensor. The camera unit is activated to capture an image at no parking site after ultra-sonic sensor detect the vehicles inside the no-parking zone[1]. The capture image is processed by the raspberry pi and upload image to the firebase to extract the number plate from the illegally parked vehicles, the ANPR technique has been used[8]. The ANPR takes input as uploaded image from the firebase to extract the number from the

number plate. At last, with the help of fast2SMS the message is sent to the vehicle owner.

II. RELATED WORK

Earlier studies have been performed identifying the vehicles were parked in the no parking slots and capture the image and within a time interval that send msg to vehicle owner this all process done by using a RFID but in our paper, we are using the raspberry pi with an ultrasonic sensor and camera. When vehicle parked at no parking zone the ultrasonic will sense and camera capture the image and that image will send to firebase then it will start to identify the number plate and compare that extracted number plate with database after it matches the alert msg will send to vehicle owner by using the fast2sms.

III. METHODOLOGY

This research involves various methodology like interfacing of ultrasonic sensors and camera with Raspberry Pi, image processing, automatic number plate detection, fast2sms interface.

A. Ultrasonic sensor and Camera

In this process ultrasonic sensor is detect the vehicle that nearest to the no-parking zone and sent signal to raspberry pi. The raspberry pi will enable the camera to capture the vehicle number plate.

B. Image processing

Image processing is the process of transubstantiating an image into a digital format and applying particular way to it in order to prize some useful information. The image processing system typically interprets all images as 2D signals when using particular defined signal processing algorithms.

C. Automatic number plate recognition

To detect the vehicle number from license plate we need to perform following steps

a) License plate detection

We must locate the contours on the picture in order to recognize the number or number plate. Prior to discovering contours, it is crucial to binarize and morph the picture in order to locate a smaller number of more pertinent contours. The region's contours are validated, as are the side ratios and the size of the biggest contour's bounding rectangle. You will receive an exact number plate shape after confirming. Adaptive thresholding can be utilized when the image plate has variable lightning conditions in various locations.

b) Character Segmentation

It is simply divided into smaller segments for subsequent processing, segmentation is the act of taking a whole picture. The term "background" refers to pixels that do not convey meaningful information while "foreground" refers to pixels that do. In line level segmentation, we are given a skew-corrected picture with text that has been produced in line format. The division of the picture into lines is the goal of line level segmentation. High background pixel counts in rows that indicate the spaces between the lines equate to smaller histogram peaks.

c) Character Recognition

The technique of identifying text contained inside photographs and turning it into an electronic format is known as optical character recognition. These pictures may contain printed or handwritten text, such as on name cards, receipts, or other printed materials. This makes the process of extracting and storing information from corporate records, such as passports, relatively simple and effective. OCR is also used to scan books, converting the unprocessed photos into digital text. OCR-based digitization undoubtedly provides several benefits, including simple text manipulation and storage.

D. Fast2sms

In India, well-known bulk SMS service provider is Fast2SMS.com. It began on July 21st, 2011. It has 2 million members and has become one of the most popular SMS websites as a result of its simplicity and use. Fast2SMS offers an API for sending bulk SMS, which guarantees security and is a very dependable way to deliver data. We deliver the alert message to the car owner using this API.

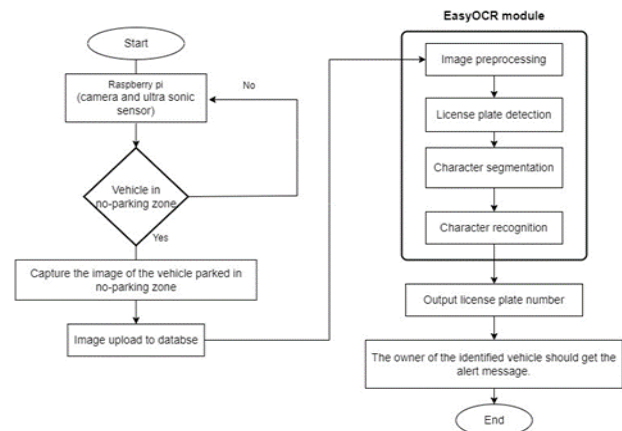


Fig 1: Flow chart

IV. MODELING AND ANALYSIS

This system is a combination of hardware and software components. The hardware part consists of different sensor like ultrasonic sensor and raspberry pi etc., whereas the software part consists of a web-based application connected to raspberry pi through the firebase. The firebase application consists of database in that it will check the owner registration number which will compare with image captured by camera and it will send alert message to the vehicle owner by using fastSMS. The improvement in automatic no-parking system, which will capture the real time images on no parking zone. These research tries to automate the processes of no-parking system.

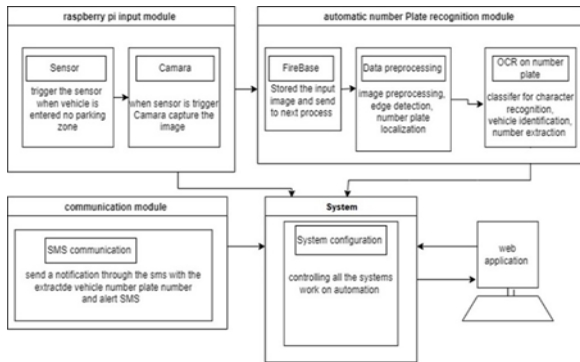


Fig2: System architecture

V. RESULTS AND DISCUSSION

The design and implementation of no parking system using IOT is presented. Because of the various regulations for illegal parking vehicle, an effective automatic alarm can be set in accordance with the regulations for illegal parking in no-parking regions, so the proposed system is used to detect illegal parked vehicles and alert to vehicle driver. The results of this system are checked at different no parking locations. We captured images with vehicles at no parking area and also, this system used for imposed to fine on vehicle.

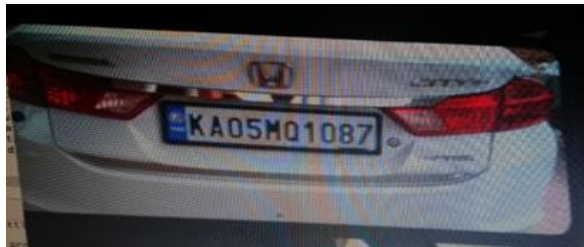


Figure 3: Input image of raspberry pi



Figure 4: Upload image to Firebase for EasyOCR process

```

(zro-env) D:\project\zeroTrafic\NumPlate>python OCR_main.py
(217, 488)
CUDA not available - defaulting to CPU. Note: This module is much faster with a GPU.
True
False
KA05MQ1087
<class 'str'>
{"return":true,"request_id":"41op9cjauedqg2w","message":["SMS sent successfully."]}
(217, 488)
    
```

Figure 5: EasyOCR module is executed and extract the number from number plate then send the alert message to user

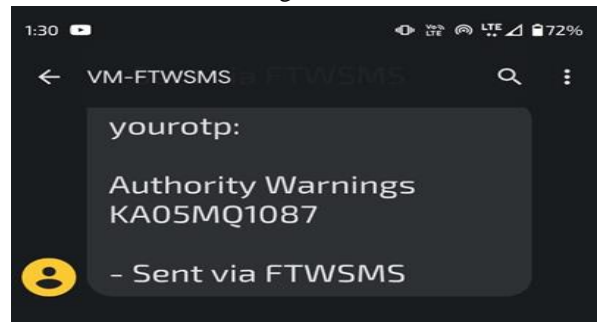


Figure 6: Message sent to owner



Figure 7: Model

V. CONCLUSION

The proposed system will eliminate need of human beings for monitoring and security applications. This system will not require physical presence of human at no parking area to take action against illegally parked vehicles. This system facilitates authority to take action against owner of illegally parked vehicles. This simple image processing approach can be used for different application with constant background such as:

1. Automated toll collection,
2. Access control
3. Border security

Some of the difficulties in recognition of number plates:

1. Broken number plate
2. Similarity between certain characters (0 and D, 5 and S, 8 and B etc.)
3. Number plate not within the legal specifications
4. Plate partially visible or dirt on the plate etc.

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