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PARKING SYSTEM USING IOT

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Abstract: This system is used for people to find unoccupied parking slot. In case of excess cars parked, people have to find parking in other areas. With the help of the real-time parking guidance software, the possibility of traffic can be avoided. This System allows people to pay for their parking slot and register their slot in prior. With the increased use of smart phones and their application, user prefer mobile-phone based solutions. So with help of web application booking their own parking slot is made easier.

Index terms - Parking area, Optical Character Recognition, ALPR systems, Certain level of human interference.

1. INTRODUCTION

In recent times, due to evolving technology and population there's been a considerable increase in auto mobile registrations. It all sums up to more vehicles than the past decade. The contemporary transporting fundamentals as well as parking establishments are not that adequate in assisting the vehicle to find the right slot. This leads to concerns like crowded car parks and delay in finding proper parking space. As the delay in time increases due to parking, the frustration of automotive drivers will increase simultaneously. So, as a solution to this dilemma, execution of a Vehicle Parking System for convenient parking in hectic places are needed. The base for this system would be in three parts that is Plate Localization, Character Division and Character Recognition. These parts make up the main segment in this system.

OCR (Optical Character Recognition) technique is used to get capable and efficient results in character identification. This accuracy in character recognition leads to instant seeking content in databases, especially in elevated volume scanning or elevated file influx. So, further we can use tools to extract the exact information in the file rather than rectify the whole document to accuracy. This technique is quick and precise which ensures the file's content is left intact and saving time when it is combined with technologies like compression and scanning of the file. Thus, advantages of OCR are highlighted. Due to advancement in technology manual labor can also be reduced and still get efficient work done.

2. SCOPE OF THE PROJECT

The concept so far used to enter a parking slot is either the car details are noted down manually or using the RFID card, and the parking amount is collected by person at the exit gate. The purpose of our project is to allow the user to register their parking slot using their mobile phones, the user enters the required details in the web application and pay the amount using it. The advantage of this system is that it reduces the man power.

3. PROPOSED METHODOLOGY

The proposed methodology in this system is that it allows user to book their parking slot before coming to the desired place. The camera fixed at the entrance recognize us by using our number plates cross check with the information which the user filled in the web application. If the user is not registered their entry to the parking slot is denied. This system do not require any cards to enter the parking. They can leave the parking slot without any hindrance since they pay their amount using the web application.

4. SYSTEM ARCHITECTURE

Initially, the user should login the web application to book their parking slot, where those details are saved using MongoDB database. At the parking entrance, the image of the car's number plate is scanned and recognized using the Raspberry Pi Camera. Finally, the user is allowed to park their car in the registered slot.

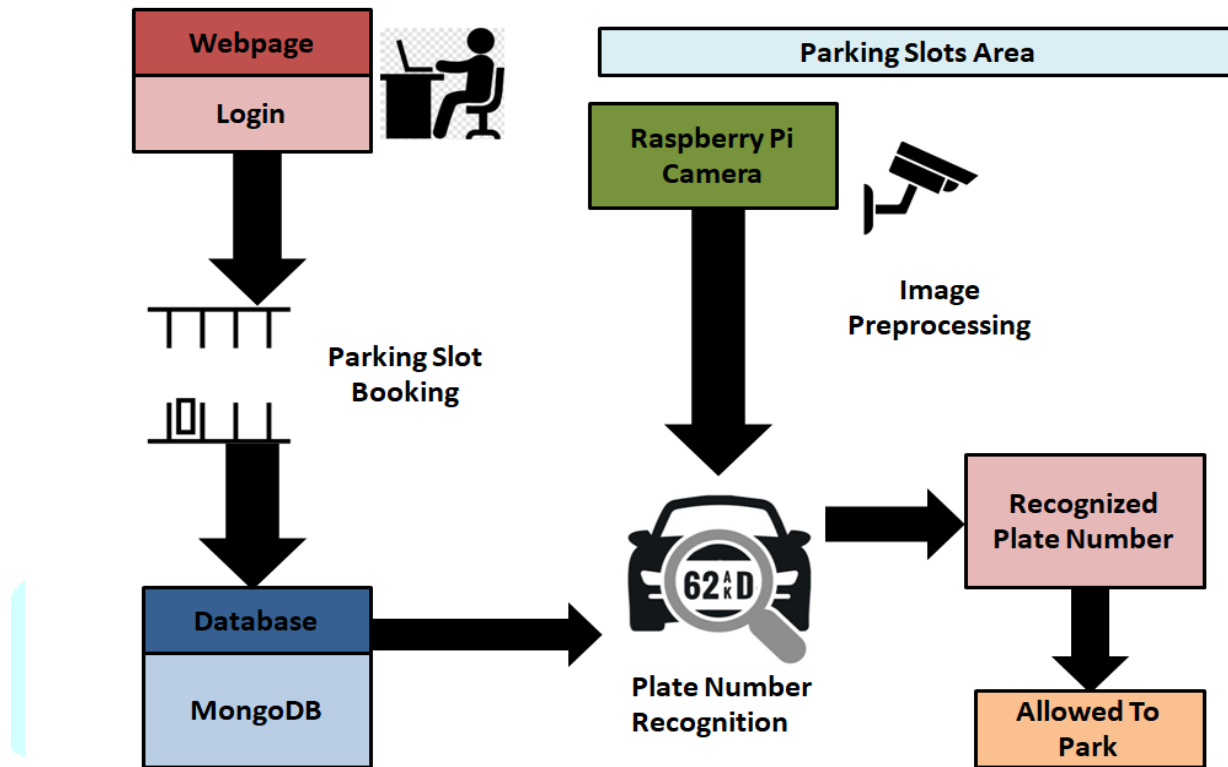


Fig.1: Architecture Diagram

5. MODULE DESCRIPTION

A. Gray Scaling:

In various applications of image processing, color information is not needed to identify important edges or other features. With complexity of the code, extra work is not easy to defend if the additional color information is not acceptable for applications of interest. With modern computers, and parallel programming, it's easy to perform a simple pixel-by-pixel processing of a megapixel image in milliseconds though color is complex.

B. Binarizing:

Images are composed of Pixels and in Binary image every pixel value is either 0 or 1 i.e., either black or white. Used in many applications since they are the simplest to process. Converting to binary is often used in order to find a Region of Interest - a portion of the image that is of interest for further processing. The intention is binary, "Yes, this pixel is of interest" or "No, this pixel is not of interest".

Algorithm for Gray Scaling and Binarizing:

```

img = cv2.imread("1.jpg")
img = imutils.resize(img, width=500)
cv2.imshow("Original Image", img)
cv2.waitKey(0)
gray_img = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
cv2.imshow("Preprocess 1 - Grayscale Conversion", gray_img)
cv2.waitKey(0)
gray_img = cv2.bilateralFilter(gray_img, 11, 17, 17)
cv2.imshow("Preprocess 2 - Bilateral Filter", gray_img)
cv2.waitKey(0)
  
```

C. Edge Detection:

Canny Edge Detection is used to detect the edges in an image. A gray scale image is used as the input. Majority of the frame information of an image is embedded at the edges. Primarily the edges in an image are detected. Then by using filters and by enhancing those areas of image which encloses the edges, the sharpness of the image will increase, and the image will become clearer for recognition.

Algorithm for Edge Detection:

```
c_edge = cv2.Canny(gray_img, 170, 200)
cv2.imshow("Preprocess 3 - Canny Edges", c_edge)
cv2.waitKey(0)
cnt, new = cv2.findContours(c_edge, cv2.RETR_LIST, cv2.CHAIN_APPROX_SIMPLE)
cnt = sorted(cnt, key = cv2.contourArea, reverse = True)[:30]
NumberPlateCount = None
im2 = img.copy()
cv2.drawContours(im2, cnt, -1, (0,255,0), 3)
cv2.imshow("Top 30 Contours", im2)
cv2.waitKey(0)
```

D. Noise Reduction:

Noise reduction is an algorithm for the process of reducing or totally removing the noise from the image. This algorithm will reduce or remove the visibility of noise by evening out the entire image and leaving the areas near contrasting boundaries. After the removal of the noise, the number plate is segmented from the image for character recognition.

```
for c in cnt:
    perimeter = cv2.arcLength(c, True)
    approx = cv2.approxPolyDP(c, 0.02 * perimeter, True)
    if len(approx) == 4:
        NumberPlateCount = approx
        break
masked = np.zeros(gray_img.shape,np.uint8)
new_image = cv2.drawContours(masked,[NumberPlateCount],0,255,-1)
new_image = cv2.bitwise_and(img,img,mask=masked)
cv2.imshow("4 - Final_Image",new_image)
```

Algorithm for OCR:

```
configr = ('-l eng --oem 1 --psm 3')
text_no = pytesseract.image_to_string(new_image, config=configr)
```

Webpage Modules:

- HTML

The Hyper Text Markup Language is the standard markup language for documents to be designed and displayed in a web browser. Html can also be assisted by Cascading Style Sheets (CSS) for the web design and scripting languages such as JavaScript. Web browsers will receive HTML files from a particular web server or from a local storage and it will render the documents into multimedia web pages.

- Cascading Styles

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language.

- Python

Python is an interpreted high-level general-purpose programming language. Python's design philosophy emphasizes code readability with its notable use of significant indentation.

6. IMPLEMENTATION DETAILS

6.1 ADMIN:

The Web page will have a login page and asks us to provide the required information for booking parking slot.

6.2 USER:

The user has to login with their details and book their particular slot with their convenient time.

6.3 PROCESS:

Firstly, the user starts registering their details for booking their slot using web application. Frame capturing happens when the car enters at the entrance of the parking slot. Then the captured image is processed using the various methods and checks whether the car is a registered user, If not the user is asked to register with their details in the application and their access will be granted.

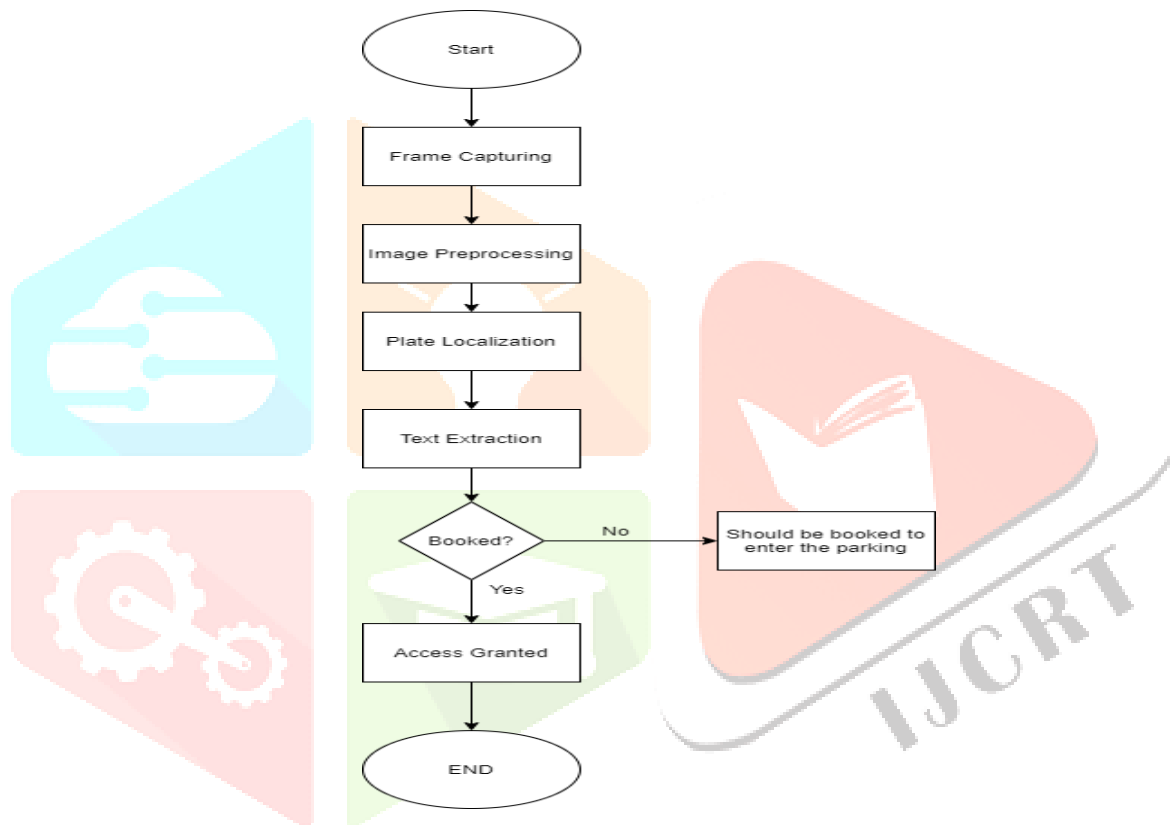


Fig.2: System flow

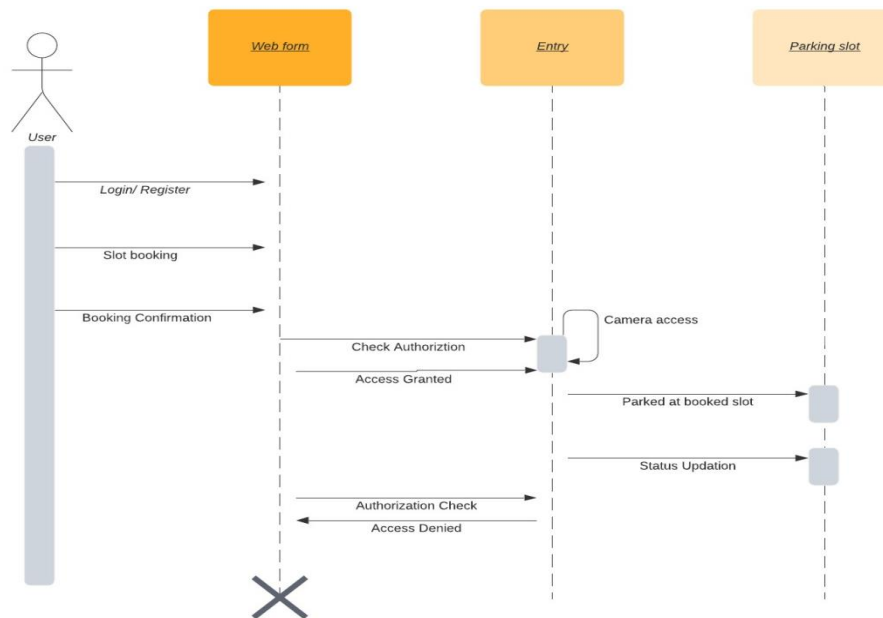


Fig.3 Parking Sequence

7. RESULT

```

You are Allowed to enter the parking
Registration Number    MH12DE1433
Date                  15-05-2021
IN                     14:20
OUT                    18:20
Registration           Registered
Slot                   1
Name: [], dtype: object
    
```

Fig.4: Output for registered user

Register through website to Enter the parking
15-LK-10898

Fig.5: Output for user who has to be registered.

8. Conclusion

Thus, searching for free parking spots is made easier and smarter by this system. It also reduces the time taken in searching for the parking spots as there is no particular evaluation in where the free spots are located in the existing system. This system also reduces human labor as it is fully based online.

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