OCR BASED SMART PARKING SYSTEM

Chenthil T.R[1], Sivakumar.N[2], Surajkumar.P[3], Surya Kumar N.K[4]

[1]Assistant professor,[2,3,4]UG Students, [1,2,3,4]Department of Electronics and Communication Engineering,Jeppiaar Engineering College, Chennai, Tamilnadu, India.

Abstract: *Successful implementation of smart parking systems can effectively reduce a lot of problems related to traffic congestion in urban areas. Wastage of fuel and time in search of a vacant parking space will be significantly reduced and the complete utilization of the available parking areas can make our cities really smart. Parking slot detection and user notification are the two major sections of a smart parking system. The empty parking space detection was initially done by deploying a number of sensors in the parking slot. It is highly expensive and complicated to install. But the advancement of image processing has enabled us to use images of the parking area to find out empty spaces. In this paper a comparative study of the various parking space identification techniques has been done and also the image processing system models has been presented as a replacement for sensor based systems. A very efficient and simple technique for parking slot identification based on optical character recognition (OCR) has been introduced in this paper. The camera installed in the parking lot captures the image of the parking area with specially numbered parking spaces. The OCR system recognizes the numbers which are not hidden by a vehicle parked over it and this information is used for identifying the empty spaces.*

KEYWORDS: OCR, Open CV, HTML, web page, raspberry pi.

I. INTRODUCTION

In this paper, the parking slots are available. In each slot there is a unique number to identify the slots. Here we are taking 6 slots, each slots are named with number along with alphabet(e.g.,B1.B2 and so on). Then the camera is placed at top of the parking slot so that the camera covers all the parking slots. The camera capture the parking slots at the rate of 30 frames per second, it sends the data to the raspberry pi via cable. The raspberry pi is a mini CPU which act as a computer. In that we are written code in python with OpenCV , act as an library file. Raspberry pi which process the image captured by the camera and extracts the numbers and character available on the picture by OCR technology. OCR (optical character recognition) is the technology used to extract the character available in the image. This is used to extract the parking slot in which it is empty. From that we can get the empty slots and it is displayed in the webpage

that we created in which it is easy to identify the empty slots. We have placed IR sensors ,which is used to count the entry and exit of the vehicle, that also displayed in the webpage.

II. RELATED WORKS

Anusooya G, Christy Jackson J , Sathya rajasekaran K proposed a system based on RFID based parking . In this system, the display unit displays a visual representation of the parking and it shows the empty and occupied slots which help the user to decide where to park their car. The system would not only save time but the software and hardware would also manage the Check in and Check outs of the cars under the control of RFID readers/tags with additional features of automatic billing. Entry exit data logging.

G.Vamvakas , B.Gatos , N.Stamatopoulos , S.J.Perantonis   proposed a system based on OCR for Historical Monuments. In this paper a complete OCR methodology for recognizing historical documents, either printed or handwritten without any knowledge of the font, is presented.

The first two steps refer to creating a database for training using a set of documents, while the third one refers to recognition of new document images. First, a pre-processing step that includes image binarization and enhancement takes place. At a second step a top down segmentation approach is used in order to detect text lines, words and characters. A clustering scheme is then adopted in order to group characters of similar shape. This is a semi-automatic procedure since the user is able to interact at any time in order to correct possible errors of clustering and assign an ASCII label. After this step, a database is created in order to be used for recognition. Finally, in the third step, for every new document image the above segmentation approach takes place while the recognition is based on the character database that has been produced at the previous step. Historical documents are of more importance because they are a significant part of our cultural heritage. During the last decades a lot of research has been done in the field of Optical Character Recognition (OCR). Numerous commercial products have been released that convert digitized documents into text files, usually in ASCII format. Although these products process machine printed documents successfully,

Marcia rajan, Bhavya Nair, Anne Dickson, Lithin k Devasia, Nazia bibi, Md Omar Hasan proposed a survey on OCR. This proposal aims to implement a reservation based automated car parking system to address the rising problems faced due to traffic congestion. The identification of vacant spots is implemented based on image processing techniques thereby overcoming the disadvantages of conventional sensor-based methods. The reservation of slots through mobile application can help drivers locate parking slots with minimum effort and in less time. The user authentication is ensured by proper verification of details implemented by means of Radio Frequency Identification process.

III. PROPOSED SYSTEM

In this proposed system, Smart parking concept becomes essential nowadays specially in urban area because it can reduce the time and the fuel wasted in searching for an empty parking slot. The aim of this paper is to develop smart parking system based on improved Optical Character Recognition (OCR) model. The proposed system consists of three stages: 1) OCR based parking slot detection, 2) User notification based on WEBPAGE approach, 3) Audio output. In this system, the vacant parking slots are detected using improved OCR model by labeling the parking slots with specific characters. The system identifies empty parking slots by detecting these characters with installed camera above the parking slots, otherwise the parking slots are occupied. The performance of the proposed OCR model in detecting these characters is enhanced by considering two stages of advanced morphology filter to remove unwanted small/large objects from the image. The accuracy of the proposed OCR model is tested by eight images having different parking street textures as a background and characters written with seven font styles. The idea of detecting empty parking spaces is to share the number of vacancies on a website for the drivers searching for a parking space. When the car crosses the entry gate, the IR v sensor will detect the car and then the available parking slot can be delivered by the audio output.

A.BLOCK DIAGRAM
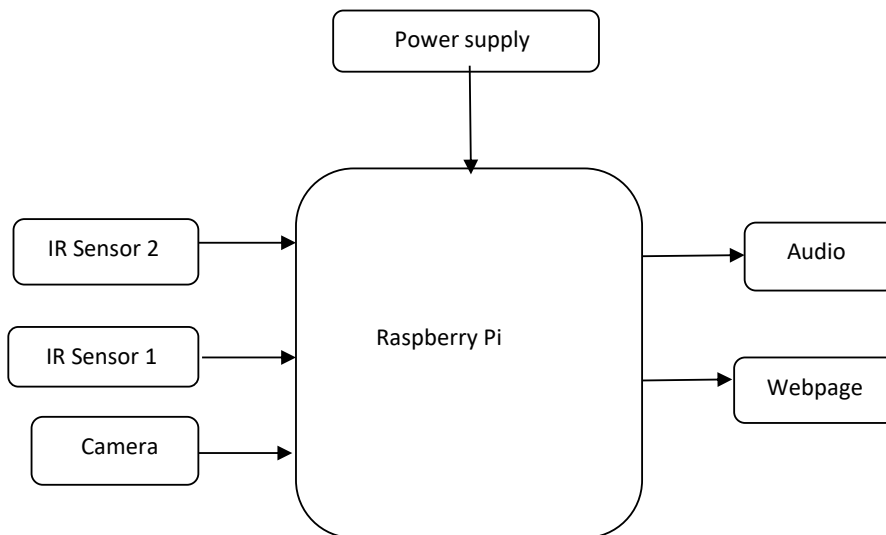
Optical Character Recognition (OCR) is an advance image processing technique that able to convert the characters in the images captured by digital camera to digital characters. In this paper, the vacant slots are identified using modified OCR model. This can be achieved by labeling all

parking slots with unique code in white color which consists of two digits as shown in figure 3.2 (the first digit is a character, and the second digit is a number). Considering such a complicated labeling of two digits is to avoid the wrong detection of a number printed over the vehicle. The camera is fixed in a position to capture the maximum number of slots in one frame. Depending on the design of the parking lot, it is possible to make the camera rotating and continuously capturing images of the entire garage with one camera only. The IR sensors are placed at the entry and exit gate of the parking slots, the IR1 will detect the number of cars entering into the slot and the IR2 will detect the no of car leaving from the slots. The Vehicle count also displayed at the webpage which is helpful to find how many vehicles are inside the parking area.The audio output will be delivered at every time of the vehicle entry and exit, which is another feature for incoming people.

IV. HARDWARE DESCRIPTION

A. RASPBERRY PI 3

The Raspberry Pi board contains a processor and graphics chip, program memory (RAM) and various interfaces and connectors for external devices (figure 4.2). Some of these devices are essential, others are optional. RPi operates in the same way as a standard PC, requiring a keyboard for command entry, a display unit and a power supply. It also requires 'mass-storage', but a hard disk drive of the type found in a typical PC is not really in keeping with the miniature size of RPi. Instead we will use an SD Flash memory card normally used in digital cameras, configured in such a way to 'look like' a hard drive to RPi's processor. RPi will 'boot' (load the Operating System into RAM) from this card in the same way as a PC 'boots up' into Windows from its hard disk.
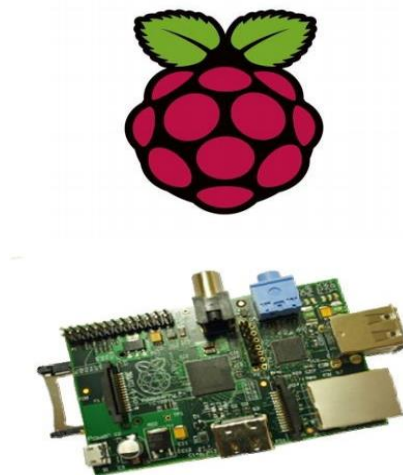

FIGURE 1 RASPBERRY PI

B. CAMERA

Logitech HD Webcam comes fitted with auto focus wide-angle lens that has smaller focal length to capture more of your subjects.

This type of lens goes well with indoors photography so that you can enjoy amazing images on your notebook or desktop at home or office.

Moreover, with its up to 720p HD video-recording capacity (special PC configuration needed), you view high-quality HD picture on your monitor that is clear, sharp and detailed (figure 4.8). Colors also look vivid and beautiful. Further, Logitech Fluid Crystal Technology enhances the video quality by making your chats' display fluid and flawless. Automatic Light Correction feature rectifies brightness-related errors to give you improved viewing experience.

FIGURE 2 CAMERA

C. IR SENSOR

These simple devices operate at 940nm and work well for generic IR systems including remote control and touch-less object sensing. Using a simple ADC on any microcontroller will allow variable readings to be collected from the detector. The emitter is driven up to 50mA with a current limiting resistor as with any LED device. The detect is a NPN transistor that is biased by incoming IR light. An infrared sensor is an electronic device that emits and/or detects infrared radiation in order to sense some aspect of its surroundings. Infrared sensors can measure the heat of an object, as well as detect motion. Many of these types of sensors only measure infrared radiation, rather than emitting it.
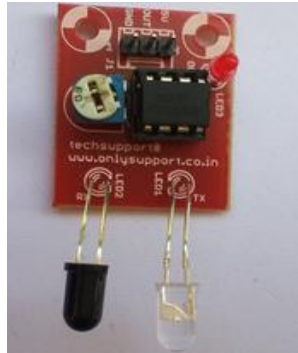
FIGURE 3 IR SENSOR

V. SOFTWARE DESCRIPTION

A. PYTHON

Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License. Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages. Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. You can actually set at a Python prompt and interact with the interpreter directly to write your programs. Python supports Object-Oriented style or technique of programming that encapsulates code within objects.

In the raspberry pi we are going to code in python, in order to execute the output of the camera and O/P display .

B. HTML

HTML (HyperText Markup Language) is a descriptive language that specifies webpage structure. An HTML document is a plaintext document structured with elements. Elements are surrounded by matching opening and closing tags. Each tag begins and ends with angle brackets (<>). There are a few empty or *void* tags that cannot enclose any text, for instance <img>.

We can extend HTML tags with attributes, which provide additional information affecting how the browser interprets the element:

An HTML file is normally saved with an .htm or .html extension, served by at web server, and can be rendered by any web browser. The purpose of a web browser (Chrome, Edge, Firefox, Safari) is to read HTML documents and display them correctly.

A browser does not display the HTML tags, but uses them to determine how to display the document.

VI.RESULTS AND DISCUSSION

The output of the proposed system is shown in figure 4.
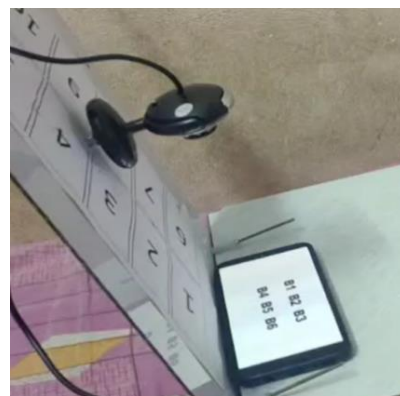

FIGURE 4 HARDWARE SETUP

FIGURE CAMERA SETUP

When the first vehicle enters in the parking zone the IR sensor will detect it and audio will delivered as "Vehicle enter in the parking zone 1". Then it occupies in B1 position of the parking slot, after that the remaining slots are available in the webpage(Fig 6) and vehicle count of the parking zone also available in the area. Like that when the every vehicle enters in the parking zone the above procedure will happen. When the parking is filled there is no parking slot available in webpage. When the vehicle leaves from the parking zone, the IR2 will detect it then vehicle count is reduced and audio is delivered as "vehicle left from the parking zone, five parking available". Like that it will happen when every vehicle is leaving from the parking zone.
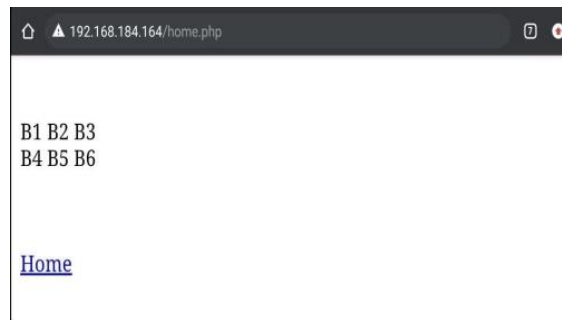
FIGURE 6 WEBPAGE PARKING SLOT

VII. CONCLUSION

The empty slot identification in the parking zone can be done in easier way by using a webcam. It reduces the overall cost of the previous system and also the speed can be increased.

In future we can improve the system facility to the people by selecting their favor parking places before entering into the parking zone. Higher priority is also available for the peoples for to choose the position to park the vehicles.

It proves the system can be implemented in the real car park situation. In order to reduce the manpower to control the system ,several sensors are used to integrate with the system to detect entry and exit vehicle. With the sensor installation, as expected, the system can work automatically without any control of administrator.

REFERENCES

[1] Athira, S.Lekshmi, P. Vijayan and B.Kurian, "Smart Parking System Based on Optical Character Recognition", 2019 3rd International Conference on Trends in Electronics and Informatics(ICOEI).

[2] Anusooya G,Christy Jackson J,Sathyarajasekaran K, "RFID Based smart car parking system",2017.

[3] F.Caicedo, " Real-time parking information management to reduce search time,vehicle displacement and emissions", Transport Res.D,vol 15,no.4 ,pp.228-234,2010.

[4] G.Vamvakas,B.Gatos,N.Stamatopoulos,S.J.Perantonis,"A complete optical character recognition for historical moments",2019.

[5] Ghulam Ali,Tariq Ali,Muhammed Irfan, "IOT based smart parking system using deep long short memory network author",2020.

[6] H.Fuan, L.Liu and M.Lio, "Approach for planning of parking guidance and information system",J.Highway Transport.Res.Develop.,vol.1,pp.034,2003.

[7]   Marcia rajan , Bhavya Nair, Anne Dickson , Lithon k Devasia, Nazia bibi,Md Omar Hasan, "OCR Parking system survey",2020.

[8]   R.Grodi,   D.B.Rawat and F.Rios-Gutierrez , "Smart parking Occupancy monitoring and visualization system for smart cities",Southeast Con 2016,Norfolk,VA,2016.