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AUTOMATIC NUMBER PLATE RECOGNITION (ANPR) USING IMAGE PROCESSING ALGORITHMS, OPENCV AND SMART PARKING SYSTEM USING IOT

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Abstract: The problem of finding an appropriate parking space is a challenging one, particularly in large cities. With theincrease in car ownership, parking spaces have become scarce. The growing demand for these spots coupled with limitedavailability has led to imbalances between supply and demand. A lack of adequate parking management systems has resulted in many streets being littered with illegally parked cars. A scalable, reliable, and efficient parking management system is needed to combat this problem. Deep learning-based computer vision techniques have emerged as promising solutions for such problems. These technologies have had a huge impact on the field of image recognition and processing.They also present great potential for further applications in the area of vehicle tracking. Hence, they can be used to detectparking spots. A densely packed city center can be an unbearable place to park your car. Finding parking spaces can prove frustrating if you're not careful. Automatic smart parking systems promise to ease the burden of finding a spot in busy areas. To help drivers find a parking spot, we have developed a vision-based smart parking framework. First, we divided the parking lot into blocks and categorized each block to determine whether it was occupied or empty. Then wesent information about the availability of free or reserved parking to motorists on their smartphones. Our system demonstrates superior performance compared to commercially available solutions because it offers higher accuracy.

Key Words: OpenCV; Raspberry Pi; Sensors.

I. INTRODUCTION

More than half of the world population lives in the urban areas so the cities have reached its full occupancy. As a result,number of vehicles in the cities is also increased. Car parking system would have more appreciated in placeless of higherdemands such like Theatre, shopping malls and in some crowded place. The devices could be tracked, controlled or monitored using remote computers connected through the Net. In IOT objects are connected to each other and exchangeinformation from internet. Our cloud based smart parking organized the parking lot. It helps user to find a vacant space in parking slot. It saves user's time as well as vehicle fuel. An infrared (IR) sensor is used at each slot in parking; it tellsthe space availability which can be easily seen in mobile application through internet. It may be defined as connecting things present in the physical world with sensors and then connecting them to a network through wired or wireless meansnetwork is used to connect the sensors to the GPIO pins of the Raspberry Pi as they give an output of 5V but the raspberrypi accepts inputs of 3.3V. The device is registered using Web API to be recognized as a part of the network. Using the sensor, we know the presence of the vehicle, is available on parking slot or not. This is enabled by checking the distance of the object in the slot from the sensor.

Most parking lots today are still managed by hand. There is no automated monitoring system in place to keep track of how much capacity each parking place contains. In order to find an empty spot, drivers often have to make a circuitous trip through the parking lot. Where there are more people than parking spots, such problems are especially common nearhospitals, malls, schools, and other large gathering places

The process of finding a free parking space can take a lot of time and involve driving around in circles. These days, parking spots are often ocpied so badly that they're almost unusable. Poorly managed parking areas lead to inefficientutilization of the parking spaces. This causes a lot of traffic jams near the parking areas. We propose a new method to improve the efficiency of parking lots by counting how much space is left in each parking zone and displaying that information to drivers via a smartphone app. We employ a camera to photograph the parking lot and use image processing approaches to determine if any vehicles are parked in each section. Whenever a vehicle moves into or out of a particularparking zone, the status of the whole lot changes.

II. LITERATURE SURVEY

The solution proposed in this paper utilizes the architecture of the cloud server is in a way that an unrestricted number ofslots may be added without any change in the code. The associated mobile application can run on Windows, Android andiOS. Moreover, the code can be recycled for multiple boards making the proposed solution cost effective, adaptable andversatile. Followed by the developments in sensor technology, man modern cities have opted for deploying various IoT based systems in and around the cities for the purpose of monitoring

Project Title : Smart Car Parking with Monitoring System

Abstract— Nowadays, the total amount of traffic is increased rapidly and parking space getting smaller. It's to design a drive less car by using RTOS (Real Time Operating System) and a Smartphone. It is motivated to configure the guidancesystem of a flexible (Automated Guided Vehicle) AGV. The driver finds very difficult to park their vehicle in a narrow garage, so it helps to park the vehicle using Smartphone via Bluetooth with the range of 100 m, ranges between the car and the Smartphone and GPS (Global Positioning System) is also used to know the location. This GPS system will helpthe user to easily identify the car location. "Car Assist" technology is used to monitor the car driving path and the thingshappening around the car can be viewed in the smart phone via GPS. It supports live time preview to monitor the car parking garage. The users need not to be present inside the car like some previous generation systems. The proposed work is compared with bench work results and yield very less time to monitor and park the vehicles against the existingsystem.

PROJECT TITLE: AUTOMATIC CAR PARKING SYSTEM WITH VISUAL INDICATOR ALONG WITH IOT

Abstract— this paper focuses on the concept of car parking detection mechanism using the ultrasonic sensor, in combination with the usage of Internet of Things i.e. sending the status of the parking slot to the Internet. Through whichthe user at any place in the world can see which parking slot is empty and where to park. This is done by sending the dataof ultrasonic sensor through our Wi-Fi module that is ESP8266 to any open source easy to use IOT platform that uses HTTP to display our data (thingspeak.com in this case).

PROJECT TITLE: AUTOMATIC PARKING SPACE DETECTION SYSTEM

Abstract—Searching a suitable parking space in populated metropolitan city is extremely difficult for drivers. Serious traffic congestion may occur due to unavailable parking space. Automatic smart parking system is emerging field and attracted computer vision researchers to contribute in this arena of technology. In this paper, we have presented a visionbased smart parking framework to assist the drivers in efficiently finding suitable parking slot and reserve it. Initially, wehave segmented the parking area into blocks using calibration. Then, classify each block to identify car and intimate thedriver about the status of parking either reserved or free. Potentially, the performance accuracy of recommended systemis higher than state of the art hardware solutions, validating the supremacy of the proposed framework.

PROJECT TITLE: SMART PARKING SYSTEM WITH AUTOMATIC CASHIER MACHINE UTILIZE THE IOT TECHNOLOGY

Abstract—The difficulty of finding car parking spot has become one of main consideration to create this paper and focusing on develop our proposed smart parking system. Other than that, the utilization of internet of things (IoT) technology has become one of great technology that match for complex system with a minimal use of hardware. With the implementation of IoT based on cloud computing, several smart devices, and also smart automatic machine, the concept of smart parking system are expected to be able to provide services for car parking spot searching and car parkingspot allocation through the mobile application.

III.THE PROPOSED PRODUCT:

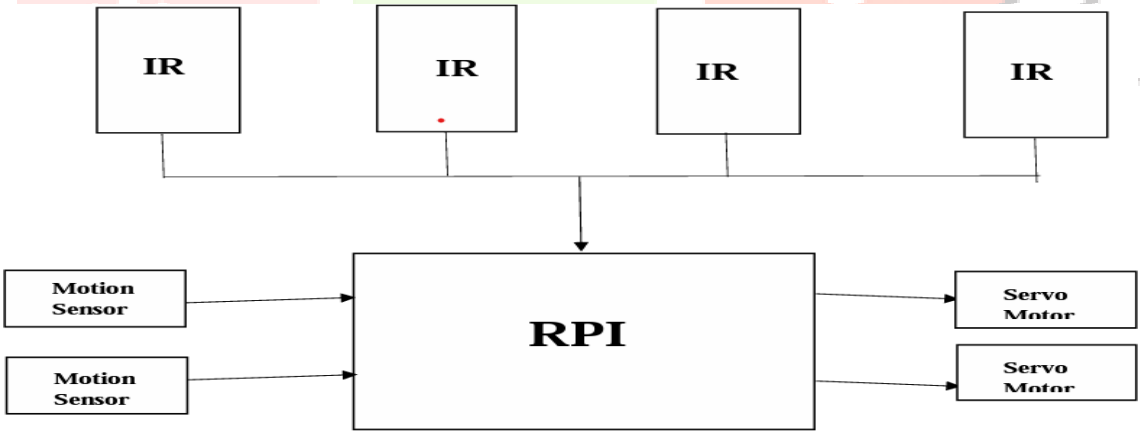
Once the vehicle entry is detected by the camera, the Automatic number plate recognition system will scan the plate and recognizes the vehicle number. The Microcontroller compares vehicle number with the database, and collects thecar owner credentials, and sends the data to the app via the cloud. Basic outline: When the vehicle enters in the place.

Number Plate Detection: The first step is to detect the number plate from the vehicle. The image of the vehicle is captured using a camera and fed to the processing system. The Contour option in OpenCV is used to detect rectangularobjects.

1. Character Segmentation: Once the Number Plate is detected, it is cropped out and saved as a new image.
2. Character Recognition: Optical Character Recognition (OCR) is used to detect the number and characters in theNumber plate.
3. Data Acquisition & Transmission: The vehicle number is used to collect the details of the detected

IV.SYSTEM DESIGN

Block Diagram



SYSTEM COMPONENTS

A. PIR Motion Sensor

PIR sensor is used for detecting infrared heat radiations. This makes them useful in the detection of moving living objectsthat emit infrared heat radiations. The output (in terms of voltage) of the PIR sensor is high when it senses motion; whereas it is low when there is no motion (stationary object or no object). PIR sensors are used in many applications likeroom light control using human detection, human motion detection for security purposes at home, etc.

When motion is detected, PIR output goes HIGH which will be read by Raspberry Pi. So, we will turn on the LED whenmotion is detected by the PIR sensor.

Here, the LED is connected to GPIO12 (pin no. 32) whereas the PIR output is connected to GPIO5 (pin no. 29). Let's write a python-based program to interface the PIR motion sensor with Raspberry Pi. To know more about how to accessGPIO on Raspberry Pi, you can refer Raspberry GPIO Access.

B. IR SENSOR

IR sensors (Infrared sensor) are modules which detect the presence of objects before them. If the object is present it give3.3V as output and if it is not present it gives 0 volt. This is made possible by using a pair of IR pair (transmitter and receiver), the transmitter (IR LED) will emit an IR ray which will get reflected if there is a object present before it. ThisIR ray will be received back by the receiver (Photodiode) and the output will be made high after amplified using an op- amp link LM358. The IR Sensor used in this project is shown above. Like all IR sensor it has three pins which are 5V, Gnd and Out respectively. The module is powered by the 5V pin from Raspberry Pi and the out pin is connected to GPIO14 of Raspberry Pi. The potentiometer on top of the module can be used to adjust the range of the IR sensor.

C. RASPBERRY PI

The raspberry pi board comprises a program memory (RAM), processor and graphics chip, CPU, GPU, Ethernet port, GPIO pins, Xbee socket, UART, power source connector. And various interfaces for other external devices. It also requires mass storage, for that we use an SD flash memory card. So that raspberry pi board will boot from this SD card similarly as a PC boots up into windows from its hard disk. Essential hardware specifications of raspberry pi board mainlyinclude SD card containing Linux OS, US keyboard, monitor, power supply and video cable. Optional hardware specifications include USB mouse, powered USB hub, case, internet connection, the Model A or B: USB Wi-Fi adaptoris used and internet connection to Model B is LAN cable.

D. LCD DISPLAY

An electronic visual display made up of liquid crystals. In this project, a 16X2 display is used. This kind of displays canbe found in a wide range of applications in the industries.

E. SERVO MOTOR

Motors are machines that operate to produce motion. This can be simply explained as changing of electric power intomechanical power. Electric current and the magnetic fields in a motor interact to produce force in the form of torque which in turn moves the motor shaft. For a motor to produce that mechanical power, we need to provide it with adequate electrical power voltage range. This is because high voltages will mean increased power to the motor whichresults in wear and tear that can cause the motor to break.

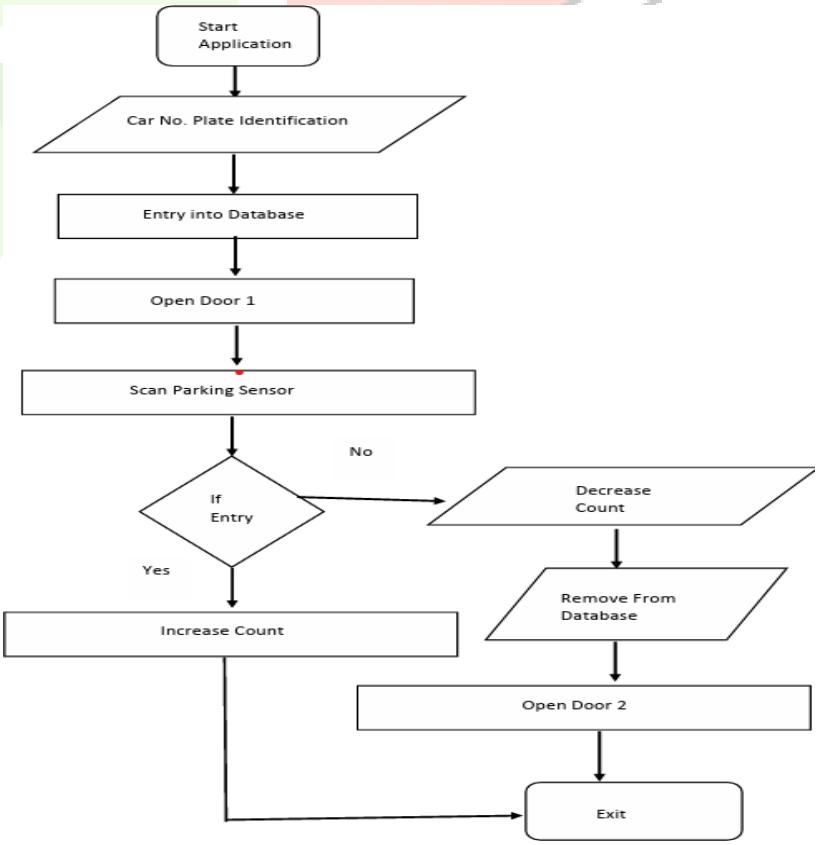
V. IMPLEMENTATION

WORKING PRINCIPLE

In this proposed system the check-in and check-out of the vehicle are maintained and controlled using a database. For thedesign of the system, both hardware and software are being used. Information of all the vehicles are stored in the databaseand the respective tags and their tag ids are provided to the users, so all the information can be accessed by the system. When the vehicle checks in, the reader reads the data of the tag. If there is no tag on the vehicle than the barrier will remain closed. Now the reader will read all the information about the tag and transfer that information to the software. Now that software compares the information of tag with the database and if the id of tag matches than barrier gate will open and if the id doesn't match than barrier will not open. When the vehicle goes out from the parking lot, the identification information of the vehicle is searched in the database. If it is an authorized vehicle and does not have unauthorized access, then only the vehicle will be allowed to check out otherwise the gate will not open.

1. When the authorized user comes at the entry gate and camera will Sean number plate.
2. We will check user information into database and balance in his account.
3. If user is not in database, then new user is created.
4. Then servo motor open the gate. We are using 2 servo motor for entry and exit.
5. Motion sensor will scan the car and car will go to parking area.
6. In parking area IR scanner is used to detected the space and display the number of empty space in display in lcd.
7. Entry and exit time is used for count the time of the vehicle.
8. When the user leaves the space our counter counts the vehicle in the parking space and how many vehicles are leftfrom the parking space
9. All history of parking area is maintained in our database.

VI. FLOWCHART



VII. RESULT

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VIII. CONCLUSION

In this project, it has been proved that using RFID tags and reader with a database we can develop a secure and well managed parking lot. This project not only provides atomized parking but we can also manage records in a better way. By using a centralized database system easy administration and access are possible. The admin can easily keep a check on the vehicles that are entering and leaving according to the date and timing. If this system is installed in some universityor school for the teacher's parking than we can expand the system to keep the track the attendance of teachers by keepingthe track of vehicles that are present in the parking lot. By using this system, personnel cost will cut off and the traffic jam problem will be solved by the faster check-in and checkouts. By expanding this system we can also use this system to collect revenue for parking in an efficient manner. In this system, we can use the LED display which can keep an account of the number of cars or the vacancies left in the parking lot.

The invention originates from the thirst of researchers to develop a low cost, lightweight, highly reliable, and userfriendlymonitoring system that can be used in important places such as business complex, office parking, or residential parking.An ANPR system encourages a smoother parking process and an easier way to manage site security for employees and guests. The aim is to monitor vehicles without any human intervention and send the details to the person in charge of theplace at the time of vehicle entry. This can potentially improve staffing, develop better procedures,

XI. REFERENCES

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