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IOT Based on Vehicle Parking Manager

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Abstract-- The main objective of this project is to design solution for overcoming the parking issues that exist in public places such as malls, multiplexes etc. especially on weekends. The aim is to achieve this by using the concept of Internet of Things (IoT), wherein an Android Application is created for the customer, whose details are constantly updated by the hardware/server at the location. The features include unique identification for each vehicle, display of available parking slots on the mobile application, possibility of making reservations for the same, maintenance of a database (for the management).

Keywords: **Code, Internet of Things, Android Application. QR**

I.INTRODUCTION

Nowadays, a problem of finding parking slots for vehicles is observed in malls mostly on public holidays and weekends. It has been observed that a considerable amount of time gets wasted while trying to find a vacant spot at large public parking spaces, and if no parking slots are available, then the parking has to be done elsewhere,

Thus resulting in more time being wasted Vehicle Parking Manager is a concept where technological solutions are designed to overcome these issues. They can be avoided if a person is enabled to book the parking slots in advance.

The cost-effective technology used in this project enables customers to check if parking slots are available at a specific location such as a mall or a movie theatre and also to book an available slot for a specific period for their vehicle using the same. This can be done on a mobilephone using an android application .This application can be managed by an administrator at the malls and multiplexes. The customer information and the booking details are stored on a continuously-updating central server. The payment for the booked slot can be done via deduction of the amount from the customer's account which can be refilled online itself.

The vehicle can be parked at the book ed slot after verification, for which hardware is used. This project primarily makes finding parking systems more efficient and less time-consuming, and also eliminates the need of a large staff to be employed for such purposes at these places, thus increasing the profit margins.

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II. LITERATURE SURVEY

The intelligent systems for car parking has been proposed by making use of Image processing . In this system, a brown rounded image on the parking slot is captured and processed to detect the free parking slot. The information about the currently available parking slots is displayed on the 7-segment display. Initially, the image of parking slots with brown-rounded image is taken.

The image is segmented to create binary images. The noise is removed from this image and the object boundaries are traced. The image detection module determines which objects are round, by estimating each objects area and perimeter. Accordingly, the free parking space is allocated. A vision based car parking system is developed which uses two types of images (positive and negative) to detect free parking slot. In this method, the object classifier detects the required object within the input. Positive images contain the images of cars from various angles. Negative images do not contain any cars in them. The co-ordinates of parking lots specified are used as input to detect the presence of cars in the region. Haar-like features are used for feature detection.

However, limitations may occur with this system with respect to the type of camera used. Also, the co-ordinate system used selects specific parking locations and thus camera has to be at a fixed location. Limited set of positive and negative images may impose limitations on the system. Number Plate Recognition technique for developing autonomous car parking system uses image processing basis to process the number plates of the vehicles. In this system, the image of the license number plate of the vehicle is acquired. It is further segmented to obtain individual characters in the number plate.Display of total parking slots in the parking lot. number of parking slots, available, occupied parking slots and the reserved parking slots.

III.PROPOSED SYSTEM

The system will require a Raspberry Pi with various IR sensors attached to it. The IR sensors will determine the parking status. The operating system of the raspberry Pi is Raspbian and to see the status of the parking in the parking lot we use the display unit for monitoring and remote server page. The parking lot setup (Raspberry Pi and IR sensor) will be accessible to the server over Internet of things. The server webpage will be used by users to check the parking status on their cell phones, and hence it will be the User interface of our project. The Raspberry Pi is interfaced with the IR sensors to determine the parking status will be the hardware setup of the project. Hence the raspberry pi becomes the hardware module of the system.

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IV.BLOCK DIAGRAM

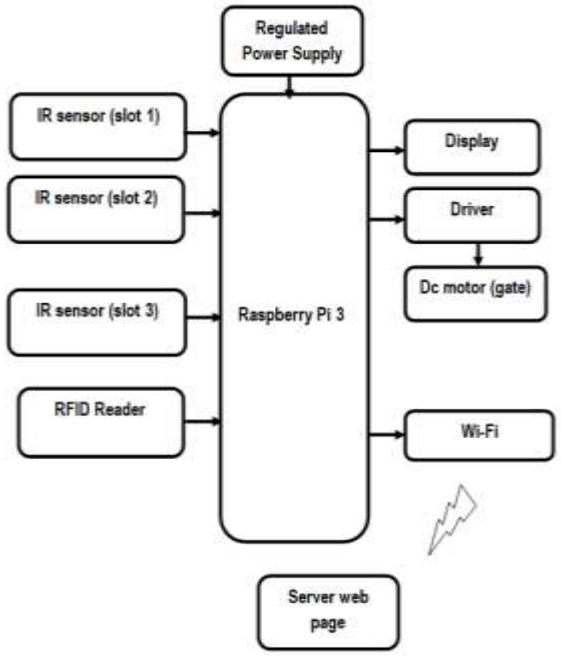

Fig.1: Proposed block diagram

. Specifically, some of the cameras with zoom-lens and motorized head can capture license plate numbers by tracking the vehicles when they enter or leave the parking lot. Other cameras with wide angle fish-eye lens will cover large parking spaces, and detect the parked parking lot via artificial intelligence. Deep learning algorithms will be used to identify occupied, vacant, and special parking spots, for example, disabled parking signs, carpool signs. Through the intelligent algorithm, we can significantly reduce the number of sensors and cameras of existing systems, while achieving a higher level of service quality. To further reduce the computational complexity of the deep learning algorithms, we propose a custom convolutional neural network that can be run on top of edge devices in real time. When compared with existing state-of-the-art approaches, our solution can achieve the same level of detection accuracy with a lower computational complexity. Along with the detected license plate numbers of vehicles, our system performs data fusion and object association from multiple cameras and enables applications such as keeping track of the duration of a vehicle's stay in a particular parking spot.

V.COMPONENTS DESCRIPTION

A. Raspberry Pi

The Raspberry Pi is a series of credit card-sized single-board computer which in this project has been used as a microcontroller.

Specifications of Raspberry Pi 3:

- A 1.2GHz 64-bit quad-core ARMv8 CPU
- 802.11n Wireless LAN

Bluetooth 4.1

Bluetooth Low Energy (BLE)

- 1GB RAM
- 4 USB ports

● 40 GPIO pins

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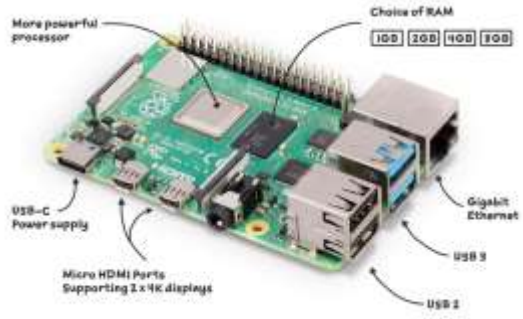

FIG.2: Raspberry Pi

• Combined 3.5mm audio jack and composite video

Camera interface (CSI)

Display interface (DSI)

• Micro SD memory card slot

• VideoCore IV 3D graphics core.

B. Raspberry Pi Camera Module

The Raspberry Pi camera module can be used to take high- definition video, as well as s tills photographs. It has a 5MP fixed-focus camera that supports 1080p30, 720p60 and VGA90 video modes, as well as stills capture. It is attached via a 15-cm ribbon cable to the CSI port on the Raspberry Pi. In this project, the camera module is being used to scan the special QR codes generated uniquely for each customer's vehicle. The camera module is connected to the Raspberry Pi at the gate of the parking system which scans the QR code of the vehicle, fe eds the data encoded in the QR code to the central machine.

FIG.3: Raspberry Pi Camera Module

C. Ultrasonic Sensors

Ultrasonic sensors are used for distance measurement where a transmitter emits an ultrasonic wave in one direction, and interfacing starts timer when it is launched. This wave propagates through giving us the air, and is reflected back when it encounters obstacles on determine the way. The receiver will then stop timer the moment it implement receives the reflected wave. As ultrasonic spread velocity is 340m/s in air, based on the timer record t, the distance(s) can be calculated between the obstacle and transmitter.

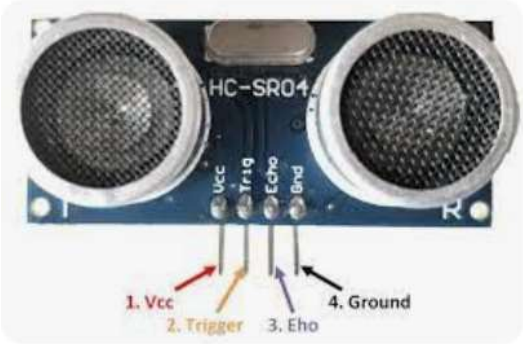

FIG.4: Ultrasonic Sensors

D. Servo Motors

A servo motor is a rotary actuator or linear actuator that allowsfor precise control of angular or linear position, velocity acceleration. It consists of a suitable motor coupled to a sensor. servo motor is a rotary actuator or linear actuator that allowsfor precise control of angular or linear position, velocity acceleration. It consists of a suitable motor coupled to a sensor

FIG.5: Servo Motors

E.IR SENSOR

An infrared sensor (IR sensor) is a radiation-sensitive optoelectronic component with a spectral

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sensitivity in the infrared wavelength range 780 nm … 50 µm. IR sensors are now widely used in motion detectors, which are used in building services to switch on lamps or in alarm systems to detect unwelcome guests.

FIG.5: IR SENSOR

F.RFID

Radio Frequency Identification (RFID) refers to a wireless system comprised of two components: tags and readers. The reader is a device that has one or more antennas that emit radio waves and receive signals back from the RFID tag.

FIG.6: RFID

VI. OPERATION

[1] The Raspberry Pi camera module scans the QR code containing registration details of the car entering the parking slot and after scanning the QR code, checks if there are any reservations.

[2] If reservations have been already do ne, then the account of the customer is checked for proper balance.

[3] If all the above conditions are fulfilled, then the gate (Servo Motor) at the entry opens and car is allowed inside along with deduction in the amount as per to the time forwhich the parking slot has been reserved.

[4] Once the car enters the parking slot, the ultrasonic sensor gives an indication of the same and thus the status of the parking slot is updated.

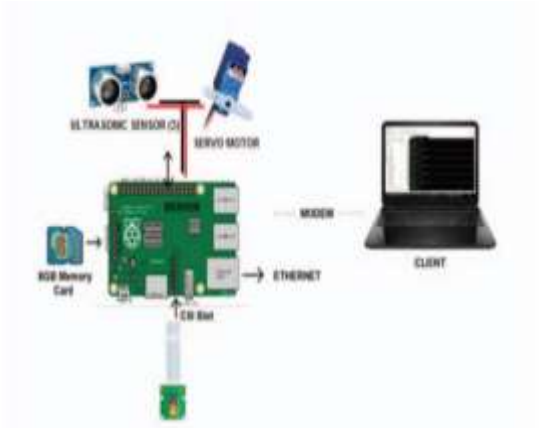

FIG.7: DESIGN OF IOT BASED ON VEHICLE PARKING

VII. RESULTS

The sensors, the servo motors and the camera module have so far been successfully interfaced with the Raspberry Pi to give us the proper functionality of the hardware side of the system. When ultrasonic sensor readings are below a certain threshold (distance between sensor and the ground surface) the presence of a vehicle is indicate d. The servo motor acts as t he gate mechanism for the slot, where the incoming vehicle is allowed to be parked after verification. The motor blade rotates 90 degrees back and forth which corresponds to the opening and closing of the gate. The camera module is efficiently able to scan the QR code where the registration details such as Customer name, contact number and vehicle registration number are s uccessfully deciphered from the QR code in which they were stored, for the purpose of verification.

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FIG.8: MobeXterm SSH Client

VIII. CONCLUSION

The current model of the project is simply a prototype of a bigger-scale version which will be developed in due course of time. This model helps us to understand the basic working and interfacing of the various components used in the project, giving us an idea of how they work on a local network and to determine the flaws which must be ove rcome before being implement.

ACKNOWLEDGEMENT

It is with great pleasure that we submit this project entitled "IoT based Vehicle Parking Manager." We take this opportunity to thank those involved directly or indirectly with this project. Without their active co-operation, it would have not been possible to complete this project on time .initial stage of project and offered us valuable suggestions for developing the project in a systematic and presentable manner.

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