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Smart Parking Based On Reservation System Using Raspberry-Pi

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ABSTRACT
In large malls or even for other outside parking, not getting a parking and getting to know the unavailability of parking area after reaching the place is a problem. Besides, the loss of petrol, diesel or CNG gas and also pollution caused because of it is another problem. The proposed project is a smart parking using reservation system that provides customers easy way of booking a slot time. This technology overcomes the problem of unavailability of parking in commercial areas. This project offers a web-based reservation system where the users can view various parking slot available and select the space. If the parking is available then he/she can book it for specific time slot. The booked area will be marked Red for the specific time slot. Additional feature of QR code is added. Once the slot is booked the customer will receive the QR code which will be scanned at the gate to ensure that the person who has booked the slot is entering. Once the QR code is scanned the barricades will open. This is for the security purpose.
K**eywords:** Smart Parking, Reservation, QR code, Sensors, Raspberry-pi.

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I. INTRODUCTION

Finding a parking space is tiring and disappointing if you are unable to find one. A study shows that every car driver wastes on average about 100 hours a year looking for a parking space, which accounts for one third of city center traffic [1]. Growing traffic volumes, increases air pollution, rising costs: A mobility solution cannot solve all infrastructure challenges on its own. But it will always contribute to making your city or municipality even more modern, more attractive and more environmental friendly.[6] The smart parking system can be a huge time saver for drivers. Our project makes use of Internet of Things. It is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, and connectivity that enables all these objects to connect and exchange the data [7]. Our system makes use of a website to book a parking space. After booking a parking slot the user is provided with a QR code. This QR code is scanned to verify the user. IR sensors are used at every parking slot to detect the car and keep count of the number of cars inside the parking complex.

II. LITERATURE SURVEY

In Smart parking using RFID and GSM Technology we saw that RFID is used to keep the count of the cars inside the Parking area. There are two types of membership:
a) Permanent member b) Visitors pass

Their system also makes sure that the person leaving the parking area is the same person who had parked the vehicle The GSM provides SMS notification. We saw few advantages. It is Cost efficient. Installation is easy, small in size. There were few disadvantages as well. If the RFID tags are damaged or one or more tags are red at same instance, the system will fail to work accurately.[3].In another paper ,i.e. A Cloud based Smart parking system based on Internet of Things Technologies They have used 2 RFID sensors: One RFID sensor is to get into the parking lot and the other RFID sensor is to get out of theparking lot. This way they are able to keep count of the cars inside the parking space. They have used an Arduino Board to implement their project. Along with theArduino Uno R3 board they have also used an Arduino Ethernet Shield. They have also used an Android app for booking a parking slot. The application was user friendly. Project makes sure of no human interference. Due to the use of 6 hardware (including Relay and Buzzers) the installation is moderately difficult. If any hardware

fails, the system will not perform accurately.[2].In the paper named

'Advanced car parking using Aurdino' they have implemented the smart parking system using Arduino. The project has been subdivided into 4 sections i.e. arduino controller systems, display to show available parking spaces, sensors(IR to sense car and vacant spaces) and RFID for authentication, and database to store the information about the user. It contains the authorization details like car number and about driver. Authentication is maintained. Easy installation Heating issues due to IR sensor.[4].In Zigbee based time and energy efficient smart parking system using IOT Arduino along with Zigbee sensor was used. The information was fed to the driver via a smart phone. The system notified about the nearby parking places. The information was communicated between the sender and receiver via time and energy efficient way. IEEE Standard used was 802.15.4. Topology used in project was Mesh topology. Zigbeehas following advantages. Zigbee sensor gives the real time notifications. Compared to other popular wireless technologies such as Wi-Fi and Bluetooth, Zigbee is more energy efficient. Zigbee sensor has indoor range of 40m and outdoor range of 120m which is much more than the Wi-Fi and Bluetooth. The only disadvantage was seen that Arduino along with sensors and LCD makes the model bulky and installation little difficult.[5]

III. ARCHITECTURE

Our project is Smart Parking using Reservation System. The booking of the Parking Slot is done using a Website. The IR Sensor is used to detect the vehicle in the parking slot and then the data is sent to the database. If the IR sensor detects a vehicle in the parking slot the database stores the value ONE and the slot appears to be booked in the website page. When the User books a parking slot he/she is provided with a QR code or an OTP. When the user arrives at the parking slot he/she is asked to show the QR code at the entrance. The QR code is scanned and if it matches he/she is allowed to park his/her car inside.

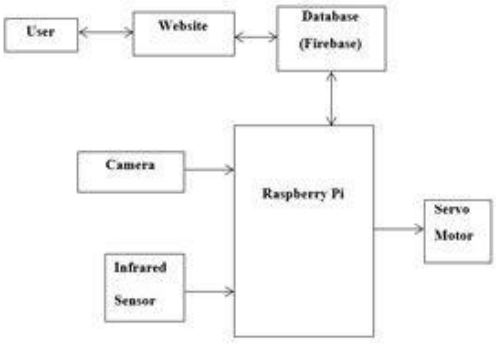

Figure.1 Block diagram

IV. MODELING OF SMART PARKING SYSTEM

The figure below shows the modeling of smart parking system. Raspberry-pi B+ is interfaced with IR Sensor, Servo motor and Webcam. Firebase act as a real-time database.

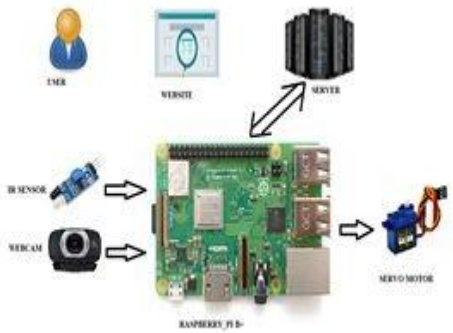

Figure.2 Modeling system

V. WORKING OF MODEL

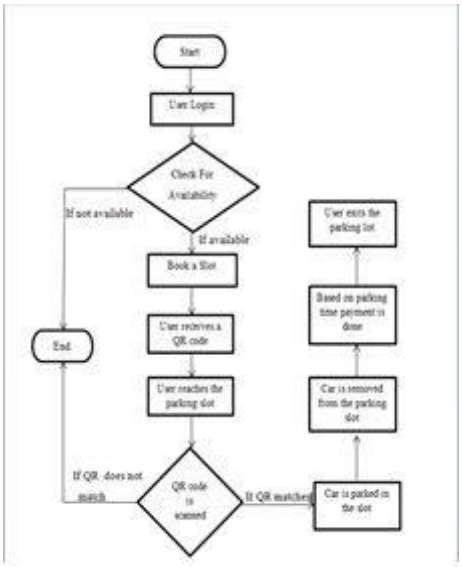

Figure.3 Flow chart

VI. RESULT OBTAINED

After the sign in for the booking of the parking slot the user receives the unique QR code. When the car enters the parking area, the obtained QR code during the booking will be scanned before the barricade. The QR code will be scanned by the webcam. The webcam scans the QR code. This is used to maintain authentication. Information was communicated between the sender and receiver via time and energy efficient way.

Figure.4 Sign up page

Figure.5 Login page

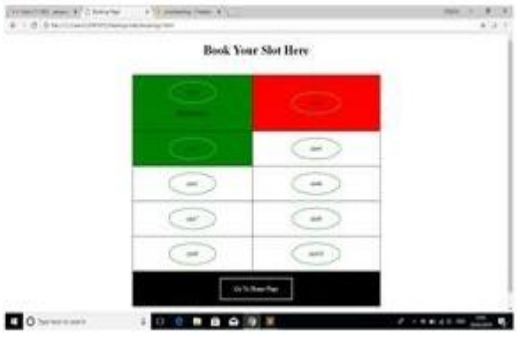

Figure.6 Availability

Figure.7 User Login

Figure.8 QRCode

CONCLUSION

The rapid urbanization of the world has made the concept of smart cities gain momentum in the international agenda. The transformation of cities into smart cities is a golden opportunity to improve citizen welfare and foster economic progress. A Smart Parking System has been designed to initialize the concept of Smart City. The Smart parking system allows the drivers to park the vehicles on the basis of availability of parking space. This ensures smooth parking and avoids congestion of vehicles. Internet of Things stands out to be the indispensable technology imposed along with Cloud Computing. The sensors used to detect the vehicle were the essential components. Here, we have employed Raspberry-pi 3B+ which is cost efficient with easy installation and maintenance. This initiative facilitates parking issues and decrease traffic congestion and pollution created by the search for parking.

VII. FUTURE SCOPE

1. Face & License plate Recognition

The idea of face & license recognition for security purpose in order to check that it is the authorized person who is driving the car. This will prevent the theft issues. The raspberry-

pi camera/Webcam can use OpenCV for creation of dataset of the user's face and then it is merged with the dataset to recognize the user's identity. It will check the user's face and license plate during the entry and exit of the parking.

2. Payment & Booking Cancellation

The website can be modified and online payment, cancellation of the booking and editing the booking can be implemented.

3. Zigbee Sensor

To implement the idea of smart parking for large area Zigbee sensor can be used. It is a communication sensor it will use the GPS and notify the driver about the nearest parking available. Zigbee sensor gives the real time notifications. It is more energy efficient. It has indoor range of 40m and outdoor range of 120m which is much more than the Wi-Fi and Bluetooth.

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