

Android and IoT-based cloud-based smart parking system

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Abstract:- Cloud computing is one of the technologies that has most significantly altered the nature of business in recent years. The Internet of Things is another technical innovation that has altered people's daily life. Real-time problem solving is possible when cloud computing and the Internet of Things are integrated. Our goal is to develop a more sophisticated intelligent parking system by combining cloud computing, Internet of Things, and Android application technologies. This article presents an overview of the process of building an intelligent parking system using an architecture diagram. To differentiate our mechanism from other current systems, we aim to reduce the physicality and reliance on humans as much as possible by automating the cars and the parking lot overall. To reduce traffic congestion, the parking lot needs a better system that can measure available space, offer services, and show information to people looking for open space. The reservations are made only by the user. Thus, using an Android application and internet connectivity, the user locates the empty parking lot with the driver's knowledge and makes the reservation.

Keywords:- *Internet of Things, Android Application, Raspberry Pi, Smart Parking, Cloud Computing.*

I. INTRODUCTION

In the development of traffic management systems, an intelligent parking system is needed to reduce the complexity of parking and for optimal use of resources for car- park owners. Currently, the common method of finding a parking space is manual where the driver usually finds a space in the street through luck and experience. If the driver is traveling in a city with a high vehicle density, this strategy can be time-consuming and, in the worst case scenario, result in them being unable to find anywhere to park. The alternative is to find a large, reserved parking area. However, since the parking lot could be far from the user's destination, this isn't the ideal choice.

The Internet of Things (IoT) has revolutionized many areas of life, including smart parking system (SPS) technology, in order to address the issues described above and benefit from the tremendous advancements in technology. The current study suggests and creates a cloud-based and Internet of Things-based smart parking system solution. Every parking lot is built by our system as an IoT network, and the data center will receive the number of open spots in the parking lots. With the help of several state-of-the-art technologies, the SPS can manage and monitor parking lots autonomously. Moreover, each parking lot in the proposed system can function independently as a traditional parking lot. This research also implements a system prototype with wireless access in an open-source physical computing platform based on Raspberry Pi, using a smart phone as the communication and user interface for both the control system and the vehicles, to verify the feasibility of the proposed system.

II. LITERATURE SURVEY

In the paper titled "A Cloud-Based Smart-Parking System Based on Internet-of-Things Technologies" published on IEEE Xplore on 09 September 2015, the authors have presented how to use of RFID and Arduino through manage parking lot and algorithm of the system operations to obtain a proposed system in real world.

In the paper titled "APPARKING: Smart Parking System based on Cloud Computing using Android and IoT" published in International Journal of Emerging Technology and Advanced Engineering, the author have presented how to use of Dijkstra's algorithm and MD5 algorithm and the android app which is used to implement the parking system and it is attached with Raspberry Pi.

III. PROPOSED SYSTEM

The project smart parking slot booking system is designed by the combination of hardware and software. As per the software part is concerned it is done in the Android application

that is used for developing a mobile application that will have access to the information given by the raspberry pi. The raspberry pi is the core of the hardware and it is the most important component of the hardware part. DC power supply is used for giving supply to the circuit. An Ultrasonic sensor is employed at each parking slot and it will tell whether its parking slot is vacant or not. A motor driver circuit and a DC gear motor is connected to the microcontroller that is used to control the barrier at the entrance of the parking. At the entrance gate user will verify the booking details via QR code scanner and then the barrier can be opened or closed by the authenticated person. LCD is connected to the microcontroller which displays the number of devices that have been parked and the buzzer beeps when the parking space is filled. The information about the vacant or filled slot is sent to the microcontroller and the microcontroller sends this information on the designed application through Cloud server module that is connected to it. The Cloud server module sends the information to the application through Internet of Things and the command about opening or closing the barrier is sent from the application through the Cloud server module to the microcontroller, which through a motor driver circuit and a DC gear motor controls the functioning of the barrier. In software part user can view the booking history, tracking parking zone via google map, QR code generation and also provides the email notification of the booking details.

IV. SYSTEM ARCHITECTURE

A. Online Booking using Android application.

In urban areas finding parking space is difficult in rush hours. So here we developed Android application we can book the parking slots in advance like movie tickets booking online. We can book the parking slots by using a mobile app. The booking procedure explained in the below flow chart. Cloud Database provides parking availability information; if there are any vacant slots available then we can book the interested slot and complete the payments through e-wallet. When we finished booking, the database is updated with current availability.

B. Parking Entrance System

This parking entrance system uses IR sensor, DC motor, LCD display and a QR code reader. IR sensor is used to give the access of the car, DC motor is used to open the barrier, LCD is used to display the parking information and QR code reader is used to detect the car details like car number, owner name etc. After detecting the car number, If the user booked online his parking space then gate is opened and can move inside. The LCD displays the allotted parking slot and parking status also. This allotment details continuously updated to database.

C. Parking Management System

This part provides directions to the owners to park their car correctly. Here each slot allotted by one Ultrasonic sensor and a buzzer. Initially it will check the slot is assigned or not, if it's assigned then LED green turns 'ON'. If any car entered in the parking slot then Ultrasonic sensor detects, LED red turned 'ON' and LED green goes 'OFF'. If buzzer 'ON' user can understand he parked his car wrongly then he can

Have left the slot and goes to his allotted slot. This data continuously updated in database.

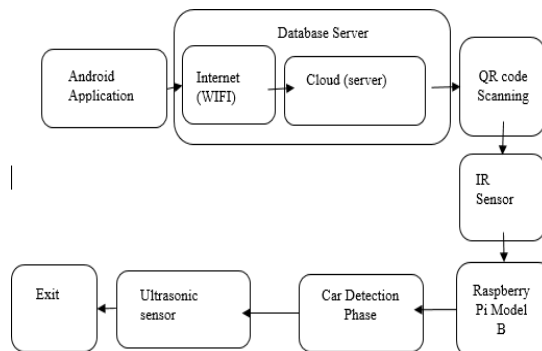
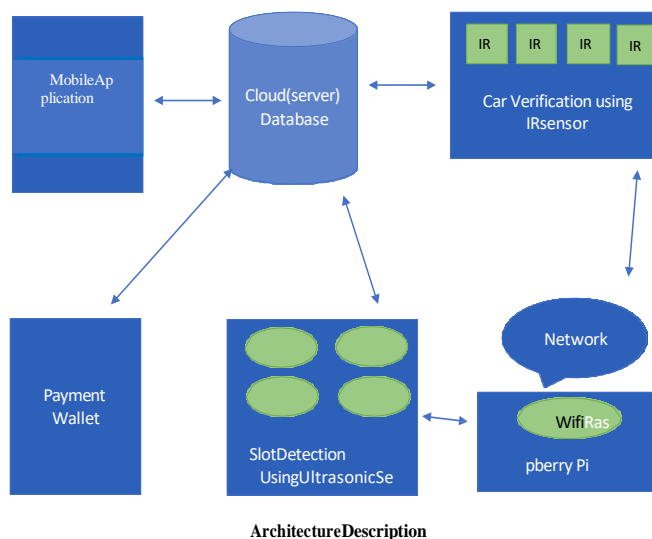


Fig.1:-Architectural Diagram of proposed system

V. IMPLEMENTATIONMODULES

The proposed system consists of these modules:

A. Android Application Module:

- Sign Up: User will open the application and new user will register on this application (Registered Information like Name, upload a photo, car number, contact number, email id)
- Login: Registered user will Login in into this application and get the required services
- Forgot Password: User scan recover their password through email
- Time Duration: Users will book the parking slot according to their timing.
- E-Wallet: After the successful booking according to their timing calculate the amount and pay through the e-wallet.
- Message generation: After the payment confirmation message users will get it on mail
- QR code generation: Generates QR code for users who has booked the parking slot.

- Android Application UI: Display the Parking Slot, Payment Gateway through e-wallet, GPS tracking feature using Google map

B. Hardware Module

- Main Entry: Scan the QR code and IR sensor through get the main entry access.
- Car Detection: Each parking slot has ultrasonic sensors whenever car enters in the parking slot Ultrasonic sensor detects the car and its details send to the cloud and save it.

VI. ADVANTAGES

- Users can get to know about parking areas for different locations.
- Provides a graphical view (Android application) for parking spaces.
- User can pay through online transaction and confirm their slot for parking.
- It reduces the need of human resource for managing parking spaces.
- System generates bill for your booking and even sends a confirmation email.
- Cost-effective.
- Optimizing Parking Space.
- Using IoT technology will help traffic in the city flow more freely.
- Smart Parking enables better and real time monitoring and managing of available parking space, resulting in significant revenue generation
- It is based on modern thoughts and innovations that guarantee perfect results and functioning.

VII. CONCLUSION

The parking space is the first and most important concern for everyone visiting an entertainment complex or market. The suggested app assists users in locating and reserving a parking space. It assists users in determining whether a parking space is available, getting confirmation of that availability, using a Google map to locate the parking area, and arriving at the designated location within the designated time frame. The suggested strategy helps consumers save time while scheduling a parking space.

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