Parking Slot Booking System using IOT

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ABSTRACT:

The escalating problem of finding parking spaces in urban areas and large organizations has led to the need for innovative solutions. To address this issue, we present a "Parking Slot Booking System Using IoT" that offers a smart and efficient way to manage parking spaces.

Our system utilizes IoT devices such as Arduino Uno and infrared (IR) motion sensors to monitor parking slot availability in real-time. A user-friendly web application allows users to check the availability of parking slots, book slots in advance, and pay for their parking sessions seamlessly.

The system aims to reduce the time and effort wasted in searching for parking spots, alleviate traffic congestion, and optimize parking space utilization. By providing users with real-time information about parking availability and automating the parking process, our system enhances user convenience and reduces environmental impact.

Keywords: Parking Slot Booking, IoT, Arduino Uno, Infrared Motion Sensors, Web Application, Real-time Monitoring, Traffic Congestion Alleviation.

INTRODUCTION:

The mostly found common problem in urban areas and the organizations that provide services to large numbers of people such as government agencies, universities, department stores and hospitals, is the unable to find car parking areas. This problem is the result of the continually increasing number of vehicles. Furthermore, the car parking management is also insufficient, and the service users thus waste their time and fuel searching for an available parking space, and the tremendous growth in the number of vehicles on road in past few years, has created in huge parking crisis especially in urban areas. At such times online parking systems are the need of the hour.

The users will be provided with the website, using which they will know about the availability of the parking slot on their mobile phones. This system aims at replacing the conventional parking system with an IOT-based parking system by using IOT devices such as Arduino Uno and different sensors. When the user will visit our site, he will log in on our website, then he will be shown too available,

booked and occupied parking slots of the parking lot, then he will choose an empty parking slot. Then our system will mark that slot as booked slot. The slots which are already booked and occupied, will not be available to book for the next user.

If the slot is booked and the user brings his car to the booked slot then our sensors will get to know that the car is parked here and the slot will be marked as occupied. Then user will have to pay for the time for which he is holding that slot. The time will be considered from the booking of parking slot to the exit from parking slot.

With just a few taps on your smartphone or any internet-connected device, you can effortlessly find and book the nearest available parking spot, eliminating unnecessary stress and time wastage. In this way, our system will reduce the time and efforts needed for finding the parking slot for your ride, also our system will reduce the inconveniences that occurs due to inappropriate parking

PROPOSED SYSTEM:

React.js technology will be used to develop the frontend of the web application, we will create a user-friendly interface of parking slot booking app, these parking lots will be shown directly on the inbuilt map of the web application, and we will fetch a map API to show the direction to user towards the parking lots. A realistic interface of the parking lot will be shown a web page, so the user can easily find the exact parking spot on the parking lot, to od this we will be using customized CSS file so we can try to replicate the parking lot view. User will pay the reasonable amount for the car parking. After the slot allocation of the parking slot to the user backend will

update the data to the database that the parking slot has been booked by a user, and after the parking of the vehicle on the correct spot motion sensors will detect the vehicle and update to the database that the parking slot is occupied by the vehicle. Other user will able to see that weather the parking slot is empty, booked or occupied, but they will not able to see the information about the booked or occupied slot We will allocate the timeslots for each parking sessions and will charge them properly if user will exceed the time limit penalty will be applied to the user. For the entry and the exit of the vehicle app will authenticate the user, that he is the one who is parking in and out, so if the vehicle moves from its place user will get the notification about it, so automatically a basic level security will get provided. Every user will able to share the experience or the feedback to the developers with help of the feedback panel. • Modules o User Registration: User can create account on our system and this module will authenticate the user and validate it for every session. o Map API: User can search for nearby parking area which uses our system to book parking slots and can navigate to the exact location o Sensors and Microcontroller: Motion sensors will detect the presence or absence of car and send the data to the microcontroller, it will process the data and send to the server. o Database Module: We will create a database on the MongoDB Atlas and connect the React app to the database to upload the frontend fetched data. The data fetched from the sensors also will be uploaded on the database o Hardware implementation: We will place the motion sensors in a perfect position that they will detect the vehicle and send the data to the microcontroller, microcontroller will send the data to the local control system. The local control system will be connected to the internet, through which it will send the data to

the database server. o Cloud Module: All these software systems will be hosted and operated through Cloud server
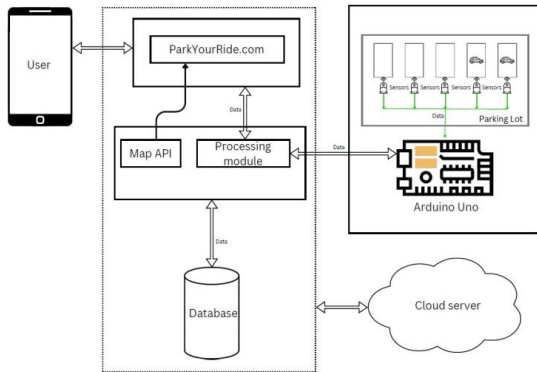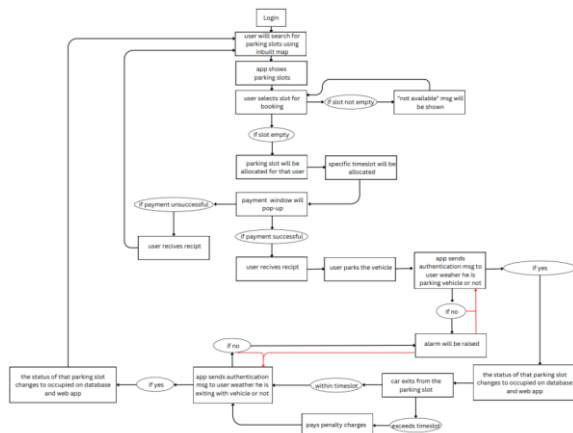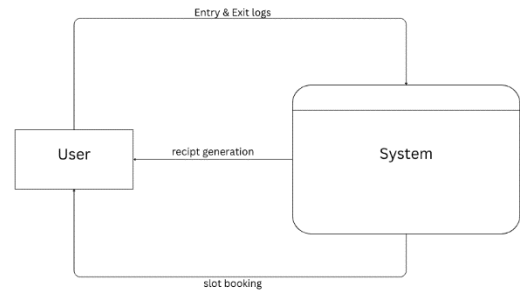

Fig.1 System Architecture
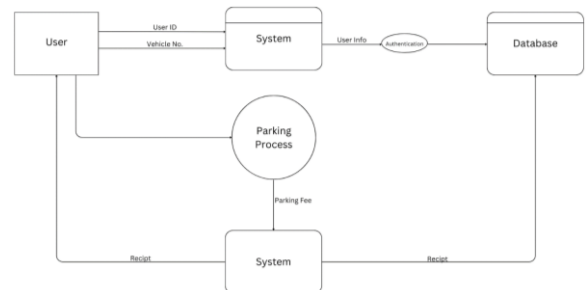

Fig.2 Flow chart

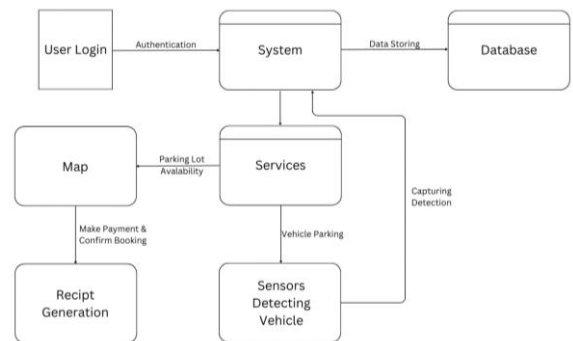
Fig. 3 DFD Level 0

Fig. 4 DFD Level 1

Fig. 5 DFD Level 2

THE METHODOLOGY:

for developing the Parking Slot Booking System using IoT involves a systematic approach to address the parking space shortage issue efficiently. Firstly, we conducted thorough research to understand

existing parking management systems and identified the need for an innovative IoT-based solution.

Following this, we planned out the system's workings, including the use of Arduino Uno and IR motion sensors for real-time monitoring of parking slot availability. Once the planning was complete, we proceeded with system development, which included designing a user-friendly web application using React.js technology. Hardware implementation involved strategically placing IR motion sensors within the parking lot to detect vehicle presence accurately. Additionally, we developed a database management system using MongoDB Atlas to store parking slot availability and user information. Extensive testing and quality assurance were conducted to ensure the system's reliability, scalability, and efficiency. Upon successful testing, we deployed the system on cloud servers such as AWS, Azure, or Google Cloud for accessibility and scalability. Post-deployment, we provided user training and support to ensure a smooth transition to the new system.Finally, we monitored the system's performance, tracking user interactions and system stability, and implemented necessary updates and improvements based on user feedback and system performance data to enhance user experience and system efficiency.

REQUIREMENTS:

Hardware Requirements:

1. Microcontroller: Arduino Uno, Arduino Mini.
2. Sensors: IR motion sensors
3. Connecting cables: Jumper cables
4. Bread board
5. Desktop or Laptop

Software Requirements:

1. Operating System: Android, IOS.
2. Development Technologies: Express, React.js, Node.js, Bootstrap and any required libraries and dependencies.
3. Development Languages: JavaScript, HTML, CSS.
4. Database: MongoDB Atlas.
5. Internet Browser: Google Chrome, Microsoft Edge, Mozilla Firefox
6. Deployment Server: AWS, Azure, google cloud.
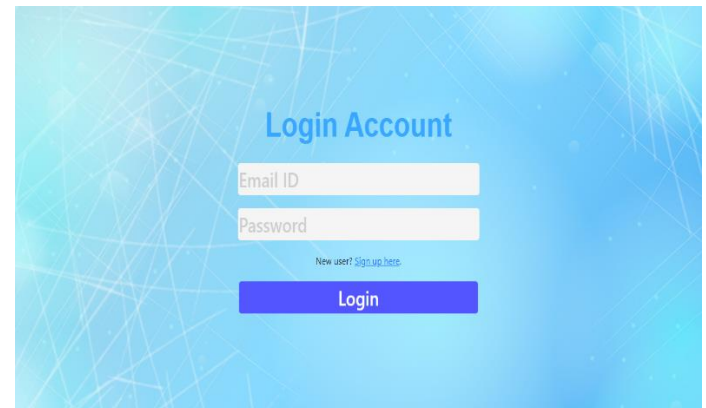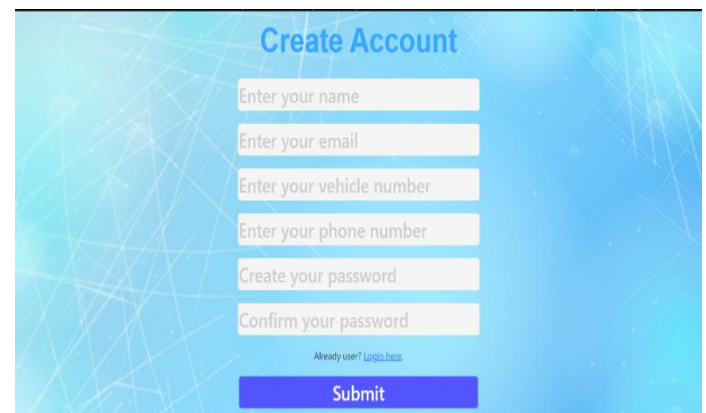
RESULTS AND OUTCOMES:
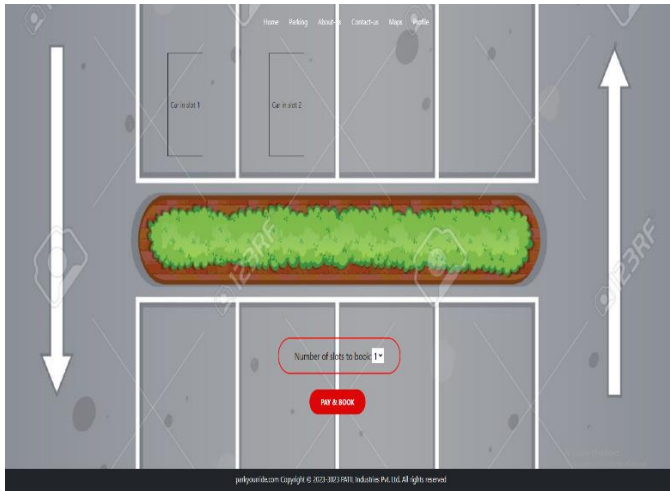

Fig.3 Login Page

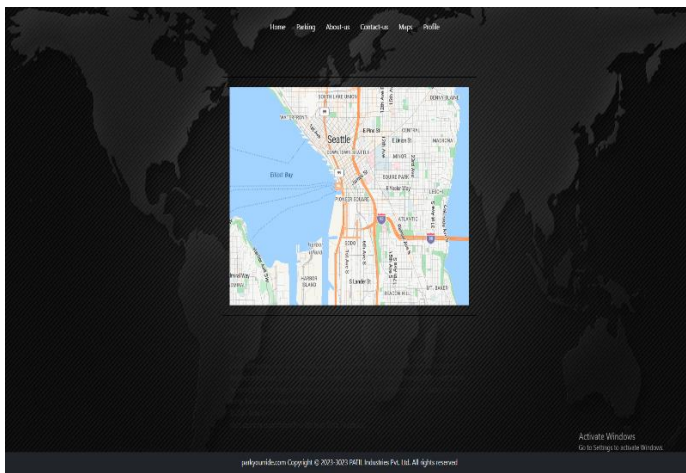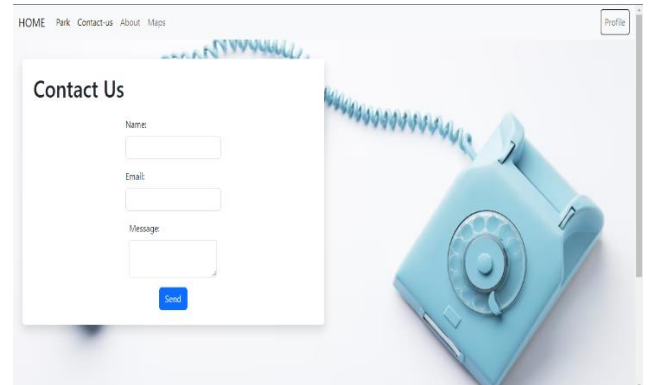Fig.4 Registration Page

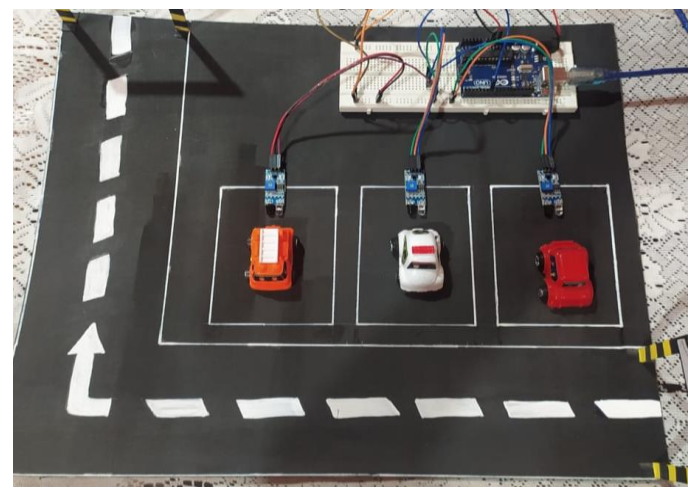Fig.5 Parking slot

Fig. 6 Map API

Fig. 7 Contact us

Fig.6 Hardware

CONCLUSION:

In conclusion, the development of the Parking Slot Booking System using IoT offers a promising solution to the growing parking space shortage issue. By utilizing IoT devices such as Arduino Uno and IR motion sensors, we have created a system that provides real-time monitoring of parking slot availability, thus reducing the time and effort wasted in searching for parking spots. The user-friendly web application, developed using React.js technology,

ensures seamless booking and payment processes for users. With the successful deployment of the system on cloud servers, we have made it accessible and scalable for both users and administrators. Moving forward, we will continue to monitor the system's performance, gather user feedback, and implement necessary updates and improvements to ensure optimal functionality and user satisfaction. Overall, the Parking Slot Booking System using IoT represents a significant step towards smarter and more efficient parking management solutions.

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