

RESERVATION BASED SMART PARKING SYSTEM

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Abstract – It is difficult to find parking space in metropolitan areas, especially in peak rush time. The problem is that the driver does not know the available space at the time. Even if know, most of vehicle may consume limited parking space which leads to traffic congestion and also the time and fuel are wasted in search (blind search) of parking. For this problem, we have designed and developed a prototype of Reservation based Smart Parking System (RSPS), which will allow the users (drivers or owners) to effectively find and reserve the available parking space. The sensor network deployed in parking system will make this system efficient to use. The drivers are allowed to use this system by their personal communication devices. This proposed parking system has the potential to solve the parking problems and also simplifies the parking operations.

I. INTRODUCTION

Finding an available space for parking is a daily thing in metropolitan areas, it is a big concern for the drivers and also very time consuming. It leads to heavy traffic congestion and increases fuel consumption thus increasing pollution. It has been found out that during rush hours in big cities, the traffic generation by blind search is 30-40% of total traffic. For eliminating this and to make it convenient for drivers, many parking system has been made and deployed. The current smart parking system only shows the availability of parking spaces at desired places. But this system has its limitation as it cannot guide the user or driver to the desired available parking destination, so many users may go for limited space and thus lead to congestion. To solve this problem, we develop a reservation based smart parking system which not only shows the real time available parking but also allow the user to reserve the slots for parking. The users will use their personal communication devices to book the slots for a particular period of time and date. This will help the user to save time and fuel thus this system is efficient.

II. BACKGROUND

In this we are focusing on the new system for parking that will allow the user to find parking available in specific areas and thus reduces time and fuel consumption. We study several existing parking system approaches and explain their limitations.

A. Parking Procedures

Blind Search: It is the simple technique used by the users or drivers for parking procedure. In this, the user does not have any information that where the space is available or not. The users keep on searching for the parking to a certain distance from the destination and stops only when a vacant space is found.

Parking Information Sharing (PIS): In this the smart parking system broadcasts the availability of parking spaces to the users then the user can decide upon the availability that where to park. But when the available space is limited and the numbers of users are high during rush hours then several users may run for single space and thus cause congestion.

Buffered PIS: In order to solve the problem of congestion of PIS, the system was upgraded to Buffered PIS. In this, the process was same as in case of PIS but there was some space kept in buffer. The number of available spaces was shown less when broadcasted to user so that in case of heavy rush the buffered space can be used. But it was quite difficult to fund that how many buffered space should be kept. If buffer is less, then the problem will not solve and if the number of buffered space is large then if it is not consumed then it is wasted.

We suggest a reservation based smart parking system to avoid the problems of PIS and BPIS. Although all problems of parking cannot be solved by this but this will be far efficient as compared to other systems. This will allow the user to book and reserve the parking slot for specific time period and date and once the reservation is done successfully then it guarantees the parking space to user.

B. Performance metrics

We give the following metrics which will show the willingness of drivers and users, and our concern for betterment.

Walking distance: It is the distance between the distances from the parking to the destination which can be easily walked. This is the important factor for willingness of parking location. This distance should be less so that it will be convenient for user. In

RSPS, user will choose the parking location accordingly.

Traffic Rush: In the project, the traffic rush is defined as the traffic generated by the drivers in search of parking. The proposed system will reduce the traffic rush caused in search of parking and will satisfy the need of drivers.

C. Challenges

The proposed reservation based smart parking system has few things which can cause a bit problem.

Reservation performance: This system utilizes internet and the users can check the real time parking available and complete the reservation. But the problem comes when many users simultaneously makes reservation. In this case the system has to be synchronized and handle every request efficiently.

- Collection of data and presentation: The system collects and stores the data about the performance metrics, including the status of parking space, reservation time, parking location, driver's identity. The system allows the user to check the parking information, including the location of parking spaces, the vacancy time of parking spaces and reservation information.
- Identity verification: Once the reservation is done, it is important to identify the user at the parking station. If the user is identified i.e. bar code matches, then only user will be allowed park the vehicle else the barriers will not open.

III.

SYSTEM DESIGN AND ARCHITURE

In this section we will show the architecture and design of Reservation based smart parking system.

A. Overview

Fig.1 shows the three components in the smart parking model i.e. user, parking lots and parking system. The management system shows the parking prices and other related information. The user may interact with the system through their personal communication device.

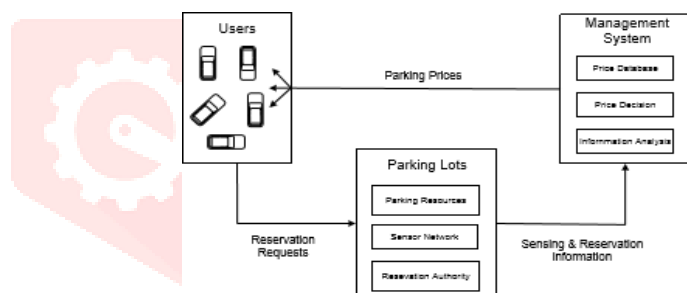
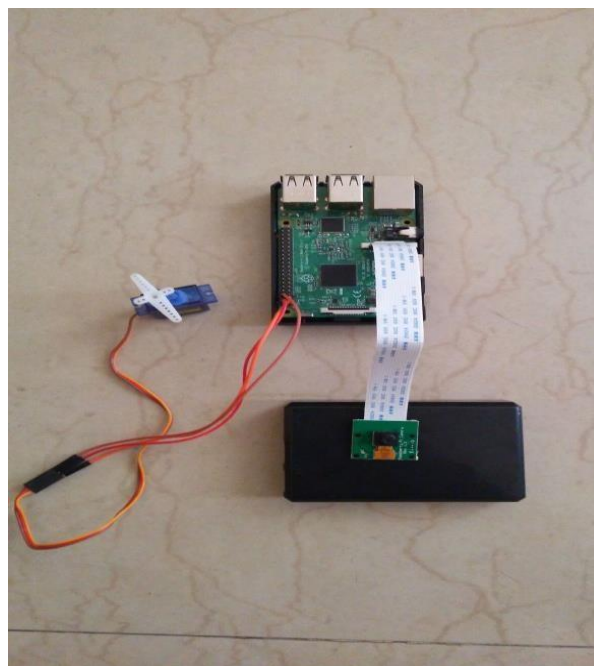


Fig. 1. System architecture

According to the states of parking lots, the system,

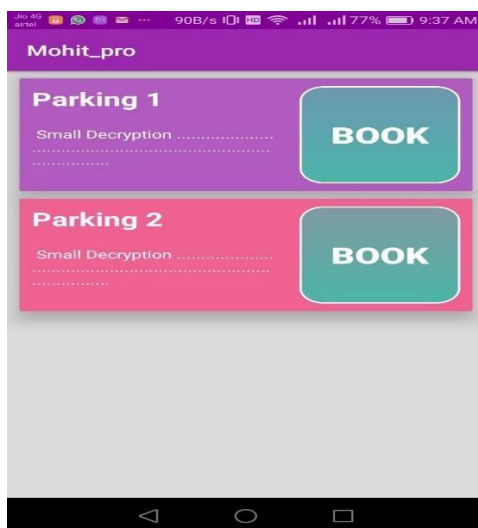
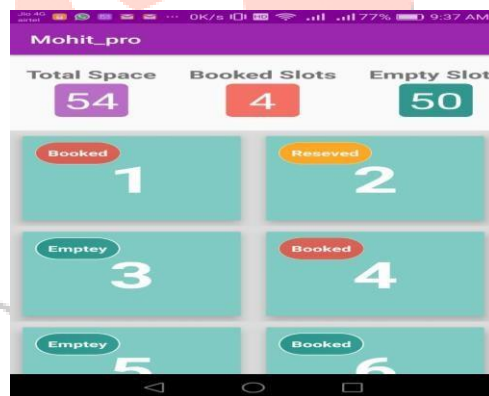
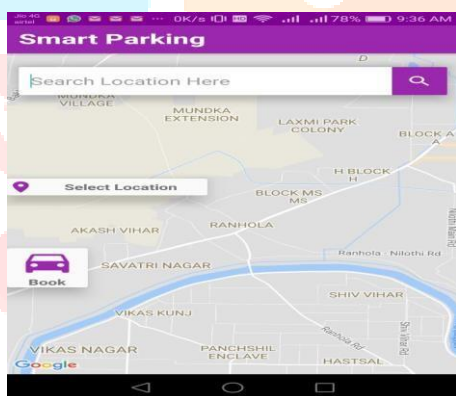
1. Determines the occupancy status and congestion level.
2. Determines the parking prices as per the parking scheme.
3. Periodically broadcasts the prices to users.
4. Save and store the parking information and prices. Hardware

The hardware system is organized by four components i.e. Raspberry pi, camera module, servo motor, user's communication device.



In our project, we have developed functions through raspberry pie that provide a continuous measure of parking status for each space. The mobile phone is used to assess Internet, over Wi-Fi to obtain the information of parking availability and make parking reservation from the Internet server.

SOFTWARE



The software architecture defines that how the communication and process will be done from start to end. The user will do the process from web application or mobile application which will communicate to internet server for parking reservation, the internet server will be connected to raspberry pi module where real time parking information is present. Raspberry pie consists of the coding which helps in carrying out the process of showing available space, parking reservation, and real time information. Also the barcode reader and generator are made which will help to authenticate so that only the valid user can use the parking.


IV. RELEATED WORK

Currently, most work on parking system (smart parking) is from the perspective of the design of system which emphasis on the implementation of a wireless sensor network to detect parking information and provide real time parking service. In addition to this, we propose a parking system which not only shows the available parking space at some place but also provide the service for reserving or booking the parking slot.

V. CONCLUSION

In this we have developed a prototype of reservation based smart parking system (RSPS) to optimize the parking facilities and management. We implement parking reservation policy to balance the benefit of service providers and requirements from the users. Furthermore, we have provided the design and implementation of the prototype. Based on the research and evaluation, we conclude that the proposed system (RSPS) has the ability to eliminate the traffic congestion and fuel wastage up to certain level and provide efficient parking system.

VI. REFERENCE



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