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SMART PARKING AND RESERVATION SYSTEM FOR QR-CODE BASED CAR PARK

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Abstract- *Parking is a problem for almost everyone today so there has to be a solution, which helps getting rid of problems arising due to the lack of a proper parking management system. Although various traditional PGIS (Parking Guidance Information System) exist, they can serve only a few users because it is difficult for such static systems to disseminate information on a wider scale. So the aim of this study is to provide a dynamic solution by introducing the concept of parking guidance system over the internet and also using one of the latest techniques available today i.e. the QR code for the user's ease. The system is basically designed for a college parking which can further be extended as required. This system enhances the components of existing parking system available in the colleges. This system runs on a mobile phone platform and provides a visual display of parking lots available to the user so that the user can book or reserve a space. Six parking spaces were gathered within College of Engineering, and were published on the web map server. The Quick Response QR code is affixed at every parking space. The user can thus select the parking space from the visual display. The user needs to scan the QR Code while parking and unparking the vehicle. The action of the user is then reflected in the database. The android application was thus developed that can incur the parking information which was uploaded on the web map server. This system reduces the time which is involved in searching the parking space thus reducing the fuel consumption, user's frustration. It reduces vehicle travel time and parking time.*

Keywords- *Smart Parking , GPS , Android App , QR Code , Scanner.*

I. INTRODUCTION

Use of automobiles is increasing day by day which leads to various parking issues. Vehicular population is shooting out the roof, no amount of space is sufficient to accommodate stationary vehicles. Management of parking has grown to large extent. The main problem is to manage parking in congested areas. One of the congested area is college campus .However improving parking on campus is important. The problem is parking spaces are either insufficient according to the demands of students or these spaces are poorly allocated. Colleges have to try almost every possible way to deal with problem of campus parking. Parking on campus needs improvement. Users entering the university are allowed to have a car on campus. With every new freshmen entering parking possess a problem in campus. Problems in parking campus results in users inconvenience, which results in frustration. Parking the car today need parking policies for safety and security reasons. There is always competition for the parking space [6]. A good solution to overcome parking crises would be by increasing the number of parking spaces or else enlarge the parking lots, but this will lead to huge investment. However better management of existing parking spaces will be wise method. The availability of parking spaces should be improved. Another approach for managing parking in campus is by improving the efficiency of the use of existing parking spaces, by informing user about available parking space and guiding him accordingly [1]. Now a day there is growing popularity and affordability of internet –enabled smartphones and because of data available online we can step to solve parking problem. Android smartphone enables user to virtually carry the internet with him.

A. Mobile web Map It is a service application providing maps. By using map user can find spaces on his phone [1]. Maps act as communication language of distinct information for viewing whether parking space is engaged or not. It will inform user about current status of parking lot [4].

B. Quick Response(QR) code It is 2-D barcode which encode numeric and alpha numeric value. QR code encodes binary information into a square matrix of black and white pixels. QR code scanner application is able to decode information encrypted in QR code [1]. QR code is used for allocation and de-allocation of space. Hence this paper focuses on use of user interface including navigations for enhancing efficiency of parking system. The

main goal of this paper is to maximize the occupancy of parking lots and develop a user-friendly mechanism that helps user find and reserve available parking in the campus, in advance [1]. At times of peak parking in the parking lot, the only primitive way is to accurately provide users with available parking spots inside the parking lot.

II. LITERATURE SURVEY

IOT are designed to support the Smart City vision, which aims at exploiting the most advanced communication technologies to support added-value services for the administration of the city and for the citizens. Padova Smart City Project is the best example of Iot[1].

Parking space is becoming a serious problem due to the day-by-day increase in number of vehicles on the road. Particularly, in cities with large population, or in places where sports or artistic events are scheduled, looking for parking space is a major problem and finding a parking spot can be a frustrating experience. Some parking lots have introduced sensors to detect when a car enters or leaves a parking lot in order to track capacity and alert drivers if they are full[2].

User can also park car with the help of a vacant parking slot detection and tracking system that fuses the sensors of an Around View Monitor (AVM) system and an ultrasonic sensor-based automatic parking system[3].

A major problem in large and busy trace areas is parking vehicles by searching for empty (and available) spaces. In the recent days, some parking lot systems are equipped with sensors and micro-controllers to automatically count the cars parked in the lot[4].

smart parking system for heavy track environments using ZigBee wireless transmission module. The proposed system is suitable for multi floor buildings and able to send a message to vehicles about the status of parking spaces. The parking monitoring system continuously collects the data from parking slot detectors and then it intimates the vehicle section[5].

Based on the users oriented parking information recommendation system, the model considers subjective demands of drivers comprehensively, makes a deeply analysis of the evaluation indicators. This recommendation model uses a phased selection method to calculate the optimal objective parking lot. The first stage is screening which based on the users subjective parking demands; the second stage is processing the candidate parking lots through multiple attribute decision making. Simulation experiments show that this model can effectively solve the problems encountered in the process of finding optimal parking lot, save the drivers parking time and parking costs and also improve the overall utilization of parking facilities to ease the trace congestion caused by vehicles parked patrol[6].

The existing car parking system in Malaysia usually required the car drivers to search an empty parking space in the car park without providing detail direction toward the available parking space. As the result, drivers may waste a lot of time and unnecessary energy while they turn around in the car park without direction and may cause car traffic congestion in parking space. This paper investigates the problems of car parking system in Malaysia and finally proposed a Wireless Mobile-based Car Parking System using low cost SMS service. The implementation of SMS service into the car parking system enable drivers to receive information regarding the availability of car parking spaces[7].

Renault is actively developing in partnership with research laboratories and outlines its usage in terms of Autonomous Valet Parking (AVP). During development, a common Renault Zoe vehicle was equipped with sensors, electro-mechanical actuators and a system of data processing. The perception system corresponds to a fusion between an ultrasonic system and a camera. It provides the localization of the vehicle, the navigable area around the car and a map of already visited areas. This information is used afterwards as input for the car control system in order to ensure its integrity during navigation[8].

secure parking reservation system using Global System for Mobile communications (GSM) technology has been performed. It helps the drivers from facing the problem that always occurs at the car park, such as time being wasted in searching for the available parking spaces and keep on circling the parking area until they found an empty parking spot.[10]

III. SYSTEM METHODOLOGIES

1. GPS:- GPS receivers take this information and use trilateration to calculate the user's exact location.

Figure 1. GPS Tracking System Tracking

2. QR code:- QR or **Quick Response Codes** are a type of two-dimensional barcode that can be read using smartphones and dedicated QR reading devices, that link directly to text, emails, websites, phone numbers and more! You may have even got to this site by scanning a QR code.

Figure 2. QR-CODE

3. Scanner:- A scanner is a device that captures images from photographic prints, posters, magazine pages, and similar sources for computer editing and display. Scanners come in hand-held, feed-in, and flatbed types and for scanning black-and-white only, or color.

Figure 3. QR-CODE Scanning

In this paper , the above mentioned are the key concepts .They are used in this technique to solve the increasing traffic problem by providing the required information to the driver. It is implemented in following ways:-

1.Initially parking spaces with their longitude and latitude is registered on the web map server to make the system more dynamic by using internet.
2.Each parking space is uniquely identified by QR Code. The QR code was generated using fields like space id, latitude and longitude of the space. The QR code is printed and affixed at the corresponding parking spaces.
3.A database that shows all the mapped parking spaces with their attributes is created. A web server Application Programming Interface, API is established and published over the internet.
4.The user can then access the API using application. The user willing to use the application must be connected to the internet via his phone. The has to download the application and install the application on his android smartphone. User has to register himself to the system by giving details like name, password, email-id, phone number. The user can then log in to the system whenever they needs to reserve a parking space or use the available space.

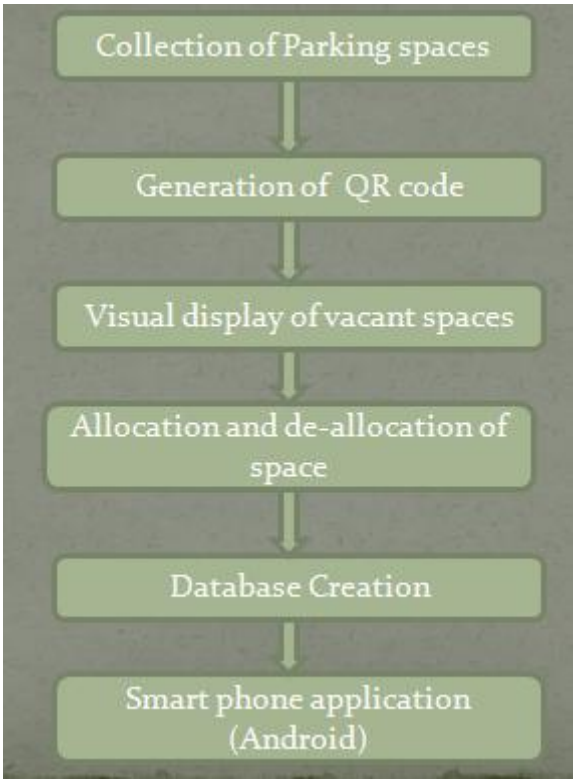

Figure 4. Methodology

IV. SYSTEM ARCHITECTURE

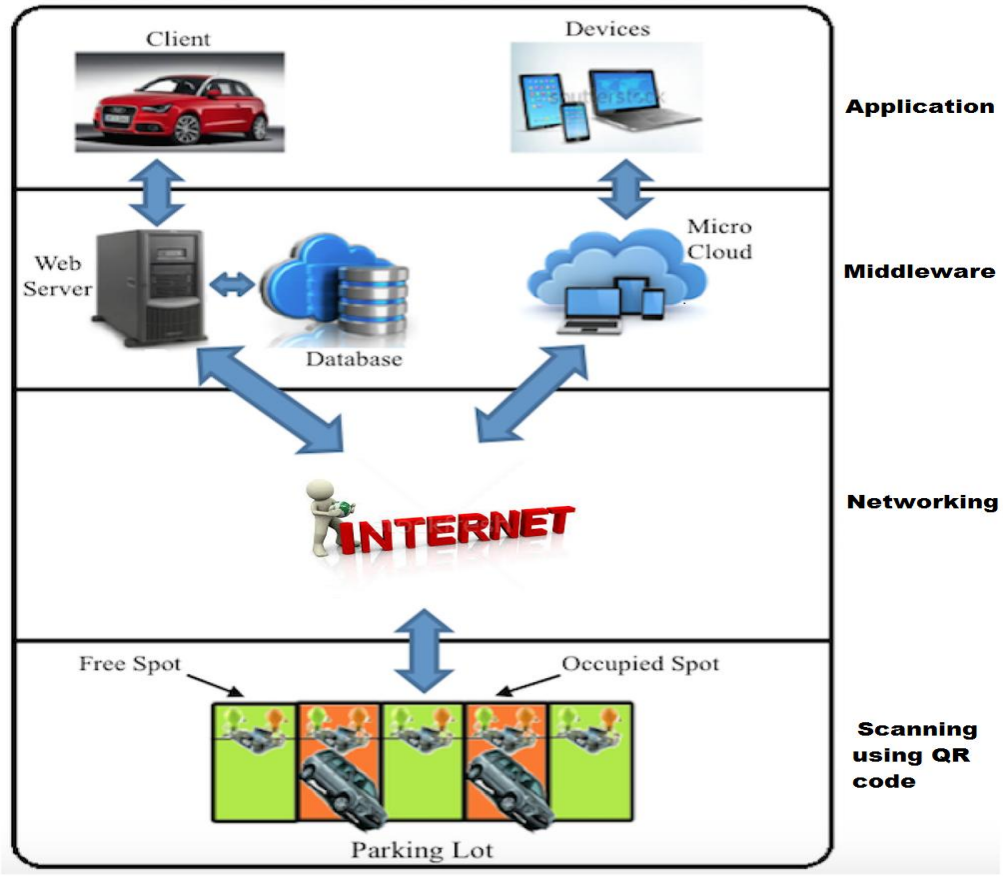

Figure 5. System Architecture

Now a day there is growing popularity and affordability of internet enabled smart phones and because of data available online we can step to solve parking problem. Android Smartphone enables user to virtually carry the internet with him.

1. Mobile web Map It is a service application providing maps. By using map user can find spaces on his phone . Maps act as communication language of distinct information for viewing whether parking space is engaged or not. It will inform user about current status of parking lot.
2. Quick Response(QR) code It is 2-D barcode which encode numeric and alpha numeric value. QR code encodes binary information into a square matrix of black and white pixels. QR code scanner application is able to decode information encrypted in QR code. QR code is used for allocation and de-allocation of space.
3. Databases It is used to store and update data of registered user for allocating and de-allocating parking lots. The information required is stored during registration of user and used each time the login procedure is processed for parking. Parking lots are provided to the users who are already registered. Parking lots are provided after scanning the QR code. Booked lots are represented by red color, available slots are represented by green and lots which are about to get available are represented by yellow color.

V. CONCLUSION

The system gives a visual display to the user regarding the current parking scenario. The system reduces work of manual parking process by converting the entire parking process to automation. The system makes it easy for the user to book or reserve a space on the smartphone. Thus smartphone acts as a park finder .This ultimately reduces the time that every driver spends for searching a parking space which then reduces the fuel consumption, traffic volume and environmental pollution by increasing the efficiency of transportation.

VI. FUTURE SCOPE

The goal of smart parking systems is to know where parking is available and to let the driver know as well, making it easier for cars to find their way into parking spots. Another goal is to understand just where parking is in demand and when. For cities, this information can be extremely useful. "Parking is generally the second or third largest source of revenue for a city. So there's a significant financial impact to this."

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