

# Android Based Smart Parking System

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**Abstract-** As the number of vehicles are increasing tremendously almost all major cities are facing parking problems which leads to insufficient parking space that causes traffic jams, air pollution ,etc. To overcome this problem we have developed this smart parking system that helps users to effectively find the free parking slots and book them using an application developed with the help of GPS. The state of the parking slot is detected by IR sensors allotted to each slot individually.

## I. INTRODUCTION

Smart Parking System helps to overcome one of the biggest problem on driving in urban areas, finding vacant parking spaces and controlling illegal parking. In the recent research it is found that the user takes nearly 10-12 minutes to park his vehicle because it takes time in searching parking spaces. This searching leads to 30% to 40% of traffic congestion. Here we have developed an Android Application using the Slot Allocation Method. The main contribution to this system is to find out the status of the parking areas that are represented by the sensors. The state of this slots is updated periodically to the server through wireless network i.e. using Wi-Fi network in real time and also the vehicle driver can check the slots using GPS using the mobile application. As specified, we have developed a unique cost effective solution of parking system using GPS. Each parking slot is located using its longitude and latitude values given by the location module in Android SDK. The driver can send a request for particular parking slot using Android Application and do the reservation. All the nearby vacant parking slots will be visible to the driver as per the destination provided by him and user can select any slot as per his/her convenience. The booked space will be marked red and will not be available for anyone else. This system provides an additional feature of booking cancellation. The Database of all the driver request will be maintained and using the FCFS scheduling method the priority of the request will be scheduled. After the allocation is completed for an particular user, finalized details will be send to the user's mobile device. It overcomes the problem of time management and is also better and cheaper as compared to dynamic slot allocation method. User will be charged as per the duration for which the slot will be allotted to him.

## II. LITERATURE REVIEW

Smart Parking system is proven as an exact, robust and cost efficient way to ensure that road users know exactly where unoccupied car parking spaces are. Over the past 20 years, traffic authorities in many cities have developed a model called Parking Guidance and Information (PGI) system for good parking management. PGI systems, tells about the dynamic information of parking in the controlled area and guides the users to the vacant parking slots. The related patent was first filled in US in 1999(US6519329). This demonstrated the use of telephony system for parking slots reservations. Currently a company named smart parking provides the android based parking system. At present a 12 month trail on smart parking system is conducted in Manuka, Canberra. This system works on the smart eye technology.

## III. PROPOSED SYSTEM

The proposed system is the combination of smart parking and the Slot allocation with the Android application.This project provides the customers an easy way of reserving a parking space online.It overcomes the problem of finding a parking space in commercial areas that unnecessary consumes time.Hence this system offers an Android based reservation system where users can view various parking slots.The booked space will be marked red and will not be available for anyone else.This system provides an additional feature of booking cancellation. The client application allows parking booking on android phone. The server side web service is stored on a web service.This system consists of server, sensors. Server controls and monitors the various sensors, and can be easily configured to handle more hardware interface module (sensors). The Arduino Board, with Ethernet Shield, connects to web server.

Flowgraph of the system:-



Figure 1. Flowgraph of the system

#### IV.METHODOLOGY

This paper involves three modules:-

Assembling the Hardware, Creating of application and Maintaining Database.

##### A) Assembling the Hardware

IR sensor are installed at each parking slot that determines its state whether the slot is vacant or not. This sensors are connected to the Arduino UNO i.e, the main hardware component. Arduino is programmed according to the Slot Allocation Method. For connectivity with the server, Ethernet shield is assembled with Arduino. Whenever any booked user enters the parking slot it will notify the server and changes will be made in the database accordingly.

##### B) Creating Android Application

This application is designed for Booking purpose. Individual is provided with user login using their unique email id or phone number which will be stored in database. Map module is included so that User can provide the destination in map. Application will display all parking area and available parking slots nearby to destination in it. Grid structure is used to display the parking slots. The available parking slot will be marked as green and booked one as red. When user request for booking, application will initialize the time counter for payment purpose and will charge accordingly.

#### C) Maintaining Database

The database of the system will have three attributes viz. parking slot number, parking slot google map location and the current status. On starting the application a query will be fired to the database to get the information about the location and the status of parking area. These locations will be directly displayed on to the google maps using marker, the color of the marker will depend upon the value of the status attribute of the slot in the database. During the development of the application the database will be created locally with database server like SQLite. During deployment of the application this database will be web hosted. The information gathered from the sensor and the booking made through the application will fire a query in the database to change the status of the slot to “Occupied”. When user empties the slot a query will be fired to change the status value back to vacant. Another database that would be created will contain the information about the user. This database will contain attributes such as user number, user id, slot number, arriving time and leaving time. Here slot number will be use in communicating with both the tables as a foreign key. The arriving and the leaving time will be used to calculate the amount to be charged to the user.

#### V. RESULTS

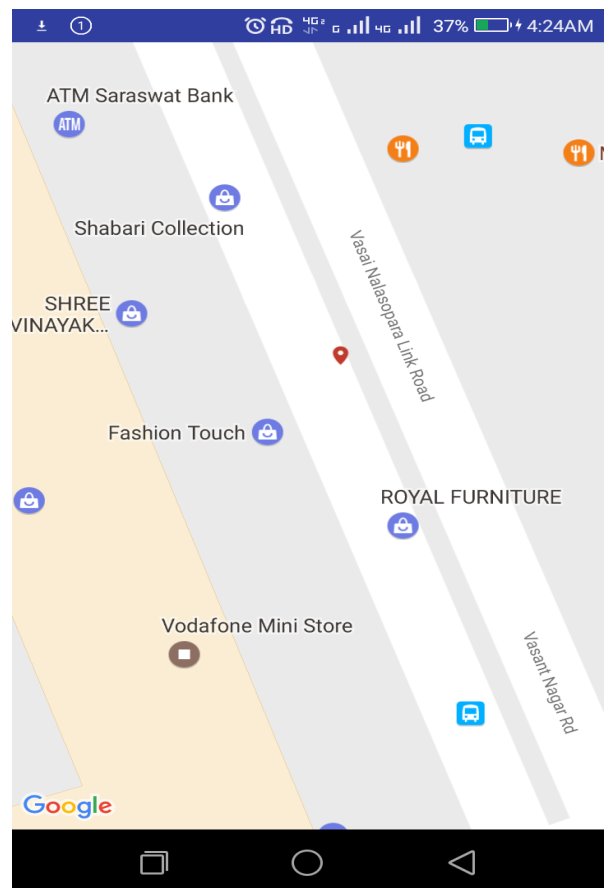


Figure 2.

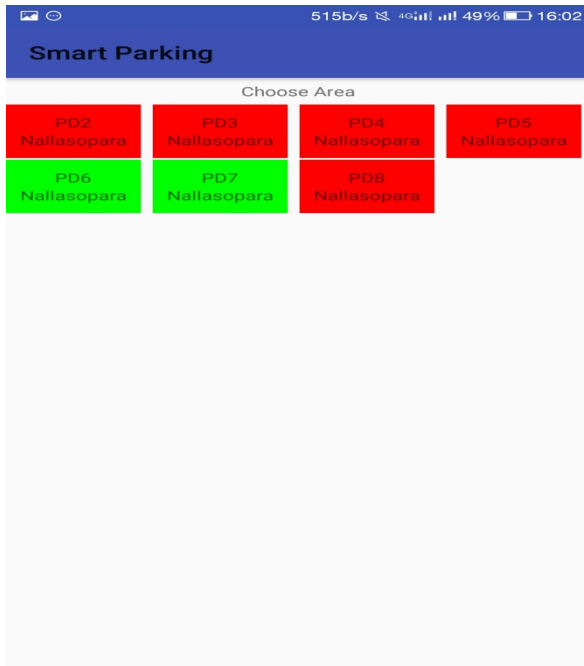


Figure 3.

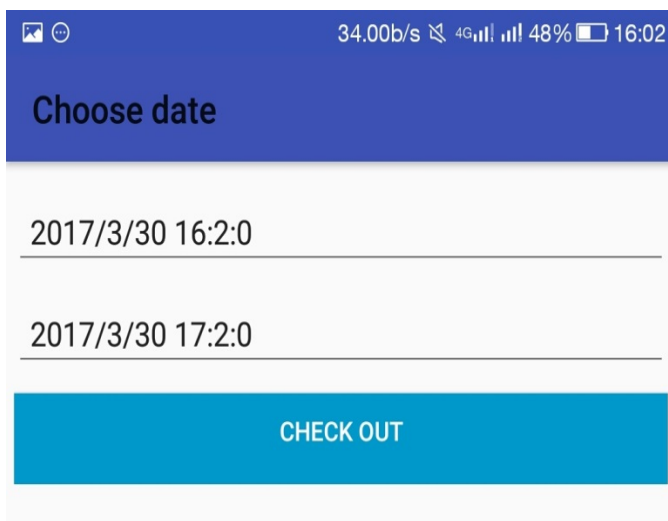


Figure 4.

## VI. CONCLUSION

This Android based smart parking system will prove very useful in solving problems related to the parking of the vehicles. It will not only solve the problem of searching parking slots but also facilitate the user with booking services. Just with an android smart phone the user will be able to access our system for a better parking experience. It will also reduce the fuel wastage that is made during the search of a proper parking .due to its low cost, easy installation and less maintenance this system can be easily implemented in any area. It can be connected to other applications like self driving cars or automatic parking.

## REFERENCES

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