

ParkWithMe: Android Application for Smart Parking Booking System

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Abstract—Many people consumes their own transport consistently. It is very challenging for the people to find parking space in their day-to-day life. The technological expansion has an influence for the shipping segment. One of them is about finding parking space for each vehicle. To search a vacant space for a parking the vehicle, the consumer must look up for a parking portion that has been provided for a parking. But it is quite difficult because the space offered for a parking is very limited and the number of vehicles that requires parking space is very high. It takes comparatively longer time for a user to get a vacant space which can result in a traffic bottleneck in the assigned a lot. As a solution an Android application is developed to solve this problem efficiently. This smart application authorizes a user to search the availability of parking space and a book it accordingly. It can decrease the fuel ingestion and pollution in metropolitan cities and in a turn will help in increasing the economy.

Index Terms—Smart parking system, Ultrasonic sensors, Parking lot, Reservation

I. INTRODUCTION

In this current world, a main problem in shopping promenades, event halls, hospitals, services, streets, and societies is a parking, because of the lower number of available parking spots. The parking concern increases the time demanded to situate the vehicle with an increase in the energy consumption of the vehicle. The more number of companies and services is facing the difficulty of the parking in the civic areas. In recent times, vehicles are the most affordable to the low-income group families also and the vehicles, especially the two-Wheeler's and four-Wheeler's, is taking a lot of space. Due to the growth in several vehicles, the parking space is also not sufficient in these metropolises. The issue is also faced by the private vehicle owners since they could not find the space for a parking their vehicle when they reach their destination. In earlier times, the private vehicle owner use to reach the destination then search for nearby space, which eventually results that the parking spaces

are not available nearby their particular destination.

To overcome the problem an integrated parking management mechanism which includes a complementary set of strategies that meet the needs of parking problems. Parking solutions include a vehicle parking facility efficiency by a sharing, regulating and pricing, use off-site facilities, improve a parking spot information. In smaller commercial centers, on the street parking may provide most of the available parking spot supply. Displaying statistics of a parking and the rate the use of signs, brochures and maps, websites, and parking statistics integrated into popular advertising and marketing materials. Provide real-time statistics at the scenario of available parking spaces.

The proposed a system is an android application that shows availability of parking slots of desired locations. Application displays empty parking spots for any type of the vehicle owned by the user. Users can extend their parking time if they want to extend it. Users can book and cancel the parking slot as per their need. The free a spot is only booked for a particular user for the specific time period reduces a wastage of time. Google map tracks a user location and visualizes parking spots with the symbol. An application provides the parking chart shows statistics of parking availability. An android application is integrated with the payment gateway with various payment options like Cards, UPI, Net banking and Mobile Wallet. It provides the security of the vehicle and a guidance for a properly parking vehicle in the parking spot.

The paper is organized as follows: - Section II includes related work created for the smart parking system. The section III shows the suggested architecture or a methodology for the system. The section IV shows the implementation of the proposed the system. The section V presents actual results and an execution of the system. The section VI shows various

advantages of recommended the system. Finally, the section VII summarizes a conclusion and the future scope for the system.

II. RELATED WORKS

In paper [1], They have created a system in which the hardware system components are Arduino UNO, AVR ATmega328 Controller, 16x2 LCD MATRIX, the Motor Driver Circuit L293D, Accelerometer ADXL-335. Arduino IDE and Android Studio as software tools used for the system. The system consists of three components, which are parking zones, users and the admin. The parking management system broadcasts live parking availability information to users and drivers. Upon receiving parking information, the user selects the desired a parking lot and reserves a space. Reserved spaces are booked only by a user. The difficulty of searching for available parking slots is eliminated by reserving spots.

In paper [2], They have developed an android application in which an authorized person has the only right to get the reservation confirmation number. Every reservation is booked by a specific time period. If the user misses that time, another user is booked for that time. Each and every procedure is automatic, such as a car detecting the number and the message sent to the user. The user gets a confirmation in the form of a slip along with the message with full records of the timing and the bill.

In paper [3], They implemented an android application technique in which a latitude and a longitude are used for a smart parking and functions. Initially, the latitude and the longitude of the center of the slot were stored in the database. The user has to reach the parking lot in 30 minutes. After reaching to the parking lot, the user can book a slot and have to press a button to get information about the user's a current latitude and longitude points. Then a fictional circle with a radius of 2 meters will be generated. If the points were within this circle, then the slots of users will be confirmed, and it will send a confirmation message to the user.

In paper [5], They used Visual Studio with programming languages like DOT NET and a database like the SQL SERVER 2012 for the front-end and back-end of the system. The system consists of six components or modules in the smart parking model, which are parking owners, users, internet, an application server, a server database and the database of parking owners. The parking owner manages the dashboard, which has its own database of booked and not booked slots. The user can book parking slots from the parking dashboard. The application server keeps a track of the location of a user and matches it to the nearest parking slots. The main server database keeps the data of all parking owners in an area and their location on the Global Positioning System (GPS).

In paper [6], The system uses sensors and a GPS system technology to watch the parked cars. A sensor counts the share of free parking spaces in each parking lot. The implementation of sensors is created for large-scale system at a low cost. After a login into the system, the stoner can choose an appropriate parking lot. The information about the selected a parking position is authenticated by the user via a notification. Then, the system updates the status of the parking space to 'pending', during which a period the system will not allow other users to book the lot. However, after a certain period of pending time, the system determines that no car is situated in that space, then it changes the status to the 'available'. The system will update the status of the WSN module (the status of a parking lot spaces) when a relief auto joins within the system. Therefore, the status of the overall parking system is always modernized in the real time.

In paper [7], They have developed an android application for an online car parking booking and implemented for the user's reliability. The system is used by an admin and customers. The Admin is merely liable for collecting information of the customer. The customer can book the parking lot for a car in different zones. The parking lot management system enables us to form more efficient use of obtainable spaces by controlling vehicle access at key entrances. This application presents the planning and implementation of Online Car Parking. After a successful booking, the slot becomes red from green and the receipt is generated for the confirmation of the successful payment.

All the systems mentioned above to have the different approach and a methodology for reserving parking spots. The proposed a system provides the simple solution for booking available parking spots. The system provides a parking facility for all type of vehicles. The user can extend time for booked a parking spot. The recommended a system provides Google Maps for tracking a user location and giving directions of the parking spots to the user. In all mentioned systems the range of devices is limited and if the user miss a specific time period he cannot book any parking spot.

III. PROPOSED SYSTEM

The research work aims to a develop system for all users to solve theirs problems related to the parking vehicle. Thus, a smart parking android application enables users to locate and reserve parking space online through accessing it on a mobile android application. It helps to establish possible solutions to improve on the current vehicle parking reservation system. The user's and booking details will be updated on an application, a generation of reports, tracking the online transaction and responding to the feedback. The proposed a system is used by the end user to a reserve the parking spot from different locations within in second. The system consists of two components, which are an android application and a hardware system.

A. System Design



Figure 3.1 System Design

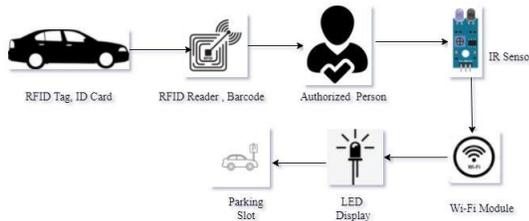


Figure 3.2 Hardware Design

The android application is for booking parking spots for vehicles for user’s reliability. The system is used by two users. They are an admin and users. The Admin is only responsible for collecting information from the user. The user can book the parking space for vehicles from available parking slots. The Android has functions which are a user registration, a login, parking notifications and displaying a parking chart. Users can view directions of parking slots with the help of Google map. The system will provide a means of enforcing parking policy, by issuing or warning notices and fines for people parking without permits or illegally. The application presents the design and implementation of a vehicle parking via an online mode. The android application provides a new design approach for automatically displaying a report of the booked and free spots.

The hardware of the parking system is divided into two parts. The first part of the system is the security system where the client or a user uses a RFID (Radio Frequency Identification) chip with the help of the parking app to open the gate to the desired the parking lot. An ultrasonic sensor is used to detect the vehicle when it gets within a certain distance of the gate. The second part of the system is to provide assistance to the client or a user who properly parks the vehicle in the slot. Here, along with the LED (Light Emitting Diode) and a sensor used, the LED shows a green light for unoccupied spots and red light for the occupied spots.

IV. EXPERIMENTAL EVALUATION

A. Specifications

1) Hardware Specifications:

- NodeMCU Micro-controller
- Ultra Sonic Sensor
- RFID (Radio Frequency Identification) Module
- Red LED
- Green LED
- Buzzer
- RFID Reader Tags
- Jumping Wires
- USB Cable

2) Software Specifications:

- Android Studio IDE
- Android App

B. Implementation Details:

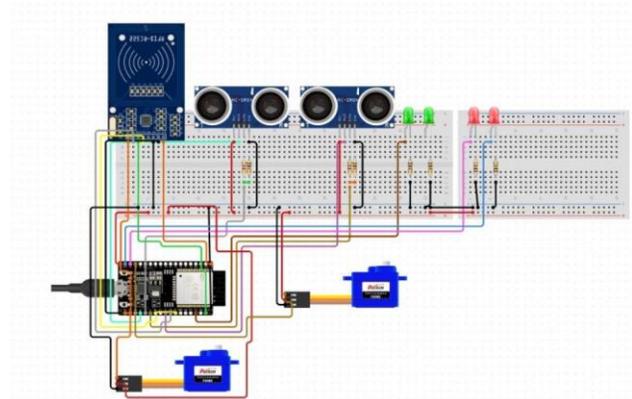


Figure 5.1 Circuit Diagram

An above circuit diagram shows the connection of various IoT(Internet of Things) based components such as NodeMCU Micro-controller, Ultrasonic sensor, RFID(Radio Frequency Identification) Module and RFID Reader Tags for working of the proposed a hardware system.

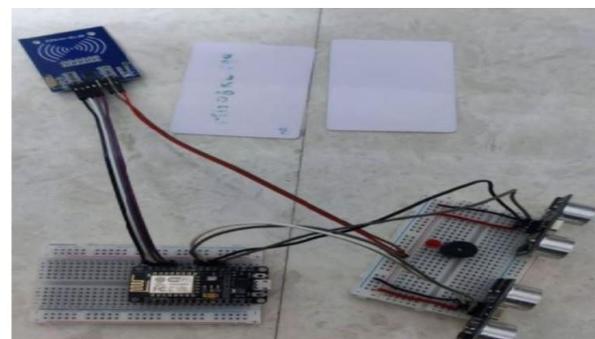


Figure 5.2 Hardware Model

The above diagram shows the hardware setup of the proposed a system with various components using jumping wires and a breadboard.



Figure 5.3 Main screen Page

Users or customers need to install "ParkWithMe" an android application from Google Play Store on an android device. After a successful installation of the application, "ParkWithMe" a main screen will be displayed on the user's a mobile phone.

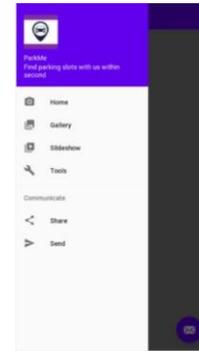


Figure 5.6 Navigation Page

After a sign-in into the system, the navigation screen appears with different options such as Booking, Google Map, Parking Chart, Extend Parking, Payment Status and Cancelling Booking.

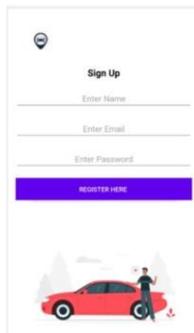


Figure 5.4 Sign-Up Page

Firstly, the user has to register with a name, email and a password with the application on an android device. This only one time a user registration. All user details will be stored on the database.

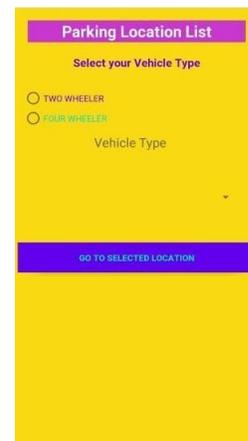


Figure 5.7 Area and Vehicle Selection Page

If a user clicks on the booking tab, the new screen opens where user can select to a desire location and a type of the vehicle for a parking.



Figure 5.5 Sign-In Page

Once the user is registered on an application. A user can log in into the system with an email and a password. This provides an authentication to the users.



Figure 5.8 Booking Page

After selecting desired location and type of vehicle, new booking page opens with available and unavailable parking slots. User can select available slot and add details such as vehicle, date and time for parking vehicle. The total cost will be calculated and displayed in the total field.

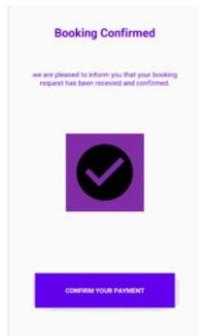


Figure 5.9 Booking Confirmation Page

After booking a particular parking spot, a book confirmation page opens with a total price for a spot.

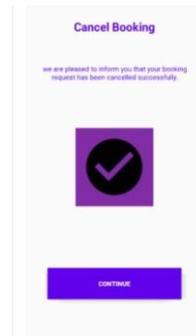


Figure 5.12 Cancelling Confirmation Page

The cancelling confirmation page ensures that user cancel his bookings for particular parking spot.

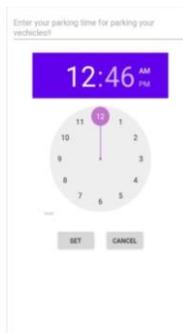


Figure 5.10 Parking Notification Page

The parking notification page sends notifications related to a parking and gives a parking remainder to the users.

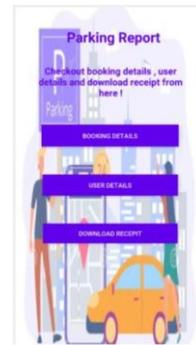


Figure 5.13 Parking Report Page

The parking report describes the user details and booking details. It also provides download receipt feature for generating parking receipt of the booked spot.



Figure 5.11 Cancelling Page

The cancelling page provides cancelling a parking spot option for users or customers if they want to cancel a booking at any time.

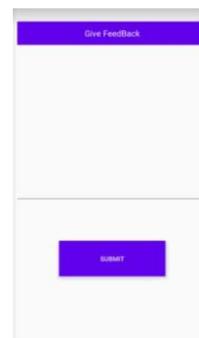


Figure 5.14 Feedback Page

In the feedback page, users can give a feedback about the application and a system service. Users can ask doubts, queries related to the parking and gives ratings to the application.

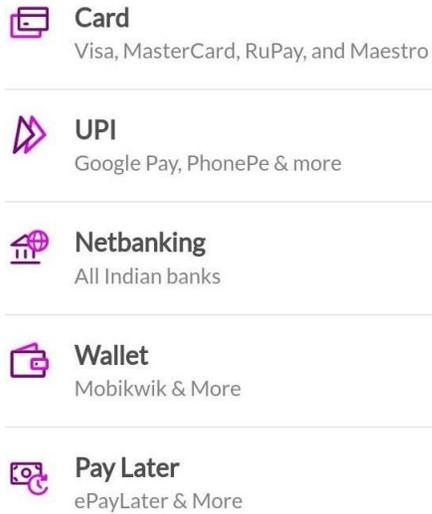


Figure 5.15 Payment Page

The payment page provides various payment options like Cards, UPI, Net banking, Wallet and Pay Later for making the payment for the booked slots.

TWO WHEELER	
Time	Price
1 Hour	Rs 50
2 Hour	Rs 50
3 Hour	Rs 70
4 Hour	Rs 100

FOUR WHEELER	
Time	Price
1 Hour	Rs 40
2 Hour	Rs 70
3 Hour	Rs 110
4 Hour	Rs 140

Figure 5.16 Price Table Page

The price table includes parking rates according to the number of hours user wants to park vehicle it can be both two-wheeler and four-wheeler.



Figure 5.17 Google Map Page

The Google map tracks a user location and displays parking spots with the directions for user convenience.

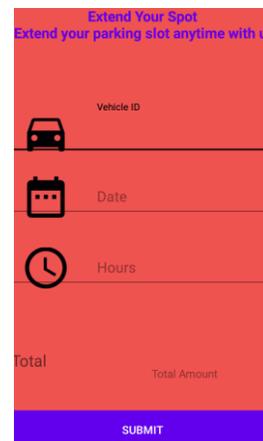


Figure 5.18 Extend Parking Page

In the extend a parking page, a user can extend parking time for of parked a vehicle in the booked a slot and a then total price will be calculated accordingly hours.

V. RESULTS AND DISCUSSION

The results generated by the proposed a system is visualized using an android application screen. These screenshots show implementation for booking a parking spot, a view booking, a parking report, and extend parking time for booked a parking spot for the user. The systems provide different areas for a parking any type of a vehicle. The system ensures a security and a detection for a properly parking vehicle in the certain distance of the parking lot area. These results are generated after successful implementation of the proposed a system. The smart parking is booking a system helps to get available parking spots to the users for different locations. Here, the

system is full working and solves issues related to the parking system.

VI. ADVANTAGES

In a comparison to the existing systems available for parking problems, the system proposed by us makes better performance, which is :

- In the smart parking booking an android application, users can view various parking locations and select the spot to view whether a spot is available or unavailable.
- The booked space is marked by a specific color and not available to anyone else for the required time.
- The system offers a further feature of extending time of booked a spot at anytime as per user convenience.
- Users can make online payment options like via a credit card, a debit card and the net-banking. After making payment users are notified about the booking via email or a text message.
- Android apps can be easily installed on users' mobile phones and users can use them easily.

VII. CONCLUSION AND FUTURE SCOPE

The proposed a system shows how the parking problem at crowded places can be managed efficiently and effectively. It helps users with finding out the availability of parking space, get the availability confirmed, and reach the place within the specific time period. It gives an easy way of managing the administrator's side. The Android app shows lists of the various parking locations. Google map shows parking spots within the area and directions of the parking spots. Users get a notification for a parking their vehicles as well as booking slots for their vehicles. An android application includes a parking report and a parking chart for a parking spot management. Users can extend parking time if they want. The Android app provides a price table of hours for parking vehicles. Hence, the recommended a system gives an effective solution for arranging the free and occupied parking spots in areas.

The system could be developed in the future for a wide area like a state or a country, so that it can help people on a large scale. The system can be sold to the parking management owners and operators to manage a more number of areas or locations.

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