

OPTI PARKING APPLICATION USING FIREBASE CLOUD

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Abstract: The rising rate of automobile ownerships is increasing the need of parking, which is a complex dilemma that lowers the quality of human existence by increasing carbon emissions in the natural environment. The creation of new Optimized parking system is necessary to reduce the pollution due to no proper infrastructure of parking and also for the space management, so here the main goal is to develop an optimized parking model which provides an effective solution to the existing problems, and also here we are also analyzing the various aspect to find an effective way to interact with the users to redirect them to the nearest parking slot

Keywords: Android, Cloud, GPS, QR Code, Parking Slot, Reservation

INTRODUCTION

The unprecedented changes in the transportation sector, like in case of travel and the movement of goods, flexibility is increasing, has been brought by the emergence of automobiles. However, the automobile manufacturers have also faced and tackling the notable challenges by finding the quick solutions. Such challenges include environmental degradation, emissions, and noise. Additionally, more the number of automobiles is increasing, more are the cases of road accidents. The Automobile industries are posing a difficult challenge for the city planners, like the increasing capacity and the number of automobiles may be accommodated, through the existence of limited parking spaces. Rising rate of automobile ownership is increasing the need for parking, which is a complex dilemma that lowers the quality of human existence by increasing carbon emissions in the natural environment. The creation of an optimized parking solution is required for reducing the time expenditure when a user is looking for parking spaces and to reduce wasteful vehicle movement. The primary goal of this research is to gain a comprehensive understanding of smart parking solutions from a technological standpoint, including the supporting systems that are available, as documented and referenced in the literature.

The specific contributions are as follows.

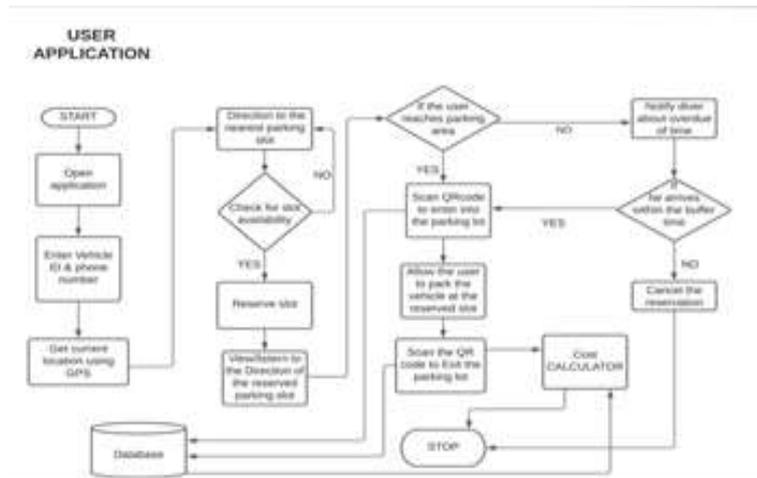
- The Opti Parking Application allows the drivers to track the real time availability of the parking slots.
- The application provides users with various features such as interactive voice and pinning of maps.
- The Opti parking application uses the cloud database to store and retrieve all the data in real time as per the user request.
- The application also allows the users to reserve or book the parking slot by scanning the QR code.

MOTIVATION

Nowadays we can see that the number of vehicles is increasing on the roads and after reaching the required place it's tough to find a suitable place to park the vehicle. Parking of vehicles is becoming a problem because of limited resources. Such as the driver should go to the particular parking place and collect a parking ticket from the ticket issuer. In this manual process there is so much time and effort wasted. So by looking into this perspective we were motivated to develop a smart parking system which will provide an efficient and required solution to the above problem.

LITERATURE SURVEY

The word 'Opti' in Opti Parking Application stands for Optimization. Here there is optimization of searching a parking space for parking a vehicle, optimization of booking a parking space for parking a vehicle etc. In the country of huge population, there is shortage of parking places due to which a person has to face the problem of searching an empty parking space which takes a lot of time. Also some people will park their vehicles in no parking place when they are unable to find a parking space, which is not a good sign. Time wastage and parking on no parking place becomes a big issue in this case. So to solve this problem, an application is developed which is named as Opti parking application system. It includes text-to-speech feature, google map apis, pinning feature to show the parking slots with red spots, scanning the QR code for final booking etc. The main motive of this application is to save the time taken by a person in searching an empty parking space. Through this application, user can find the parking places near his/her current location and can search the empty parking slots in that particular parking place and can do an advanced booking for that particular parking slot. By scanning the QR code the booking will get confirmed. But before reaching to the parking destination, there is a toast message that booking will expire in 1 hour. Also the person will get charged according to for how much time he/she will park their vehicle in the parking slot. On Admin Side, the admin can add the parking by providing details like place name, it's location (latitude and longitude), number of slots etc. For each parking place, QR code will be generated so that a person can scan that QR Code to confirm their booking in the parking slot.



METHODOLOGY

A. Proposed model

The proposed model consists of a mobile application through which it connects the driver directly to the cloud storage. Here we are using firebase as a cloud Database which is used to store all the real time availability data of the parking slots, whenever the Driver wants to park his car he can use his mobile application (Opti parking) which is used to fetch the driver’s current GPS location and map him to the nearest available parking slot, the proposed system also has a new feature such as voice over to reach the particular parking slot (which prevents the driver from distractions) after the mapping the application it retrieves the data from the cloud and allows the user know the details, so when the user wants to park the vehicle he can perform the reservation of the parking slot, and then the application directly maps the user GPS to the respective parking slot, when the Driver reaches the place (Parking slot) a QR code will be generated to authenticate the Driver and his reservation, if in case the driver couldn’t make it to the nearest parking slot with the stipulated amount of time, then the application provides some extra buffer time on request, if the driver reaches with the buffer time then the slot is allocated otherwise the parking reservation will be cancelled.



Fig. 1. Proposed System Design.

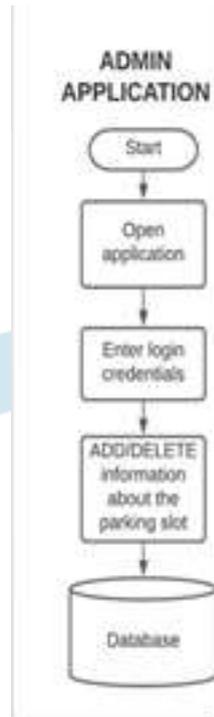
B. Admin Application

Here the Figure 2 indicates the working of admin part, The Admin part is used by the area managers through which they can perform the scalability of the parking availability in real time, So by which it gets automatically updated in the cloud and the users can access the real time slots available for parking, The flow of the admin part starts by the login page where the application authenticates the owner of the particular parking slot and provides him the Add/Deletion/ Updating options for the slot availability which will directly reflect onto the Database (Firebase DB).

C. User Application

Here in the Figure 3 of User application it shows the detailed mapping of flow in the application, When the user opens the application the user has to enter his/her vehicle

Fig. 2. Flow chat of Admin Application



details and also his phone number for security purpose, So in this flow the main objective is to minimize the user's input for effective interaction with user friendly UI and in the next flow after the successful entry of the details the Maps APIs fetched so it can find the current location of the user and mapped to the nearest parking slot by which the user can select and book the parking location of their choice, Here we have a constraint of whether the parking location is available or not, if it is pre-booked fully then the user cannot go to the particular location so they can be mapped to the another nearest available parking slot and when he clicks upon the parking location it has a useful feature of Voice for direction which reduces the driver's concentration upon the infotainment cluster and keep the driver concentrated upon the road, When the driver is late to reach to the particular parking slot the notification pops up displaying the over due of time, This is calculated by the time allotted by google maps to reach the particular destination, and the notification also allows the user to have extra 10 minutes of buffer time in case of traffic or any other circumstances, if the user reaches the parking slot within the stipulated amount of given time then the user can park-in the vehicle by scanning the QR code which connects all the information to the cloud DB of the entry time and when the user wants to exit from the particular parking slot again he should scan the same QR which is near the exit, So by scanning the QR at exit it notes the exit time and the Cloud DB will provide the amount to be paid for parking by calculating the entry and exit time of the vehicle and if the user doesn't arrive at the parking location within the stipulated time then the parking booking will be automatically cancelled.

RESULT

Here are some of the screenshots of the Smart Parking Android Application

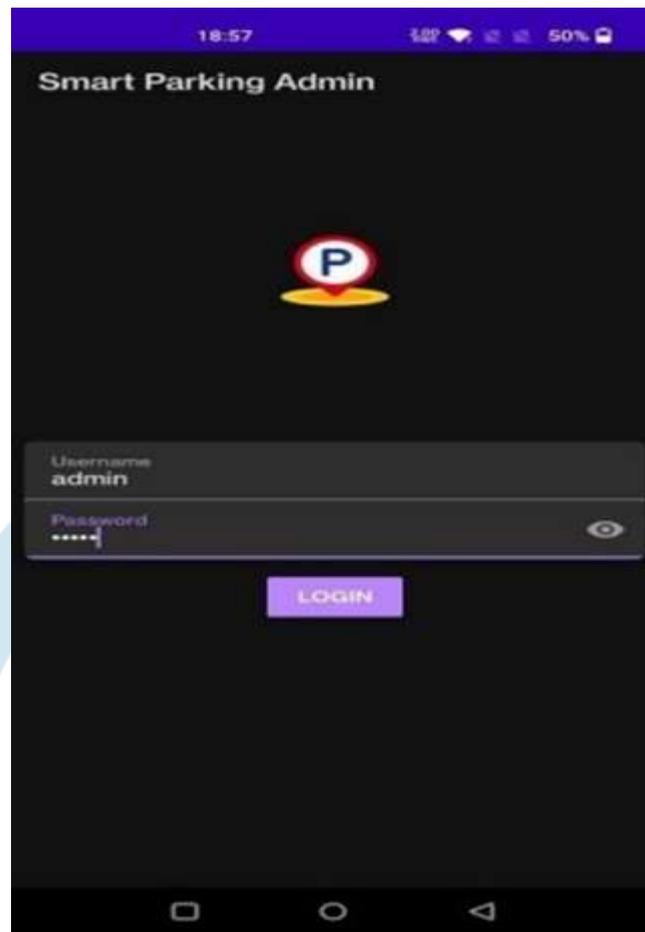


Fig. 4. The above screenshot shows the UI of admin application, here the manager who has the authentication can enter the credentials to login to the admin UI through which he can manage the parking slots in real time.

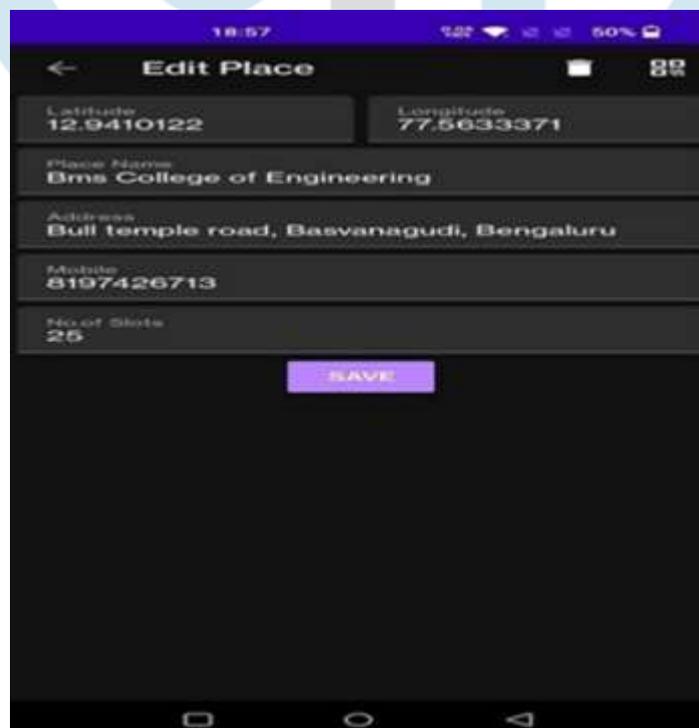


Fig. 5. The above screenshot consists of some of the fields which are to be entered by the admin, such as longitude and latitude so that the location of the parking slot will be exactly located in the map rather than entering the names of the place of which some names are not recognized. There are also some mandatory fields such as the number of parking slots, which specifies the availability of place to park the vehicle, and the address field provides the user about the landmark of the parking location and the phone number of the manager of the particular location is provided for assisting the user.

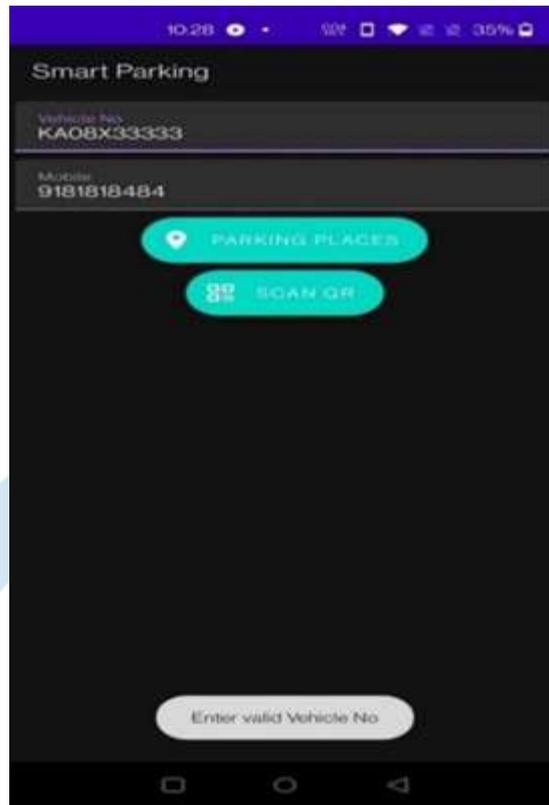


Fig. 6. Here the above screenshot is shown for User UI which has the fields of entering the Vehicle UID (Unique identification number) and the phone number of the driver, on the successful entry of the valid data, the page will be redirected to the nearest parking location from the current user (Driver) location and also provides the user to select the nearest available parking slot of his/her wish.

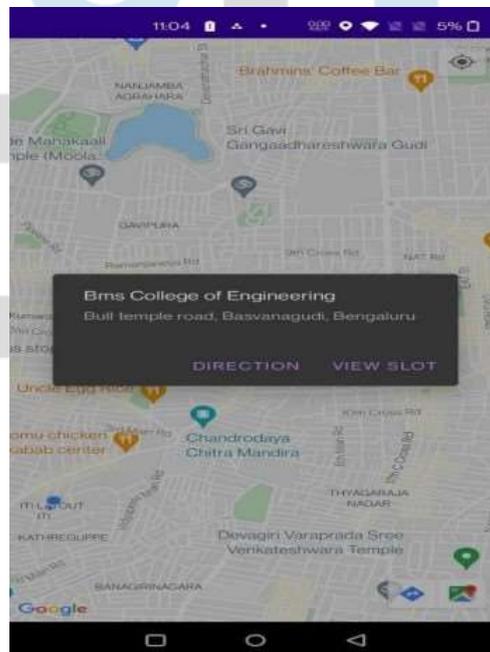


Fig. 7. The above screenshot represents the view slot availability and the directions to the particular parking slot.



Fig. 8. In the above screenshot of the User UI when the view slot option is selected by the user of a particular parking slot, then the slots of the particular parking slot is displayed which consist of overall info about the availability, booked and park-in. The booked refers to the advanced booking of the particular user and park-in refers to the vehicle parked at the location and also the availability shows the vacant slots.

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