

Online Parking Slot Booking and Management System

Rahul Krishnan.P¹, R Ajmal Hussain², Akhil Mohammed P.B³, Abhijith Sanal⁴

¹Associate Software Engineer, OSPYN Technologies

²Systems Engineer, Infosys

^{3,4}Btech Graduate

⁴Information Security Analyst, UST Global

Abstract - Due to the increase in population and the number of vehicles, the parking issue is getting worst day by day in many big and crowded cities of the world. People have to spend more money and time to find safe parking for their vehicles. The street and roadside parking causes various troubles like fines and damages to the vehicles. Wide usage of android technology with the recent advances in wireless applications, manifests that digital data dissemination could be the key to solve emerging parking problems since there is a steady increase in the number of people using android mobile phones. In this paper, an optimum solution is proposed to find available parking slots in nearby parking areas and to manage them efficiently. A mobile application is designed that helps users in a number of ways, find nearest parking areas, search for available parking slots and allow real time reservation of these slots. Moreover, a complete navigation map using GPS is provided that help users to reach the designated parking slot. Additionally, hours prior to his expected arrival, the user can pre-book a slot in the area he desires if it is available this will help the user to search the parking slot through android application. With this application not only the time is saved but the safety of the vehicle is also ensured.

Index Terms – Android technology, digital data dissemination, GPS.

I.INTRODUCTION

Thanks to the phenomenal growth of Internet users worldwide over the past decade, e-commerce has grown exponentially. E-commerce has changed the way businesses operate and has influenced the overall business model. “New competitors such as Internet retailers are creating a void in the revenue model and are known to PTTA PERPUSTAKAAN TUNKU TUN AMINAH7revolutionize competition. As example, at the branch of hotel, we can notice the huge effect of this event on the site of booking.com (the online retailer).” Due to the high commission of

commercial agents in 2010, they accounted for only \$ 5.4 billion, which is a 'leak' in the hospitality industry (Starkov,2010) [8]. “With the growth of urban areas caused by economic development and urbanization, car ownership has increased dramatically and it is increasingly hard to find place for parking in overcrowded areas. Many studies have clearly shown that parking time for conventional cars is around 95%(Shoup, 2005). As a result, today's parking system is, of course, an important part of the system of transportation. In overcrowded areas such cities, we can notice a high demand (the number of cars requiring parking) and a low offer (parking), so parking must be regulated and economically viable. Here, garage operators and municipalities receive revenue from regulated and public access parking spaces. Business park activity is known as a relatively traditional and relatively 'young' business, as evidenced by the fact that the scientific literature on commercial parking is very limited. Due to the relatively young and traditional commercial parking activity, existing operators may be inclined to enter the 'park brokers'. Currently, relatively small merchant brokers such Yellow Brick and Park-Line are gaining market share in the Dutch car park through websites and smartphone apps. With phenomenal growth in e-commerce and an even more accurate online buying broker, it is believed that existing fleet market participants are very important to their strategy for these new players in the parking market [8].”

With the increasing number of vehicles finding a parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers. Parking problems are becoming ubiquitous and ever growing at an alarming rate in every major city [6]. Wide usage of android technology with the recent advances in wireless applications, manifests that digital data dissemination could be the key to solve emerging

parking problems [5]. Now-a-days there is a steady increase in the number of people using android mobile phones. Online parking slot booking is based on android technology for avoiding the parking problems which provides process of pre-booking the slots through the use of a simple and interactive android application. The user needs to have an android enabled device to reap the benefits of this application. After installing the app, user needs to mandatorily register with the application. Booking of the slot at user's desired location should be done four hours prior to the arrival. Payment services are made available using google wallet in the future. The idea behind our android application is to help the user analyses area's where parking is available and number of slots free in that area. Additionally, four hours prior to his expected arrival, the user can pre-book a slot in the area he desires if it is available this will help the user to search the parking slot through android application.

II.LITERATURE REVIEW

We mainly focus on designing a new smart parking management system that assists users to find the authorized parking areas in the nearby areas by using the android application. In addition, an important goal of the system is to reduce the traffic searching for parking, hence reduce energy consumption and air pollution. This paper mainly focuses on helping the user to find the nearby authorized parking areas with ease. The application will also help the parking owner in managing the load. The application will be a middleware for connecting user to the owners of the parking area. This greatly facilitates the user as his parking slot will be confirmed and would not waste time in searching the slot for parking. This application will help the user to find the parking space when he/she visits the new area or the state. A user new to any city or state can use this app to safely park the vehicle. The app ensures the safety of the identity of the user by addressing user by username. As the parking slots are under government registration there is no possibility of fake parking area or false slot information. The necessary document photocopy is required for the owner to be submitted while registering. The nearest parking areas to the user are prompted for which MAPS are used. Amongst the suggested area the user gets the choice to

select which enhances the usability of the app. Once the user reaches the parking area then he can park the vehicle in the confirmed slot. Once user renounces his slot then it appears reserved for other users and after leaving the slot it is shown as 'available' for other user

III.PROBLEM STATEMENT

Nowadays most of the car parks require user's initiative to search for empty space to park their car. This will cause problems when it is too many cars and it makes them wasting their time and energy [7]. One of the factors that contribute to this problem is because of lack of information that given at parking lot. So, one system has to be design to solve this parking problem which will include the information interfacecriteria.ie with the increasing number of vehicles finding a parking space in city areas, especially during the rush hours, is difficult for drivers, And searching for a parking slot consumes lot of time.

And also we don't care about the safety of our vehicle, we just park anywhere when we get some space. This is usually risky as there is no guarantee of what will happen to our vehicle risks includes theft, damage to property etc

IV.METHODOLOGY

The currently proposed connects parking slot owners and slot seekers through mobile application, Mainly consist of 2 modules , the Application interface, database

A. Application interface

The application interface helps user to find and book desired parking slot of a particular area. It also helps the manager to manage their parking slot. Here the user needs to register for the first time with mail id , phone number and password, later user must use former credentials to login on to their account. As for manager registration is done via other means by developer and owner. After registration a unique id is distributed to the manager with which he/she can login to their account App interface/ui is built using Flutter, an open source framework to create high quality, high performance mobile applications. It is based on Dart language. IDE used is Android Studio

B. Database

Here we use Firebase real-time database to implement centralized database to store details of user and

manager. Firebase is a backend platform developed by Google for creating mobile and web applications. It offers real time database, different APIs, multiple authentication types and hosting platform. Firebase real time database, an API that synchronizes application data across iOS, Android, and Web devices, and stores it on Firebase's cloud. This assists us in building real-time, collaborative platform. The Firebase real time database is a cloud-hosted database in which data is stored as JSON. The data is synchronized in real time to every connected client. All of our clients share one real time database instances and automatically receive updates with the newest data. It uses data synchronization instead of using HTTP requests. Any connected device receives the updates within milliseconds. It is also optimized for offline use that is when users go offline, the real time Database SDKs use local cache on the device to serve and store changes. When the device comes online, the local data is automatically synchronized. The use of mobile and web SDKs allows us to build our platform without the need for servers. Firebase provides several built-in security features to help manage project security goals.

C. GPS

Global Positioning System (GPS) is defined as spaced-based radio navigation system. This system is owned by the United States government and is operated by the United States Air Force. Time information and geo location is provided by the global navigation satellite system to the GPS receiver. For transmitting data, GPS does not require any user. It can operate independently of any Internet or telephone reception, although these technologies can increase the usefulness.

D. Android Studio

Android Studio is the official IDE for Android app development, based on IntelliJ IDEA. On top of IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps, such as:

- A flexible Gradle-based build system.
- Build variants and multiple APK file generation.
- Code templates to help you build common app features.

- A rich layout editor with support for drag and drop theme editing.
- Lint tools to catch performance, usability, version compatibility, and other problems
- Code shrinking with ProGuard and resource shrinking with Gradle.
- Built-in support for Google Cloud Platform, making it easy to integrate Google Cloud Messaging and App Engine

E. Architecture

The proposed system helps a user to find and book particular parking slot. For that the user has to register with credentials, these credentials are store in cloud and further used for login. The user has to first sign up into the application which registers the user onto the central database and thereafter the user can log onto the application wherein available spots are shown. The user selects the suitable spot and mentions the time for how long he might be needing the spot and confirms the booking by making payment for the spot online.

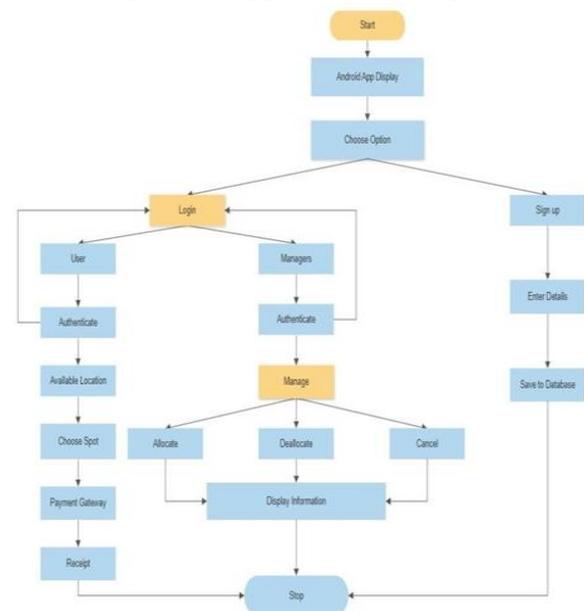


Fig.1 overview flowchart

Enter your User name

Enter your phone number

Enter your email

Enter your password

Register

Fig 2 user registration



Fig.3 user login



Fig 4 Parking locations

It is divided into 3 modules

A. User interface

A user gets to register,login,view details of parking slot ,edit credentials etc,

B. Manager interface

Here the manager can log in to view their parking dash board and other details related to parking. They gets the option to allocate and deallocate slots to their desire

C. Firebase and Firestore

Through Firebase database the details of user and manager is stored to firestore , a real time database. Where one change is quickly updated through out the whole database. For each registration mailid is stored with a unique id. This unique id is then used to acces all the details.



Fig.5 Sample firestore

Password reset is also initiated using firebase inbuilt package.

V.RESULTS AND DISCUSSIONS

The project has been successfully completed and the application is working as intended. We could sign in as manager and user. In user section we can select parking area, slot and time and they can pay. After this the user will get a slot confirmation receipt for the same. Similarly in manager section, the manager can allocate, deallocate and cancel slots. When a user books a slot the parking dashboard gets updated and the manager can view the changes. In order to understand the accuracy of the application, we booked several slots using several customer ids, then user gets a confirmation receipt as in fig 6 and the parking dashboard gets updated as fig 7



The project is completed within 3-4 months where initial research and analysis took almost 1 month. UI and database development took 2 and 1 month respectively to complete. Existing online parking system fails to provide a managerial control over the parking area in the app itself. Our slot booking system provides a managerial control over the parking area and provides real time database updation. We observed that this app is very much user friendly and is usable in every circumstances.

VI . CONCLUSIONS AND FUTUREWORK

As conclusion, the objective of online slot booking system have been achieved. The difficulty of searching available parking lots has been completely eliminated by reserving slots via the proposed system. User can learn about parking areas for particular locations. It saves user time in search of parking space available in such a long parking area. This app is a small step to make city a 'smart-city'. This can be developed in future for a wide area like a state or a country so that it can help people on large scale. This app can be sold to the government so that the database for number of parking owners and the server capacity can be utilized. This app server data can be used by government for certain crime investigation details

REFERENCES

- [1] Kun-Chan Lan, Wen-Yuah Shih, "An Intelligent Driver Location System for Smart Parking", Expert Systems with Applications, 2013.
- [2] M. M. Rashid, A. Musa, M. Ataur Rahman, and N. Farahana, A. Farhana, "Automatic Parking Management System and Parking Fee Collection Based on Number Plate Recognition", International Journal of Machine Learning and Computing, Vol. 2, No. 2, April 2012.
- [3] Prof. D. J. Bonde , Rohit S. Shende, Ketan S. Gaikwad, Akshay S. Kedari, Amol U. Bhokre, "Automated Car Parking System Commanded by Android Application ", (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 5 (3) , 2014.
- [4] Mala Aggarwal, Simmi Aggarwal, R.S.Uppal, "Comparative Implementation of Automatic Car Parking System with least distance parking space in Wireless Sensor Networks ", International

Journal of Scientific and Research Publications, Volume 2, Issue 10, October 2012 ISSN 2250-3153

- [5] Priyanka S. Patil, S.K. Shah, "A Review: Development of Android Applications WHATS HERE Places", International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 4, Issue 4, April 2015
- [6] R. Yusnita, Fariza Norbaya, and Norazwinawati Basharuiddin, "Intelligent Parking Space Detection System Based on Image Processing", International Journal of Innovation, Management and Technology, Vol. 3, No. 3, June 2012
- [7] Muhamad Abdul Shukur B Othman, "Smart Parking System," Tesis, UTHM, 2007/2008.
- [8] de Lange, H. (2015). Bachelor Thesis: The Future Role of the Parking Transaction Broker.
- [9] Jian-Yu Chen, Chih-Ming Hsu, "A Visual method for the detection of available parking slots" IEEE International Conference on Systems, Man, and Cybernetics (SMC) ,2017.
- [10] Sagar Piyush Parikh, Dhruvil Rakesh Shah, Parshva Rajesh "Park Indicator: Booking Your Parking Spot" Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), 2018.