Smart Car Parking System Approach Using Firebase

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In

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SHRI RAMDEOBABA COLLEGE OF ENGINEERING & MANAGEMENT, NAGPUR

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Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Thesis on "**Smart Car Parking System Approach Using Firebase** " is a bonafide work of Antarang Poogalia,Devan Somani,Gaurav Agrawal and Kawakib Darain submitted to the Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur in partial fulfilment of the award of a Bachelor of Engineering, in Computer Science and Engineering has been carried out at the Department of Computer Science and Engineering, Shri Ramdeobaba College of Engineering and Management, Nagpur during the academic year 2019 – 2020.

Date:

Place: Nagpur

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DECLARATION

We, hereby declare that the thesis titled "**Smart Car Parking System Approach Using Firebase** " submitted herein, has been carried out in the Department of Computer Science and Engineering of Shri Ramdeobaba College of Engineering and Management, Nagpur. The work is original and has not been submitted earlier as a whole or part for the award of any degree / diploma at this or any other institution / university.

Date:

Place: Nagpur

Name , signature & roll numbers of group members -

Antarang Poogalia	Devan Somani	Gaurav Agrawal	Kawakib Darain
32	37	40	41

Approval Sheet

This thesis entitled “Smart Car Parking System Approach Using Firebase ” by Antarang Poogalia, Devan Somani, Gaurav Agrawal and Kawakib Darain is approved for the degree of Bachelor of Engineering.

Name & signature of Supervisor

Name & signature of External Examiners(s)

Name & signature of H.O.D

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ABSTRACT

The number of personal vehicles usage is increasing manifold. People prefer personal vehicles to commute than depend on public transportation. Finding a parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers. Due to this there is a need to provide sufficient parking places coupled with plenty of slots to help the user park his vehicle safely, also to ensure the user does not end up parking on non-parking area and cause discomfort to pedestrian. The idea behind our Android Application- “Smart Car Parking System Approach Using Firebase “ is to help the user analyse area’s where parking is available and number of slots free in that area. Additionally, prior to his expected arrival, the user can pre-book a slot in the area he desires if it is available.

This will help reduce the load on the administrator as his physical work reduces drastically and user can search the parking slot through Android Application. Payment services are made available using PayPal, so the user can go cashless. “Smart Car Parking System Approach Using Firebase” Application relieves the user from the hassle of manually searching and waiting for empty slots to park the vehicle.

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INTRODUCTION

1.1 Motivation

The number of personal vehicles usage is increasing manifold. People prefer personal vehicles to commute than depend on public transportation. Finding a parking space in most metropolitan areas, especially during the rush hours, is difficult for drivers. Due to this there is a need to provide sufficient parking places coupled with plenty of slots to help the user park his vehicle safely, also to ensure the user does not end up parking on non-parking area and cause discomfort to pedestrian. The idea behind our Android Application-"Smart Car Parking System Approach Using Firebase " is to help the user analyse area's where parking is available and number of slots free in that area. Additionally, prior to his expected arrival, the user can pre-book a slot in the area he desires if it is available. This will help reduce the load on the administrator as his physical work reduces drastically and user can search the parking slot through Android Application. Payment services are made available using PayPal, so the user can go cashless. "Smart Car Parking System Approach Using Firebase " Application relieves the user from the hassle of manually searching and waiting for empty slots to park the vehicle.

1.2 Aim & Objective

To develop an efficient and time saving parking slot application to reduce traffic and inconvenience while parking vehicles.

1.3 Benefits

The Benefits of using Smart Car Parking System Approach Using Firebase :-

- Reducing Traffic within the parking slot.
- Implementing a smart pricing system to attract customers.
- Allowing customers to make reservations online in advance.
- Providing a real time visual interface that will allow customers to select their preferred parking slot.

1.4 Brief Description of System

The User will select a slot according his choice and when he arrives at selected location, user's location should matched the location which he booked. Store User's detail in Database. Providing a real time visual interface that will allow customers to select their preferred parking slot. Calculation of Fare according to his selected slots and redirecting to Payment Gateway. Providing user with direction and pressing leave button to leave the slot.

Chapter 2

Literature Review

2.1 Android Studio

Android is a Linux-based open source software stack created for a wide array of devices and form factors.

Android is an operating system designed for mobile devices like smartphones, tablets, and smartwatches. Android is based on a modified version of the Linux kernel and was initially developed by Android Inc. which was later bought by Google in 2005.

2.1.1Android Interface

The android interface is mainly dependent on direct interaction and manipulation by the user. This includes touch inputs and device movements. Touch inputs include finger touches, swiping, pinching, dragging, and tapping. Device movements refer to changes in screen orientations, device shakes, and in some devices squeezes and air gestures.

The Android OS also supports a virtual keyboard, because android is mainly used for touch devices that don't contain an actual physical keyboard.

An android device doesn't need a computer mouse, for inputs are provided by touch where your finger acts as a mouse pointer.

2.1.2 Android Applications

Android applications are built using the Android Software Development Kit (SDK). The common programming languages used to develop these applications include Java, XML, Kotlin, etc.

The Android SDK includes development tools like debugger, various software libraries, editor, android virtual device emulator, etc. Android Studio is the primary Android development IDE (Integrated Development Environment) which is provided by Google.

An Android app has the file format namely APK (Android Application Package). To install an app on your device, the APK of that app is required, Alternatively, applications can be downloaded from the official Google Play Store which has a wide variety of first and third-party apps available both paid, free and some which require paid subscriptions.

Other app stores like Amazon Appstore and other online websites can also be used to get android applications.

2.2 Firebase

Firebase is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google in 2014. As of October 2018, the Firebase platform has 18 products, which are used by 1.5 million apps.

2.2.1 Real-Time Database

Real-time data is the way of the future. Nothing compares to it. Most databases require you to make HTTP calls to get and sync your data. Most databases give you data only when you ask for it. When you connect your app to Firebase, you're not connecting through normal HTTP. You're connecting through a WebSocket. WebSockets are much, much faster than HTTP. You don't have to make individual WebSocket calls, because one socket connection is plenty. All of your data syncs automagically through that single WebSocket as fast as your client's network can carry it. Firebase sends you new data as soon as it's updated. When your client saves a change to the data, all connected clients receive the updated data almost instantly.

2.2.2Authentication

Firebase auth has a built in email/password authentication system. It also supports OAuth2 for Google, Facebook, Twitter and GitHub. We'll focus on email/password authentication for the most part. Firebase's OAuth2 system is well-documented and mostly copy/paste.

If you've ever written an authentication system, let's commiserate for a moment. Custom authentication is terrible. I will never write an auth system again for as long as I live. I fell in love with Firebase Auth at first sight, and the flame has never wavered. Sometimes I get frustrated. Sometimes we fight. But I never forget the cold, dark abyss of a custom auth system. I count my blessings.

Oh, and Firebase Auth integrates directly into Firebase Database, so you can use it to control access to your data. I'm writing this as if it's an afterthought. It's not. It's the second reason that you will love Firebase Auth.

2.3 PayPal

PayPal provides an easy and quick way to send and request money online. You can transfer money (abroad) to family, friends, online shops, and auction sites like eBay.

2.3.1 Online payments

All you need to send money to family or friends is the email address of the recipient. By registering your credit card or bank account with your PayPal account you can send payments using the option Send and Request Money. The money will be credited to the recipient's account and can then be transferred to a bank account, or used to make a payment.

2.3.2 To receive money online

Anyone can send money to you using your email address. Your email address is linked to your personal PayPal account. You will receive an email notification whenever you receive a payment and the payment will be shown on your account.

Online shops that offer PayPal as a payment option can post the PayPal logo on their website. There are various ways to offer PayPal as a payment option, like Pay Now and Shopping Cart.

If you receive a payment through PayPal, we'll send you a notification by email. The money will be credited to your PayPal balance. You can transfer the money to your bank account or use it to make a payment yourself.

2.3.3 Fees

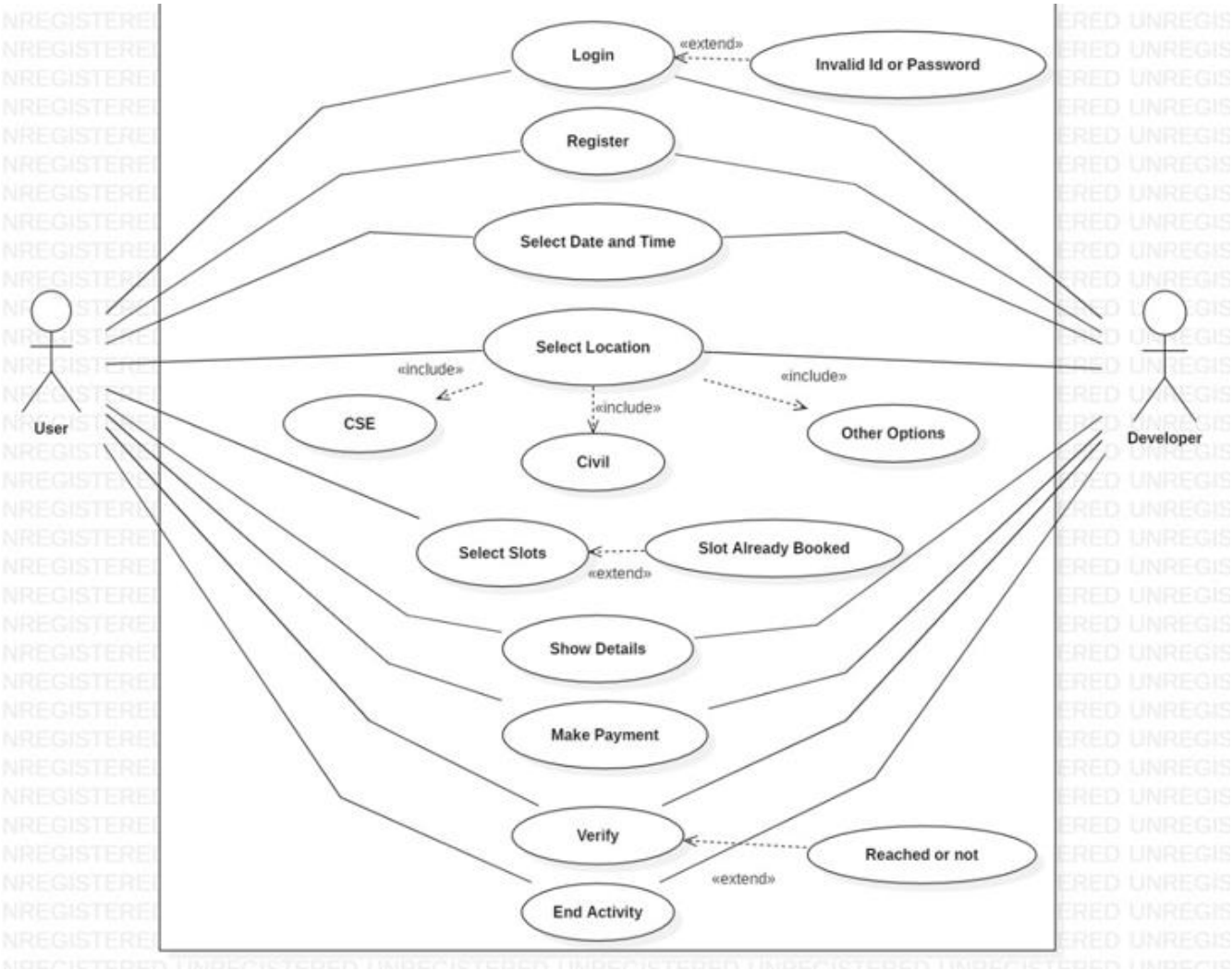
Opening a PayPal account is free. Fees will be charged depending on the payment you make:

- **Personal payments**: Payments to friends and family are free provided you use your PayPal balance or bank account to send these payments. If you use your credit card, the recipient will be charged the associated fees. However, you as sender can state that you will pay these fees.
- **Commercial payments:** If you buy an item, the recipient (seller) will be charged the associated fees.

Chapter 3
Implementation

3.1 Design

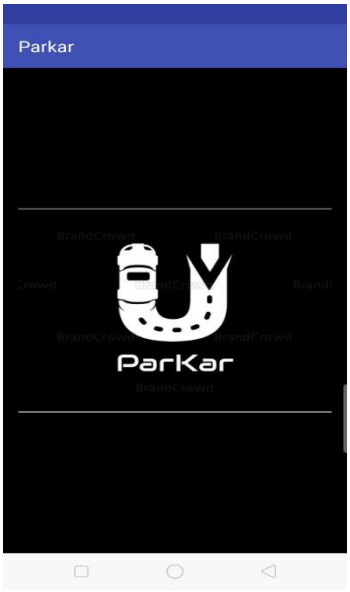
The Following Use-Case Diagram explains about the flow of Smart Car Parking System Approach Using Firebase .



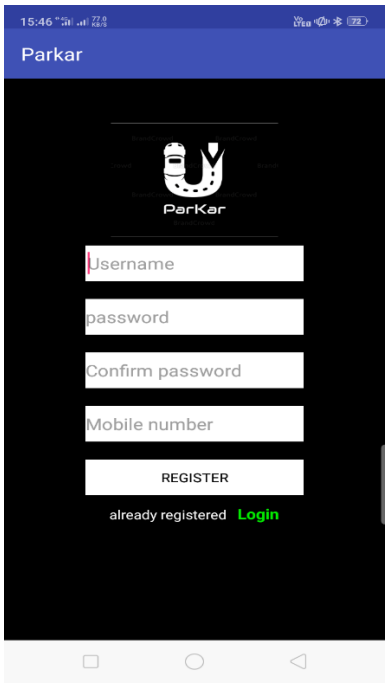
3.2 Execution

3.2.1 Client Side

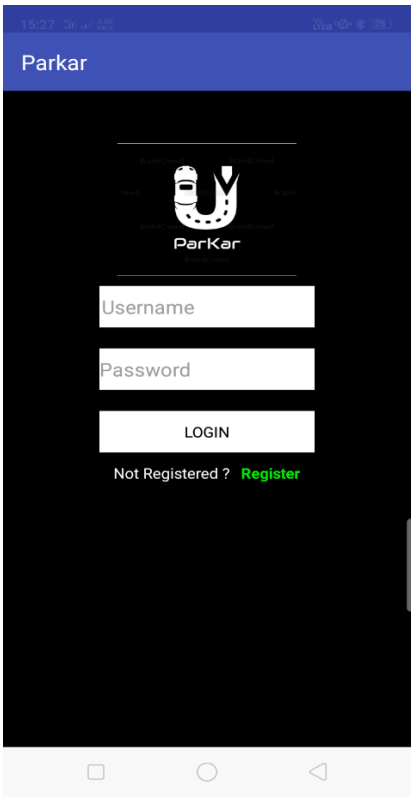
1. **Starting the Application:-** The user needs to install the “Smart Car Parking System Approach Using Firebase ” application on his Android based device. After installation, the icon of the app will feature on the Home Screen of the user’s device. “Smart Car Parking System Approach Using Firebase ” welcome screen will be flashed to the user on opening the application.



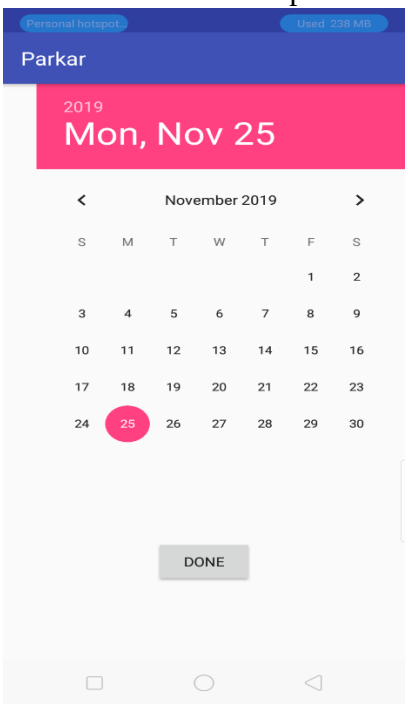
2. **Registration:** Initially, the user has to register his details with the application for the first time. This is a one-time registration. The user has to enter details like email, password and phone number. All this data will be stored on Database . Booking for slots mandatorily has to be done prior to arrival.

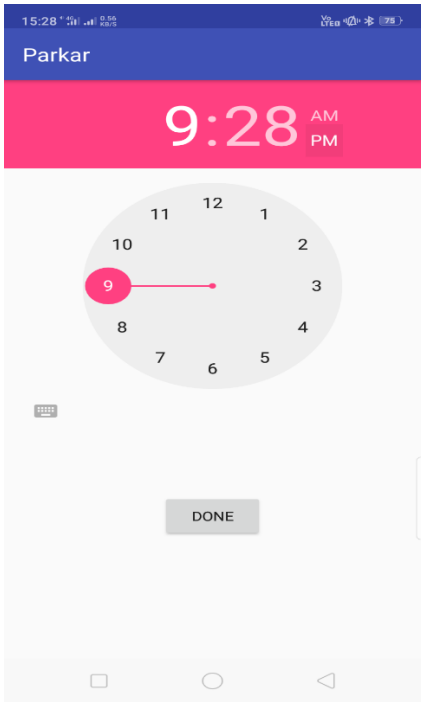


3. **Login:**-Once the user register's, he can use his email id and password to login in future. This authenticates the user.

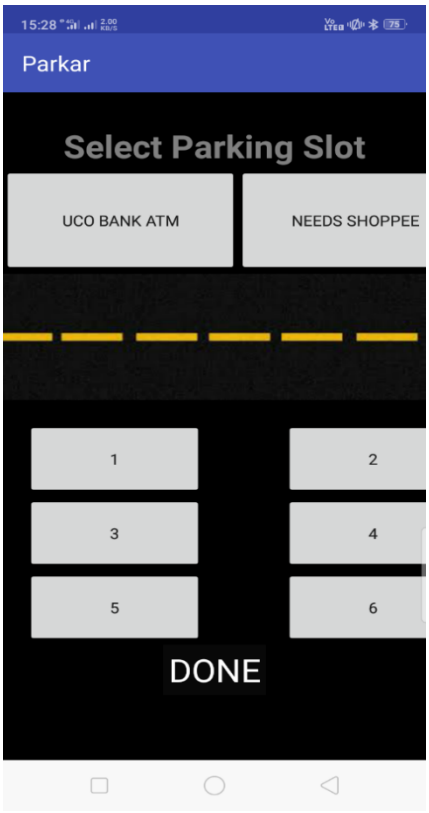


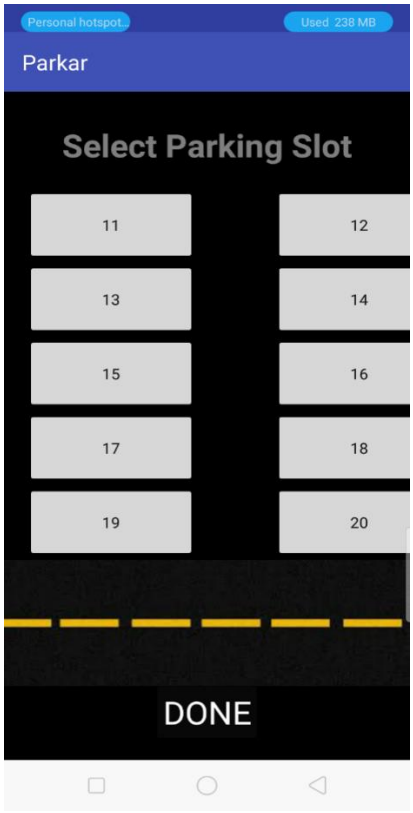
4. **Selection of date, time and location for parking**:- The client has to choose the date and time-in and is provided with multiple parking locations. Client has to select one of the locations provided where he desires to park the vehicle.

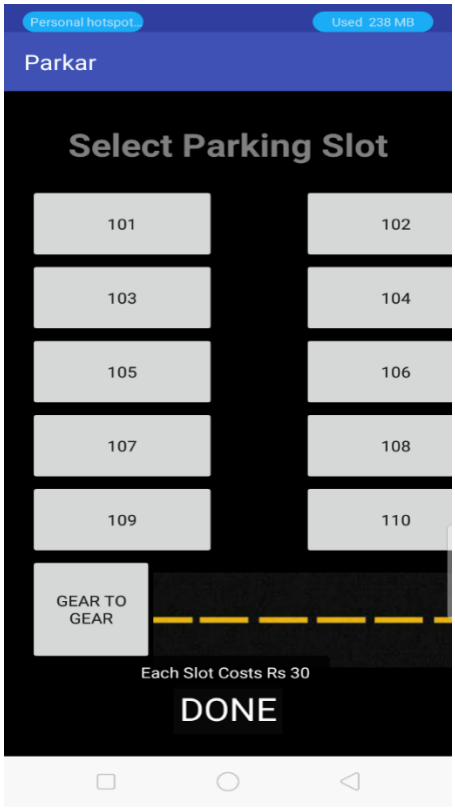




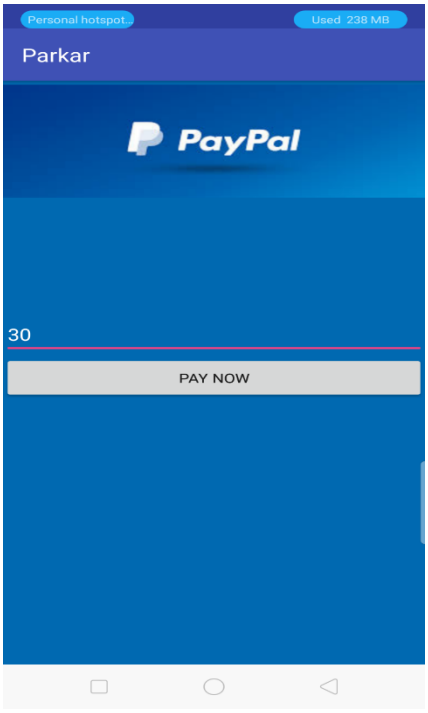
5. **Selection of slots:-** The user can select the slot that he wants , color coding is used to indicate empty v/s reserved slots , green indicates empty slots and red indicates that currently there are no empty slots for reservation.

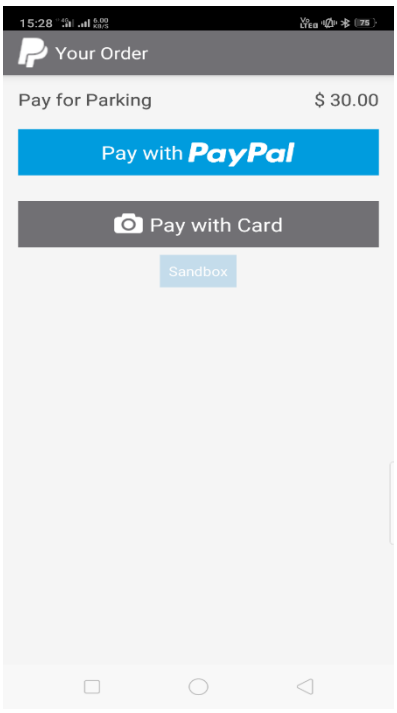




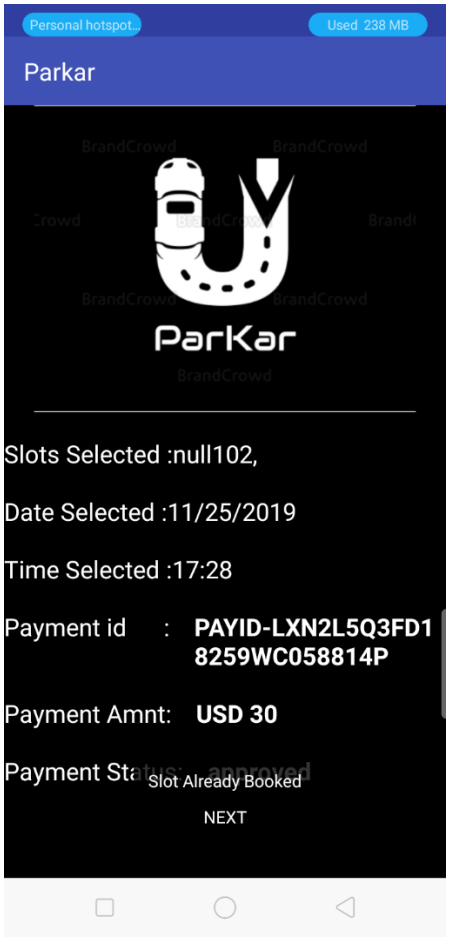


6. **Payment :-**The user is redirected to PayPal and is asked to pay the required amount.





6. **Booking Details :-** The user is shown his booked slots and the amount paid.

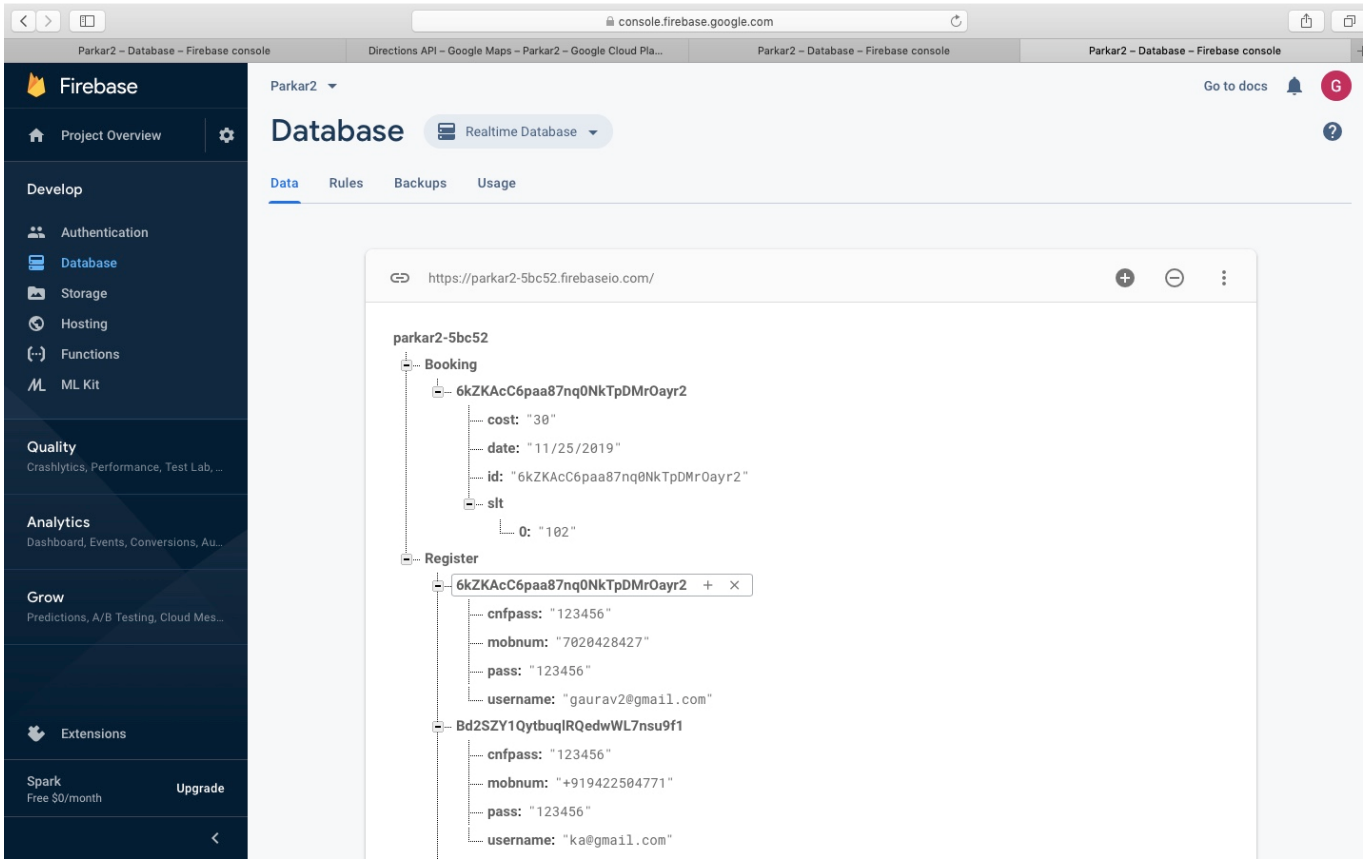


7. **Location Detection:- :-** After reaching desired location, the user presses reached to verify user's location. By Pressing Leave Button the user leaves the slot.

3.2.2 Server Side

1. **Managing Data:-** Storing the credentials that the user entered at the time of registration. It also stores the number of slots user has selected for reserving the slot and deletes when user presses left button.

2. **Verification:-** Verifying Username and Password at the time of login.



Chapter 4
BENEFITS

- Reducing Traffic within the parking slot.

Smart Car Parking System Approach Using Firebase provides user to book the slot that the user wants according to his choice and this is will reduce the traffic when the user comes to the site of parking.Since the user parks at the booked slot the damage caused and time wasted is reduced while parking or leaving the parking slot.Hence this will reduce frustration of the driver while parking.

- Implementing a smart pricing system to attract customers.

Since PayPal accounts connect directly to a bank account, buyers can pay for online purchases even if they do not own a credit card. Using PayPal may increase financial security for buyers since the seller does not receive bank account or credit card numbers, only the PayPal account number. Buyers can use accounts for booking slots . The fact that PayPal is free is also appealing to many buyers. The price for each slot is reasonable and ensures complete safety of the vehicle from any damages.

- Allowing customers to make reservations online in advance.

Smart Car Parking System Approach Using Firebase provides a parking system where user can know whether there exists a parking slot near his destination and can book according to his need. Hence prior booking of slots ensures user to park in parking zone rather than in a non-parking zone and this will reduce both traffic and frustration of the driver. Booking prior to travelling will make the user confident about his travelling as he won't worry about the time-taking parking .

- Providing a real time visual interface that will allow customers to select their preferred parking slot.

The user can select the slot that he wants, color coding is used to indicate empty v/s reserved slots, green indicates empty slots and red indicates that currently there are no empty slots for reservation hence this is real-time look gives user a view about whether there are any parking slots available near his destination available for parking.

Chapter 5

FUTURE SCOPE

The Smart Car Parking System Approach Using Firebase Application can be developed for other popular mobile operating systems. In future, our application can be implemented on the existing operating systems like iOS.

Our application can be used as an alternative to the present parking systems in Malls, near Railway stations, near Airports, theatres, etc. as an efficient means to park. Google Wallet can used to make secure payments fast and convenient.

The introduction to Google Maps for directing the user to reach to the parking location.

The Introduction of Internet of Things (IoT) will unleash its major perspectives of parking operations The use of IoT at a parking lot will help vehicle users to know the availability of a parking location through smartphones. This IoT-based parking system is created by using controllers, sensors, servers and cloud. Controllers and sensors will be placed on the ceiling of each parking slots to detect the presence of a car. Server collects the vehicle number and stores them in Cloud. This number will be used to check whether the parked vehicle is parked at perfect location or not. Also Flutter can be use to improve the User interface of the application.

Chapter 6
Conclusion

If it is a dwelling, entertainment centre or a market place, the first and foremost question in the minds of everyone is about the parking slot. Compared to other developed countries, the problem of parking is disheartening in India as there is no well devised plan in place. Government authorities have been raking their brains day in and day out to tackle this problem. The parking problem is quite acute in places of entertainment such as theatres and shopping malls. We touched a small scenario of parking problem in India in this paper. We brought out in this paper how the parking problem in such places can be tackled with a well-thought plan. The plan helps both the visitors and administrators. It helps the visitors in finding out the availability of a parking slot and get the availability confirmed. It helps the administration to allocate the vacant slot to the next person in queue. A well thought parking plan saves the time of visitors in booking a parking slot in advance and the administration to allocate the

vacant slot in a methodical and organized manner.

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- http://www.slideshare.net/maverickadhar/m ulti- level-car-parking-in-india