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Android Application for Vehicle Parking System "Parking Informatics"

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Abstract - *With the increasing population, the amount of vehicles is increasing considerably in metropolitan areas. The world is developing towards a smart living approach. Smart cities are a new and very effective concept highlighting the use of technology. The parking management in a metropolitan area becomes very difficult as there is a lack of knowledge of proper parking space. For example, in cities such as Pune, Mumbai there are numerous vehicles used daily, therefore managing these vehicles' parking at personal level becomes a challenge. One aspect of the solution is parking management. The vehicle's parking management will utilize the available space and avoid unnecessary parking problems. The user will only need to download this app and click the button to find the nearest location for parking. The security of the vehicle is ensured and the user's data while registering remains safe. Park Smart is a thoughtful approach that will increase user's convenience.*

Key Words: Application (app), Global Positioning System (GPS), Android, Dalvik Virtual Machine (DVM); Google Wallet; International Mobile Station Equipment Identity (IMEI).

1. INTRODUCTION

Android is an operating system, developed for mobile devices like smartphones and tablet computers, which is based on the Linux operating system. It was developed by Google in the year 2005. It is the Smartphone platform. Motor vehicles are a major mode of transportation, which has seen significant growth over the years. The need for parking spaces is increasing in conjunction with this growth, and becoming a major problem in busy cities. There are many problems associated with this overuse such as pollution, fuel consumption, wasted time because of the looping, a higher percentage of accidents, and drivers' frustration due to traffic congestion. The open-loop strategy is defined as the Blind Search, where drivers keep cruising the area looking for vacant parking and will stop once they reach a free spot. A study shows that approximately 45% of road traffic is caused by motorists looking for a free parking spot. Moreover, traditional methods like 3 static or digital parking signs at sites are no longer relevant, because of the significant increase in drivers who are looking for parking. Drivers' eyes are often busy off-road and they lose their focus on what is happening on the road, by searching for parking signs or free parking. Even if they temporarily wait for a spot to be vacant, parking illegally on-road has a direct impact on road traffic. Nowadays, we have advanced technologies that are used in many different fields to solve problems like reservations. Evoking these technologies and merging them with a single travel-related system is still in the early stages and needs to be used by drivers in their day-to-day travels. Certain companies are already applying several reservation methodologies and are making huge investments to achieve customer satisfaction and maximize their profits. In the last decade, there have been many online parking reservation systems that were developed to serve people using computer-based web browsers and allow them to book their parking in advance. Unfortunately, these systems were developed to work on personal computers and laptops, before the era of smartphones. So design a system that will save users time and allow them to know ahead of time when and how to reach their guaranteed parking space (private or public parking service providers everywhere nearby the customer), instead of having to travel to their desired destination unsure of where to park their vehicle.

2. MOTIVATION

To park a vehicle in the nearby location has become a very big challenge for organizations, educational institutions with a high percentage of vehicle ownership, and decreasing parking supply results in triggering blockage of vehicles, congestion, wastage of time, and money. A survey was conducted in 2016 by U.S.News among 215 national universities. Among these universities, the students who had cars on campus for one school year were at 98 percent followed by 80 to 95 percent. This demographic shows the requirement for an application that provides an easy way for anyone to park their car. Many works involving smart parking solutions have been proposed, but in general, they do not discuss the reliability and effectiveness of their solutions. The main requirements are vehicle detection and the presentation of the status of parking spaces for the users, which are achieved using different ways. The various applications available to assist in parking are generally for shopping malls or airports. These applications mostly use parking meters or sensors to show if any parking space is available. It is difficult to know the exact location of an empty space using parking meters. On

the contrary, using sensors is the most effective and best method so far, but it has its own disadvantage of not being able to easily deploy in open parking lots, and it's not robust enough to withstand extreme weather conditions. To apply any of the above methods at a university does not cost effective. Android is the software stack for mobile devices that includes an operating system, middleware, and key applications. An Android app is an application that runs on the Android platform. As the Android platform is built for mobile devices, an android app is designed for a Smartphone or a tablet PC running on the Android OS (Android Operating System) [10]. There are four layers in the Android Operating System and they are- Linux, Kernel Libraries, Android Runtime Application, and Framework Applications. Most of the parking-related apps are tied to an existing system of garages, parking meters, and sensors to gauge the traffic, prices, and availability of parking spaces. A case study of the most downloaded among these apps gives a premise to designing an application with a functional user interface and a satisfying user experience. This section a few mobile apps which are some of the real-world examples of parking space finders. Most existing systems are not cost-efficiency or easy to implement. Some of the applications do not provide the exact slot to park. Thus, the proposed system overcomes these disadvantages. Slots, in turn reducing his time. This application is to save time and make it easier to locate the nearby parking lot and a free space in it without any external help of a third person. It shows the real-time location of the free space and allows you to book a slot in advance in the desired lot, finally you can navigate to the parking lot by the map given to you.

Ideology behind our application:

"Parking Informatics" application is based on the client-server architecture. The client is provided with an interactive Android based user interface for the process of pre-booking of parking slots. The server side processing will be enabled using Firebase and Mongodb. The client requests the server for locations where parking is available and the server responds with slot availability.

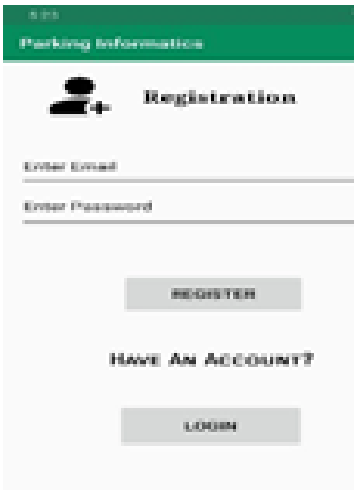
3. IMPLEMENTATION

3.1 Starting the application

The user has to install the application "Parking Informatics" application on his Android-based device. After installation, the icon of the application will feature on the Home Screen of the user's device. "Parking Informatics" welcome screen will be flashed to the user on opening the application.

3.2 Registration

Initially, the user has to register his details once with the application for the first time. This is a one-time registration. The user has to enter details



Like username, phone number, and email- id. All this data will be stored on the server. Booking for slots mandatorily has to be done prior to arrival.

Figure3.2: Saving client registration details in the server

3.3 Login

Once the user registers, he can use his email id and phone number to login in the future. This authenticates the user.

Figure 3.3: Authenticating client details into server

3.4 Selection of location for parking

The client is provided with multiple parking locations. The client has to select one of the locations provided where he desires to park the

3.5 Confirmation

On the successful reservation, a confirmation page with user details is shown which is not editable.

Figure 3.5: Confirmation Screen

4. FUTURE SCOPE

The "Parking Informatics" app can be developed for other popular mobile operating systems. In the future, our application can be implemented on the existing operating systems like android for now. Our android application can be used as an alternative to the present parking systems in malls. When the registered user selects the location and vehicle type, the immediately the server receives the client's request. After receiving the request for the desired location, the server processes the related information and responds accordingly. Furthermore, the administrator has a direct option to view user details and slot details stored on the server directly via the application. This is also one-time registration and can make use of his username and password to login in the future. Whenever a new user registers with the application, those details will be recorded using Firebase.

5. CONCLUSION

This paper summarizes an efficient way to park a vehicle using recent technology. This app allows the user to take control of the parking decision unlike traditional methods of trying several parking spaces physically. Usage of this app at large scale would benefit users albeit a user is in a new place. The app is user friendly and handy so people of all age groups can use it easily.

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