

## MOBILE APPLICATION FOR EASY TO FIND CAR PARKING IN JAKARTA AREA

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*ABSTRACT.* Current parking needs cannot be denied, especially in crowded places. The problem of car parking is a significant contributor to traffic congestion and has still been a significant problem with the increasing size of vehicles in the luxury segment and also limited parking spaces in urban cities particularly in Jakarta as an Indonesian capital city. The rapid growth in the number of vehicles around the world further adds to the problem of the lack of parking spaces. Our proposed ParkFinderID mobile application has multiple benefits such as for people for easy finding parking space in crowded places, for landlord who wants to let their property land as parking space becoming a new way for disruption technology for getting new or adding income for unused land. For government, this application will make easy their regulation and controlling regarding parking space and traffic jump and at the end of the day will give a huge contribution to society to reduce traffic jump and congestion regarding using sidewalk shoulder road for illegal parking space. Hopefully, this application will reduce congestion particularly for traffic in Jakarta.

**Keywords:** Smart parking lot, Smart parking application, Smart parking system, Smart parking area, Parking mobile online application

**1. Introduction.** In the current era of globalization, people's need for more flexibility in time will increase. Even unaffected rights can affect the development of the world of technology. A straightforward problem is traffic jump and congestion in the capital cities such as Jakarta for finding a parking space for cars [1]. Simple things like this are sometimes a matter of time for some people, especially people in Jakarta. Jakarta with a large population in Indonesia, is a vast and bustling city with a very dense population of 5,241,200, which allows all traffic congestion to occur. From our personal experience, congestion in Jakarta can make traffic lights not function properly [1]. In fact, many people violate traffic which causes a lot of traffic congestion by 60% in 2018, and in 2019 luckily traffic congestion decreases by 7% and still stands at 53% where the number is more significant than 50% which means congestion is still frequent especially the range of hours of work return which is 5-7 nights [2]. One of the causes of congestion is illegal parking. Wild parking is standard in the mall and market areas where the mall itself has abundant parking [2]. According to our personal experience, this illegal parking also makes the road narrow so that congestion often occurs and makes people upset. Therefore we have the idea of a ParkFinderID that is expected to overcome this problem. Car drivers do not need to spend time looking for an empty parking lot because the car parking system can detect empty parking lots by using a mobile application that is connected with GPS [3].

Moreover, congestion in Jakarta can be reduced by the neat parking in Jakarta so that Jakarta can become a decent capital city and not inferior to the capitals of other countries. Especially in the time efficiency section where Jakarta's time efficiency is volatile due to excessive traffic jams, when we have a 7 o'clock schedule, we can get to 9 o'clock because of the traffic jam in Jakarta [3]. We hope from this research people can use an empty place for the parking area so it can reduce traffic jam because traffic jam is a really serious matter that needs to be solved, not only for the driver who is looking for parking space but for the landlord who wants to let their space for parking space.

This paper will be explained in 5 sections, where the 1st section will give the introduction as the problems why we need to apply this research and the 2nd section will give the basic knowledge of our proposed idea based on previous similar paper research. The 3rd section explains the investigations and how the application will be running, the model system design for our proposed application can be seen in the 4th section and the 5th section as the conclusion for this proposed mobile application implementation.

**2. ParkFinderID Mobile Application Concept.** ParkFinderID is an application created with a system that aims to make it easier for motorized vehicle users, primarily cars, to find and find a parking space in a particular location with their smartphone, not only makes it easy for drivers but also for parking providers, because this application works with people who have parking garages in their homes, the garage can be rented when the homeowner is away or when the garage is empty [4].

It is very effective to be used by both parties, namely the driver and the parking provider [5]. The ParkFinderID application is also expected to overcome some of the problems that occur in areas with heavy traffic intensity such as congestion, wasteful of fuel, spending much time searching for parking [5]. Traffic jams on highways occur during currents. Traffic vehicles increase with increasing travel demand for a period, and the number of road users exceeds the available capacity [5].

The dynamics of parking problems continue to roll with the problems that come and go. Starting from the number of vehicles that are increasing rapidly and limited parking lots, until the latest is the mushrooming of illegal parking by motorbikes and taxis online on the roadside [5]. Various solutions were tried by the government by dividing parking zones by various tariffs, until strict actions for parking violators on the streets starting from pulling nipples, cranes, and even transporting vehicles by the local transportation agency [6]. However, it still, makes parking in Indonesia difficult to park its vehicles in one of the famous locations in the mall. Someone can spend 5-15 minutes to drive a car, especially in holidays where many people arrive in the street at the same time.

Illegal parking even makes traffic jams in Jakarta, because the illegal parking narrows the road so that several times it can cause congestion, this is usually because there is a market or mall whose main parking has been used up or is hard to find. Therefore people take the initiative to park on the road [7]. Therefore, we have the idea of creating a ParkFinderID where ParkFinderID has the purpose of making it easier for people to find parking in Jakarta, how? We used the C2C system that arranges customer (driver) and land provider that makes both parties benefit and of course its benefit for the government too. Firstly we will be asked people to join us to be provider and driver, then we help them to arrange price and security for them so they will not concern about their land or garage, we use GIS and Google Maps for this Application. So people can get an extra income. We have this idea to reduce congestion in Jakarta, where the primary cause is a lack of parking [8].

**3. Investigation about ParkFinderID.** As we know, the problem of parking areas is a phenomenon that deserves to be explored. Parking space is one part of many transportation infrastructures. Limited availability of transportation infrastructure, especially

parking lots, forced the road bodies to be used as parking lots, resulting in traffic congestion [9]. The lack of parking space at tourist attractions or malls causes many visitors to choose to park their vehicles on the road. Parking space that is not sufficient to accommodate tourist vehicles or people who take a parking trip needs to be determined how much parking space needs in the tourist area or mall as well as the need for parking arrangements because at certain hours parking in the tourist area or mall is very crowded [9].

ParkFinderID will use the digital map, GIS, and LBS (location based service) where digital maps are representations of geographic phenomena that are stored for display and analysis by computers. This map is a map of the surface of the earth that is squashed and shown on an absolute scale [10]. The GIS is the integration of software/hard work methods for accessing geospatial data and services through mobile devices via wired or wireless networks in general. By using this GIS, ParkFinderID can tell the exact location of the parking lot to be ordered because GIS itself functions to display and navigate, search queries or queries, and do the coloring on the ordered area [11]. LBS is a service that identifies the location or object, such as the presence of someone, the location of a bank, hospital, mall, restaurant, or the nearest school. By using LBS, ParkFinderID can identify the existence of a house that has an empty garage to be used as a parking rental place [12].

The types of parking we use are private parking and general parking where private parking can be found on building related to a neighborhood or apartment with the feature only resident can use it [13] and general parking on the road is not on the central road and utilization for every people with terms & conditions like parking time [14]. ParkFinderID combines the two concepts to make private parking but could be used by every people [15]. Our proposed application has successful indicators such as cooperation between landowners with ParkFinderID [16], successful making ParkFinderID software with Android studio and SQLite database [17] and successful ParkFinderID application in mobile applications for parking users [18].

**4. ParkFinderID Model System.** According to Aston, in general, the Internet of things is a concept that aims to expand the benefits of continuous Internet connectivity [19]. This enables control, communication, cooperation with various hardware devices, sharing data, virtualizing everything in the form of the Internet, through the Internet network or also called M2M (machine to machine) [20]. Moreover, the Internet of things (IoT) has become a thing that is used by people in everyday life, where people have formed businesses and other things using the Internet of things.

We can create parking lots where people can use it easily in finding parking. We use the Internet of things system as used by Gojek and Grab using technology such as Google maps and others [21]. By using the applied database system, we can see the position of the place according to Google maps so that the user can be guided to the destination [22]. Most people find it challenging to find a parking lot, either it is full, or indeed, the place we go to does not have parking and our proposed ParkFinderID application can facilitate people's lives in Indonesia and this is because searching for parking lots in Indonesia, especially in the city of Jakarta takes a long time and can make traffic jams [23].

Our proposed ParkFinderID application has to use case diagram as seen in Figure 1 that has a user actor which can act as user for finding parking space and user landlord who wants to let their parking space rented. The use case diagram contents such use case activities such as registration, login, find parking, list parking, forum, and information. All the users can do registration, login, forum, and information, the use case "Find Parking" for user who needs to find parking space whilst "List Parking" for user landlord who wants to let their land for parking space. Next, the details of the use case diagram are shown as follows.

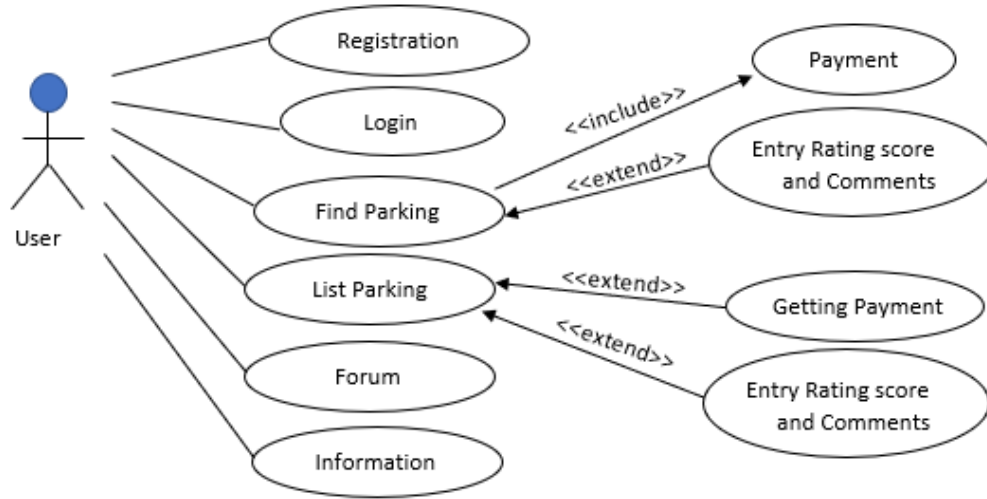


FIGURE 1. Use case ParkFinderID

1) Registration

If the user does not have an account to log in, the user can sign up first, where the user must enter their data such as username, telephone number, gender, DOB, email, username, and password. The user who wants to find parking space should enter their vehicle plate number including uploading their vehicle license and driver license whilst the landlord user should enter their proofing regarding the location which they want to let with such as land certificate. Special for landlord users, the admin of the application will do physical activity to check the real parking space and if it is suitable for renting parking space. After that, the user can click the signup button. The user interface (UI) of use case registration is found in Figure 2(a). After registration, the user will get a notification to verify his account by entering a verification code that will be sent to SMS. UI verification is found in Figure 2(b). After the verification, the user can log in with the registered email as username and password.

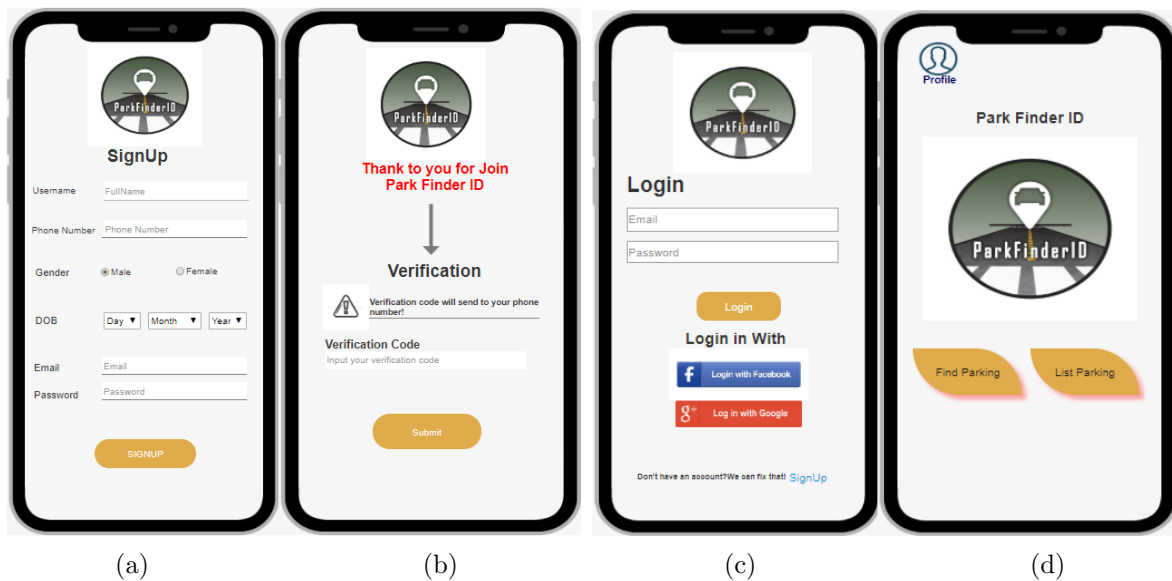


FIGURE 2. (a) Sign up user interface, (b) Verification user interface, (c) Login user interface, (d) Main menu user interface

2) Login

The UI of Login is found in Figure 2(c) by entering username and password. After logging in, the user enters ParkFinderID main menu as can be seen in Figure 2(d).

In the main menu, there is a logo and Find Parking and List Parking button. The user who wants to find parking space then clicks the link “Find Parking” and the user landlord who wants to let their parking space click the link “List Parking”.

3) Find Parking

In the find parking menu, the user can choose the parking type in the parking type, then choose the destination he wants to go to at the destination address. After that, the user can choose the type of car he uses. After completing all the data, the user can click the “find” button in Figure 3(a). Users can also see photos of available parking lots, prices, and also can see maps of available parking locations as can be seen on the UI Figure 3(b). Figure 3(c) shows the available parking space which can be chosen by user and Figure 3(d) shows the summary of booking which contains a detail transaction or you already come or not, and you want to finish your book and the summary of booking parking space. The booking will include the payment which can choose the payment method that consists of OVO, GOPAY, or pay with cash too. After doing their payment the user can opt to give their rating score and comments regarding the parking space.

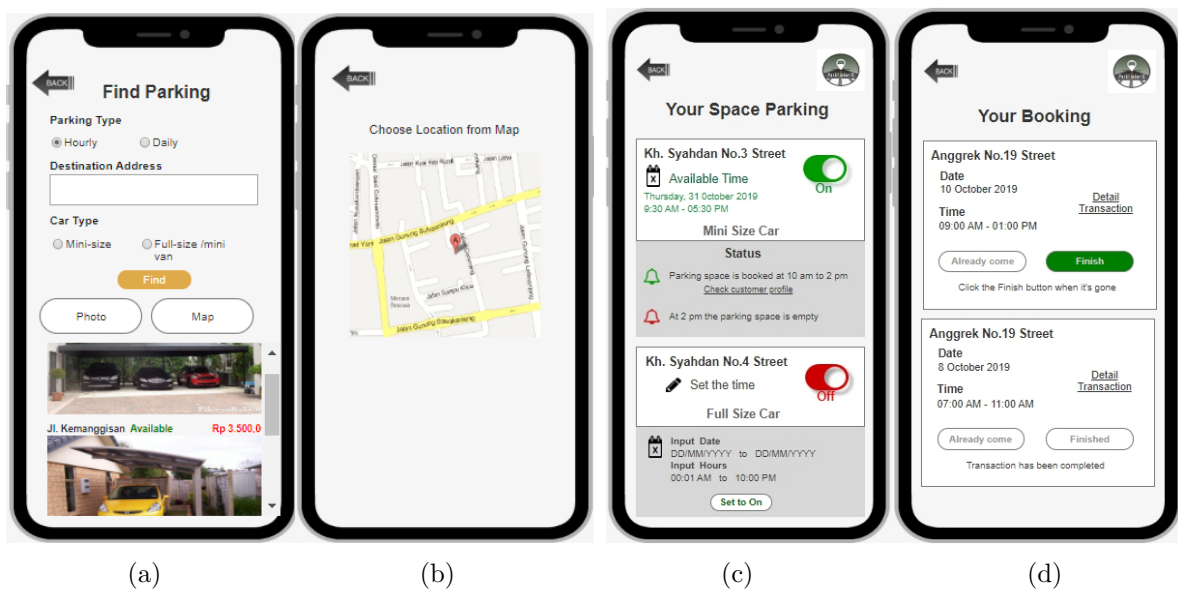


FIGURE 3. (a) Find parking user interface, (b) Map user interface, (c) List parking user interface, (d) Summary user interface

4) List Parking

For that user landlord who wants to let their land space then the UI can be seen in Figure 4(a) where the users can enter data to register their parking area, including parking type between hourly and daily payment, address, car type, and number total of the slot. After that, the user can click submit. Figure 4(b) shows the summary of “List Parking” from process list parking in Figure 4(a) and finishes with the choice of way of payment such as OVO, GOPAY or cash. User landlord can give their rating score and comments for each user who uses their parking space and they can withdraw their income as well after the payment or as cumulative income payment.

5) Forum

This forum use case will become the communication among the user either user for finding parking space and user landlord and the communication will be split it as well. This forum will become a sharing knowledge for users regarding the using of the application, the regulation, benefit, discount, and any topics.

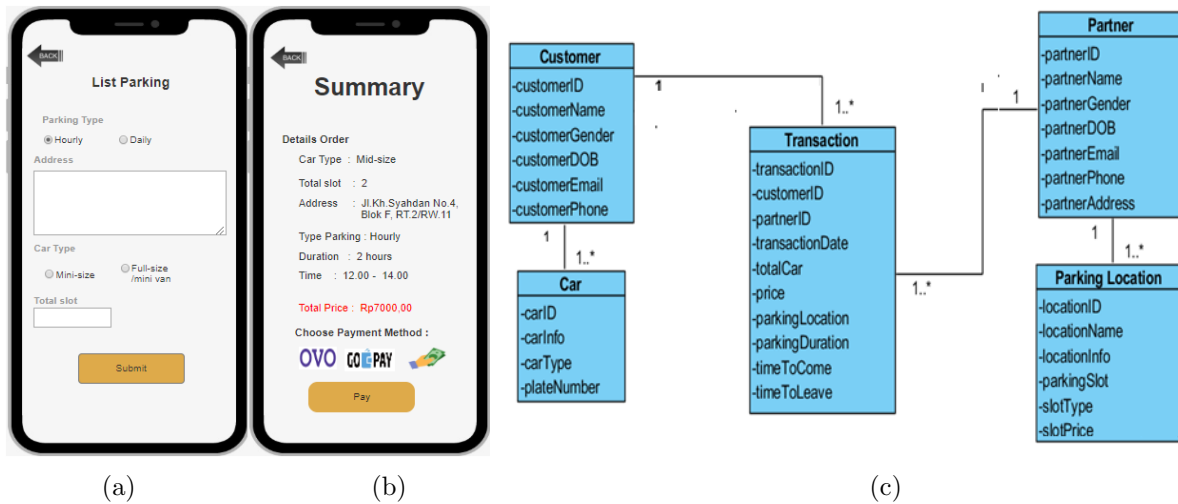


FIGURE 4. (a) Your space parking user interface, (b) Your booking user interface, (c) Class diagram of ParkFinderID mobile application

## 6) Information

This information use case will become news media from the admin to give some information regarding parking space regulation, news, benefit, discount and so on.

Our proposal ParkFinderID application has a model database design which can be seen in Figure 4(c), which contains five tables database consisting of Car, Customer, Transaction, Partner, and Parking Location. The table customer is the user who needs to find parking space where the Customer has car data, such as car info, car type, and plate number. Customers and Partners have a Transaction class because they can transact in the application. Moreover, the Partner has a class Parking Location, which consists of the location name, location info, parking slot, slot type, and slot price.

**5. Conclusion.** The level of readiness of the technology for ParkFinderID is reasonably promising. The highest level of evidence is that the technology of the Go-jek company as disruption technology in online transportation received excellent reviews. Online transportation makes easy for Indonesian people, especially in Jakarta, who can easily find transportation when traveling. In the past, the people of Jakarta still had difficulty finding transportation, and the price was still uncertain. Moreover, Jakarta people are generally lazy with old things like buffering and looking for parking. They stated that looking for parking in Jakarta is a waste of time [24].

In the future, ParkFinderID will try to disseminate regions to remote areas, and ParkFinderID will add features where motorized vehicles can also use ParkFinderID and increase our service level to be better than yesterday every day. Moreover, the landlord can raise the income for their unused land for parking space. Our first plan is to spread ParkFinderID on the island of Java and in essential cities and then to other areas [25].

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