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Development of Electronic Parking Coupon Application in Bukit Gambir

Kan Jia Qi, Noryusliza Abdullah*

Faculty of Computer Science & Information Technology,
Universiti Tun Hussein Onn Malaysia, Parit Raja Batu Pahat Johor, MALAYSIA

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Abstract: Electronic parking coupon application is proposed to replace traditional parking coupon. This is because people need to buy the new coupon while visiting another area or region and find the store that selling parking coupon. Besides that, people in shopping mall or other places are difficult to top up their parking time because they need go back to the car. This project is focusing on drivers who are using the traditional coupon when parking in Bukit Gambir. The system is developed using Java language and it is based on Agile methodology. The development of this system is to help driver in Bukit Gambir to use electronic parking coupon application when they are in different area of Bukit Gambir.

Keywords: Electronic Parking, mobile application, android

1. Introduction

Parking coupon is a change of payment and display without using the machine. To use the parking coupon, driver must wipe off the panel on the date and time before they leave the car. Electronic parking coupon application is an electronic parking system used to replace traditional parking coupon [1]. It is designed to help users to save time to buy and fill in the coupon [2].

Many people face a problem to buy new coupon while visiting another area or region. Sometime people just go to another area for a short trip but need to buy the coupon for parking. After using it once, the coupon will put aside until it is expired.

Moreover, people need to find a store that sells coupons. Furthermore, people in the shopping mall or other places are difficult to top up their parking time because they need to go back to their car. Some people are delay in adjusting the parking time because the car park is far away. Due to this reason, people are difficult to top up their parking time.

The purpose of this project is to help driver in Bukit Gambir to use electronic parking coupon application when they are in different area of Bukit Gambir. The scope for this project is mostly focusing on driver who using the traditional coupon when parking in Bukit Gambir. This proposed system will decrease the usage of paper and helps the driver through electronic parking coupon

*Corresponding author: yusliza@uthm.edu.my

application when they visit different area in Bukit Gambir. This system can help driver to save their time and money because electronic parking coupon application will ensure to overcome expire problem.

2. Related Work

2.1 Electronic Parking Coupon

The electronic parking coupon system is a new payment system for street parking in the city. It is different from traditional coupons made in paper format [3]. However, drivers can make payment by using fingertips through a mobile app now [4][5].

2.2 Comparison Existing Application with The Proposed Application

There are existing electronic parking applications such as Park@Perak, Smart Selangor Parking, and Smart Parking Melaka. These three apps are the application that chosen to make comparisons with the proposed application. Table 1 will show the comparison of the characteristics between three existing applications with the proposed application.

Table 1: Comparison Between Three Existing Applications with The Proposed Application

Characteristics	Park@Perak	Smart Selangor Parking	Smart Parking Melaka	Electronic Parking Coupon
Android platform	✓	✓	✓	✓
IOS platform	✓	✓	✓	×
Use at Bukit Gambir area	×	×	×	✓
Login	✓	✓	✓	✓
Pay parking fee	✓	✓	✓	✓
Remind user when the parking time less than 15 minutes	×	✓	×	✓
Top up parking time	✓	✓	✓	✓
Show remaining time	×	✓	×	✓
Admin check plate number	✓	✓	✓	✓

3. Methodology/Framework

The Software Development Life Cycle (SDLC) describes the general stages of the software development process. However, there are various ways to implement SDLC, such as Waterfall, V-model, Iterative, Agile, and so on. Agile development has been used in this project. The iterative agile methods development and prototyping are widely used in the development method, which can satisfy the changes in requirements [6]. Agile development is based on the iterative and incremental development process, which can be changed according to customer needs [7].

First, the developer had conducted a questionnaire by using google form to get the problem statement and objective at requirement gathering phase. This phase developer evaluates the program to understand how it works. At the design phase, the developer draws the wireframe to provide a visual understanding of a page. The developer designs the interface to show briefly how the interface looks like for the user to use. Third phase is development and coding. The developer follows the requirement and design interface explained in the previous phase to implement the coding in Android Studio by using Java. In the integration and testing phase, the developer performs alpha and beta testing to ensure the system is bug-free and achieve the objective by using a text plan with comprehensive test cases and google form questionnaire. Fifth, the developer solves bugs and problems in implementation and deployment phase according to the feedback collected during beta testing. Last, the developer determines the deliverables that have been produced and determine whether the project has achieved the goals during review phase.

4. Results and Discussion

The results and discussion section presents system analysis and design of the project. It includes use-case diagram, activity diagram and entity relationship diagram. Next section discusses the system implementation. They are register and login module, choose area and parking time module, pay parking fee module, reminder module, check plate number module, and give summon module.

4.1 System Analysis and Design

To ensure the quality of both process and product, analysis and design modeling of software development is important. The analysis and design modeling for this proposed system is done using UML [8].

4.1.1 Use-Case Diagram

A UML use case diagram is the primary type of framework specification for an underdeveloped new software program. It summarizes the interactions between use cases, participants, and systems in this proposed system. Figure 1 shows the use case diagram for driver and Figure 2 shows the use diagram for officer.

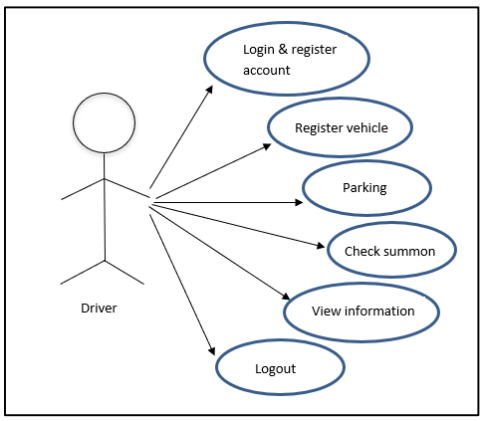

Figure 1: Use Case Diagram for Driver

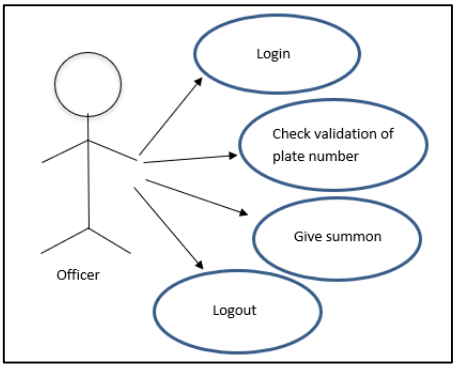

Figure 2: Use Case Diagram for Officer

4.1.2 Activity Diagram

Activity diagram is another important diagram in the UML diagram to describe the dynamic aspects of the system. The activity diagram is essential an advanced version of a flow chart modeling the flow from one activity to another activity. Figure 3 shows the activity diagram for the proposed system.

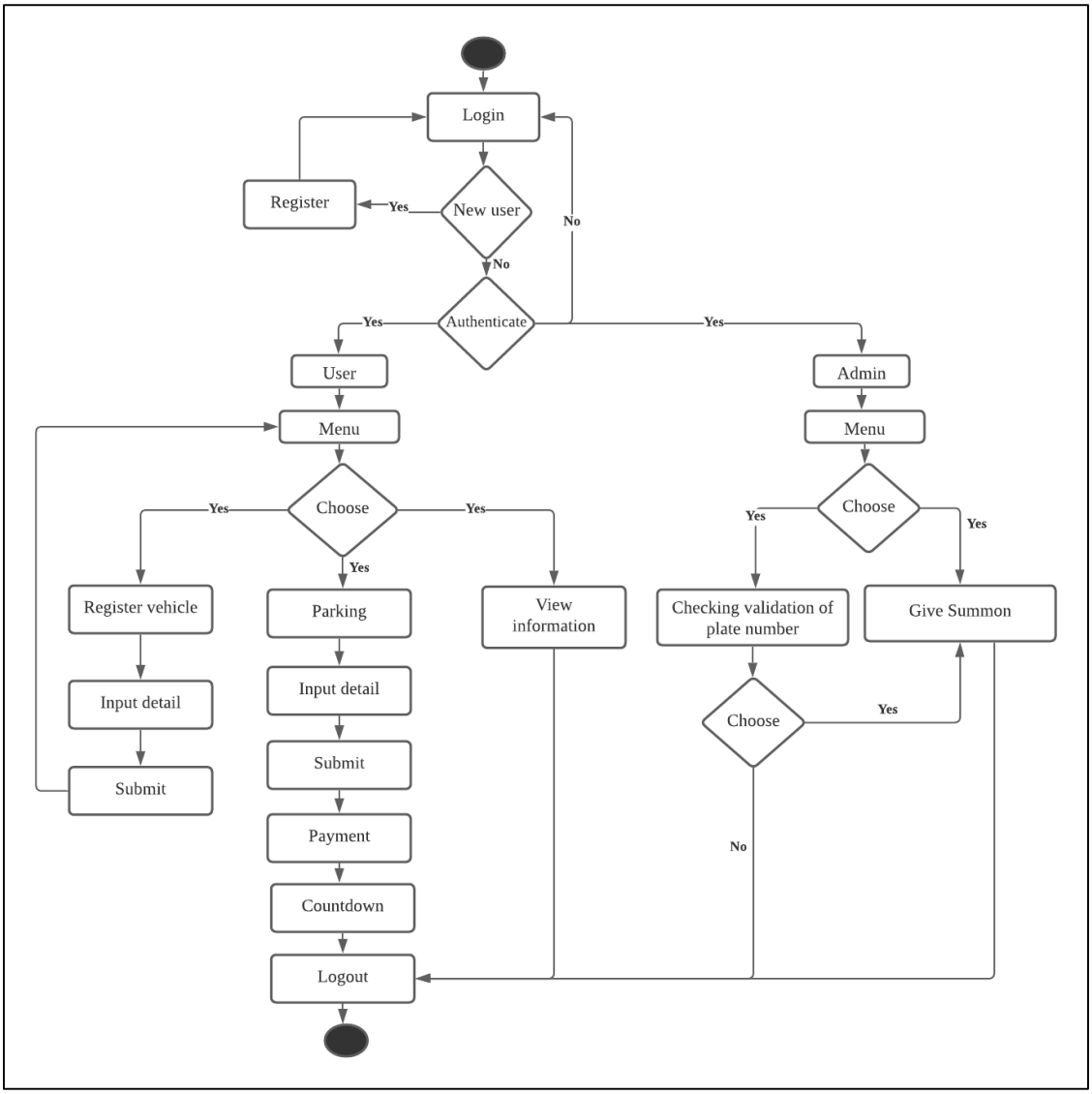

Figure 3: Activity Diagram for The Proposed System

4.1.3 Entity Relationship Diagram (ERD)

This section will show the entity relation diagram (ERD) for the proposed system. ERD is a type of structural diagram for use in database design. Figure 4 shows the ERD for the proposed system.

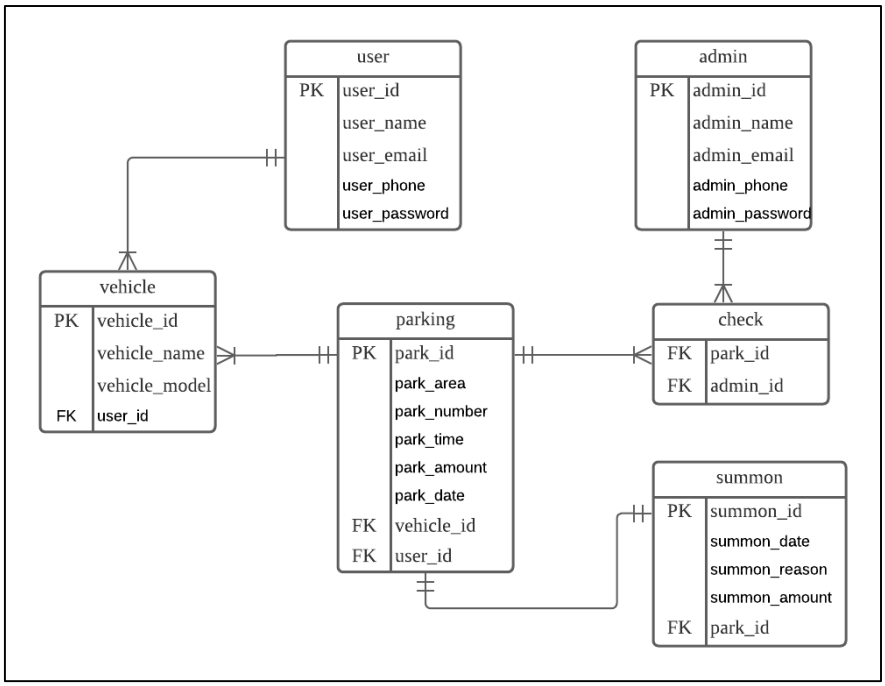

Figure 4: ERD for Proposed System

4.2 System Implementation

Electronic parking coupon is designed for driver who lives in Bukit Gambir to replace traditional parking coupon. Register and login module, choose area and parking time module, pay parking fee module, reminder module, check plate number module, and give summon module will be presented in each section.

4.2.1 Implementation of Register and Login Module

Figure 5 shows the user interface of login, register and menu. Users are requested to enter their email and password to login to their account. If user did not have account, they need to register a new account. After the process, user will go to the menu page.

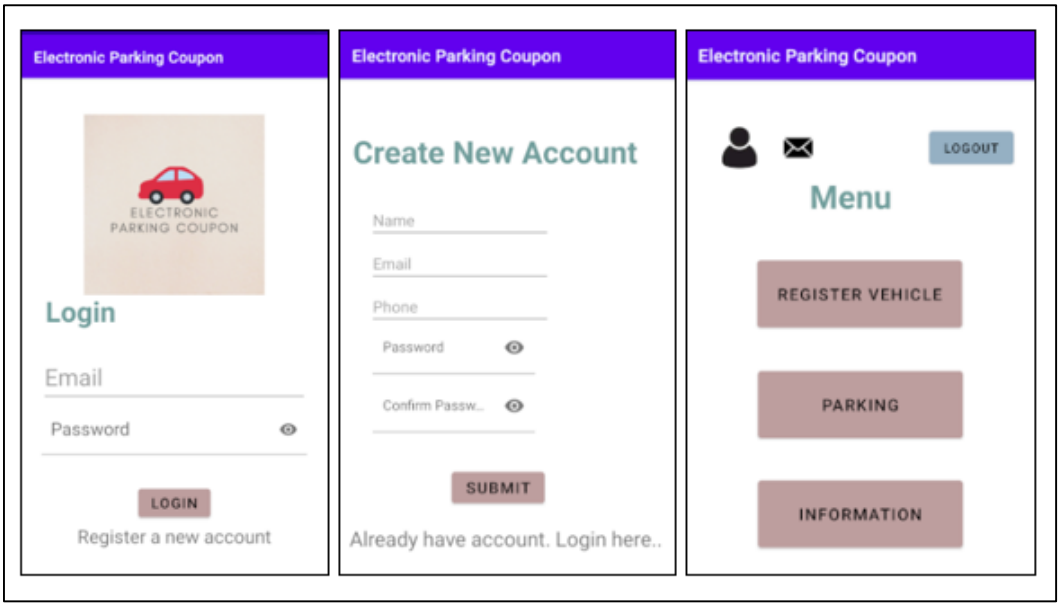

Figure 5: User Interface of Login, Register and Menu

4.2.2 Implementation of Choose Area and Parking Time Module

Figure 6 shows the user interface of register vehicle and choose area and parking time. User can enter their plate number, car model, and select the car color in the register vehicle page. After that, user can select their plate number, area of parking, number of the parking lot, and the duration of the parking.

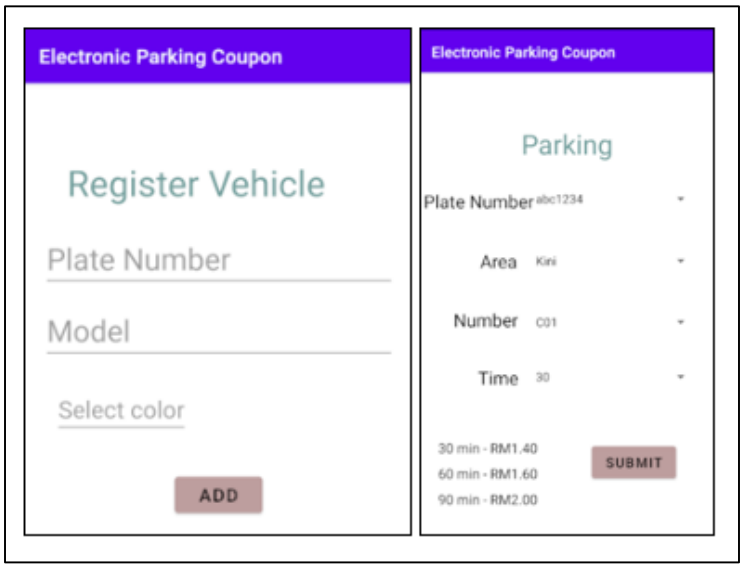

Figure 6: User Interface of Register Vehicle and Choose Area and Parking Time

4.2.3 Implementation of Pay Parking Fee Module

Figure 7 shows the user interface of payment. User need to enter the amount then click the 'PAY NOW' button. System will redirect to Razor Pay platform.

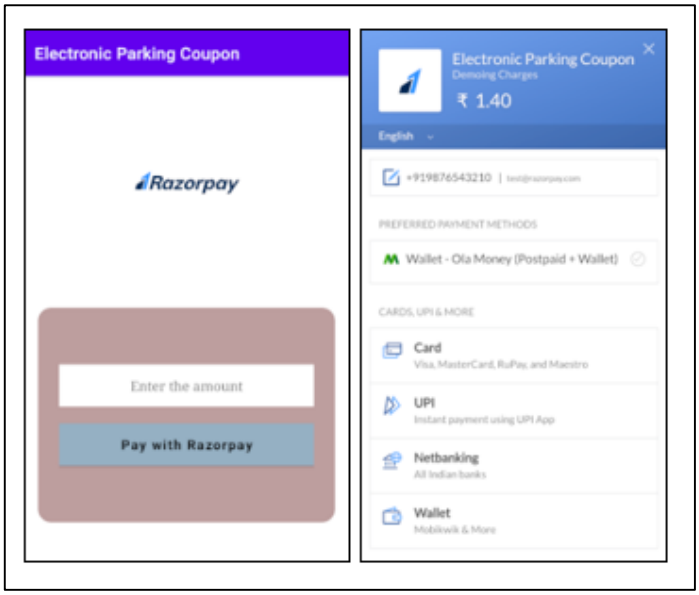

Figure 7: User Interface of Payment

4.2.4 Implementation of Reminder Module

Figure 8 shows the user interface of countdown and notification. System will start countdown the user parking time. When the time is left 15 minutes, system will give notification to user. After the parking time finish, system also will give the notification to remind user that the parking time is ended.

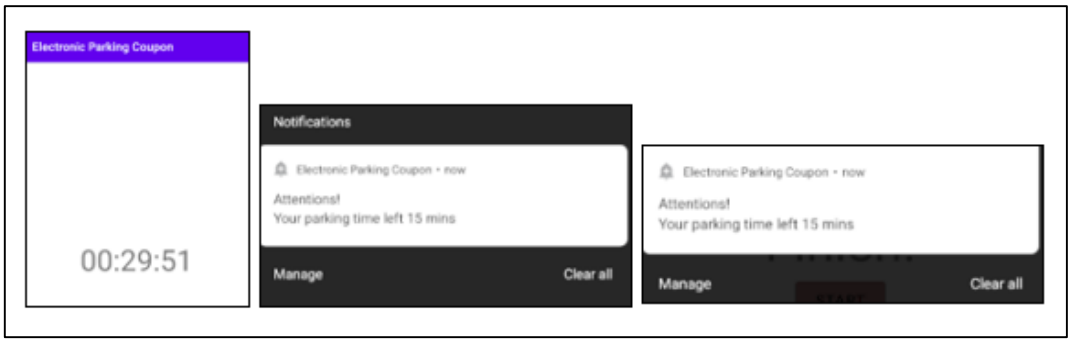

Figure 8: User Interface of Countdown and Notification

4.2.5 Implementation of Check Plate Number Module

Figure 9 shows the admin interface of checking plate number. Admin can enter the plate number in the search field and press the search button. The parking information will be show.

Figure 9: Admin Interface of Checking Plate Number

4.2.6 Implementation of Give Summon Module

Figure 10 shows the admin interface of give summon. Admin can give summon to the driver by enter plate number, amount and reason. User can check the summon by enter their plate number in the search bar as shown in Figure 11.

Figure 10: Admin Interface of Give Summon

Figure 11: User Interface of Check Summon

5. Conclusion

Based on the project objective, it is shown that Electronic Parking Coupon for the driver Bukit Gambir is successfully designed and developed. Driver can use this system to pay the parking fee at

certain areas of Bukit Gambir. The advantage of this system is driver can save their time and money because Electronic Parking Coupon will ensure to overcome expire problem. The disadvantage of the system is this system only can use for certain areas of the Bukit Gambir. Driver still need to use traditional parking coupon at the excluded areas.

There is a room for improvement for Electronic Parking Coupon system. For example, Electronic Parking Coupon may cooperate with the e-wallet to help driver do the payment at the future. Other than that, this system can add more area of the Bukit Gambir so driver can use it in the wider area.

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