Application Information System Smart Parking Based on Smartphone

R Wahdiniwaty1*, A Nugraha2
1Departemen Magister Manajemen, Universitas Komputer Indonesia, Indonesia
2Departmen Teknik Informatika, Universitas Komputer Indonesia, Indonesia
Email: *rahma@unikom.ac.id

Abstract. The purpose of this study is to minimize the problems of people who want to visit a shopping center, but sometimes the parking lots provided by shopping centers are inadequate with the number of visitors who come especially those who use four-wheeled vehicles. This causes a long queue so it makes congestion. For this reason, there is a need for information regarding parking lots in a shopping center. The method used in this study was the Waterfall method, the technique used was searching for user needs first, then followed by coding and implementation. After being implemented directly in the verification and maintenance stage. The results obtained are an android-based application that can be used to notify information regarding available parking lots, parking reservations, and parking payments. The research concludes that this application can provide accurate information promptly to users related to parking in a shopping center.

1. Introduction
Increasing the quality of a shopping center makes Indonesian people interested in visiting the place which is commonly called the Mall [1]. To find their needs or just fill their spare time as a substitute for their daily activities. The number of visitors who come is influenced by the position of the shopping center, facilities, and road access. However, these shopping centers sometimes pay little attention to parking problems for four-wheeled vehicles. To minimize this in this sophisticated era, an application with a mobile basis is needed that can convey information about the parking capacity at the shopping center [2]. Therefore, it is necessary to develop information systems by using the use of internet network technology and the Android operating system that can be accessed by consumers. The design of this application is to make easier to get real and true information. Therefore, in this day and age smartphone has become a necessity for people today[1-4]. Any information can now be accessed via a smartphone, because this technology can revolutionize life in more modern society, just like this parking facility [5,6]. Smartphones have very attractive facilities and characteristics to be used in developing a modern lifestyle or carrying the concept of the smart city [7-10].

Smart parking also has the same opportunity because this is the beginning to create a city with a smart city concept. Android technology use in research becomes a blueprint for system design that is ready to implement [11]. Based on the results of testing, the Android mobile application can help to recommend tourist attractions that meet the criteria desired by tourists[12]. The results of assessment depend on the type of smartphone that uses, so the value of the test results can be different if implemented on a different smartphone[13].
The purpose of this study is to minimize the problems of people who want to visit a shopping center, and the method used the Waterfall method.

2. Method
This research was carried out on parking lots in several shopping centers. The observation was carried out by looking at the parking capacity with the volume of the vehicle. Observations are made by estimating each vehicle that enters with the width of the parking lot. Then, the observation was done by conducting interviews with several visitors.

3. Results and Discussion
Collaborating technology with human activities is an advancement that can be accepted by all people. Parties Shopping centers can regulate their parking capacity, and visitors can facilitate parking reservations. For this reason, it is necessary to separate the needs and functions. To make these devices, we use the waterfall method [8], which has a way of working like the one in the picture (Figure 1)

![Figure 1. Method Waterfall](image)

The method used was the waterfall. The Waterfall Model was the first Process Model to be introduced. In a Waterfall model, each phase must be completed before the next phase can be overlapping in the phases. The waterfall model is the earliest SDLC approach that was used for software development. Here are some stages of the waterfall method[8,9]:

a. Requirement
All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document. User needs are obtained from the results of surveys and interviews directly from several people about opinions and needs if a problem about parking will be made mobile-based applications. Based on the survey, the following are the requirements needed by each actor:

- Visitor
  - Can see parking capacity, check status, book a parking space, and make payments
- Head of Parking Facility Division
  - Adjust parking capacity and check the status
- Admin
b. Design
The requirement specifications from the first phase are studied in this phase and the system design is prepared. This system design helps in specifying hardware and system requirements and helps in defining the overall system architecture. After conducting a survey to look for the needs of each user the next step is to design the system that will be created. This study used a design with UML diagrams. Then also choosing the tools used to create the system, starting from making logic processes and a display that can be understood by all users. React native is the main programming language for making this program because it is suitable for making programs on a mobile basis.

c. Coding and Unit Test
With inputs from the system design, the system is first developed in small programs called units, which are integrated into the next phase. Each unit is developed and tested for its functionality, which is referred to as Unit Testing. After doing the system design the next step is to do the main process, namely by doing the coding. The language used with javascript is compiled using a text editor to create a mobile platform.

d. System Integration
Once the functional and non-functional testing is done; the product is deployed in the customer environment or released into the market. After the program is finished and has done some testing to find errors or bugs that are still in the application, the next step is integration. Like starting the introduction of the application by doing a simulation with the shopping center. If it feels that nothing is missing, the simulation stage continues with some volunteers who are ready to be used as simulation objects. After everything matches, it will immediately proceed at the launching stage.

e. Maintenance
Some issues come up in the client environment. To fix those issues, patches are released. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment.

3.1 Analysis Data and Information Need
Data needed to make smart parking applications are parking capacity data, vehicle volume, and parking rates. While the information that needs to be generated is information about the amount of parking capacity available, how to place an order, and payment of parking.

a. Analysis
The analysis is an understanding of the application made. This analysis is needed to find out the application of the processes involved in the application and process relationships. The analysis made is this Information System using a flow map, which provides an overview of the processes that occur in the application so that the application can find information and find out easily.

b. Ongoing Process Analysis
To start the ongoing process, visitors come to the expense center and queue to the ticket window to pick up the parking ticket, after that look for a parking space, and if they have finished visiting, look for a ticket window by going out and buying a ticket according to the specified price.

c. Analysis of the system to be built
This system is expected to facilitate visitors because they do not have to look for parking spaces suddenly and can find out the status and information on the available parking in the shopping center in question.
Also for the management of shopping centers can arrange parking facilities as needed or adjust the conditions of the problems that are being caused.

3.2 Actor Analysis
There are 3 actors needed in this smart parking application, the first is an admin who enters the system and then manages user data and manages parking status information. The second is a head of the parking facilities division who manages status checks and looks at parking payment reports. Finally, a visitor enters the system to see information about parking capacity, place an order and pay

3.3 Use Case of User Diagram
In figure 2 Use Case diagram illustrates the activities performed by the user of the system to produce information about the access rights of each user [10]

![Figure 2. Use Case of Class Diagram](image)

After designing the user use case diagram, the next step is to design the class diagram. The results of the class diagram are as follows:

1. In the class diagram above each actor who will enter each process is required to enter the login process
2. Visitor actors can view parking information, place orders, and make payments
3. Division head actors can view parking information and manage reports from parking payments
4. Actor admin can only manage parking information
3.4 Forum Interface
After logging in, there are several features displayed by the system. Like a parking map that shows which are available and filled, the directions feature where the user will park according to the place that has been booked, and also the payment feature by making a transfer (See figure 3).

![Mockup](image)

Figure 3. Mockup

4. Conclusion
After analyzing, designing and implementing Smart Parking Application Information Systems based on smartphones, it can be concluded that with the existence of this information system, the management of the shopping center or visitors can control the status of the parking area using a smartphone. As well as in this application, visitors who will visit the shopping center in question can make reservations in advance to make it easier to get a parking space

Acknowledgment
This research was supported by the Universitas Komputer Indonesia.
References

[1] Körmendi A, Czki Z B V B P and S R, 2016 Smartphone use can be addictive? A case report J. Behav. Addict. 5, p. 548
[2] Adiyarta K Napitupulu D Nurdianto H Rahim R and Ahmar A, May 2018 User acceptance of Egovernment Services Based on TRAM model IOP Conf. Ser. Mater. Sci. Eng. 352(1), p. 012057.
[3] Nasrudin N Agustina I Akrim A Ahmar A S and Rahim R, 2018 Multimedia educational game approach for psychological conditional Int. J. Eng. Technol. 7(2.9) p. 78–81.
[4] Adiyarta K Napitupulu D Rahim R Abdullah D and Setiawan M, Apr. 2018 Analysis of e-learning implementation readiness based on integrated elr model J. Phys. Conf. Ser.1007(1)p. 012041.
[5] H H M and B, 2018 Habituated: A m erleau-pontian analysis of the smartphone Libr. Trends 66 p. 267–88.
[6] Kartikadarma E Listyorini T and Rahim R, 2018 An Android mobile RC4 simulation for education World Trans. Eng. Technol. Educ. 16(1) p. 75–79.
[7] Lee J, Sung M J, Song S H, Lee Y M, Lee J J, Cho S M P M K and S Y M, 2018 Psychological Factors Associated With Smartphone Addiction in South Korean Adolescents J. Early Adolesc. 38 p. 288–302.
[8] Mohammed F, 2016 Prediction of Unacceptable Software Performance in Sequential Development Methodology, International Journal of Computer Science and Mobile Computing, 5, pp. 31-38.
[9] Sahil B, Ankur S, and Usha R, 2017 A detailed study of Software Development Life Cycle (SDLC) Models, 6, Issue, p. 22097-22100.
[10] Skersys, T., Danenas, P., & Butleris, R. 2018. Extracting SBVR business vocabularies and business rules from UML use case diagrams. Journal of Systems and Software, 141, pp. 111-130.
[11] Wahdiniwaty, R., Setiawan, E. B., & Syaroni, D. A. W. 2020. Model of Travel Planning and Tourism Costs with Integration of Creative Industries Information Using Web and Mobile Technology. In International Conference on Business, Economic, Social Science, and Humanities–Humanities and Social Sciences Track (ICOBEST-HSS 2019) (pp. 142-147). Atlantis Press.
[12] Wahdiniwaty, R., Setiawan, E. B., Auliardi, F., & Wahab, D. A. 2019. Application Model for Travel Recommendations Based on Android. IJNMT (International Journal of New Media Technology), 6(1), p. 9-16.
[13] Setiawan, E. B., Setiyadi, A., & Wahdiniwaty, R. 2019. Quality Analysis of Mobile Web Server. In IOP Conference Series: Materials Science and Engineering 662(2), p. 022043. IOP Publishing.