Intelligent Parking Condominium System with Smartphone

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Abstract—This paper presents an in the parking area by introducing the intelligent parking system employing Near Field Communication (NFC) technology. This paper aims to solve the problem execute by the driver such as congestion in parking area. The problem of unnecessary time consumption in finding a parking spot in a residential parking area many cause the driver waste time just only to find the parking area. This work is developed based on hardware and software to ensure the project is certified tested successfully. As a whole, the result gets from this project achieved as desired. This project success use NFC technology and a smartphone (android) as replace the card access recently in the smart parking system.

I. INTRODUCTION

This project wants to develop and improve a recently parking system, especially in area residential condominium. This is because want to upgrade security features more detailed and facilities the process of parking vehicle[1]. In addition, also want to reduce the maintenance cost and to reduce problem the losing card pass to enter the recently parking system. Furthermore, this system also provides real time information on parking that allow smartphone applications and traffic signs to guide driver to find an available parking spot. Based the journal "A Reservionbased Smart Parking System" by Hongwei Wang and Wenbo He [2]. This paper provides user to choose which one the parking lot want to reserve. In addition, this project developed the sensor system.

In this work, a intelligent parking system is proposed. A system employs smartphone (android) application that have an NFC sensor to enter the parking area. NFC sensor is able a powered device like a phone to reads and writes through NFC chip [3].

This project includes a few the research problem. The current issue on the parking system for condominium is to locate available parking space. There is no indication of the empty parking spot for a driver to enter the parking area. In addition, time consuming to find an empty space to park the vehicle since the current parking space is not automated via any communication tools such as smartphone (android). Furthermore, it also can cause the car parking at the outside residential area and make it overshadow situation especially condominium area. Beside that, the other problem is the residents losing the card access the existing system for entering the parking area.

Follow this project by the objective of the study. The aims of the proposed this work are to reduce the congestion in the parking area by introducing the new parking system which is has the potential to save people waste time time caused by people crushing for a park. The next objective is to analyze the application in the smartphone (android) by using NFC technology.

This topic is going to discuss the topic of parking areas, to solve the problem driver to enter and park in the parking area. In the era of rapid globalization, recently parking system or parking services provided are still a step behind [4]. In addition, based on the journal "Innovative Smart Car Parking System with NFC Access" by Mr. John Nair and Mr. Nimesh Gupta [1]. This paper provides the project that control by mechanical system with automated. Beside that, this paper advanced with introducing the NFC technology for authentication and also help to find owner car in this system.

II. METHODOLOGY

A. Hardware System Design



Figure 1: Block diagram Hardware Design (Phase 1)



Figure 2: Block diagram Hardware Design (Phase 2)

This project consists of 2 phases. Figure 1 and 2 show the block diagram of Phase 1 and Phase 2 respectively. Phase 1 is the hardware design for entering the parking system, whereas Phase 2 is the hardware design for finding the parking space.

B. Software System Design



Figure 3 depicts the block diagram software design. This software will introduce as an application in the smartphone (android), this application is created by Android Studio, includes a database to save all users information.

C. Flow Chart of Intelligent Parking Condominium System





Figure 4: Flow Chart of Intelligent Parking Codominium System

Figure 4 exhibits the flow chart of the overall system. This system must be login through the application at smartphone (android). The first time user must be signed up to create the account. After login, scan the smartphone (android) at NFC shield, the NFC shield will read and if the data is true, the gate will automatically open and the LCD will display "approve". The ultrasonic sensor will detect and gate still open with the limitation distance range, if the ultrasonic sensor detect the car is not in the ranger distance, the gate will be closed. In the parking lot, the ultrasonic sensor also used to detect car at the parking lot. If the ultrasonic sensor senses the presence of the car, LED will light up to red, if not the LED will display green. At the exit way, IR module is used to detect car to open the gate.

III. RESULT AND DISCUSSION

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Figure 5: Choice to Sign In or Sign Up

Figure 5, shows the first view inside the application smartphone (android). For the first time user, he or she must click the Sign Up to create and fill all the information includes the password.

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| Confirm Password | | | | |
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| Phone | , | | | |
| Create Account | | | | |

Figure 6: Create the Account

Figure 6, shows to create the account for the first time as the user for the intelligent parking condominium system. Fill all the information required includes the password.



Figure 7: To Sign In Figure 7, shows to sign in the application, fill the the username and password.

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Figure 8: Display confirmation Sign In

Figure 8, show display confirmation Sign In after the database compare the information. That means all information is true.



Figure 9: scanner NFC shield

Figure 9, shows the users to enter the parking area. Based on the application at figure 8, the smartphone must scan on the NFC shield.



Figure 10: Gate opened

Figure 10 shown, the gate has already opened after NFC shield gets the signal from the smartphone.



Figure 11: The parking lot

Based on figure 11 above, shown the parking lot, after done enter the parking area, find the parking lot available based on the LED light. The green will light up if parking lot available, while red show the parking lot not available.



Figure 12: At the exit way

Figure 12, shows at the exit way, when the car sense at the IR module sensor in limitation distance, the gate will open to give the car exit the parking area.

IV. CONCLUSION

As a conclusion, this system is developed to help driver face the problem to park the vehicle especially residential condominium area. The objective of this project was achieved a desired. The first objective for this project is to reduce the congestion in the parking area by introducing the new parking system. The objective was achieved by introducing the architecture for a parking detection system would decrease finding and take time vacant space. The second objective to analyze the application in android or smartphone by using NFC technology. This second was also achieved when the NFC system in smartphone was used in this project.

The most important thing, the connection between the application and the NFC in smartphone must be connected and success. This is because the NFC is the main component in this project. Finally, we can conclude that the overall of this project is functioning successfully as desired. Lastly, in the future is attracted to introduce the payment system by use smartphone same like this project.

References

[1] Mr. John Nair, Mr. Nimesh Gupta, Ms. Rakhee Mahadik, Mr. Chintan Chauhan "Innovative Smart Car Parking System with NFC Access" in International Journal of Engineering and Technical Research (JJETR) ISSN: 2321-0869, Volume-3, Issue-4, April 2015

[2] Hongwei Wang and Wenbo He. "A Reservation-based Smart Parking System" in The First International Workshop on Cyber-Physical Networking Systems, 2011.

[3] Büşra ÖZDENİZCİ1, Mehmet AYDIN2, Vedat COŞKUN2, Kerem OK "NFC Research Framework: A Literature Review And Future Research Directions", in 14th IBIMA Conference on 23-24 June 2010.

[4] UKessays. (Copyright © 2003 - 2015) "Literature review on car parking system information technology essay".[Online]. Available: http://www.ukessays.com/essays/information-technology/literature-reviewon-car-parking-system-information-technology-essay.php