UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF PARKING INFORMATION SYSTEM BY USING IOT APPLICATION

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Telecommunication) with Honours.

by

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Sesi Pengajian: 2019

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I hereby, declared this report entitled “Development of Parking Information System by Using IoT Application” is the results of my own research except as cited in references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronic Engineering Technology (Telecommunication) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Idea Sistem Maklumat Tempat Letak Kereta dengan menggunakan Aplikasi IoT adalah disebabkan oleh tempat meletak kenderaan telah menjadi isu utama di kawasan bandar. Semakin banyak kenderaan telah menyumbang kepada masalah lalu lintas dan isu letak kenderaan pada masa kini. Tujuan utama projek ini adalah untuk membantu pengguna mencari tempat letak kereta yang kosong, dengan membantu mengurangkan pembuangan masa dan penggunaan minyak apabila mencari tempat letak kereta yang ada. Sistem yang dicadangkan ini menggunakan sistem dalam internet menerusi aplikasi laman web, yang membantu orang ramai mendapatkan maklumat mengenai ruang letak kereta yang terdapat di kawasan tertentu. Sebenarnya, sistem itu mengira kapasiti ruang letak kereta yang ada dan memberitahu pengguna melalui aplikasi laman web. Selain itu, sistem ini dilengkapi dengan sensor ultrasonik dan berat beban berat yang bertindak sebagai pengesan yang menghantar data kepada mikrokontroler untuk mengemaskini ke dalam sistem awan untuk tujuan kemasukkan data. Sistem ini dapat mengurangkan atau menyelesaikan masalah pengurusan masa di kawasan tempat letak kereta, yang pengguna dapat menjimatkan masa mereka dengan memeriksa kekosongan tempat letak keenderaan yang disediakan terlebih dahulu melalui aplikasi laman web.

ABSTRACT

The idea of Development Parking Information System By Using IoT Application was mainly due to the vehicle parking has become major issue in urban areas. The growing number of vehicles has contributed to the traffic problem and vehicle parking issue nowadays. The main purpose of this project is to assist the user to locate the vacant parking space, which help to reduce time wasting and fuel consumption on searching the parking space available. This proposed system was used online system via website application, which assist people to gain information on parking space available on certain area. In fact, the system counted the capacity of the available parking space and notified the user through the website application. Moreover, the system was equipped with an Ultrasonic and load cell weight sensor, which acts as the detector that sent data to the microcontroller in order to update into the cloud system for data logger purposes. This system could lessen or solve the time management problem at the parking area, which user could save their time by checking the available parking space in advance simple through the website application by using smartphone or other devices.

DEDICATION

First and foremost, alhamdulillah thanks to God for His blessings and His grace, I have complete the Projek Sarjana Muda 2 (PSM2) report on the Development of Parking Information System by Using IoT Application study project. In preparing for this report, there are many expectations and challenges that has been faced, eventually it is a valuable lesson and experience because of our tiredness it's worth it when the report ends up perfectly and successful. Highly acclaimed and our infinite gratitude to our supervisor Madam Wan Haszerila Binti Wan Hassan for guiding me in all respects during this semester course. In addition, I would to congratulate all lecturers and staff from Universiti Teknikal Melaka Malaysia for contributing to me during I have studying in here. This speech is also intended for both of my beloved mother and father following with my other family members as they always giving me support and motivates me in terms of moral and other aspects. I also shall not forget to my fellow classmates and as well for those who are directly and indirectly involved in helping me prepare this report successfully. Thank you very much and assalamualaikum.

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IoT	Internet of Things

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter gives the general display of the project including the background, the problem statement, the typical problem statement, objectives, scopes and the project outline.

1.2 Background

In an era that we have been living in, most of the existing parking station does not have a proper systematic system. A large portion of them are physically overseen and somewhat wasteful. The problem that always occurs at the parking station is time being wasted in searching for the available parking spaces. Users keep on circling the parking area until they found an empty parking space. This problem usually occurs in urban areas, where number of vehicles is higher as compared to the availability of parking spaces. These inadequate conditions happened because of the lack of implementation in technologies which are available in the market today. From manual executions utilized in the old frameworks, they have advanced into completely automated and modernized system. Despite the fact, there is some advance technologies has been proposed by numerous project research but the overall system are quite expensive, incomplete and less effective. Generally in Malaysia, most of the parking station entrances are usually controlled by barrier gates whereby parking tickets are used extensively for access purpose. Other than that, there is also parking station particularly at the structure region where they introduced a wired sensor at each parking lot for reason to illuminate the client the stopping opening accessible which they have squandered a ton of cash since there is no private vendor out there implement the existed technologies completely.

With the growth of technology, these major problems can be solved by using "The Development of Parking Information System by Using IoT Application". An economical parking system comes with efficient features and special component that will contribute in big part of reducing the traffic congestion in parking facility. A parking system that can be monitored anywhere in the world in terms of availability of parking space. This project study contains a circuit of wireless sensor and apply the concept of Internet of things. The data collected will transfer to the cloud system whereas the data can be visualized and monitored on the web application. Internet of things give such a big impact and freedom to our community to make a better decision making.

Besides that, this parking system also can be used not just at the indoor parking but as well can be used at outdoor parking where we used to face a problem while during attending to outdoor event such a wedding party, student convocation, campaigns and etc. Hence, two in one advantages therefore the proposed system will have powerful integrated data analysis and efficient management functions, and set to become the foundation towards the future technologies.

1.3 Problem Statement

Finding a free parking lot in a congested city in likes of Kuala Lumpur is very hard. Here in Malaysia, if anyone wants to go outside from home with their personal vehicle first thing comes in mind is about parking, where will we parks our vehicle. Most of the cases, people go to a parking station and find that all parking slot are full and then they have to wait that leads to traffic congestion in that parking facility area due to slow moving vehicles that are driving around the parking station. Further, it leads to time wasting, traffic congestion and fuel consumption that contributes to greenhouse gas emissions (CO2 emissions). Even nowadays, with this existed technologies system, there is several building have already using the 'Digital Outdoor Parking Space Available Signboard' but yet we spend a lot of time and energy to go to the that area and monitor on the digital signboard just to know whether there is available parking space. So, it is a big hassle and many people keep in fear about to go towards crowded area due to unknown available parking slot that are available.

1.4 Project Objectives

The objectives of this project are:

1. To design a parking system with IoT application for indoor and outdoor parking.
2. To develop the economical IoT parking system by using real-time monitoring application.
3. To integrate the concept of communication between IoT and microcontroller.

1.5 Scope of project

Overall this project will cover the aspects of the community, time consuming and the traffic congestion. The purpose of this project is to integrate the system with Internet of Things (IoT) in order to help the people avoiding the traffic congestion at the parking area. Using this system user will be able to know the available parking space easily by using via smartphone or computer and go to the specific webpage and monitoring how many parking slot are available at the current time from anywhere. The main element in this project are the HC-SR04 ultrasonic sensor, WeMos-D1 R2 as a microcontroller and smartphone or computer to monitoring. With the development of the Internet of Things, it also possible for user to analyse the how many parking spaces that are available at the current time from anywhere. The real-time data will be updated from time to time at the webpage.

To fulfil the stated objectives, the scopes of study are listed below:

1. Searching information in connection with a series of WeMos-D1 R2 microcontrollers, Ultrasonic Sensor HC-SR04, Load Cell Weight Sensor Hx711, cloud storage and webpage interface application.
2. Designing an electronic circuits and determined the other components such as servo motor, LCD and buzzer that will be used in this project.
3. Write and simulate the code using Arduino IDE application to analyse the incoming and outgoing vehicle at the parking area.
4. Design real-time monitoring application using a specific webpage application.

5. Analyse and visualize the data from cloud into the webpage and ensure it works properly and achieved the objective.
6. Design the prototype of the system, in order to sense the incoming and outgoing vehicle using WeMos-D1 R2 microcontrollers, HC-SR04 ultrasonic sensor and Load Cell Weight Sensor Hx71 in a project model.

1.6 Project Outline

In brief, the Projek Sarjana Muda (PSM) report contained 5 main chapters that will present the overall progress from the main idea to collecting the information and later design the project. Hence, the main contents of the report will be as the following:

Chapter 1 - The introduction are briefly discussed in chapter 1. In this chapter, the background of the research, objectives, problem statement, scope of the project and the outline are mentioned.

Chapter 2 - In this section focused on the information of the project that were gathered using the information in past research related to Parking Information System.

Chapter 3 - This chapter l discussed about the working principle of the project. Each of the hardware and software details which will be use for the development of this project were highlighted.

Chapter 4 - This chapter contained the results and analysis throughout this project development. Including hardware and software development and system performances.

Chapter 5 - This chapter conclude all the conclusion for this project study as well for the recommendations for future works.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter emphasis on the project research including the crucial information involved with the related parking system project scope and ideas. The revision also focuses on the several projects implementation and method involving the type of microcontroller, type of sensor and different technique and method of approaching the cloud system that already being utilized to contribute the user interfaces for the parking system by the previous research.

2.2 Overview on previous research and project related to the Development of Parking Information System by Using IoT Application

The following is a summary articles of the previous research and related work has been reviewed to provide an overview of the various technologies used by others.

2.2.1 An Approach to IoT based Car Parking and Reservation system on Cloud

The research conducted by (Hans, Sethi and Kinra, 2016) cited that solution to the ancient parking system is by leveraging the power of IoT and embedding it with the latest innovation of electronic sensors & computers. The objectives for this research project is to overcome the serious issue that society facing in those days is when to leave their vehicle in staggered parking garages. Regardless of whether it's

a shopping mall, Airport or a worldwide organization, encouraging stopping is a noteworthy piece of any foundation. Subsequently by utilizing the existed innovation, open source distributed computing server, for example, Cloud Foundry is an establishment that are utilized to store the data information. Figure 2.1 shows the flow diagram of the IoT based car parking system. The express passage check point has a detached infrared sensor (PIR) that used to distinguish the approaching vehicle at the section checkpoint and a preparing board (Arduino UNO, Intel Edison and so forth.) associated with it. Each stopping space has a closeness sensor and LED lights to demonstrate whether if a stopping opening are accessible or not. Server Side contents rushed to dispense the closest leaving opening, compute the span for which the vehicle was left and the all out charging sum. Versatile application for android and iOS are created which require the clients to enroll one time. By downloading and enlisting on this versatile application, clients can profit by a wide scope of offices gave to them. They can hold stopping spaces (e.g.: close to the lifts) before touching base to the office itself by effectively paying through online payment for faster payment. However, as a recap this is an efficient prototype system for parking system but the cost to make is very expensive and in my point of view this system it takes time for our community accommodate in this system.

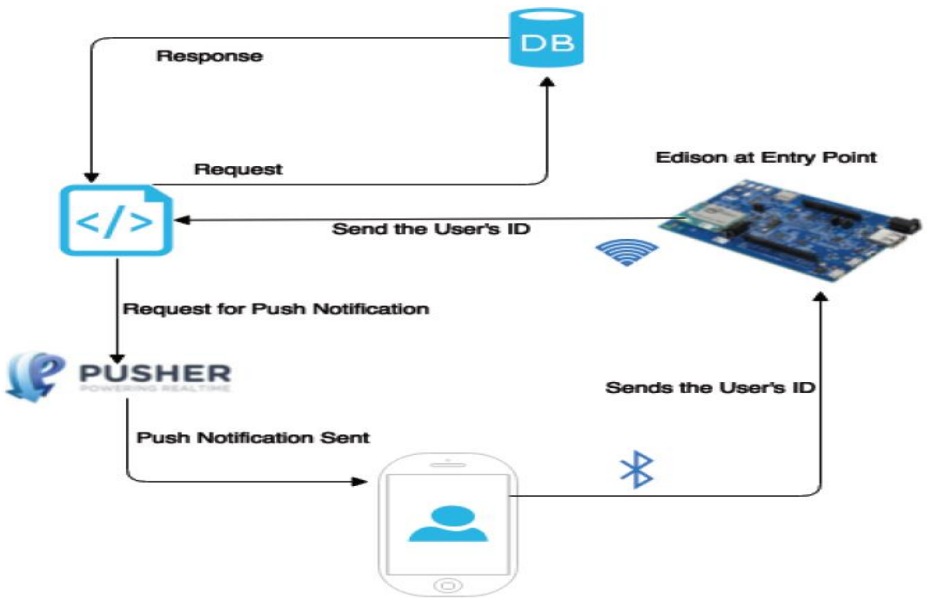

Figure 2.1: Flow diagram of the IoT-based car parking system

2.2.2 Smart Parking Reservation System using Short Message Services (SMS)

In mention of (Hanif, Badiozaman and Daud, 2010) proposed a smart parking using SMS services to communicate with drivers. A parking reservation system was created where clients could hold a parking space with a SMS message, including GPS data. Figure 2.2 shows example of the SMS sent to the clients that will be handled by a remote correspondence instrumentation gadget called small scale RTU (Remote Terminal Unit). This miniaturized scale RTU will answer the affirmation of booking by giving the subtleties of reservation like secret key and part number. The secret key or password will be utilized to enter the parking territory and substantial for a specific time frame. The system is completely computerized with the utilization of the Peripheral Interface Controller (PIC). The microcontroller is competent in putting away data of void parking spots, give passwords just as permitting or denying access to the parking area.

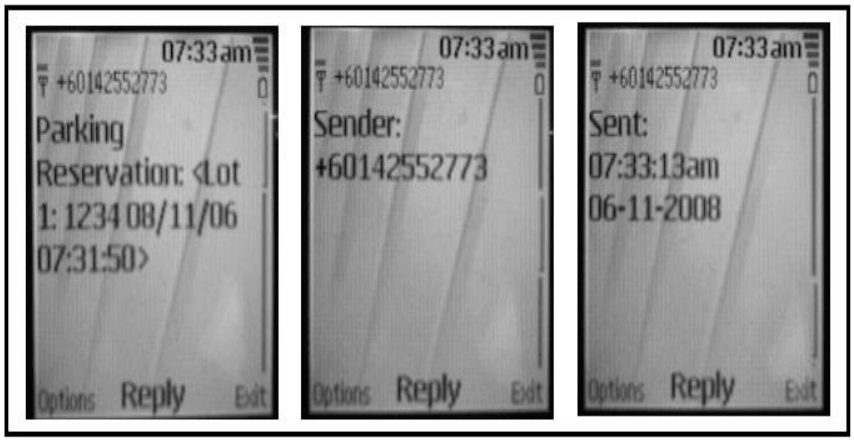

Figure 2.2: Reservation Messages