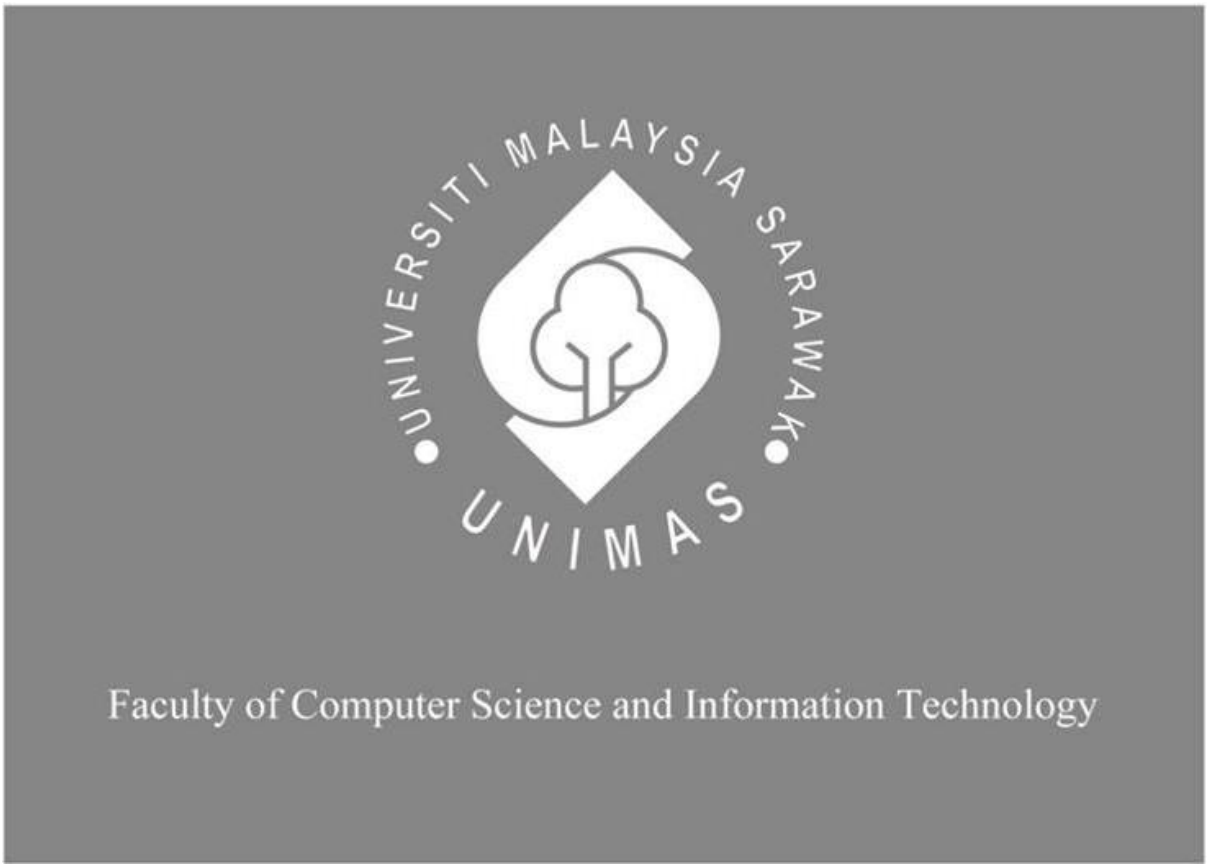

INTELLIGENT OUTDOOR PARKING SPOT LOCATOR

LEMUEL LO LI YONG

Bachelor of Computer Science with Honors (Network Computing)

2019

UNIVERSITI MALAYSIA SARAWAK

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INTELLIGENT OUTDOOR PARKING SPOT LOCATOR

LEMUEL LO LI YONG

This project is submitted in partial fulfilment

of the requirement for the

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2019

PENCARI TEMPAT PARKIR KERETA PINTAR

LEMUEL LO LI YONG

Project ini merupakan asas untuk

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Ijazah Sarjana Muda Sains Komputer

(Rangkaian Perkomputeran)

Fakulti Sains Komputer dan Teknologi Maklumat

UNIVERSITI MALAYSIA SARAWAK

2019

This Final Year Project Report entitled intelligent outdoor parking spot locator was submitted by Lemuel Lo Li Yong in partial fulfilment of the requirements for Bachelor Degree of Computer Science (Hons.) Network Computing, in Faculty of Computer Science & Information Technology, University Malaysia Sarawak and was approved by

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Supervisor

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Lemuel Lo Li Yong 12 December 2019

Faculty of Computer Science and Information Technology

Universiti Malaysia Sarawak.

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ABSTRACT

The drivers always waste time looking for a parking slot especially when in a rush. The drivers need to search the entire area to find an available parking slot to park their cars. This issue has been causing inconvenience to the car drivers. It also consumes a lot of time and wastes petrol. The objective of the system is to detect the available parking slots in real-time. The parking sensor will detect the available parking slots, it provides real-time information on the status of parking slots. In addition, it also displays available parking slots to drivers. The webpage or mobile application will display parking status to drivers. It helps drivers find available parking slots faster and more comfortably. Moreover, it also collects the occupancy of the parking slots. The parking sensor will detect the car in the parking slot and send the signal to microcontroller, and then the microcontroller will send the data to the 000webhost via Wi-Fi. Unfortunately, this system can help more of the drivers to solve the parking problem. The system develops by some technologies and tools such as PHP develop the website, Java programming to build mobile application and Arduino code for detect from hardware.

ABSTRAK

Pemandu kereta selalu membuang masa untuk mencari slot letak kereta terutamanya pada masa yang sibuk. Pemandu kereta perlu mencari seluruh kawasan sehingga mendapat slot letak kereta yang kosong untuk meletak kereta mereka. Masalah ini menyebabkan kesusahan kepada pemandu kereta. Keadaan ini juga menyebabkan pembaziran banyak masa dan minyak petrol. Namun demikian, perkembangan teknologi yang pesat telah mewujudkan satu sistem yang berguna untuk keperluan sistem teknologi semasa. Sensor kecil boleh dipasang di setiap slot letak kereta untuk mengesan slot letak kereta yang kosong dan boleh diparkir kenderaan. Walau bagaimanapun, sistem ini memerlukan pemandu kereta memasang aplikasi mudah alih untuk melihat status setiap slot letak kereta. Kajian ini akan menerangkan aplikasi mudah alih dengan bantuan sensor magnetik dan mikrokontroler untuk mengurangkan masa untuk mencari slot letak kereta.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

This project aims to develop a webpage and mobile application to provide parking information and location for visitors. The number of cars in city increases day by day as the population of citizens inside cities are increasing. There are a lot of city councils urging the developers to lessen outdoor parking lots (Shoup, 1999) to reduce space for car parking and encourage walking or using public transport. An efficient parking management is a solution that can ensure everyone's satisfaction and take benefit of the city's outdoor parking.

This project provides an alternative way of finding an empty or available parking slot. The purpose of this project is to create a simple webpage or flexible mobile application that can be implemented outdoor for the ease of drivers in parking their cars. The purpose of developing the intelligent outdoor parking spot locator is to eliminate unnecessary frustration of drivers because they waste a lot of time looking for the parking slots.

The project allows vehicle drivers to search for empty and available parking slots using the webpage or mobile application. This project consists of a microcontroller, parking sensor, a central web server and a mobile application. In this project, the parking sensor in the parking slots is used as a sensor that can detect car parking at that spot. The parking sensor will receive data and send data to the online database via Wi-Fi. Next, the webpage and mobile application can use the data from the database for the visitors to check the parking status. This Intelligent Outdoor Parking Spot Locator uses a NodeMCU microcontroller and QML5883L sensor. Arduino IDE is used to program the NodeMCU microcontroller.

1.2 Problem statement

With the increase in the number of vehicles per day, we know that most places have built underground parking lots or free parking lots to overcome the increase in the number of cars every day. If we want to find an empty parking space, it is time and fuel consuming. For example, it is difficult to look for an empty parking space in the parking lot, especially during shopping complexes' promotion, weekend or public holiday. Users often face problem during promotion day, weekend or federal holidays in which they take a lot of time to find empty parking spaces.

At this point, shopping centers become very crowded during peak hours, and it is a major problem for the users to find a parking lot, especially with no information on the parking slot utility. Since it is quite challenging to find an empty parking space, it can cause users' frustration and create improper parking, such as double parking. This project helps to solve the above problems by providing information about the available parking space and prevent users from taking more time and fuel from searching a parking lot.

1.3 Scope

a) This project focused on the user or people who own a car. The user here is the driver.

b) This project uses the NodeMCU microcontroller to receive the parking slot status from the parking sensors.

c) This project provides a simple webpage or mobile application, it is easy to use with user interface for the driver to get real-time parking status.

1.4 Objectives

a) Detect available parking slots in real-time.

- The parking sensor will detect the available parking slots, it provides real-time information of the status of parking slots.

b) Display available parking slots to drivers.

- The webpage or mobile application will display parking status to drivers. It helps drivers find an available parking slots faster and more comfortably.

c) Collect the occupancy of the parking slots.

- The parking sensor will detect the car in the parking slot and send the signal to microcontroller, and then microcontroller will send the data to the webserver via Wi-Fi.

1.5 Methodology

In the development of this project, a simple methodology is chosen, which is the "waterfall model." The waterfall model is a sequential development model, which is a process for creating software. This method is like a waterfall because it flows downwards through the phases of requirements, analysis, design, implementation, and testing. All steps in this methodology will relate to this project based on the sequential process.

Chapter 1 explains briefly about the proposed system. Chapter 2 explains detailly about the system analysis such as comparison between with proposed system and current system. The information of the reviewed current system are searched and collected. The proposed system is compared with current system. Chapter 3 explains detailly about the system design, which is the method used to develop for this proposed system, such as requirements, analysis, design, implementation, and testing. It also includes the system design, system interface, system architecture and context diagram.

Chapter 4 explains in detail about the implementation and testing. This chapter describes the phase of implementation for the purposed project. The design of the prototype is explained in detail in this chapter. Chapter 5 presents the conclusion of this entire project and outline for the future works. It also describes the lesson learned throughout the entire project.

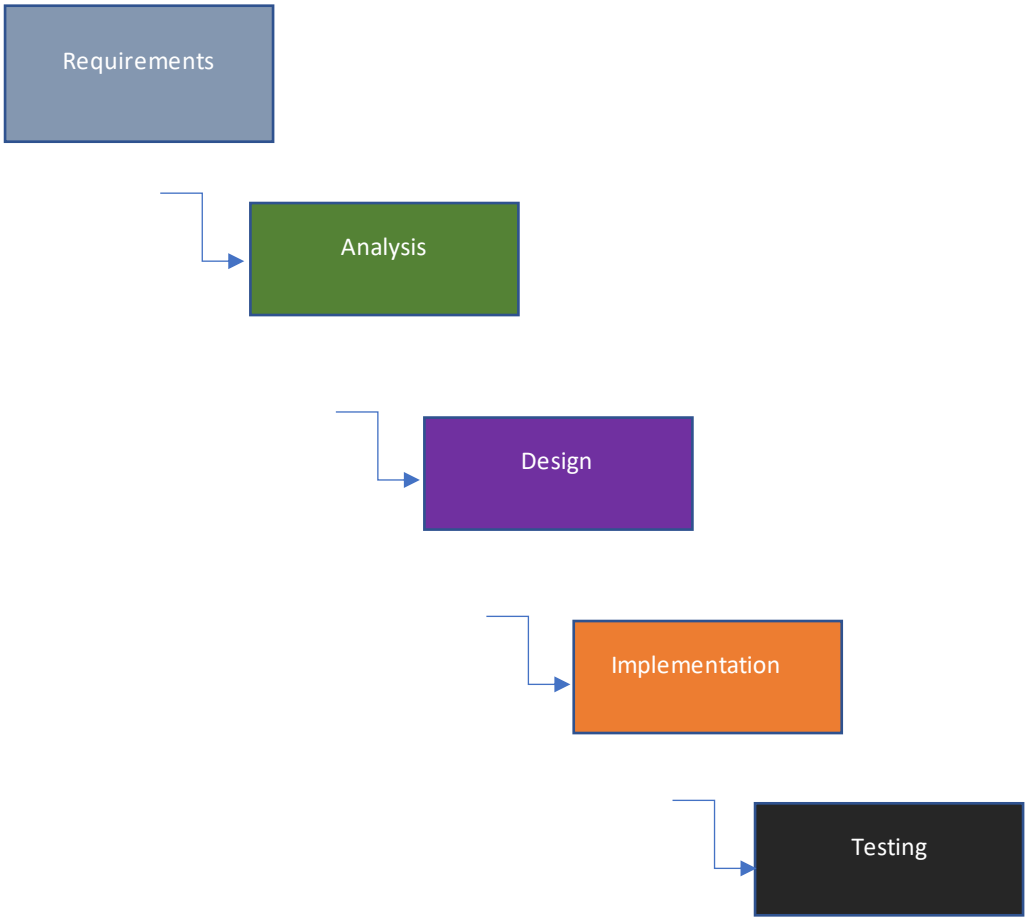

Figure 1. 1: Waterfall model

Phase 1: Requirement

In this phase, a basic requirement for this project is defined. The main activity includes data and information collection.

Phase 2: Analysis

In this phase, the project is briefly described. The information for the reviewed current system is searched and collected. A comparison between the proposed system and current system is described.

Phase 3: Design

In this phase, the system design, system interface and system architecture are developed. The system interface including the web page and mobile application interface are designed in this phase.

Phase 4: Implementation

In this phase, the prototype or hardware design is developed. The microcontroller with sensors is assembled. Some software such as Notepad++ and android studio are used to develop the website and mobile application.

Phase 5: Testing

In this phase, the proposed system is tested. Every feature and function must be tested thoroughly. The system should also have error handling during unexpected situation. All the errors and bugs are corrected in this phase. Bugs and errors are also eliminated.

1.6 Significance of project

In this FYP, this project provides the real-time data using webpage or mobile application that allows visitors to view the status of the parking slot. The intelligent outdoor parking spot locator provides an easier way to search and find empty parking slots. In addition, this project also avoids the drivers to spend too much time in finding empty parking slots. It helps drivers to save time and money. Moreover, this project means to reduce car accidents too. It is because when the traffic flow increases, the drivers need to find the empty parking slots and tend to cause some accidents.

Moreover, this project is designed to eliminate the hassle of circling in searching a parking space too. In this context, it can reduce pollution. According to Das A., approximately a million barrels of oil is used by cars to search for parking lot (Das A, Dash P K and Mishra B K, 2018). This project reduces the driver's driving time, reduces the emissions of carbon and result in better global environment.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Literature review is one of the important parts of this project. This chapter contains literature reviews related to the purpose of the system. This chapter will also describe the comparison between the proposed system and existing systems. In this chapter, a table of comparison of the proposed system against the existing system will be provided.

2.2 Background of study

Finding a parking slot has become a problem to us lately. In fact, we know that some areas around the world, especially populated areas or more developed countries are facing this kind of issue. However, some countries which is undeveloped and poor, they are less tools and technologies to solve the difficulty of finding a parking slot. With the development of science and technology, we know that mobile phones have been very popular in the global market in recent years (Chi and Tsai, 2014). The smartphone also played a very important role today as it is very convenient, having many functions and furthermost portable. Therefore, the portable smartphone could be used to help the driver to check the parking slot status. There is a need for mobile applications that allow citizens to find and park at the nearest empty parking slot.

2.3 Current System Review

2.3.1 Automatic Smart Parking System using Internet of Things

This system uses a Raspberry pi with pi-camera to detect the available parking slot. It will collect the parking data and send it to the server. This data can be viewed by user to check the parking status. This help the users to plan their journey before going out from their house. It also saves the time of users because they can check the status of parking slot beforehand. The challenge of this system is to use the existing resources in a optimum level to reduce the searching time, traffic congestion in the city.

This system has a goal to develop a less cost with more performance, because very few existing parking systems which uses sensors to collect the information such as this using sensor like video sensors in a parking system where the cost is high.

The Automatic Smart Parking System which incorporates the features of raspberry pi 2 and has pi camera attached on it. Where pi camera is mounted on the top of streetlight lamp posts or at the ceiling of indoor parks. Thus, the camera can make survey on each parking slot in the parking lot continuously to check whether the particular slot is filled or empty. Figure 2.1 presents the structure of smart parking system which contains some control points on each parking slot which will be used as reference points for the camera.

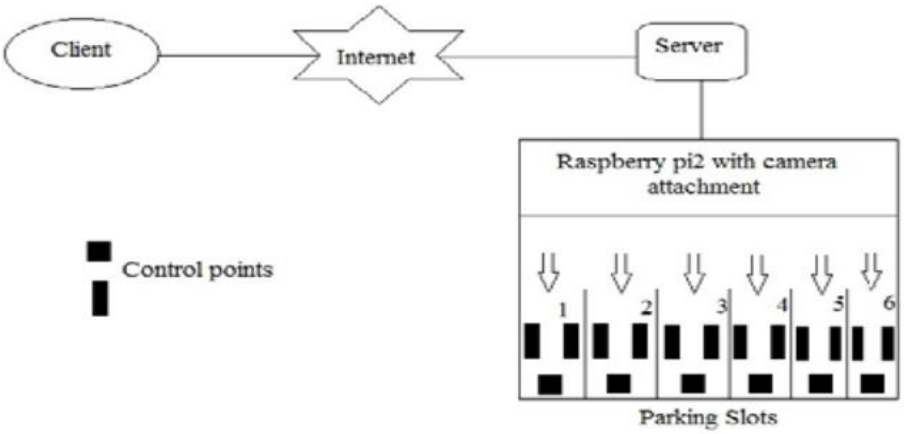

Figure 2. 1: Structure of Smart Parking System ***(***adapted from SR M. B, 2015***)***

2.3.2 Smart Parking System for Vehicles

The Smart Parking System for Vehicles project is one of the projects developed to determine empty parking spaces in the parking complex. It helped the drivers to park their car in empty parking spaces more easily. This Smart Parking System uses wireless sensor network that consisted of autonomous sensing devices connected to the network using radio communication.

This system used wireless sensor network to get the information about the individual parking spaces in a parking complex and monitors the duration of which vehicle is parked at the specific parking space at the same time. This system uses sensors that can detect empty parking spaces by measuring the amount light reaching and propagate their measurement to the base station every second for further processing. This project was also created for allowing the operator to use the information that has been detected from wireless sensor network for billing purposes.

This system is able to show the drivers an available parking slot and occupied parking slot so they can park their car in the empty parking slot. This project uses two sensors as shown in figure 2.2 and figure 2.3, which is IRIS sensor mote and MTS420CC sensor board. The sensors are connected to the base station and then base station to the computer. When the vehicle enters