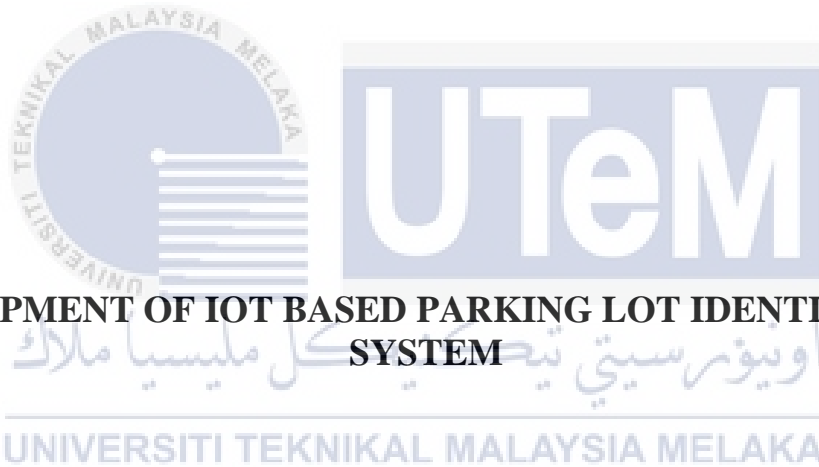




Faculty of Electrical and Electronic Engineering Technology



**DEVELOPMENT OF IOT BASED PARKING LOT IDENTIFICATION
SYSTEM**

AMIRUL FAUZAN BIN MOHD KAMAL

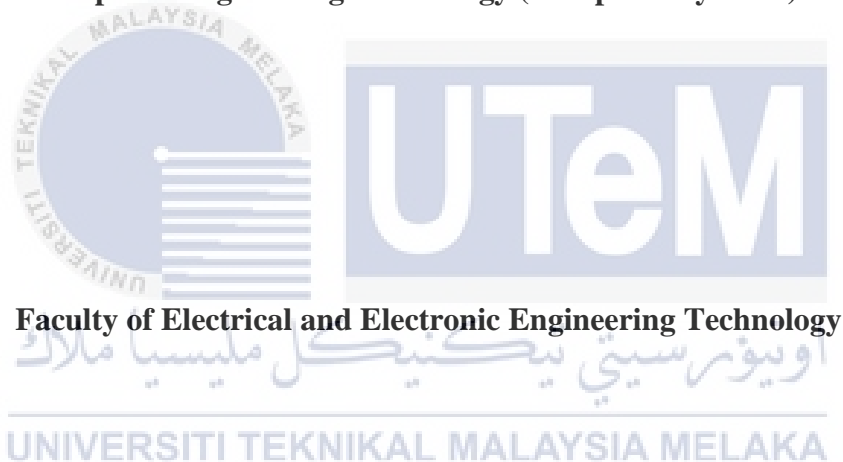
Bachelor of Computer Engineering Technology (Computer Systems) with Honours

2021

DEVELOPMENT OF IOT BASED PARKING LOT IDENTIFICATION SYSTEM

AMIRUL FAUZAN BIN MOHD KAMAL

**A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Computer Engineering Technology (Computer Systems) with Honours**



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021



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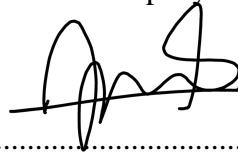
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NURLIYANA BINTI ABD. MUTALIB

Alamat Tetap:

No 24, Jalan Taman Megah 31,
Taman Megah, Batu 11, 43200,
Cheras, Selangor.

Cop Rasmi Penyelia

NURLIYANA BINTI ABD MUTALIB
PENSYARAH
Jabatan Teknologi Kejuruteraan Elektronik Dan Komputer
Fakulti Teknologi Kejuruteraan Elektrik Dan Elektronik
Universiti Teknikal Malaysia Melaka

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I declare that this project report entitled “Development of IoT Based Parking Lot Identification System “ is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Student Name :

Date :


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20/01/2022

اونيورسيتي تيكنيكل مليسيا ملاك

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APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electronics Engineering Technology (Telecommunications) with Honours.

Signature :



NURLIYANA BINTI ABD MUTALIB

Pensyarah

Jabatan Teknologi Kejuruteraan Elektronik dan Komputer

Fakulti Teknologi Kejuruteraan Elektrik Dan Elektronik
Universiti Teknikal Malaysia Melaka

Supervisor Name :

NURLIYANA BINTI ABD. MUTALIB

Date :

21/1/2022

Signature :

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Co-Supervisor :

Name (if any)

Date :

DEDICATION

A lot of thank you to Mdm. Nurliyana Binti Abd. Mutalib, thank you for helping by giving ideas on my final year project.

And to the fellow friends of BEEC, who gives co-operation and knowledge sharing in completing this project.

Thank you so much.



ABSTRACT

IoT based parking lot identification system is one of the systems required due to the increasing of vehicle. The majority of existing parking lots do not have a well-organized framework. The majority of them are inefficient and need a lot of time to find a single parking lot at the popular place. This project aims to develop a prototype of parking lot identification system based on Internet of Things (IoT) that provides data about available and occupied parking spaces through the web to a user's smartphone device. This prototype also provide a real-time update on the availability of all parking spaces and is given the option for user to choose the best one. This project aims to develop a prototype of IoT based parking lot identification system that is able to measure detect the existence of the vehicle using the IoT system while the performance of the system is analysed. Moreover, this prototype system shows a good performance in terms of power consumption because Arduino Mega used very low power consumption of 11.85mA for the size of the board. After that, a module for developing the website is designed using php along with the web hosting platform which is the 000webhost. Following that, the data from the IR sensor are analysed to identify the performance of IoT based parking lot identification system. Therefore, this prototype able to provide and assist the user in locating available parking in the building.

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ABSTRAK

Sistem pengenalan tempat letak kereta berasaskan IOT merupakan salah satu sistem yang diperlukan berikutan peningkatan kenderaan. Majoriti tempat letak kereta sedia ada tidak mempunyai rangka kerja yang teratur. Majoriti mereka tidak cekap dan memerlukan banyak masa untuk mencari satu tempat letak kereta di tempat yang popular. Projek ini bertujuan untuk membangunkan prototaip sistem pengenalan tempat letak kereta berdasarkan Internet of Things (IoT) yang menyediakan data tentang ruang letak kereta yang tersedia dan diduduki melalui web kepada peranti telefon pintar pengguna. Prototaip ini juga menyediakan kemas kini masa nyata tentang ketersediaan semua ruang letak kereta dan diberi pilihan untuk pengguna memilih yang terbaik. Projek ini bertujuan untuk membangunkan prototaip sistem pengenalan tempat letak kereta berasaskan iot yang mampu mengukur pengesanan kewujudan kenderaan menggunakan sistem IoT semasa prestasi sistem dianalisis. Selain itu, sistem prototaip ini menunjukkan prestasi yang baik dari segi penggunaan kuasa kerana Arduino Mega menggunakan penggunaan kuasa yang sangat rendah iaitu 11.85mA untuk saiz papan. Selepas itu, modul untuk membangunkan laman web direka menggunakan php bersama-sama platform pengehosan web iaitu 000webhost. Selepas itu, data daripada sensor IR dianalisis untuk mengenal pasti prestasi sistem pengenalan tempat letak kereta berasaskan iot. Oleh itu, prototaip ini dapat menyediakan dan membantu pengguna dalam mencari tempat letak kenderaan yang tersedia di dalam bangunan.

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LIST OF SYMBOLS

δ	-	Voltage angle
	-	
	-	
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LIST OF ABBREVIATIONS

UTeM	-	Universiti Teknikal Malaysia Melaka
PSM	-	Projek Sarjana Muda
IoT	-	Internet of things
PHP	-	Hypertext Preprocessor
SQL	-	My Structure Query Language
HTML	-	Hypertext Markup Language
UTeM	-	Universiti Teknikal Malaysia Melaka
RFID	-	Radio-frequency identification



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CHAPTER 1

INTRODUCTION

1.1 Background

The majority of existing parking lots do not have a well-organized framework. The majority of them are inefficient and run by hand. The time spent hunting for available parking spaces is a persistent concern in the car park. Users will circle the parking lot until they discover a spot that is free. This problem is most widespread in urban areas, where the number of cars outnumbers the available parking spaces.

Because of a lack of implementation in already available technology, these inefficient circumstances emerged. Many local car parks are now created inside shop malls or multipurpose buildings to give room for car drivers. Parking lot in a building is becoming increasingly popular in many shopping malls since it is convenient and keeps vehicles out of the sun. This type of parking lot usually has a parking good system that mostly relies on message signs to inform motorists about parking availability in the lot. The sensors and LEDs used to represent the availability of vacant parking spaces are often used to determine the availability of parking spaces within a car park. This information on parking lot availability within a car park is often expressed in terms of available parking spaces and proximity to the motorist. A parking garage's real number of available parking spaces is rarely given. Every day, hundreds of cars enter the parking lot, trying to find an open place.

As a result, obtaining an available parking spot is difficult. In most local parking lots, car drivers must still find an empty spot. They will surely squander slot time seeking for empty parking places, especially if each row of parking slots only includes a few empty parking spaces. As a result, having an effective empty parking slot tracking system that shows unoccupied parking space availability at each row of parking slots and leads vehicle drivers to those spaces is vital. The development of this project prototype can function as a wayfinder, leading drivers inside the parking lot to available parking spaces and directing

them there. It's an Arduino microcontroller-based project that uses an infrared sensor to detect vacant parking spots at a car park level, sending a signal to the website and showing the vacant parking spot on the user's smartphone. In a modern, advanced society where almost everyone owns a car and vehicle, finding an empty parking spot is challenging. Finding a parking spot is a regular and often aggravating issue for many people in cities all around the world. Time and money are the two most important factors of a person's daily life.

As a result, each company that has a large or even a modest building must provide adequate parking for visitors. In the driver's perspective, an IoT-based Smart Parking System helps to reduce time consumption by reducing trip time due to the information provided. Drivers can avoid searching for a vacant parking space that is actually fully occupied based on the information provided. This concept is based on study into existing parking systems in congested parking areas such as shopping malls and shopping centres. Knowing how difficult it may be to obtain a parking spot in some regions, this project was created to address the issue. This study attempts to discover the most efficient method for quickly directing vehicles and vehicle users to a free parking spot. Drivers can use the Smart Parking System to see which parking zones are available and how many free parking spaces are available, allowing them to make an informed decision about where they want to park and acquire free parking quickly. As a result, finding free parking is straightforward.

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1.2 Problem Statement

Due to the increasing number of people living in cities, the need for mobility solutions has become more prevalent. As the level of living rises in many regions of the world, an increasing number of people and businesses purchase new vehicle. This has created a dilemma in terms of finding place to park these cars in cities, particularly in buildings. The parking lot concept has grown significantly over time, from just a space where individuals may park their automobiles to areas where automated solutions are utilised to ensure operational efficiency and security.

Cities are bursting to the seams with malls and other commercial centres, attracting a rising number of people who prefer to drive in. This has heightened the need for malls to

implement effective parking lot management systems, not only to ensure that customers have a pleasant experience, but also to avoid squandering money and resources. Nevertheless, getting a parking spot at the mall poses a number of difficulties. Depending on their size and popularity, all malls have designated parking areas that can accommodate automobiles ranging from 500 to 10,000 units. These parking garages can be either public or private, as well as indoor or outdoor. Most malls have indoor parking lots and a large amount of floor space. People will take a long time to find a parking spot because they can't find one and will just go back and forth on a few floors although there are plenty on the other.

1.3 Project Objective

This project's goal is to promote development of IoT Based Parking Lot Identification System. Specifically, the objectives are as follows:

- a) To develop of effectiveness the IoT parking lot system and can be fills up efficiently.
- b) To design an improvement of IoT parking system that will combine the complete user experience into a single activity.
- c) To implement the database by using QR code.

1.4 Scope of Project

An architecture for Development of IoT Based Parking Lot Identification System is a cell phone connected to the website was proposed to the user. The system provides real-time parking facilities, allowing users to find a parking spot without increasing driving time, reducing daily car emissions and, as a result, the global environmental imprint.

There are few limitations of this project. The first limitation of this project is that the port of microcontroller, there are insufficient port provided by Arduino Mega for IR sensor to accommodate the number of parking lots according to the actual number in a building.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The purpose of the literature review is to study and review the kind of projects that had been done by the engineers, students and researchers. This chapter will cover the fundamental study related to Development of IoT based Parking Lot Identification System. All material and research based on journals, articles, and webpages authored by other researchers can be analysed and discussed to produce the project's desired output. As a result, this chapter is critical for learning about components, features, and evaluating project reliability.

2.2 Previous Related Work

2.2.1 Smart Parking Using Internet of Things

(Rupam and Doshi, 2019) proposed a Smart Parking using Internet of Things. In this project, the author created a parking system based on Internet of Things. In this project there is online and offline parking system with payment. There also has gate on parking slot to allow user to park their car. The major goal of this project is to find a parking spot for a driver without involving people, so that they may park their automobiles safely, and to make it easier for users to find parking slots before they arrive at the location. Figure 2.1 below shown that the author 3 element to make this project success which is anytime, anyhow and anywhere that connected to Internet of things.

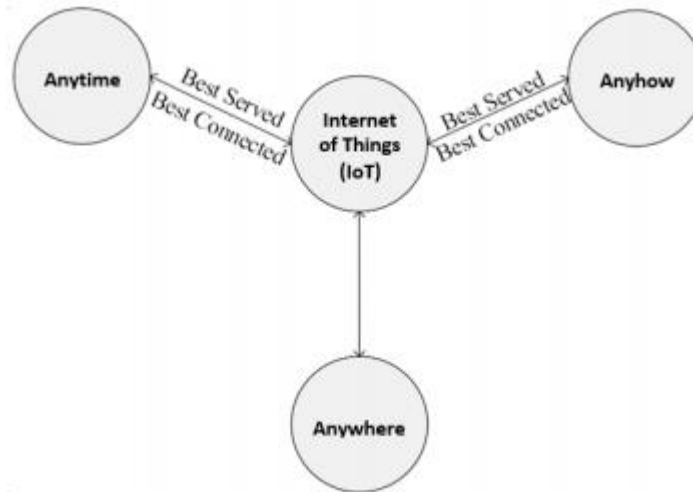


Figure 2.1. Schematic Representation of Internet of Things (Rupamr and Doshi, 2019)

This project using Raspberry PI 3 as a platform with IR sensor, Ultra Sonic Sensor, Node MCU and RFID. The author used Raspberry PI 3 as main component for entry system that has database that connected to internet. Due to Raspberry PI 3 come with embed Wi-fi module unlike the previous version, external wi-fi are no need. The system built by the author allows the user to check available slot in database that provide by sensor at the location. The author also provided offline booking for available parking slot and pay manually. On offline booking, author also provide the display screen for user to check an available slot on the parking entry. Then, the barcode will be generated after the payment successful whether online or offline to allow user to park their car because without the barcode gets will not be opened.

On the parking area, the author used IR sensor and ultrasonic sensor to detect the existence of the car. IR sensor act as proximity sensors that used to obstacle detection, when the object come close to the sensor, The infrared light from LED reflects off of the object and detected by receiver. This type of sensor not ideal for outdoor used because it using light emitting diode (LED). Other than that, author also using ultrasonic sensor. This sensor emits sound wave and reflected back to receiver and measure the distance. On the parking entry, the author put gate using DC motor and barcode scanner to open the gate after the barcode scanned succeed. Node MCU is a wi-fi module for IOT purpose. It connected to all the sensor to transmitted the data to Raspberry PI 3.

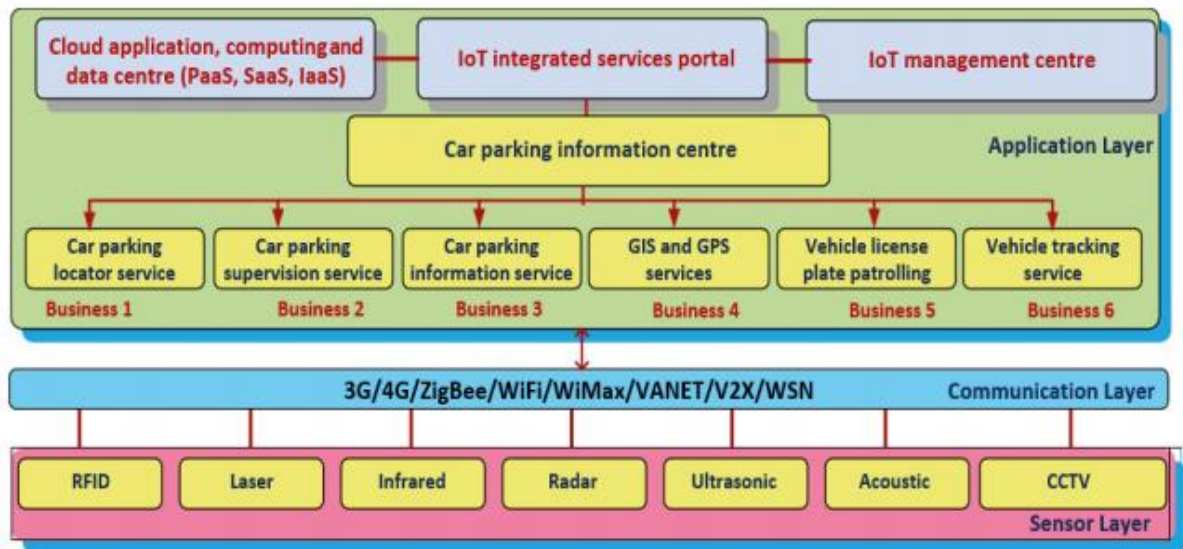


Figure 2.2. Smart Parking System Layer (Rupanr and Doshi, 2019)

From figure 2.2 that provided by author, there are 3 layers of architecture in this project which is application, communication and sensor layer. Application layer there is on Raspberry PI 3 that run all the system online and offline. The author's mobile phone application is based on cloud computing, computing, and data centres. This system also manages the business of automobile parking finder, supervision, information, GIS, GPS, licence plate patrolling, and tracking. The sensor layer, which includes RFID, laser, infrared, radar, ultrasonic, acoustic, and CCTV, provides all of these services. The Raspberry PI 3 receives all of the sensor layers.

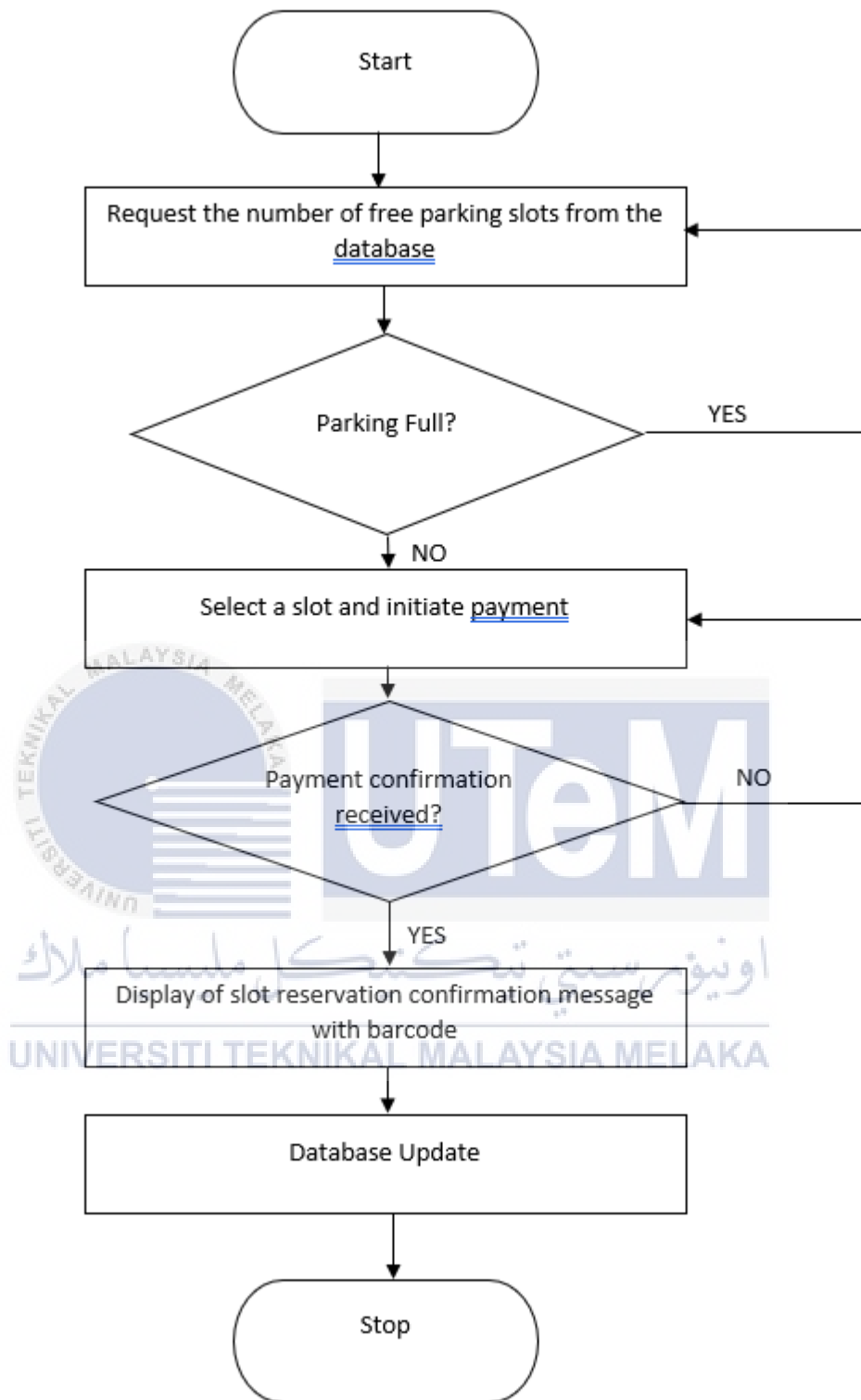


Figure 2.3. Smart Parking flowchart