SMART PARKING SYSTEM

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Tajuk Projek : SMART PARKING SYSTEM

Sesi Pengajian : 1 3 / 1 4

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To my beloved family, for their genuine love, prayers and encouragement. Thank you my supervisor and all lecturers who guide me, and to all my friends for giving me mentally and moral support during process of finish final year project.

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ABSTRACT

Finding a vacant parking space nowadays is time and fuel consuming. This problem may causes drivers to get frustrated and eventually improper parking will appears. This will at the end causing traffic jam in the parking space and accident might occur. Hence, this project proposes the smart parking system using wireless sensor network based on Arduino Uno and LabVIEW as graphical interface. This project help solve the problem state above as users get to choose the parking space and this will feed the information of vacant spaces available to users so to prevent users to wander around at the parking lot. This project using 2.4 GHz radio frequency communication as medium to transfer data between sensors and system. Wireless communication is used because it is easy to configure and implement into the project compare to the wired connection. As conclusion, this project will helps reduce traffic jams and improper parking in the parking spaces in the future.

ABSTRAK

Mencari tempat kosong untuk meletak kerata pada masa kini amat membazir masa dan bahan api untuk kereta. Masalah ini akan menyebabkan pamandu-pemandu berasa keliru dan marah. Dengan perasaan negatif ini, akhirnya pemandu tersebut akan meletak kereta di tempat yang dilarang. Ini akan menghuru-hara situasi seperti kesesakan trafik dalam tempat letak kereta dan mungkin kemalangan boleh berlaku. Projek ini mencadangkan satu sistem yang mangandungi wayarles komunikasi yang berasas Arduino Uno dan Labview sebagai grafik. Sistem ini akan menyelesaikan masalah-masalah yang disebut tadi kerana pemandu-pemandu dapat memilih tempat letat kereta meraka dan ini dapat memberitahu informasi tentang tempat kekosongan. Projek ini menguna wayarles komunikasi yang menguna frekuensi radio 2.4 GHz sebagai medium. Wayarles lomunikasi system digunakan sebab senang untuk mengkonfigurasi. Kesimpulan, projek ini dapat menyelesaikan masalah tersebut pada masa hadapan.

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CHAPTER I

INTRODUCTION

In this chapter, there will be explanation on introduction of the project which is include the project background, overview of the project, problem statement, objective of the project and scope of the work.

1.1 Project Background

Available parking slot nowadays is very limited for places like office building and shopping complex. This problem is very common now is this world. There are many systems provide the available parking slot for the drivers. There is a flaw in the system which is the drivers do not know have the information of the location for the available parking. Thus, this project will provide the graphic user interface which will show the available parking slot and the location of it. Furthermore the drivers will have a chance to pick the preferred parking. In this project, the wireless sensor network will implement and will operate with the ultrasonic sensors. Drivers will have to key in the pass key provided to prove that parking slot is pick by the actual drivers otherwise there will be an alarm to alert the security.

1.2 Project Objective

This project objectives are to:

- Develop a parking system that have Graphic User Interface for driver and management.

- Involve wireless communication system, sensor, programming into this parking system.

- Provide better parking management system and booking system for car park.

1.3 Problem Statement

Nowadays, most of the office buildings and shopping mall had built underground parking and multilevel parking to overcome the number of cars which is increasing rapidly. However, drivers are still difficult to find an available parking slot to park their car. The process of looking for a parking lot is time consuming, confusing and wasting fuel as well. At this point of time, someone may miss or late for their important event. This might cause frustration for the drivers. Eventually the effect of lacking parking slot will causes the officer to have bad mood or consumer to leave the shopping mall without purchase anything. The side effect of this problem is serious and need a better solution to handle it.

1.4 Scope of Work

The scope of work that are involve as below:

- Indoor car park such as underground and multilevel car park.

- This project assume the user will follow the procedure when using the parking system

- The simulation of this project will only use the car which have smaller scale to the actual car.
- Only one parking slot will simulate for this scenario.
- This project only use Zigbee S1 which only can communicate one to one with another Zigbee S1.

1.5 Methodology

The methods are involve is literature review, project planning and designing, project development and project testing. The ideas that created this project is due to the problem statement and brainstorming activities. After that, the project is then enter second stage which is planning and designing based on the ideas. After that, the suitable development will be done to realize the idea in reality world. Finally, the project will be test by using the proper instrument and procedure.

1.6 Report Overview

In this report, there will be 5 chapters. Chapter 1 will explain the introduction of the project. This will explain the idea of the project and problem that are related to the project. It also will contain the objective of the project and scope of the work that are involve.

For the chapter 2, it is about the summary of the literatures that are reviewed and studied. This will include the basic information of the technology that involve with this project and so related paper work and previous work study.

In chapter 3, methodology will be explain in detail. This chapter will explain the flow of this project and the ideas to realize this project to the real work. It also will include the explanation of the hardware and software.

As in chapter 4, the result will be further discuss and analysis of data from the result. Finally chapter 5 will conclude this 1st phase of the project and suggestion for the future development.

CHAPTER II

LITERATURE REVIEW

This section is about the survey of literature review from the research paper and also from the current project or application that are already been used.

2.1 Wireless Communication

Wireless communication nowadays is very common and it is important because it is convenient to setup compare to wired communication and easy to configure. Wireless communication types are separated by the frequency band used such as Global System for Mobile (GSM) is using 800/900MHz, Global Position System used about 1.6GHz frequency band and some use 2.4 GHz as frequency band. For this project, it is use 2.4Ghz radio frequency wireless communication which is Zigbee. There are few other product that use 2.4 GHz RF such as Wi-Fi and Bluetooth. Although they are using the same frequency band but the design and infrastructure is totally different. The table below shows the differences about them.

Table 2.1 Comparison between 2.4 GHz radio frequency communication [1]

	Zigbee	**Wi-Fi**	**Bluetooth**
Range	10-100 meters	30-100 meters	10 meters
Data rate	20,40,250 Kbits/s	54 Mbits/s	1 Mbits/s
Operating Frequency	2.4GHz (worldwide)	2.4GHz, 5GHz	2.4GHz
Networking topology	Ad-hoc, peer to peer, start , mesh	Point to hub	Ad-hoc, very small networks
Complexity	Low	High	High
Power Consumption	Very low	High	High

2.2 Related Paper Researched

This section is discuss about the researched paper that related to smart parking system. There are three paper are reviewed in the following section.

2.2.1 Smart Parking System Architecture Using Ultrasonic Sensor

This project aim is to help drivers to locate the vacant spaces in a parking lot in a short period of time. This system is using the ultrasonic sensor as detector to detect the car park availability. The project also as known as Smart Parking System contain few features such as vacant car park detection, improper parking detection, display available parking lot and directional indicators toward the vacant car park space, payment facilities and different types of parking spaces by using LED indicator.

Figure 2.1 Improper parking [2]

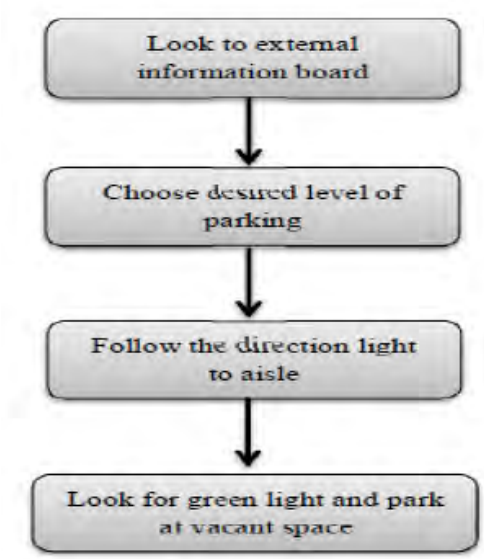

Figure 2.2 Overview of SPS project [2]

Figure 2.3 Ultrasonic sensor detection [2]

This project provide graphic user interface as well for the user to look for the free parking slot. In the GUI, user can choose number of floor to check the total number of free parking spaces and headed to the desired parking slot. In the same time, this

project provided LED indicator to indicate the current condition of the parking slot. However this system does not implement wireless sensor network.

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

This project proposes a smart parking reservation system in such a way that users can book their parking slot with short message service (SMS). The SMS that sent by users will be processed by a wireless communication instrumentation device called micro-RTU (Remote Terminal Unit). This micro-RTU will eventually reply the confirmation of booking with the reservation details such as password and numbers. The password will be used to enter the parking area and valid for a certain amount of time.

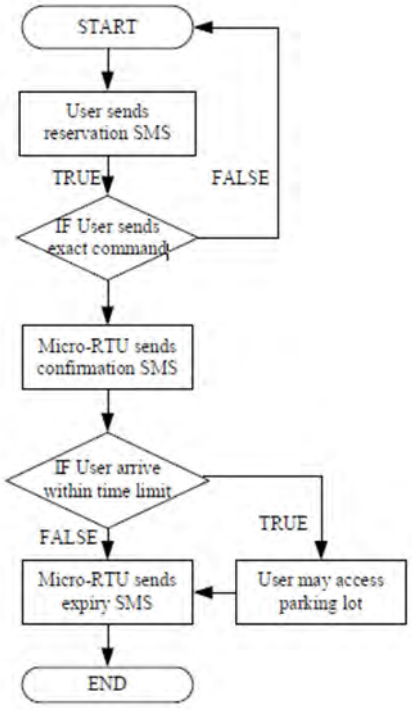

Figure 2.4 Overview of parking system [3]

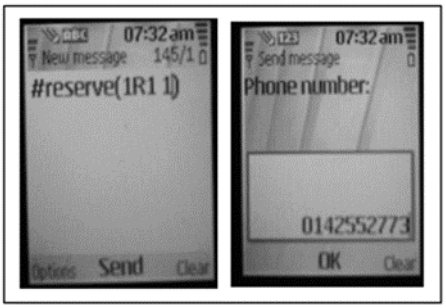

Figure 2.5 Reservation message [3]

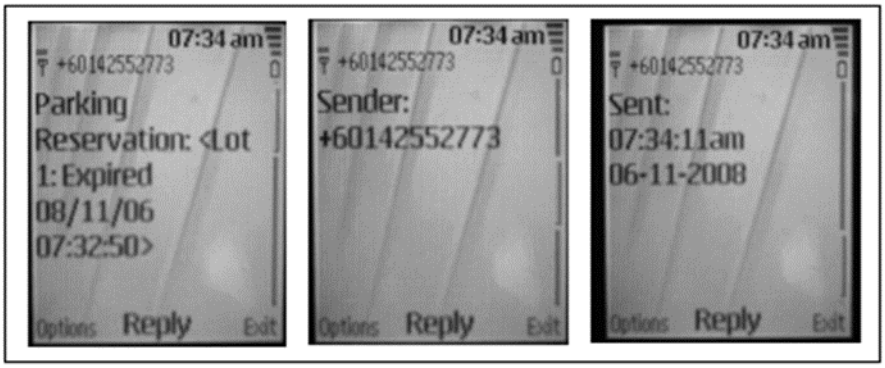

Figure 2.6 Expiration message [3]

This project does not provide GUI for the user to look for reservation system but it only have GUI for the management. This project used weight sensor as the sensor to detect the availability of the parking slot and LED to indicate the condition of the car park.

2.2.3 Smart Parking Service based on Wireless Sensor Networks

This project aim is to propose the prototype system of Smart Parking Services based on Wireless Sensor Network. This system allows drivers of vehicle to search for the free parking places effectively by using mobile application. The project is consists of wireless sensor networks, embedded web server, central web server and mobile application. [4]

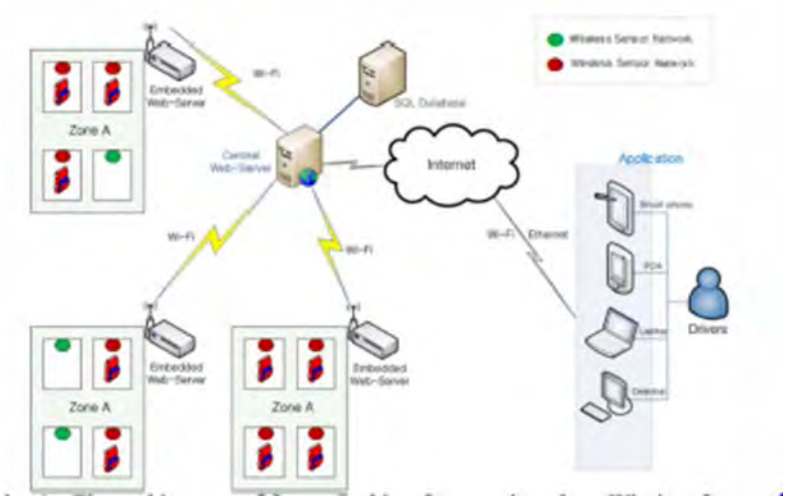

Figure 2.7 Overview of architecture [4]

There is a sensor node in every parking slot. This sensor is detect the vacant of the parking slot. The data of the sensor node will send to the central web server by using Wi-Fi as medium. After that, user can check the data which vacant of the parking slot at the website.

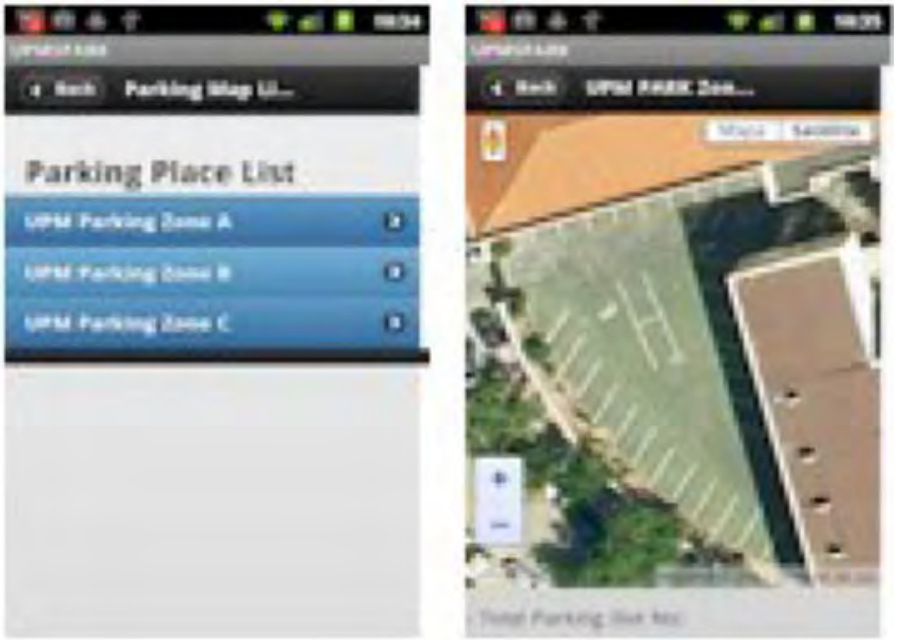

Figure 2.8 Mobile phone application [4]