Power Management System (PMS)

JESSIE LIONG SHIH MAN

This Report Is Submitted In Partial Fulfillment of Requirements For The Bachelor Degree of Electronic Engineering (Computer Engineering)

Fakulti Kejuruteraan Elektronik dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka

JUNE 2015

UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : POWER MANAGEMENT SYSTEM (PMS)

Sesi Pengajian : 1 4 / 1 5

Saya JESSIE LIONG SHIH MAN
mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan (√) :

☐	**SULIT***	*(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	**TERHAD****	**(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☑	**TIDAK TERHAD**	

(TANDATANGAN PENULIS)

Tarikh: 5/6/2015

Disahkan oleh:

(COP DAN TANDATANGAN PENYELIA)

Ahamed Fayeez Bin Tuani Ibrahim
Pensyarah
Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Hang Tuah Jaya
76100 Durian Tunggal, Melaka

Tarikh: 5/6/2015

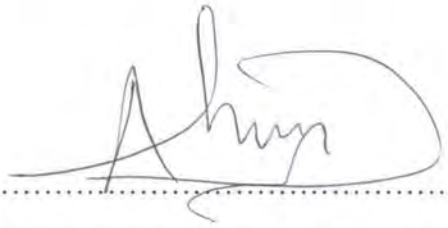
"I hereby declare that this report is the result of my own work expect for quotes as cited in the references."

Signature : .....

Name : JESSIE LIONG SHIH MAN

Date : 5th JUNE 2015

"I hereby declare that I have read this project report and in my own opinion this project report is sufficient in terms of the scope and quality for the award of Bachelor of Electronic Engineering (Computer Engineering) With Honours."

Signature : 

Name : EN. AHAMED FAYEEZ BIN TUANI IBRAHIM

Date : 5th JUNE 2015

Specially..

To my beloved parents

And not forgetting to all friends

For their

Love, Sacrifice, Encouragements, and Best Wishes

ACKNOWLEDGEMENTS

At first I appreciate Faculty of Electronic and Computer Engineering (FKEKK), Universiti Teknikal Malaysia Melaka (UTeM) for giving me a chance to design and implement my project.

I would like to thank all the people who are helping me and give me advice throughout the process in completing of my Final Year Project (FYP). I would never have been able to finish my project without the guidance of my supervisor, help from my friends, and support from my family.

Next, I would like to thank the person who gave me guidance and suggestion when I was lost in the junction to complete my FYP. He helps me a lot throughout the year in my FYP journey. He is a generous and a kind person who willing to space some precious time to meet me and gave advices to solve my FYP problem. I would like to thank him again, my FYP Supervisor Mr. Ahamed Fayeez bin Tuani Ibrahim. I am lucky able to do my FYP under his supervision.

Last but not least, I would also like to thank my family members and my friend. They were always supporting me and encouraging me with their best wishes. Besides that, my parents gave me a lot financial supports such as purchasing costly tools and useful reference books which help me a lot in my project. My project would not have been possible without their help.

ABSTRAK

Power Management System adalah satu projek untuk memperbaiki sistem pengurusan bilik kuliah semasa dengan mengawal tempahan bilik kuliah dan peralatan elektrik secara dalam talian malah bukannya secara manual. Ia boleh mengurangkan tenaga pekerja di mana universiti mungkin tidak perlu mengupah pekerja untuk mengunci dan membuka kunci pintu setiap hari pada awal pagi dan petang selepas seksyen kelas, kerana pintu bilik kuliah itu akan dikawal dengan menggunakan kunci pintu magnet yang dikawal secara dalam talian oleh pengguna. Selain itu, ia boleh meningkatkan keselamatan dengan mengurangkan risiko vandalisme di dalam bilik kuliah. Bukan itu sahaja, projek ini membolehkan pengguna untuk mengawal peralatan elektrik dari jarak jauh. Faktor ini telah membantu hidup menjadi lebih mudah pada masa akan datang. Sistem ini membolehkan pengguna menghidupkan atau mematikan peralatan di luar kawasan kampus degan mudah. Projek ini adalah satu sistem pengurusan kos yang rendah. Konsep keseluruhan sistem adalah sistem pembangunan web dan Raspberry Pi sebagai pengantara perisian dan perkakasan. Dengan membina projek ini saya perlu menggunakan Raspberry Pi, router, kabel Ethernet dan papan litar yang untuk mengawal peralatan elektrik. Dalam web aplikasi, butang GUI akan menghubungkan alamat soket Raspberry Pi untuk menghantar arahan kepada nod, untuk menghidupkan dan mematikan nod melalui web server Xampp. Kesimpulannya, projek itu berjaya berfungsi seperti yang diharapkan.

ABSTRACT

This project revolves around creating a power management system prototype with the main focus being the ability to turn on/off a lamp through the internet. This system idea can be applied in university to enhance current lecture hall management system by controlling faculty's electrical appliances such as an electromagnetic door lock, lighting and air-conditioner via online system rather than manually. Indirectly, it may improve current lecture hall booking system because this system includes online lecture hall booking system and each lecture hall can be controlled by admin. The system consists of a central device, two servers and a web application. The central device is a miniature computer and also a microprocessor. In this project, a Raspberry Pi is the one connected to the Internet and receive commands to control a switch to turn on/off the lamp. It acts as an intermediate of software and hardware. To work this project out, the required components are a Raspberry Pi, a router, an Ethernet cable and a designed circuit board which is connected with electrical appliances. For web application, a page displaying Graphic User Interface of ON/OFF buttons are created using Raspberry Pi server-side scripts that run in a cloud, and it can be remote through Raspberry Pi's socket address. Its function is to send command to Raspberry Pi, to trigger on and off of the output. In conclusion, the project is a low cost management system and it is successfully working as expected.

LIST OF CONTENT

LIST OF TABLE

LIST OF FIGURE

LIST OF ABBREVIATION

AC	-	Alternate Current
API	-	Application Programming Interface
COM	-	Common
DC	-	Direct Current
DPDT	-	Double Pole Double Throw
DSL	-	Digital Subscriber Line
GND	-	Ground
GPIO	-	General Pin Input Output
GUI	-	Graphic User Interface
HTML	-	Hyper Text Markup Language
LAN	-	Local Area Network
LCD	-	Liquid Crystal Display
M2M	-	Mesh-to-Mesh
NO	-	Normally Open
NC	-	Normally Closed
PCB	-	Printed Circuit Board
PMS	-	Power Management System
RF	-	Radio Frequency
SPST	-	Single Pole Single Throw

SPDT - Single Pole Double Throw

WSNs - Wireless Sensor Networks

LIST OF APPENDIX

CHAPTER 1

INTRODUCTION

Nowadays, the internet has become an integrated part of our life. It has become a common interface that many electronic devices were used in order to simplify the daily life of people. The internet is a powerful tool which has given people the ability to search, store and manage their own information. From the time of its introduction, the amount of people surfing the internet has increased dramatically and has become one of the major means of communication.

In order to make good use of the internet, online management system was invented. Power Management System (PMS) is a system that able to allow user to control any connected electrical appliances through the internet. By implementing this system in university, it could enhance current lecture hall management system by controlling faculty‟s electrical appliances such as an electromagnetic door lock, lighting and air-conditioner via online rather than manually. Thus, the university may no longer need to hire technicians to manage all the lecture halls because the electromagnetic door lock would be controlled by an authorized person via online system.

In addition to that, it could improve the security level of the lecture hall by reducing the risk of vandalism especially during night activities. Besides that, PMS also

provides online lecture hall of booking management system which may improve the current system. As if for now, lecturers had to fill in the form and wait for his or her pending request from officer for approval, so valuable time was wasted and it is not environmentally or user friendly. Moreover, only the authorized person could monitor and remote electrical appliances from far distance over an internet access through a website. PMS is a low cost management system and it makes life easier.

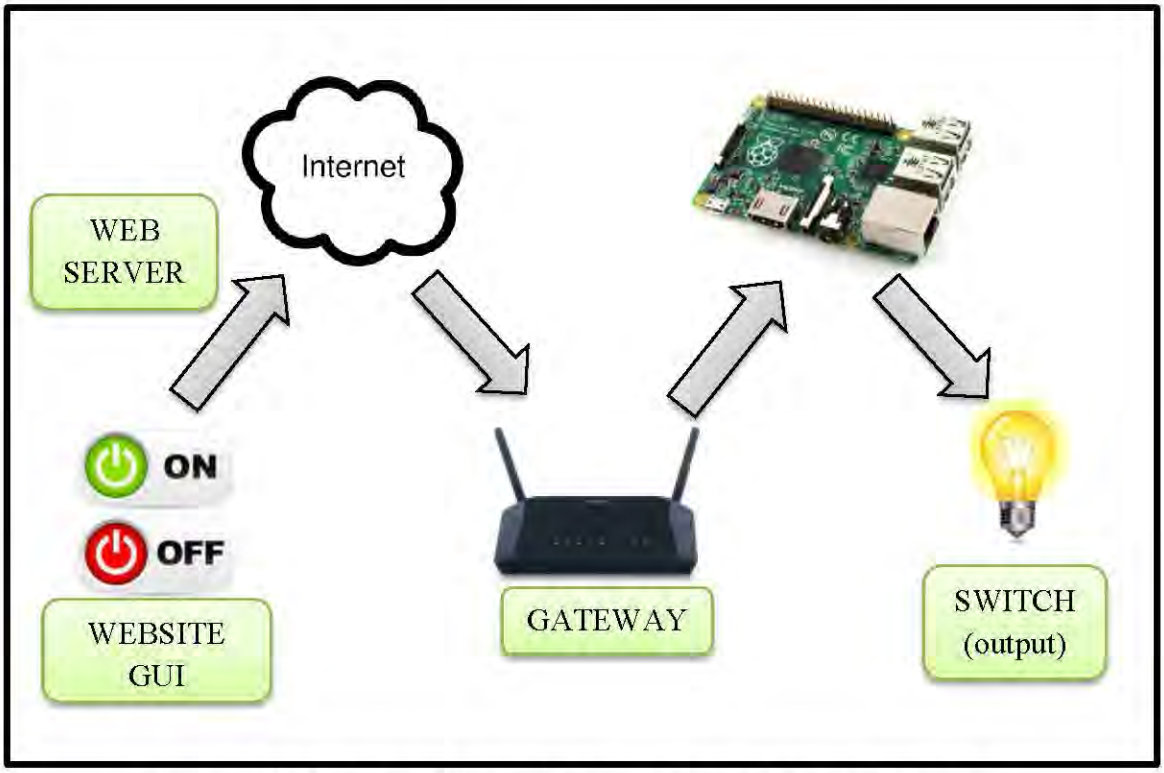


Figure 1.0: Concept of Power Control System Using Raspberry Pi.

1.1 Problem Statement

Currently the management system of controlling lecture hall doors is quite troublesome, the students and lecturers have to wait for technician to unlock the door in the early morning while the worker is late on duty. Besides that, it is wasting of manpower because the technician has to check each of the lecture hall's electricity to

ensure all electrical appliances are turned off and locked the door one by one every day after class session. So, it is actually a time wasting and unsystematic.

Furthermore, the technician has to work overtime if there are any extra activities that would be held in the lecture hall during the night, such as class replacement or there is a test conducted. Not only that, the university has to extra pay for the technician to work overtime, it is also very insecure if he has emerged and need to leave the campus earlier, he probably just leave the door unlocked until the next morning. This might cause vandalism in the lecture hall. Moreover, the current booking of lecture hall system is in manual, the lecturers have to fill in the form and need to wait for pending request from officer to be approved which may take time for days to wait upon approval. So, it is also wasting of valuable time and not environmentally friendly.

Thus, in order to overcome this problem, this project is to develop a low-cost system which provides real-time management of the lecture hall electrical appliances through online. Besides that, it also consists of a website to ease lecturers for their lecture hall booking procedure.

1.2 Objectives

The main objectives of this project are:

- To develop a system to control electrical appliances through online system.
- To develop a proper system to manage the lecture hall.
- To develop a low cost and energy saving lecture hall management system.
- To reduce paper usage by using the online application through the website for lecture hall booking application.

1.3 Scope Of Work

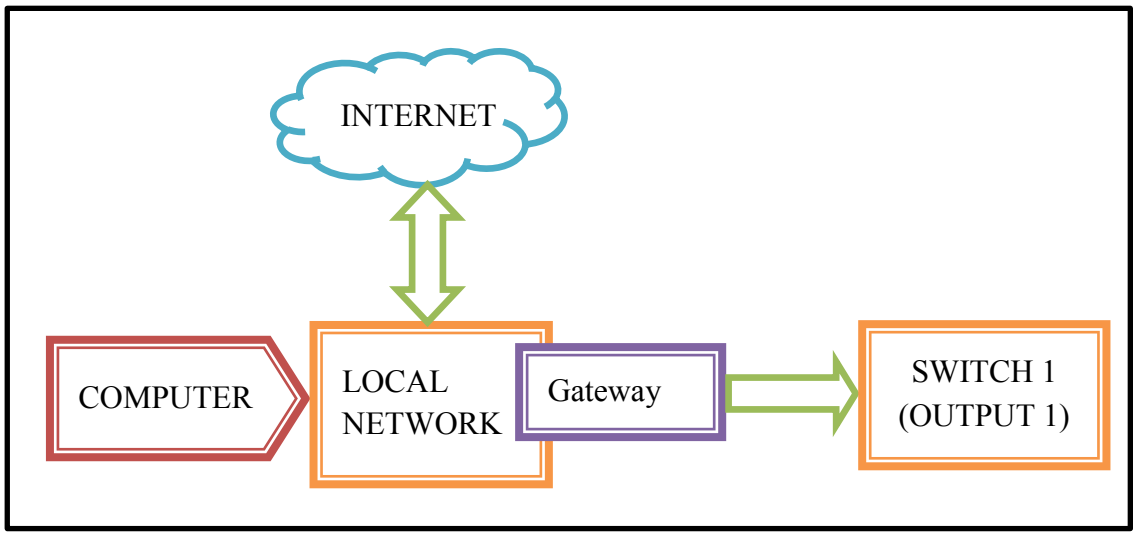


Figure 1.1: Scope of work

The scope of work will be similar as the block diagram in Figure 1.1. This project will primarily focus on using the internet (local network) to control electrical appliances (switch). In order to do that, this project will target on one switch only. For online lecture hall booking system, this application is available only for registered staff or lecturers.

Next, only the authorised person can control the switch through a Graphic User Interface (GUI) button inside the website. On top of that, lecturers can't apply the booking system later than 5pm on the day he or she wants to use it. So for an emergency booking application, lecturers have to contact the authorised person personally. Lastly, this system application is only available in local system.

.

1.4 Report Structure

This thesis consists of five chapters which contains the introduction, literature review, methodology, result and discussion as well as the last chapter is the conclusion and recommendation of the project.

CHAPTER 1 is the introduction of this project. In this chapter, the introduction, objective and problem statement of the project will be explained throughly. The concept behind the project and an overall overview of the project also will be discussed within this chapter.

CHAPTER 2 will mention about the literature review of the Raspberry Pi usage in managing power system by comparing other journal with the similar project system.

CHAPTER 3 is about the project methodologies of the project. This chapter will show the steps and the flow of the problem solving in such a specific method used to design and develop the Power Management System and also the other factors and characteristics that need to be focused on.

CHAPTER 4 will describe the expected result from this project and justify its performance to make sure it meets the objectives of this project.

CHAPTER 5 concludes the overall research and propose the future progress of the project.