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TITLE: HOMESTAY POWER SWITCHING CARD SYSTEM (HOPs-C)

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" I hereby declare that I have read through this report entitle "Homestay Power Switching Card System (HOPs-C)" and found that it has comply the partial fulfilment for awarding the degree of Bachelor of Electrical Engineering (Control, Instrument and Automation)"

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Date : 28 MAY 2014

HOMESTAY POWER SWITCHING CARD SYSTEM (HOPS-C)

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A report submitted in partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering (Control, Instrumentation and Automation)

Faculty of Electrical Engineering

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2014

STUDENT DECLARATION

I declare that this report entitle "Homestay Power Switching Card System (HOPs-C)" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : .....

Name : MUHAMAD HAFIDZI BIN ISMAIL

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ABSTRACT

Nowadays, there are many homestays built in Malaysia especially in tourist attraction areas. However, some of homestay owners had to pay a relatively high electricity bill especially during school holidays. The main purpose of this project is to design homestay power switching card system which can reduce the waste of electricity and also to analyze the pattern of power consumption between private home and homestay. Most homestay in Malaysia do not use any tools to control their use of electricity and reduce wastage of electricity. One of the electric saver that sell in the market is capacitor bank and there has another technique to cut OFF the electricity power supply which is Automation of Residential Electricity Cut OFF Using Network Based Embedded Controller. This project come out with the product named "Homestay Power Switching Card System (HOPs-C)". This project implements Radio Frequency Identification (RFID) as a tool to control the switching system using RFID card and reader. The product also easy and simple operation of power cut OFF system. The power supply will cut OFF when the RFID card is removed from the card holder. When the RFID card is inserted in the card holder and the reader reads the exact number of RFID card, the system will turn on the power supply. This system also will display the amount of power consumption that used in the homestay on the Liquid Crystal Display (LCD). The survey also conducted in order to complete the project. The majority of homestay owners agrees with the project objective.

ABSTRAK

Pada masa kini , terdapat banyak inap desa dibina di Malaysia terutamanya di kawasan tarikan pelancong . Walau bagaimanapun, sesetengah pemilik homestay terpaksa membayar bil elektrik yang agak tinggi terutama semasa cuti sekolah. Tujuan utama projek ini adalah untuk mereka bentuk sistem kad pensuisan kuasa di inap desa yang boleh mengurangkan pembaziran tenaga elektrik dan juga untuk menganalisis corak penggunaan kuasa antara rumah peribadi dan inap desa. Kebanyakan inap desa di Malaysia tidak menggunakan sebarang alat untuk mengawal penggunaan elektrik dan mengurangkan pembaziran elektrik. Salah satu penjimat elektrik yang menjual di pasaran adalah bank kapasitor dan satu lagi teknik untuk memotong bekalan kuasa elektrik adalah *Automation of Residential Electricity Cut OFF Using Network Based Embedded Controller*. Projek ini adalah untuk mencipta produk yang dinamakan *"Homestay Power Switching Card System (HOPs-C)".* Projek ini melaksanakan *Radio Frequency Identification (RFID)* sebagai alat untuk mengawal sistem pensuisan yang menggunakan kad RFID dan pembaca kad . Produk ini juga operasi yang mudah untuk memotong sistem bekalan kuasa. Bekalan kuasa akan terputus apabila kad RFID dikeluarkan dari pemegang kad. Apabila kad RFID dimasukkan dalam pemegang kad dan pembaca yang membaca jumlah sebenar nilai kad RFID , sistem akan menghidupkan bekalan kuasa. Sistem ini juga akan memaparkan jumlah penggunaan kuasa yang digunakan dalam inap desa tersebut pada Paparan Kristal Cecair (LCD). Kaji selidik juga dijalankan untuk menyiapkan projek itu. Majoriti pemilik inap desa bersetuju dengan objektif projek ini.

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RFID	-	Radio Frequency Identification
LCD	-	Liquid Crystal Display
IEEE	-	Institute of Electrical and Electronics Engineers
KWh	-	Kilowatt hour
PIC	-	Peripheral Interface Controller
RM	-	Ringgit Malaysia

CHAPTER 1

INTRODUCTION

1.1 Project Background

This project is about to design a system that can cut OFF the flow of electricity automatically in homestay when there are no people in the house. This system is named as Homestay Power Switching Card System (HOPs-C). Homestay is a house providing a space or room for tourist to rent a place to stay. In Malaysia, there are many homestays built especially in tourist areas [1]. According to the survey, some homestay owners had to pay a relatively high electricity bill especially during the school holidays. This is because most of homestay provides complete facilities such as refrigerators, cooking appliances, televisions, air conditioners and other electrical appliances. The electricity consumption will also increase especially with the use of air conditioning for long periods. Other than that, tourists who stay at homestay do not switch OFF the power supply of electrical appliances especially air conditioner when they are not in the homestay because they want environment in homestay is always cold. Air conditioners which operate every hour without stop will make the electricity bill increases. Furthermore, majority of homestay do not ave a system that can cut OFF the power supply automatically when the tourists come out. So, this power switching card system is an idea to overcome the problem that faced by the homestay owners. This project uses

Radio Frequency Identification (RFID) as tools to cut OFF the electricity flow. RFID system consists of two parts which is card and card reader. When the card is removed by the tourist, the system immediately will cut OFF supply electric into the homestay. Energy consumption will display on the Liquid Crystal Display (LCD) and this make homestay owners easier to see the energy usage of their homestay. The Figure 1.1 and 1.2 show the simple structure of the system and instrumentation part of energy reading, respectively.

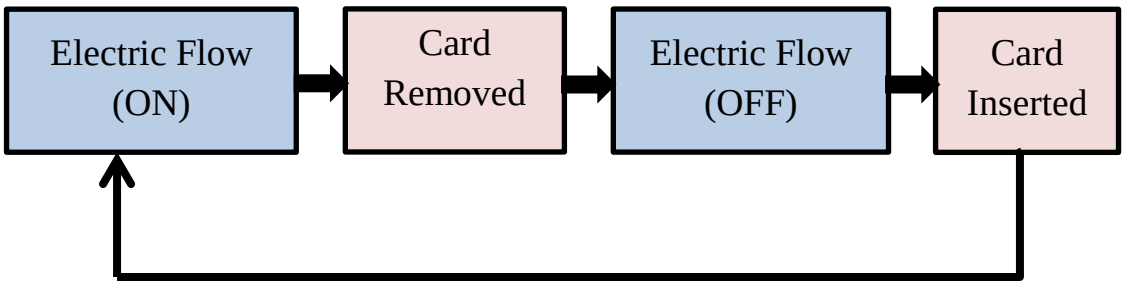

Figure 1.1: Simple Structure of the System

Refer Figure 1.1, when the card is inserted in the card holder, the RFID reader will read the number of the RFID card. If the number that reader read is same to the number that stored in the system, the system will energize the contactor and turn ON the power supply to flow the electricity. The electricity will continue flow if the card still in the card holder. If the card is removed from its holder, the system will automatically cut OFF the power supply and the flow of electricity will stop. This process is repeated as key as the card is inserted or removed.

The process of reading the energy consumption in the homestay is shown in Figure 1.2. In this system, an energy meter used to capture the usage of power (watt) in homestay. The energy meter will display in the LCD dispaly power consumption that tourists used within they stayed at the homestay.

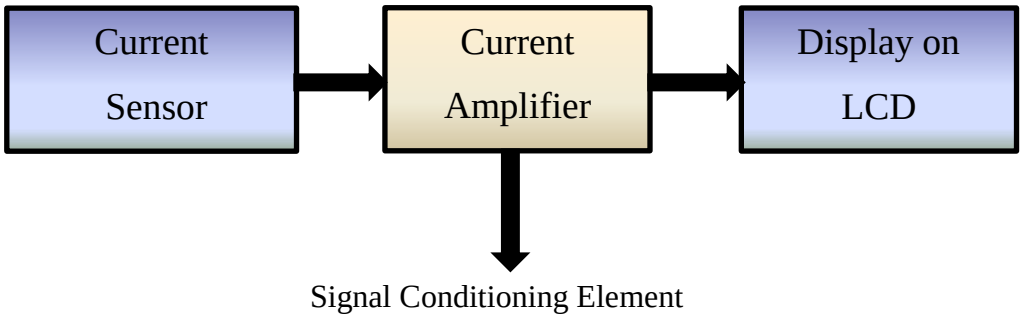

Figure 1.2: Instrumentation Part (Energy Reading)

1.2 Problems Statement

In homestay industry, a higher electricity bill in the homestay industry was the main issue why this project has to develop. Electricity bills will increase especially when school holidays as more tourists will come to the homestay. From the survey, homestay owners need to pay higher for the electricity bill on school holidays compared to the other months. Besides, the behavior of tourists when they stay at homestay also becomes the problem to homestay owners. They leave the homestay without switch OFF the electrical appliance especially air conditioner. Most of them do not concerned and less responsibility for the equipment they used.

In addition, the emphasis on safety precaution at the homestay is also vitally important to avoid unexpected incidents. Long term usage of electrical appliance without switch OFF will cause the faulty equipment and maintenance costs will increase and also power control for the unused electrical appliances. The homestay owner will be informed about the concept of the project and about the convenient solution to reduce the massive amount of unused energy consumption in homestay accommodation.

1.3 Project Motivations

The first motivation to develop this project is to create products with reasonable price for homestay owners. This project will help homestay owners in order to reduce their monthly electricity bill. In addition, homestay owners also can promote energy saving awareness to the people who stay at their homestay. Due to lower rental of homestay, then every expenses must be well managed, especially electricity bill management [3].

Furthermore, this system will implement RFID because RFID system still not widely apply at homestay accommodation. From the respondent feedback, almost of homestay does not use any electric saver or the system that able to cut OFF the flow of the overall electricity. There is various electricity saving products on the market [4]. Thus, the creation of this project is expected to diversify products' energy saving devices in the local market especially the device which can control electricity consumption and also give more options to users to choose the best product. Lastly, the selection to use RFID system is because this RFID easier to find in the market and the cost of this system also cheaper than other system like barcode system [14]. Other than that, this system also has its own benefit like the number of the RFID card cannot to duplicate and each of the cards have their own unique characteristic number. So, the tourist cannot use another card to turn ON the power supply.

1.4 Objectives of Project

The objectives of this project are:

i. To conduct a survey to at least 20 of homestay owners to find out the electricity consumption in homestay.
ii. To design homestay power switching card system which can reduce the waste of electrical.
iii. To analyze the pattern of power consumption between private home and homestay.

1.5 Scopes of Project

The scope of the work for this project includes survey among the homestay owner around Kedah, Kuala Lumpur and Melaka. This project also has simulation part. The simulation of this project will be tested before it copy to the prototype module. This project used PIC Microcontroller, Proteus and the prototype will use the concept of single phase domestic wiring. The analysis is performed based on the experimental and survey. Besides, the energy consumption and electricity usage will be capture by using energy meter.

In this project, the system design process can be divided into four main parts. Firstly, design of energy meter to display the energy consumption. Second, design of system to key in the new RFID card number when touch at reader. The third, design display system part using Liquid Crystal Display (LCD) and the last is to design a system that will cut OFF the electricity flow when the card is removed.

1.6 Report Outlines

This report consists of five chapters. First chapter discusses about the project background, problem statement, objective and scope of this project. Then, Chapter 2 will discuss more on project background and literature reviews that related to this project. It will discuss about Radio Frequency Identification, electricity consumption and other method to save the electricity energy consumption. In Chapter 3, it will discuss on the methodology, hardware and software implementation of the project. While Chapter 4 will be presenting the result and discussion of this project. The last chapter will discusses the conclusion of this project and recommendation in the future works for project improvement.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, it is basically based on understanding the literature review that related to this project. Study in this chapter is focused more on radio frequency identification, electricity consumption and energy saver. Other than that, this chapter also discusses about other electricity cut OFF techniques.

2.1.1 Radio Frequency Identification (RFID)

Radio frequency identification (RFID) is a system that sends the characteristics in the form of a unique number of an object using radio waves. The main components in RFID system are RFID tag and RFID reader. When RFID tag is tagged to the reader, it will read the tag information data before it will send the data to the RFID user interface.

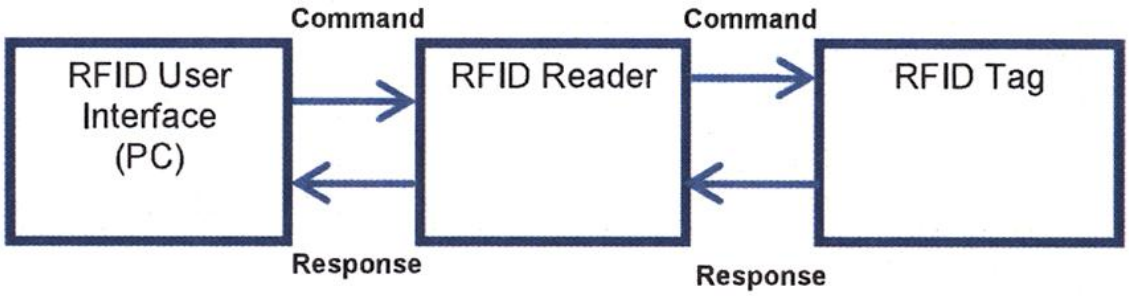

Figure 2.1: The Block Diagram of RFID System

Figure 2.1 shows the block diagram of the RFID system. The RFID system has become more popular, with various strengths and advantages such as recognition speed and non-touch method [5-6]. The capability of the RFID system is considered and tested because it is important to achieve a target. Nowadays, radio frequency identification is a kind of electronic identification technology that is becoming widely deployed and it was the factor RFID was chosen as a main function in this project. Many of companies over the world have been used RFID systems to improve efficiency in their business process and security issues [7].

RFID is a technology system that enables the electronic labeling verification and wireless identification of an object using digital communication transition [5]. Other than that, the price of the RFID device also lower compares to bar code device and easily found in the market. RFID tags can hold up to 32 Mega Bytes of information data and making the data more difficult to be duplicating than barcodes [6]. These benefits were considered as major advantage over barcodes along with the large capacity of storing information data that the RFID tags offer in comparison to the barcode tags. Information is exchanged to radio frequency where no contact or no line of sight is needed for the identification process. This makes RFID more secured since a reader was designed to locate tags in a distance of several meters [7]. An RFID tag can have a much longer read range than other identification techniques [7]. By using this system, tourist cannot use another card because each of cards has their own unique number. There are some

advantages of using RFID in this project. Figure 2.2 shows the advantages by using this system.

RFID was chosen to implement in this project because it not widely used for electricity cut OFF system. Furthermore, this RFID also not widely used in homestay industry to compare hotel industry. Although the hotel industry used this RFID system but they only used this system for door security, not to cut OFF the electricity in hotel room [13-14]. Other that, the price of the RFID was also the factors RFID is chosen. RFID equipment is cheaper than others scanning method like a bar code. RFID also has multiple choices of the length of frequency and more reliable than other products [5-7].

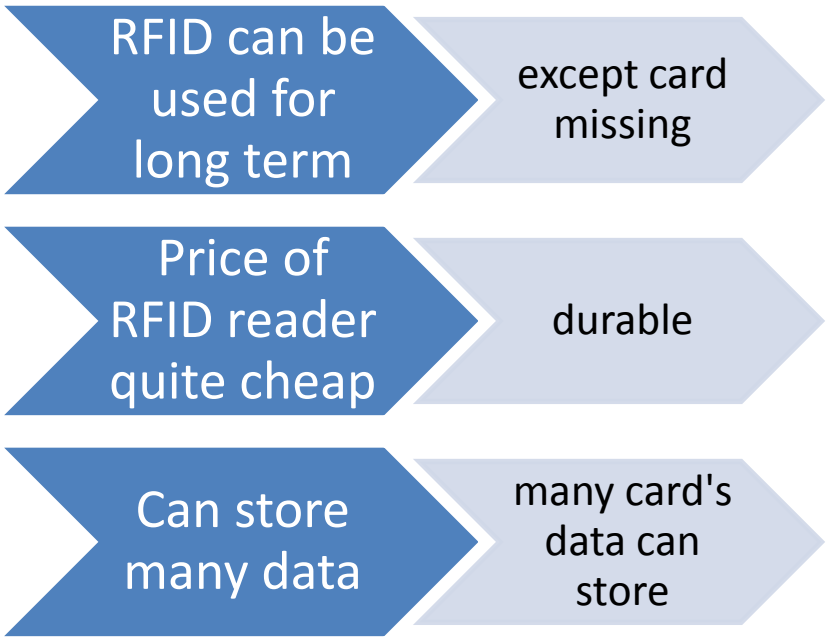

Figure 2.2: Advantages of RFID System