LCD GRAPHIC MONITORING FOR ENERGY SAVING CONTROL APPLICATION

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Specially dedicated to

my beloved parents, brothers and sisters.

ACKNOWLEDGEMENT

Praise is to God for His help and guidance that I finally able to complete this undergraduate project. I would like to take this opportunity to extend my deepest gratitude to all the parties involved in this project.

First of all, a special thank to my supervisor , Puan Norhafidzah binti Mohd Saad for her tireless effort and on-going support, advice as well as guidance, without whose help, my report would not have been completed successfully.

I would like to extend my heartfelt gratitude to all FKEE lecturers especially panels for presentations who offer tips, advice, and endless cooperation, thank you very much.

I hope that this report will give the reader some insight as to using electricity wisely and this design project will reduce energy wasting successfully.

ABSTRACT

This project is describe about the designing of control system in order to diminish energy wasting occur at the lecture halls. The main reason of the energy wasting is because of the position of lighting and air conditioning systems' switches are located separately and at different places in the lecture hall, thereby make it difficult to lecturers and students to find the switch in order to on and off the equipments. In addition, it was make complicated and wasting time for students and lecturers to find the correct switch to on and off the equipment because switches are not denoted for which one lighting system and air conditioning system. This project can be divided into two major parts. The first one is an energy saving control system part, which consists of Graphic Liquid Crystal Display monitoring system and switching module whereas the second part is circuit driver of lighting and air conditioning development. LCD Graphic and switching module are used as a user interface where user merely needs to push buttons, which placing on the user interface plate in order to switch on or off the lighting and air conditioning system. The software programming of the PIC acts as the brain of LCD Graphic Monitoring for energy saving control system to control overall of the project performances.

ABSTRAK

Projek ini menghuraikan mengenai penciptaan sistem kawalan bertujuan untuk menghapuskan pembaziran tenaga yang berlaku di dewan kuliah Universiti Malaysia Pahang. Antara sebab utama pembaziran tenaga yang berlaku adalah di sebabkan oleh kedudukan suis lampu dan penghawa dingin di letakkan secara berasingan dan pada tempat yang berbeza dalam dewan kuliah, oleh yang demikian, ia menjadi sukar kepada pensyarah dan pelajar untuk mencari kedudukan suis bagi menyalakan unit lampu dan menghidupkan unit penghawa dingin juga mematikan lampu dan penghawa dingin. Tambahan pula, ini akan menyulitkan dan membazirkan masa pelajar dan pensyarah untuk mencari suis yang betul untuk menyalakan atau mematikan lengkapan tersebut kerana suis tidak ditandakan dengan unit-unit lampu atau penghawa dingin. Projek ini boleh dibahagikan kepada dua bahagian utama. Bahagian pertama ialah Sistem Pengawalan Penyimpanan Tenaga, di mana ia dilengkapi dengan sistem paparan Papar Kristal Cecair Grafik dan Modul Suis manakala bahagian kedua adalah bahagian pemandu litar bagi sistem lampu dan penghawa dingin. Papar Kristal Cecair Grafik dan Modul Suis gunakan sebagai sempadan pengguna di mana pengguna hanya perlu menekan butang yang diletakkan di atas kepingan sempadan pengguna. Pengaturcaraan pengisian Pengawal Permukaan Sekeliling bertindak sebagai minda untuk mengawal keseluruhan projek Sistem Pengawalan Penyimpanan Tenaga menggunakan Papar Kristal Cecair Grafik.

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LIST OF ABBREVIATIONS

PIC	-	Programmable Interface Controller
GLCD	-	Graphic Liquid Crystal Display
DK	-	Dewan Kuliah
kWh	-	Kilowatt Hour
UI	-	User Interface
IC	-	Integrated Circuit
LED	-	Light Emitting Diode
LP	-	Low Power
XT	-	Crystal
OSC	-	Oscillator
SSR	-	Solid State Relay
AC	-	Alternating Current
DC	-	Direct Current
EM	-	Electromagnetic
COM	-	Common
NC	-	Normal Close
NO	-	Normal Open
MAX	-	Maximum
MIN	-	Minimum
PCB	-	Printed Circuit Board
SPDT	-	Single Pole Double Throw
ASM	-	Assembler
UMP	-	University Malaysia Pahang

CHAPTER 1

INTRODUCTION

1.1 Overview

This control system is manually interface with user consists two main parts. The first one is switching module and the second one is developed circuit driver for controlling lighting and air conditioning systems.

Two PICs (Programmable Interface Controller) were used to control both parts separately. For the first main part, PIC 18F4550 type was used to control and instruct the GLCD (Graphic Liquid Crystal Display) monitoring and switching module of the system whereas another PIC 18F4620 type was used to control and instruct the circuit driver for controlling lighting and air conditioning systems.

Switching module acts as a user interface and it was implemented on the user control panel board. There were three buttons only placed on the panel board which the first button stands for increment button, the second button stands for enter button and the

last one stands for decrement button. The functionality of the buttons were depends on the Graphic Liquid Crystal Display itself.

For the working process of the Energy Saving Control System, Graphic Liquid Crystal Display is used to monitor the lighting and air-conditioning systems. There were two conditions need to be considered in order to switch ON or OFF the lighting or air conditioning systems. The first condition is switch ON or OFF 4 units of lighting system simultaneously, so as to 4 units of air conditioning system. The second condition is switch ON or OFF 4 units of lighting system one by one, so as to 4 units of air conditioning systems.

Software programming such as PICBASIC was used to make a programming and this programming will be dragged into the PIC (Programmable Interface Controller) in order to control overall of the system performance.

Data were gathered at the lecture hall before the installation of Energy Saving Control System to measure the power consumption at the lecture hall for a month and make a comparison for the energy usage everyday at that particular place. Meter (kWh) reading was taken at three different times, those were before the class start, 8 am, during the mid day break, 1 pm and after the class finish, 6 pm. Most of the meter reading taken at the free time means no student in the class in order to capture the energy wasting during that time.

1.2 Problem Statement

University Malaysia Pahang is one of the local universities located at a Gambang City, Kuantan Pahang. It provide four lecture halls blocks to make the learning process which starts from 8 am to 6 pm and have a midday break at 1 pm except for weekend, there is no class will be held.

Lighting and air conditioning system always leaving at the on Condition even though there is no person inside the lecture hall specifically at the mid day break, 1 pm and after finish the learning session, 6 pm.

After a few research, I got the major reason of why lighting and air conditioning systems always leaving in the ON condition at the free classes is because by the location of lighting and air conditioning switches which placed at the different position and rather longer distances each other. This makes it difficult to lecturers and students to find all the separately switches and off the system concurrently because may be they are rushing to go to the café or going back homes/rooms.

1.3 Objectives

The aim of this project is to develop the Energy Saving Control System that can be manually controlled by LCD Graphic Monitoring System and Switching Module. There are two main objectives to be achieved in this project:

1. To design, build and test the Energy Saving Control System for reducing energy wasting occurrences in lecture hall.

2. To compile the system switches together onto interfacing plate.

1.4 Scopes of Work

This Energy Saving Control System consists of two parts. The first part is software development and the second part is hardware design. The project will highlight the following:

1. Develop the hardware and software of the Energy Saving Control System

2. Develop the project using LCD Graphic and switches.

3. Develop the project using two PICs: 18F4620 and 18F4550

Thesis Outline

Chapter 1 is discussing about introduction and overview of the project, problem statement, objectives to be achieved in the project and scopes of work.

Chapter 2 is discussing the information about the article that related to the project design. It also includes the journal and the important information when do the research about the project. The information got from several sources such as websites, journals, books, magazines, handout and others.

Chapter 3 is discussing about the methodology of the project encompass block diagram of the project built, flowchart, circuit diagram. It is also explain about some methods used in order to design the Energy Saving Control System. The methods used can be divided into two ways which are qualitative and quantitative.

Chapter 4 is explanation about the result and analysis of the project. This chapter also explains the theory that adapted into the project and shows the result of the software development.

Chapter 5 was discussing about conclusion, future recommendation, costing and commercialization of the project.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will explain the information about the article that related to the project design. Besides that, it will be important references when do the project. It also includes the journal and the important information when do the research about the project. The information got from several sources such as websites, journals, books, magazines, handout and others.

2.2 Case study – Power Utilization at DK 13, UMP

Before the Energy Saving Control System is design, a research and survey of energy consumption has been done at DK 13 University Malaysia Pahang on March 2008.

Data of the numbers of air conditioning and lighting systems which stayed in ON condition were gathered. The reading of the power meter in kWh was taken every day within March 2008. Those data were taken at three different times that is before the class start, 8 am, during the mid day break, 1 pm and after the class finish, 6 pm. Most of the meter reading taken at the free time means no student in the class. The numbers of air conditioner and lighting systems are 9 units and 10 units respectively.

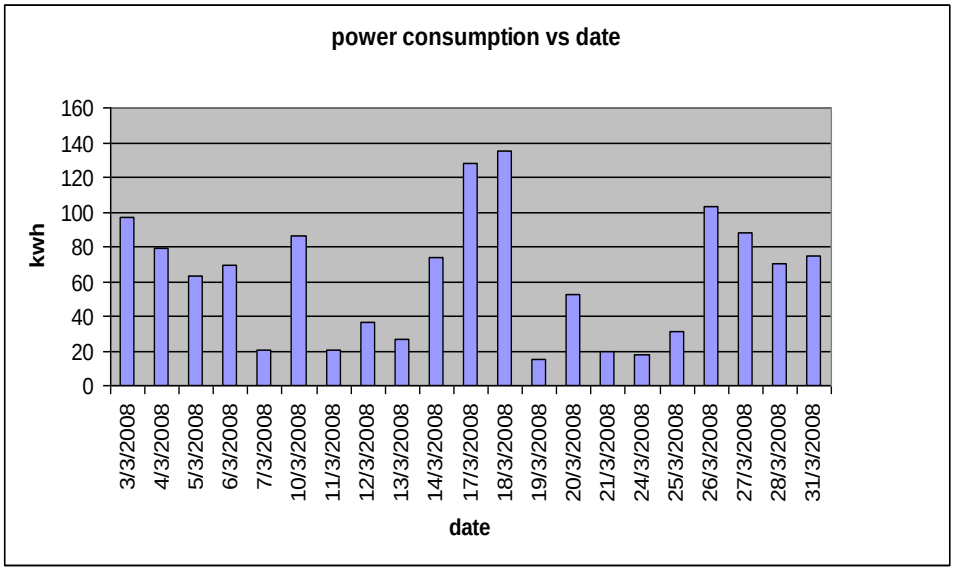

Figure 2.1 Power Consumption at function of date

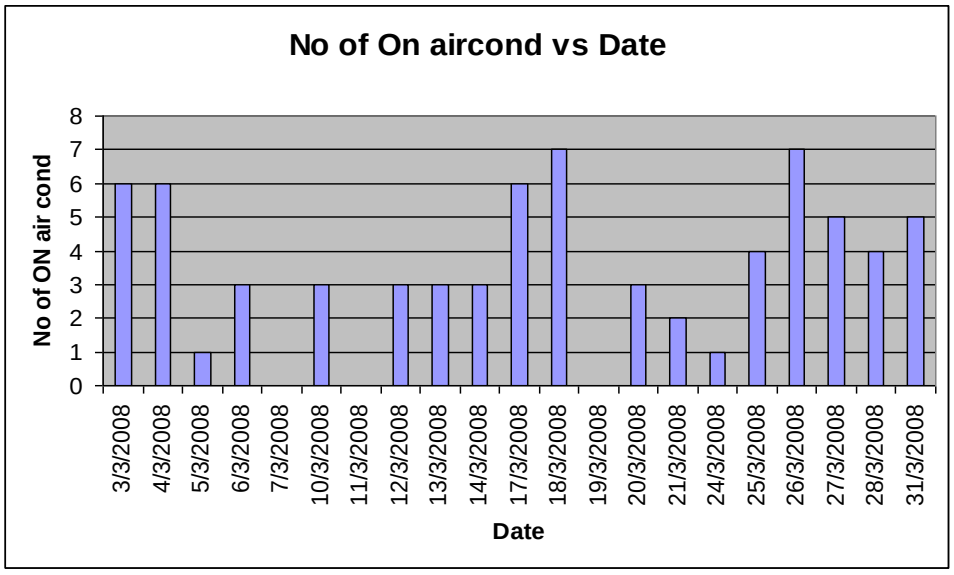

Figure 2.2 Number of ON air conditioning at the function of date

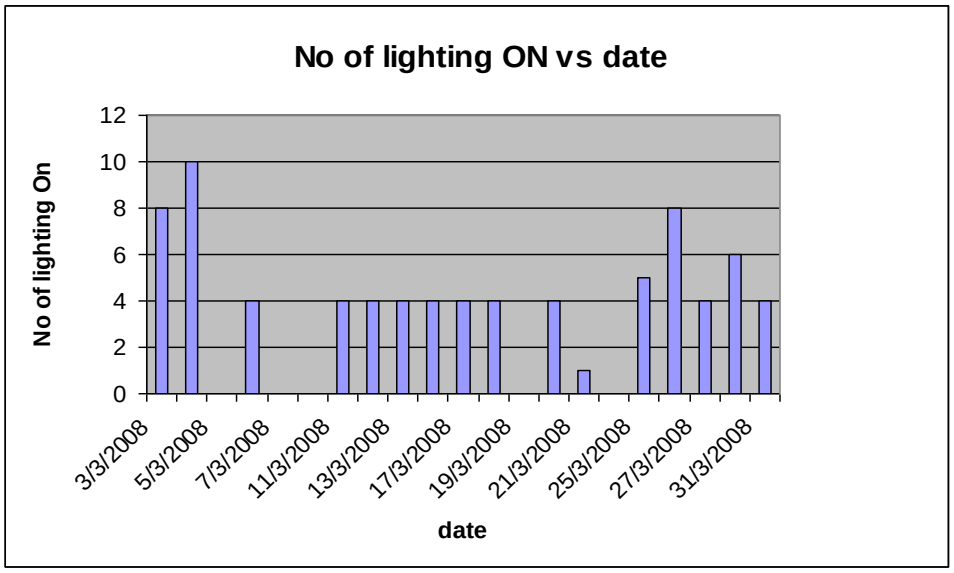

Figure 2.3 Number of ON Lighting at the function of date

The result of power consumption at function of date at DK 13 University Malaysia Pahang is shown in Figure 2.1, number of ON air conditioning at function of

date is shown in Figure 2.2 and number of ON lighting at the function of date is shown in Figure 2.3.

The survey is done in March 2008 at DK13. The data were collected three times daily, taken when the hall is unoccupied. The highest energy consumption is 135.3 kWh on 18th March 2008. The lowest energy consumption is 15.3 kWh on 19th March 2008 because there is a holiday. 7 units air-conditioning and 4 units of lighting are ON when the hall was unoccupied on 18th March contribute to high energy consumption. The trend of graph for power consumption and energy wasting due to air-conditioning and lighting are almost same [1].

2.3 Energy- Saving Light Control System

Using electronic lighting control systems to save energy is increasingly a mandatory part of commercial lighting design, and it can be a big energy-saver at home as well. A lighting control system is a computer programmed with a keypad or touch panel to turn lights on and off at specified times, and/or to provide less or more light in a room for different times of use [2].

Motion sensors are typically incorporated into these systems, turning on lights when someone walks into a room and turning them off when no motion is sensed after a period of time [3].

Many light control systems are light-sensitive, meaning that they only turn on electric lights when there is insufficient daylight in the area. They can be programmed to control blinds and fans as well as lights. Light control system can be applied to whole house or to one area [4].

Figure 2.4 Energy Saving of lighting system

The system works by using a wireless mesh network of nodes and sensors. Brick-size nodes are attached to lighting fixtures on the ceiling, while smaller sensors are positioned around the plant to detect varying levels of lighting.

The light can then be controlled from an on-site or off-site computer instead of manually operating lights in various locations. One of the greatest advantages of the system is its potential for energy savings. The sensors allow the fluorescent lights to be turned on and off automatically, depending on daylight levels and/or occupancy of the workspace. Adjusting the brightness in accordance with incoming sunlight could result in energy savings up to 60% [5].

2.4 User Interface

The User Interface (or Human Computer Interface) which means the users interact with the system such as a particular machine, device, computer program or other complex tool.

The User Interface provides means of input, allowing the users to manipulate a system and output which allowing the system to produce the effects of the users' manipulation. The term User Interface is often used in the context of computer systems and electronic devices [6].

Types of user interface are the most common such as Graphical User Interfaces (GUI) accept input via devices such as computer keyboard and mouse and provide articulated graphical output on the computer monitor and touchscreen display. Touch interfaces are Graphical User Interfaces using a touchscreen display as a combined input and output device [7].

The User Interface is the system to the users. What users want is for developers to build applications that meet their needs and that are easy to use.

User Interface design important for several reasons:

1. The more intuitive the User Interface the easier it is to use and the easier it is to use and the less expensive to use it.