DESIGN OF CONTROLLED COMPUTERIZED ROOM

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This report is submitted in partial fulfillment of requirements for the award of Bachelor
of Electronic Engineering (Industrial Electronics) with honours

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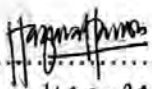Karung Berkunci 1200
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DEDICATION

I would like to thank the God, as with His blessings, as I managed to complete this Final Year Project. I would also like to convey my heartiest appreciation to my project supervisor Puan Hazura Bt Haroon for her advise, precious guidance and co-operation. Under her guidance, I have developed, improved and achieved the completion of the project. She always gives me the wisdom to think and work independently. Besides that, I would also like to thank other lecturers and technicians in Electronic Engineering and Computer Engineering Faculty for giving me the advices and the opportunity to handle this project as well as their encouragement. Thanks also to my friends who have lend me their helping hand that made the task of the project much easier and able to complete on time. At last but not least, I would like to express my gratitude to both of my parents who had provided me with financial support and encouragement throughout my course of studies.

"THANK YOU"

ABSTRACT

"Design of Controlled Computerized Room" is a design used to measure temperature and light level brightness. The concept in used for this project is that the LCD screen and computer screen will display the reading of temperature and light level brightness reading and the according feedback given by outputs of relay light, heater and cooler to adjust the current temperature and light brightness level according to desired value. This project used PIC16F873 microcontroller, which treated as the main component in hardware part. The software (in assembly language) programmed in the PIC16F873 implements all the calculation and displayed the results through the liquid crystal display.

ABSTRAK

"Design of Controlled Computerized Room" adalah satu rekabentuk untuk mengukur suhu bilik dan tahap kecerahan cahaya. Konsep projek ini adalah mengunakan paparan 'LCD' dan paparan skrin computer sebagai penunjuk bacaan suhu bilik dan tahap kecerahan cahaya, seterusnya tindakbalas akan diambil oleh litar keluaran yang terdiri daripada 'relay' lampu, pemanas dan penyejuk untuk mengubahsuai bacaan semasa suhu bilik dan cahaya bilik mengikut nilai yang dikehendaki. Projek ini mengunakan PIC16F873 sebagai komponen utmana dalam litar, di dalam PIC tesrsebut telah diprogramkan semua aturcara yang diperlukan bagi melaksanakan arahan – arahan untuk menunjukkan kepurtusan di skrin LCD dan computer, serta tindakbalas yang perlu diambil oleh 'relay' lampu, pemanas dan penyejuk..

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LIST OF ABBREVIATION

A/D	–	Analog-To-Digital
ASCII	–	American Standard Code for Information Interchange
CAD	–	Computer Aided Design
CHAP.	–	Chapter
CLKIN	–	Clock In
CLKOUT	–	Clock Out
CMOS	–	Complementary Metal–Oxide–Semiconductor
CPU	–	Central Processing Unit
D/A	–	Digital-To-Analog
DC	–	Direct Current
E	–	Enable
EEPROM	–	Electrically Erasable Programmable Read-Only Memory
FSO	–	Full Scale
GND	–	Ground
HS	–	High-Speed crystal
I	–	Input
I/O	–	Input/Output
IC	–	Integrated Circuit
LCD	–	Liquid Crystal Display
LED	–	Light Emitting Diode
LP	–	Lower-power crystal
mA	–	miliAmpere
mb	–	milibars
MCLR	–	Master Clear
MCU	–	Microcontroller Unit
mV	–	miliVolt

O	–	Output
OP-AMP	–	Operational Amplifier
OSC	–	Oscillator
P	–	Power
P.U.T	–	Power-up Timer
PCB	–	Printed Circuit Board
PIC	–	Peripheral Interface Controller
PLL	–	Phased-Locked Loop (PLL)
psi	–	Pound-force per square inch
PSM	–	Projek Sarjana Muda
PWM	–	Pulse Width Modulation
R	–	Resistor
R/W	–	Read/Write
RA	–	Pin on port A
RAM	–	Random-Access Memory
RB	–	Pin on port B
RC	–	Resistor-Capacitor
RISC	–	Reduced Instruction Set Computer
ROM	–	Read-Only Memory
RS	–	Register Select
ST	–	Schmitt Trigger input
UART	–	Universal Asynchronous Receiver Transmitter
UTeM	–	Unervisiti Teknikal Malaysia Melaka
v.f.c	–	Voltage-To Frequency Converter
VCO	–	Voltage Controlled Oscillator
XT	–	Crystal Oscillator

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CHAPTER 1

INTRODUCTION

1.1   INTRODUCTION

Computerized controlled room is an efficient way to monitor and check room's temperature and light brightness compare to manually check the room. This system can be applied in building which consisting of rooms. Thus, it will be easy to determine the room's exactly and temperature reading and also the brightness level.

The control system can be applied for checking room's temperature, in order to determine the room's humidity and light brightness and to detect whether there is light source or not. The features such as display segment where can view the temperature reading and as well brightness level. The desired temperature and brightness level can be set using interface link between computer and circuit. If the current state of room temperature is higher than desired value, it will auto adjust by using cooler system. The same application goes to brightness level, if the room is dark, it will auto ON the light.

1.2   OBJECTIVE

The objective of this project is to develop a controlled temperature and brightness level with hardware circuit and interfacing serial port to computer. The features of result displayed at LCD screen and at VB display as well.

1.3   SCOPES OF WORK

While doing the project, the scope of work plays a very important role. In order to do in guideline method, student should fulfill the project requirement. The scope of this project is listed as below:

i.   To study the basic idea and operation of computerized room controlled.

ii. To identify the suitable type of PIC microcontroller for the project and design the microcontroller board.

iii. To study the operation of light sensor and its implementation into circuit.

iv. To developed interfacing link between hardware circuit and software programming for display purpose and PIC commands.

v.   To display the reading of temperature and light value at LCD screen display and Visual Basic display.

1.4   PROBLEM STATEMENTS

Mostly room of buildings such as universities, do not have computerized room controlled. Thus, it's hard to determine whether the room temperature in suitable state and also whether the room light is ON or OFF. This criterion only can be done by manual inspection.

Manual way of monitoring room is time consuming, and hard to monitor room constantly by doing manual check and will not be efficient. In safety wise, if the room temperature rises to heat level, it might be cause of fire element or other dangerous heat element. The room light brightness level if less, then need to manually 'on' it, which may be a difficulty to be done each time.

Thus by having computerized room; one can monitor room by computer which displays needed information (temperature and light level). The display will be shown at computer's monitor, with the temperature reading and light brightness reading

In order to get accurate statement regarding the room condition, in terms of temperature and brightness level, the computerized room controlled project is developed.

1.5   REPORT STRUCTURE

The report overall consists of five chapters. Following is an each chapter description in this thesis.

Chapter 1 is delivering term of computerized room control. It also contains objective, scopes of works, and problem statement of the project.

Chapter 2 is a literature review on theoretical concepts applied in this project. The chapter consist explanation about what is computerized room control and differentiate with existing of room humidity and light checking system. The type of PIC chosen, suitable components and sensor also been discussed.

Methodology is important part of the whole project because it shows out how is the project's activity developed for Chapter 3. Thus, it is divided in two parts, hardware development and software development, which involves the overview of microcontroller circuit and PCB fabrication. It also contains some of the reason why have chosen the hardware and a list of typical tools and approaches used in this project. For the software part, it discuss about the software development of the project. The process also stated from download the program into the PIC microcontroller through programmer board.

In Chapter 4, all the analysis result from the hardware and software experiments is included in the form of table, and discussion.

Chapter 5 is the last chapter that will be the summary of the whole project. The problems facing during work progress also will be discussed in this chapter. Beside it also concludes with some recommendations that can be implemented in future.

CHAPTER II

LITERATURE REVIEW

2.1 BACKGROUND STUDY

2.1.1 Room control for temperature and light brightness

Computerized room control can be defined with many features, most are feature only one part that is displayed at the room only. Room with temperature and light control usually can be viewed in room surrounding only. This, it's a drawback if one to monitor the room condition from far distance. Thus, it's not convenient to check the temperature and brightness level manually.

2.1.2 Current similar products with disadvantages

Currently there are product in market with features of temperature and brightness control, but then cannot be controlled in far distance. For example, the Climatic Testing System *(by Sean Daniel, Climatic Corp,Inc)*. It is a microprocessor based PID controllers are provided to maintain the desired temperature and humidity in the environmental room. All temperature and humidity rooms are also provided with high and low temperature and relative humidity alarms. It has also equipment of indicator

lights, audible alarms, alarm delays and dry contacts for remote monitoring. The disadvantage of this product is it cannot be controlled or monitored in far distance. The inspector or user need to manually get in room to inspect or check the room temperature and brightness level, thus, it time consuming and the result would not be accurate [1]. The figure 2.1 shows the product picture.
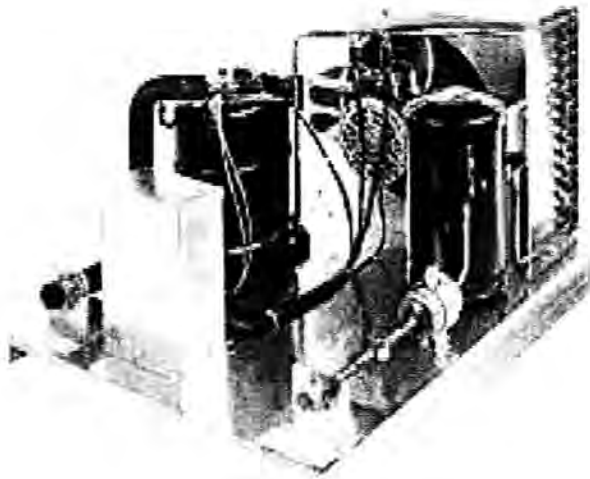

Figure 2.1: Climatic Temperature System

The Wireless Weather Temperature Station is composed of a remote station and base station. The former is solar-powered and wakes up once per minute to collect and transfer data. The base station receives and buffers the incoming data and then transfers it via an RS-232 connection to a PC for processing. Within each of the stations is a dedicated circuit card as well as a separate RF circuit card. The disadvantage of this product it only can display temperature reading of weather with one display at product only. There is no reference of reading from a distance, thus it troubling user to get data easily [2]. Figure 2.2 shows the picture of the product.

Figure 2.2: The Wireless Weather Temperature Station

2.1.3 What is computerized room control?

Computerized room control is a system where room temperature and light brightness is controlled and monitored by microcontroller and also by serial port interface to computer, thus can be controlled by computer also.

The advantage of this design is that user or inspector of room no needs to manually get in room to check temperature and light brightness level of the room. Thus, it is time saving and also the result will be more accurate. The desired temperature or ideal temperature will adjust either higher or lower reading according to its current reading. Thus, the ideal temperature is always attained, and the same method applies to light level brightness [3]. Figure 2.3 shows the overview of the project.