

# **SMART CONTROL VENTILATION FOR ROOM**

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This report is submitted in partial fulfillment of the requirements for award of Bachelor of Electronic Engineering (Electronic Industry) with honour.

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April 2011



**UNIVERSTI TEKNIKAL MALAYSIA MELAKA**

FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

**BORANG PENGESAHAN STATUS LAPORAN**

**PROJEK SARJANA MUDA II**

**Tajuk Projek : SMART CONTROL VENTILATION FOR ROOM**

**Sesi Pengajian : 2008/2011**

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## ACKNOWLEDGEMENT

Alhamdulillah. Thanks to Allah SWT, with his willing that giving me the opportunity to complete the Final Year Project which is title Smart Control Ventilation System for Room. This report were prepared for Faculty of Electronic and Computer engineering, University Teknikal Malaysia Melaka (UTeM), for student in final year to complete the degree of bachelor of Engineering in electronic Industry.

I would like to express my deepest thanks to, Miss Muzaliffah binti Mohd Said as my supervisor who had guided me in this project during the two semester 2010/2011. At the same time, I would never forget all the guidance and support that have be given in all the time. Moreover, she had given me a strong motivation to complete the project.

Deepest thanks and appreciation to my beloved father and mother, family members, friends and others for their cooperation, encouragement, constructive suggestion and support for complete this report, from beginning until the end.

## ABSTRACT

Ventilation is an air circulation from outdoors into the building. Inside the building, the ventilation system was created to control the movement of air to clean air and unpolluted, and the system is added either by using cold air. On this day, the ventilation system can only be controlled in the operating room immediately. This means that the temperature control system can only be controlled in the operating room and cannot be controlled in the room itself. For example, in a room in the building, there is a student with a fever. He had to sit in a cold room because for controlling the temperature can only be done in the operating room immediately. This problem can be solved with this project. Project is to improve the ventilation system so that it can be controlled from the room by using a combination of infra-red remote controller, microcontroller PIC16F877A and the DC motor. This system can control the entry of cold air into the room only by adjust the adjustable. This project is hoped to improve and to facilitate the public who cannot tolerate cold temperatures.

## ABSTRAK

Ventilasi ialah pergerakan udara dari luar bangunan ke dalam bangunan. Di dalam bangunan, ventilasi sistem telah di wujudkan untuk mengawal pergerakan udara supaya udara sentiasa bersih dan tidak tercemar serta sistem ini di tambah baik dengan menggunakan udara sejuk. Pada hari ini, ventilasi sistem hanya boleh di kawal di dalam bilik operasi sahaja. Ini bermakna, sistem pengawalan suhu hanya boleh di kawal di dalam bilik operasi dan tidak boleh di kawal di dalam bilik sendiri. Sebagai contoh, di dalam sebuah bilik di dalam bangunan, ada seorang murid yang demam. Dia terpaksa duduk di dalam bilik yang sejuk kerana pengawalan suhu hanya boleh di lakukan di dalam bilik operasi sahaja. Dengan menggunakan projek yang telah saya lakukan, masalah ini boleh di atasi. Objektif utama projek ini ialah untuk memperbaiki sistem ventilasi supaya ia dapat di kawal dari dalam bilik dengan menggunakan kombinasi alat pengawal jauh infra red, mikrokawalan PIC16F877A dan menggunakan DC motor. Sistem ini boleh mengawal kadar kemasukan udara sejuk yang masuk ke dalam bilik dengan melaraskan gril yang telah di reka. Projek ini di harap dapat menambahbaikkan dan dapat memudahkan orang ramai yang tidak tahan dengan suhu yang sejuk.

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## **CHAPTER I**

### **INTRODUCTION**

#### **1.1 Background Project**

Ventilation systems are an integral part in the building. Ventilation is the process to refresh the environment in a room by reducing the temperature to improve the quality of air in the room. This system is designed to control the temperature in the room automatically.

The system will be placed in the AC vents at the system output. There are devices installed on the line output hole ventilation system. To control the flow of cold air and the temperature in the room, this device has a grill adapted to close or open the hole. This will allow cold air into the room can be brought under control and make the room more comfortable.

## 1.2 Problem Statement

Ventilation systems in buildings controlled by centralized control systems. Therefore, the ventilation system cannot control the temperature in each room. Then the room temperature is always changing and sometimes drastic changes (eg days of rain or night). Thus, the environment is not comfortable as the temperature is very cold will take place on human life. Second, the controls are used at present by the people there are some unexpected things happen. For example, when a rainy day, the ventilation system will lower the temperatures by using the manual method and vice versa. For this reason, an automatic control system is needed.

## 1.3 Project objective:

Due to the problem statement stated above, it's cleared that the objectives of the project is:

- To develop and implement an automatic control ventilation system.
- To design a smart and intelligent system of automatic control room temperature.
- To build an accurate and sensitive circuit to control the room's temperature according to any changes of temperature that user want.
- To write a program in C programming language for the peripheral interface microcontroller(PIC) to detect the changes on temperature and to run the motor automatically according the changes of temperature.



## **1.4 Scope of work**

There are several process was involved to complete this Smart Control Ventilation for Room. This system was consisting of several devices such as PIC, LCD display, Infrared connection and DC geared Motor.

Beside the hardware, there are two programs that used in the project. The software is Proteus Professional 6 and PIC C Compiler. Proteus Professional 6 is used to simulation of work and to design the circuit on PCB board. While PIC C Compiler is used to compile the C language code to HEX code so that it can be compatible with the PIC program.

The following shows all the circuit that applied in this project:

### **a. Transmitter and Receiver Circuit**

This circuit was used to transmit the signal from user to the system. The Transmitter and Receiver Circuit was used infrared medium and the signal that has transmitted will receive and send to the PIC.

### **b. Temperature Circuit**

It is to detect the changes of temperature. After detect the temperature, it will send the data to PIC microcontroller to compare with data from Receiver Circuit.

**c. Motor Circuit**

Motor Circuit will run when it received signal from PIC Microcontroller. Motor will run backward or forward according the data that were received.

**d. Power Supply Circuit**

The power supply circuit is used to supply the voltage to all of the circuit.

## 1.5 Project Methodology

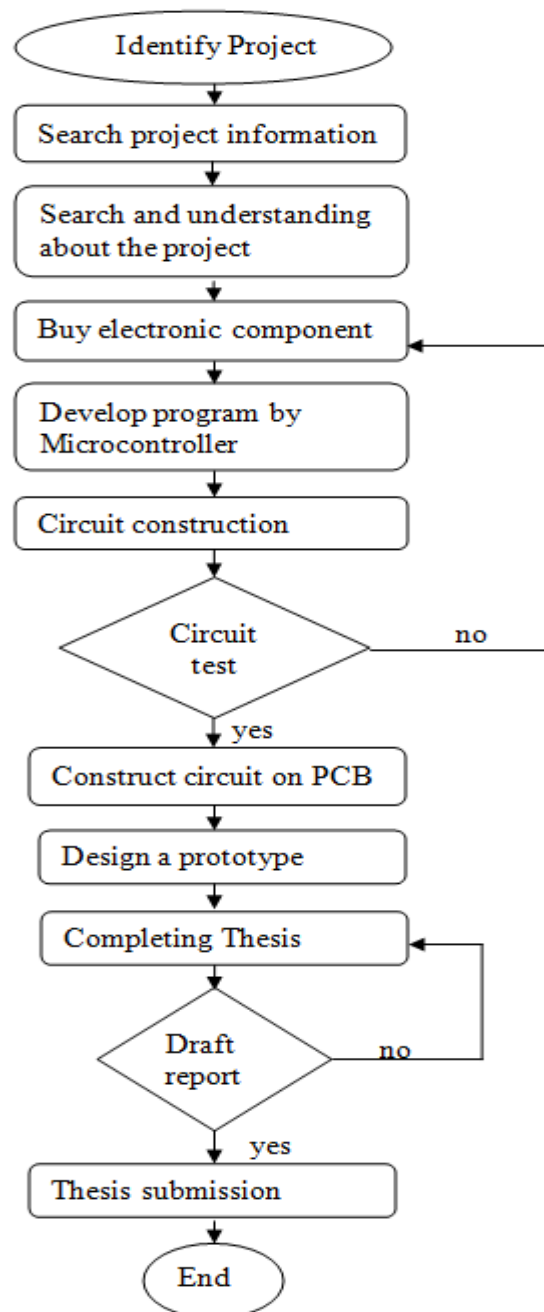


Figure 1.1: Flow Chart for Project Methodology

## 1.6 Project Outline

As provided in the format of the thesis, there are five chapters as whole. In the first chapter, it focuses on a brief introduction about the project being carried. Important things in this chapter is the problem statement, purpose and scope of the project objectives are emphasized in this section.

Chapter II is usually focused on the literature review, including relevant theory and previous work on the project described in this chapter. It discusses the theory of infrared remote control, IR range of reference, the reference temperature range and the microcontroller is used.

Chapter III consists of the project methodology. It also includes information on research and experiments conducted during the project development. This would explain the theory of concepts and principles used in order to complete the project. In this chapter, the function of each part used has been explained clearly.

Chapter IV consists of the results and analysis. It describes and details the components of focus for the project.

Chapter V consists of discussions and conclusions for this project. This will explain to this chapter includes discussions, conclusions, witnesses and further improvements can be done in the future.

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Literature Review is important in each project as a base for gathering information necessary to complete the project. All information is gathered from various sources such as:-

1. Journal
2. Books
3. Conference Transcript
4. Thesis
5. Patent
6. Website

After searching through all this various material, all information will be filtered to be related to Smart Control Ventilation System for Building. The information that will be focused on this chapter is about some reference circuit of automatic controlled room temperature and its main components that to be used.

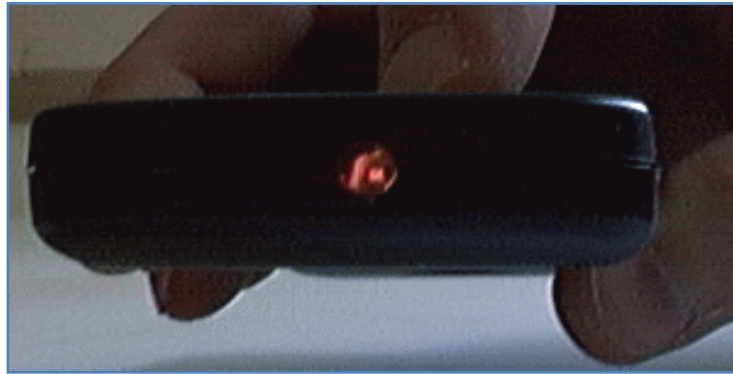
## **2.2 IR Remote control theory**

The cheapest way to remotely control a device within a visible range is via Infra-Red light. Almost all audio, video and temperature equipment can be controlled this way nowadays. Due to this wide spread use the required components are quite cheap, thus making it ideal for own projects. This part of knowledge base will explain the theory of operation of IR remote control, and some of the protocols that are in used in consumer electronics.

### ***2.2.1 Infrared light***

Infra-Red actually is normal light with a particular colour. Human cannot see this colour because the wave length of 950nm and it below the visible spectrum. That is one of the reasons why I choose the Infrared connection because human want to use it but they are not interested in seeing it. Another reason is because IR LEDs are quite easy to find, and it is was be very cheap.

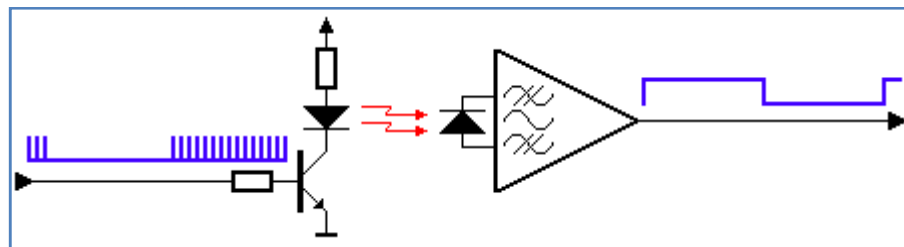
A video camera or digital photo camera can "see" the Infra-Red light as see in the below picture. Unfortunately, there are many more sources of Infra-Red light. The sun is the brightest source of all, but there are many others, like light bulbs, candles and central heating system. In fact, everything that radiates heat, also radiates Infra-Red light.



**Figure 2.1: infrared light**

### 2.2.2 Modulation

Modulation is the best answer to make the signal stand out above the noise. With modulation signal, the IR light source blink in a particular frequency. The IR receiver will be tuned to that frequency. This blinking as attracting the receiver's attention.



**Figure 2.2: Modulation signal**

In the figure 2.2, the modulated signal was sending the signal into IR Led of the transmitter on the left side. The signal was detected signal of the receiver at the other side.

In serial communication, it were usually speak of 'marks' and 'spaces'. The 'space' is the default signal, which is the off state in the transmitter case. No light is emitted during the 'space' state. During the 'mark' state of the signal the IR light is pulsed on and off at a particular frequency. Frequencies between 30kHz and 60kHz

are commonly used in electronics. At the receiver side a 'space' is represented by a high level of the receiver's output. A 'mark' is then automatically represented by a low level.

The real relationship between the 'marks' and 'spaces' and the 1-s and 0-s depends on the protocol that is being used.

### **2.2.3 Transmitter**

The transmitter usually is a battery powered handset. It was consume as little power, and the IR signal should also be as strong as possible to achieve an acceptable control distance.

Many circuit are designed to be used as IR transmitters. Nowadays, very low power microcontrollers are used in IR transmitters and the reason that, they are more flexible in their use. When no button is pressed, the circuit are in a very low power sleep mode, in which hardly any current is consumed. The processor wakes up to transmit the appropriate IR command only when a key is pressed.

Quartz crystals are seldom used in such handsets. They are very fragile and tend to break easily when the handset is dropped. Ceramic resonators are much more suitable, because they can withstand larger physical shocks.

The current through the LED can vary from 100mA to well over 1A. In order to get an acceptable control distance the LED currents have to be as high as possible. A trade-off should be made between LED parameters, battery lifetime and maximum control distance. LED currents can be that high because the pulses driving the LEDs are very short. Average power dissipation of the LED should not exceed the maximum value though. Note that the maximum peek current for the LED is not exceeded.