

**ENHANCEMENT THE PERFORMANCE OF LIGHTING AND  
VENTILATION SYSTEM IN INDUSTRY**

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**This report is submitted in partial fulfillment of the requirement for  
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**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**  
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**BORANG PENGESAHAN STATUS LAPORAN  
PROJEK SARJANA MUDA II**

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## SUPERVISOR APPROVAL

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

Signature : .....

Supervisor's Name : EN. CHAIRULSYAH BIN ABD WASLI  
.....

Date : .....

## **DEDICATION**

Dedicated to my beloved family especially my father and mother, lecturer, and also to all my friends. I am thankful for their support, help, cooperation and guidance for this project.

## ACKNOWLEDGEMENT

First and foremost, I would like to praise God for His blessing. He gave me physical and mental strength to carry on my final year project up to completion.

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## ABSTRACT

This project was to develop a system switch control automatically. Purpose of this project conducted would be to generate and develop a system to control lighting usage and exhaust fan automatically in the toilet. Control process of light switch and exhaust fan by using Programmable Integrated Circuit (PIC). This software communicated with hardware connected to PIC, such as infrared, ultrasonic and others. Sensors used as key component to receive and send signals to PIC to monitor all functions of this project. Flash software used to show this project in animation. To realize this project, a profoundest study made on sensors, PIC and software. Basic and major study applies in this project including background study, system development, programmed test field and production.

Key words: Electric automatic control, PIC, humidity sensor, electric conservation

## ABSTRAK

Projek ini adalah untuk membina sebuah sistem pengawalan suis secara automatik. Tujuan projek ini dijalankan adalah untuk menghasilkan dan membangunkan satu sistem untuk mengawal penggunaan lampu dan ekzos secara automatik di dalam tandas. Proses pengawalan suis lampu dan ekzos dihasilkan dengan menggunakan Programable Integrated Circuit (PIC). Perisian ini berkomunikasi dengan perkakasan yang disambungkan kepadanya, seperti sensor-sensor yang sedia ada. Contohnya adalah seperti infrared, ultrasonic dan lain-lain. Sensor digunakan sebagai komponen utama untuk menerima dan menghantar isyarat kepada PIC untuk mengawal keseluruhan fungsi projek ini. Perisian Flash digunakan untuk menunjukkan projek ini dalam bentuk animasi. Untuk merealisasikan projek ini suatu kenyataan, kajian yang mendalam dilakukan mengenai sensor-sensor, PIC dan perisian. Kajian yang asas dan utama yang digunakan dalam projek ini termasuk kajian latar belakang, pembangunan sistem, ujian lapangan dan penghasilan program.



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## LIST OF ABBREVIATION

BPF	-	Band Pass Filter
foL	-	Low cut-off frequency
foH	-	High cut-off frequency
IR	-	Infrared
PIR	-	Passive Infrared Sensor
PIC	-	Programmable Interface Controller
PID	-	Passive Infrared Detector
LED	-	Light Emitted Diode
CIE	-	International Commission on Illumination
NIR	-	Near-infrared
SWIR	-	Short-wavelength infrared
MWIR	-	Mid-wavelength infrared
LWIR	-	Long-wavelength infrared
FLIR	-	Forward-looking infrared
FIR	-	Far infrared
MW	-	Mid-wavelength
LW	-	Long-wavelength
VLWIR	-	Very-long wave infrared
LTE	-	Local Thermal Equilibrium
RH	-	Relative Humidity
PWM	-	Pulse Width Modulation
DC	-	Direct Current
AC	-	Alternating Current
ADC	-	Analog-To-Digital Converter
LED	-	Light-emitting Diode
SPST	-	Single Pole Single Throw
SPDT	-	Single Pole Double Throw
DPST	-	Double Pole Single Throw
DPDT	-	Double Pole Double Throw
QPDT	-	Quadruple Pole Double Throw

NO	-	Normally Open
NC	-	Normally Closed
RAM	-	Random Access Memory
ROM	-	Real-only Memory
PROM	-	Programmable Real-only Memory
EPROM	-	Erasable Programmable Real-only Memory
IC	-	Integrated Circuit
I/O	-	Input/Output
RC	-	Resistor Capacitor
TX	-	Transmitter
RX	-	Receiver
RPM	-	Revolutions Per Minute
EMF	-	Electromotive Force
PLL	-	Phase-Locked-Loop
MOSFET	-	Metal-Oxide-Semiconductor Field Effect Transistor

# CHAPTER 1

## INTRODUCTION

This chapter starts with introduction and background of the project. It is followed by objectives, scope of works and problem statements. Methodologies are presented in the last part of this chapter.

### 1.1 INTRODUCTION

Smart Control System is an automatic switching system. This system does not require users to switch on or off the lights and exhaust fan manually. Programmable Interface Controller (PIC) is a main controller which is used in this system. PIC controls the devices by receiving the input signal, processing the signal and sending out the output signal. Once the system detects that there is no one in the toilet, the system will shut down and switch off the lights in the toilet automatically. Once the system detects humidity index goes beyond the preset humidity, exhaust fan will be turned on. If the humidity index goes below the preset humidity, exhaust fan will be turned off. This project will develop a control system to monitor the lighting and exhaust system whether to turn on or turn off the lighting and exhaust system automatically.

## 1.2 OBJECTIVES

The main objective of this project is to achieve the energy saving purpose where it will automatically turn off the lights and exhaust fans when there is no one in the toilet. The wastage of electricity happened where most of the people will leave the toilet without switching off the lights and exhaust fans. This will increase the electricity bill of the premises.

Besides, this project will create a more user friendly system which do not require user to switch on or switch off the lights and exhaust fans in a toilet manually. For a new comer, it is even harder as he has no knowledge of the correct switch to be turned on or off.

The typical toilet design often has switches mounted on a position which is not suitable for those disable person. This project also showing the concern on those disable person.

## 1.3 SCOPES OF WORKS

The scopes of works in this project are:

- a) Focus on the working principle of exhaust fan and light.
- b) Focus on the humidity and motion sensor.
- c) The study and understanding of the human sensing technology.
- d) Identification of the parameters and limiting errors to be considered in this project.
- e) Develop model and prototype for the system with assisting by ControlEZ Technology Sdn.Bhd.
- f) This project will be analyzed from theoretical and calculation.
- g) Using Proteus to design a small circuit for the automatic control system.
- h) Using FLASH MX to design an animation of the system.
- i) Enhance the performance technique of lighting and exhaust system.

## **1.4 PROBLEM STATEMENTS**

In recent year, as the cost of producing electrical energy is constantly on the rise, any electricity wastage must be avoided. Very often, the usage of lights and exhaust fan in the room, toilet or kitchen is twenty-four hours per day without turn it off. This is a waste of electricity power and it will also increase the expenses. Thus by designing this system, the lights and exhaust fan will be turned off automatically and save the electricity power. Besides that, we can increase the life-span of light and exhaust fan by avoiding overuse them.

## **1.5 EXPECTED OUTCOME**

The expected outcome for this project is that the automatic switch control is built and it can perform well. The animation of the system is built to show the working principle of the designed system. Besides that, this project shows the comparison between the enhanced system and existent lighting and exhaust system. For current used system, users have to switch on or off the lights and exhaust fan manually but for enhanced system the light will be switched on and off when people come in or out from the toilet. The exhaust fan will also be switched on automatically when humidity index present high during bathing. The energy saving purpose is achieved where it will automatically turn off the exhaust fan sand lights when there is no one in the toilet, it can cut cost at least 50%.

## 1.6 METHODOLOGY

### Project Planning

- Understanding the concept and theory of the project
- Prepare Gantt Chart for guidelines and progress of the project

### Literature Review

- Background reading and references
- Search for suitable and practical circuits
- List down and identify the suitable components using in the circuits
- Design the prototype circuit boards and assembling
- Test and do analysis to the circuits

### Study animation of the project with software

- FLASH software used to develop the animation

### Design the schematic of the project with software

- Proteus software used to develop the simulation

### Finishing

- Testing of final assembly circuit in operation, application record the results
- Presentation of the project
- Finishing the technical report of the project

The project flowchart is shown in Figure 1.1:

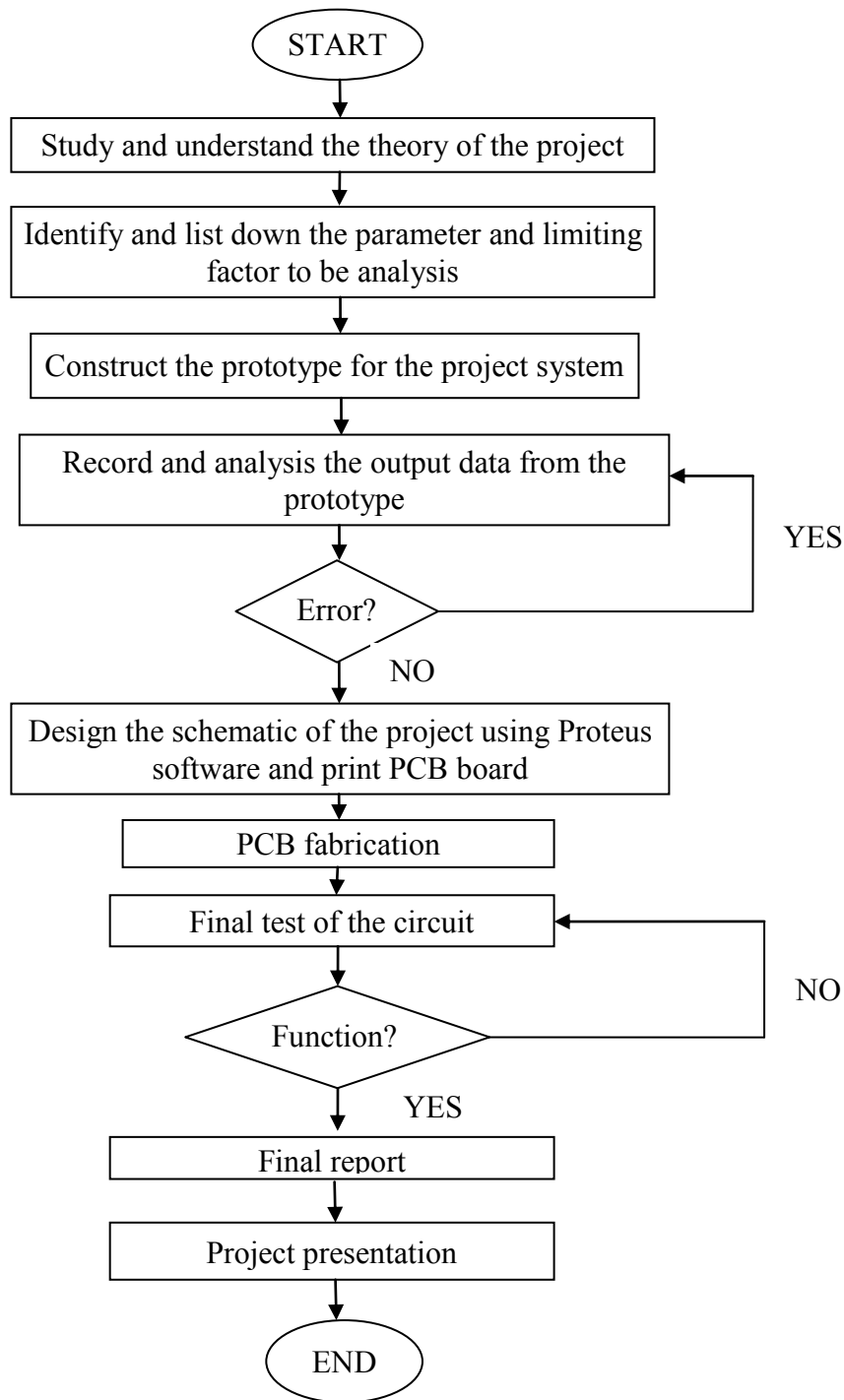


Figure 1.1: Project Flowchart