

AUTOMATIC SWITCH CONTROLLER

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For my lovely mum and dad, thanks for your sacrifice towards my success.

For my supervisor, Pn. Noor Asyikin Bt Sulaiman, thanks for all your

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ABSTRACT

This system is designed to control the usage of electricity for particular room. The system is either to switch on or off the lamp and air cond automatically due to existence people going in or out from the room. The system consists of PIC, detector circuit, power supply and display circuit. The detector employs an infrared detector for detecting the number of persons entering and leaving the room. Then, the PIC will act as a counter to count the number of people in the room and will display it through seven segments. When the system senses the existences of people in the room, it automatically turns the light on. In other word, it detects the existences of people in the room and avoids the problem of having a manual switch controller where people maybe forget to switch off the light and it can lead to electrical waste.

ABSTRAK

Sistem Suis Kawalan Automatik ini direka untuk mengawal penggunaan elektrik khas untuk bilik. Sistem ini digunakan untuk menghidup atau menutup lampu dan penghawa dingin secara automatic dengan mengambil kira bilangan orang yang masuk atau keluar dari bilik tersebut. Sistem ini mengandungi litar PIC, litar pengesan, litar bekalan kuasa, litar pamer. Litar pengesan ini menggunakan inframerah untuk mengesan bilangan orang yang melalui pintu bilik tersebut. PIC yang digunakan pula bertindak sebagai pengiraan untuk mengira bilangan orang yang melalui pintu tersebut dan seterusnya akan memaparkan bilangan orang yang melalui pintu tersebut pada paparan yang disediakan. Sekiranya system yang digunakan ini mengesan kewujudan orang didalam bilik tersebut, secara automatic ia akan menyalakan lampu. Dalam erti kata lain, sistem ini akan mengesan kewujudan orang dalam bilik tersebut dan seterusnya akan mengurangkan penggunaan suis manual, dimana orang mungkin terlupa untuk menutup lampu dan ini akan menyebabkan pembaziran elektrik

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LIST OF ABBREVIATIONS

PIC – Programmable Interface Circuit

IC – Integrated Circuit

AC – Alternative Current

DC – Direct Current

LED – Light Emitting Diode

ELF – Extremely Low Frequency

HZ – Hertz

BJT – Bipolar Junction Transistor

RAM – Random Access Memory

DSP – Digital Signal Processing

IR – Infra-Red

mA - Miliampere

A/D – Analog to Digital

PWM – Pulse Width Modulation

DIP – Dual In Line Pins

I/O – Input/ Output

PCB – Printed Circuit Board

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CHAPTER I

INTRODUCTION

1.1 Introduction

Switches with automatic control capabilities are widely used for security or personal convenience in both residential and industrial applications. Most of the conventional automatic switches in the prior art simply turn on electric light whenever a person moves through a detection pattern of a motion detector. Typically, conventional automatic switches employ a infra-red detector for sensing the infra-red energy emitted by a human body. Unfortunately, most of the switches automatic controller products in market are expensive, complicated and unfriendly with user.

The project present invention relates to an automatic switch for controlling electric loads and more particularly to an intelligent automatic switch which includes the function of counting and storing in memory the net number of persons entering and leaving an enclosure or room to automatically control actuation or deactivation of light or other home appliances to the room or enclosure. Moreover, these systems which apply low power consumption are easy to manage and install. With some extra features, this system will fulfill the criteria needed by the user. All the criteria will include in this project

1.2 Objectives

The objectives of this project are:-

1. To design an automatic switch controller this is suitable for ISM (Industrial, Scientific and Residential) applications.
2. To display the number of people in the room.
3. To fabricate and measurement the system on the circuit board by using etching technique.

To compare between simulation and measurement result

The main objective for this project is to design an automatic switch controller using an infrared as a medium transmission. This project is capable to function as a switch controller and use the processing circuit which collects data from the sensor through the programmable integrated circuit microcontroller (PIC micro-controller).

This project also will apply the function of PIC micro-controller and type of sensor; human body sensors. The PIC micro-controller is programmed to collect the data when it received request form the control panel. It also converts an analog output signal from the sensors into digital signal.

1.3 Problem Statement

Nowadays switches in the market are very simple. For this system used sensor as a medium compared to the older version. By using this infrared technology, user will find more convenience to handle the system. The automatic switch controller system is able to sense, count, and store the amount of people in the room and display it through seven segments.

This project also can eliminate the problem of having manual switch controller where the system using a high capacity of electric. Beside that, it give troubles to the user when the user needs to turn on and off manually and sometimes user forget to turn off the switch when they are in a rush.

Moreover, this new intelligence can save both time and money by reducing the unnecessary usage electrical. Due to this factor, this system will bring more benefit. This project likely will be done for a low cost and simple installation system as most of the products in the market are expensive and unfriendly with user. With a low cost of making this project, users will have more option to buy this kind of product.

1.4 Scopes Of Work

A several scope of work has been determined are:-

1. This system is using two doors where door is assigned for coming in and the other is for coming out.
2. This system is used for a room which the capacity is up to 256 persons.
3. To design and simulation the system by using Multisim software
4. To fabricate the system on the circuit board.
5. To use the etching technique.

The scope for this project is divided into two part; hardware and software part. For the hardware part, it will consists the designing an automatic switch controller prototype which consists of sensors; human body sensors, PIC micro-controller. The PIC micro-controller (PIC16F873) will be programmed to integrate with software part as to make sure that the connection between both parts is available. Then, the hardware is fabricated by using printed circuit board (PCB).

As a software part, it will include the development of a programming for PIC micro-controller. The programming will control the hardware part .The assembly language is needed to creating the source code for PIC microcontroller.

1.5 Project Methodology

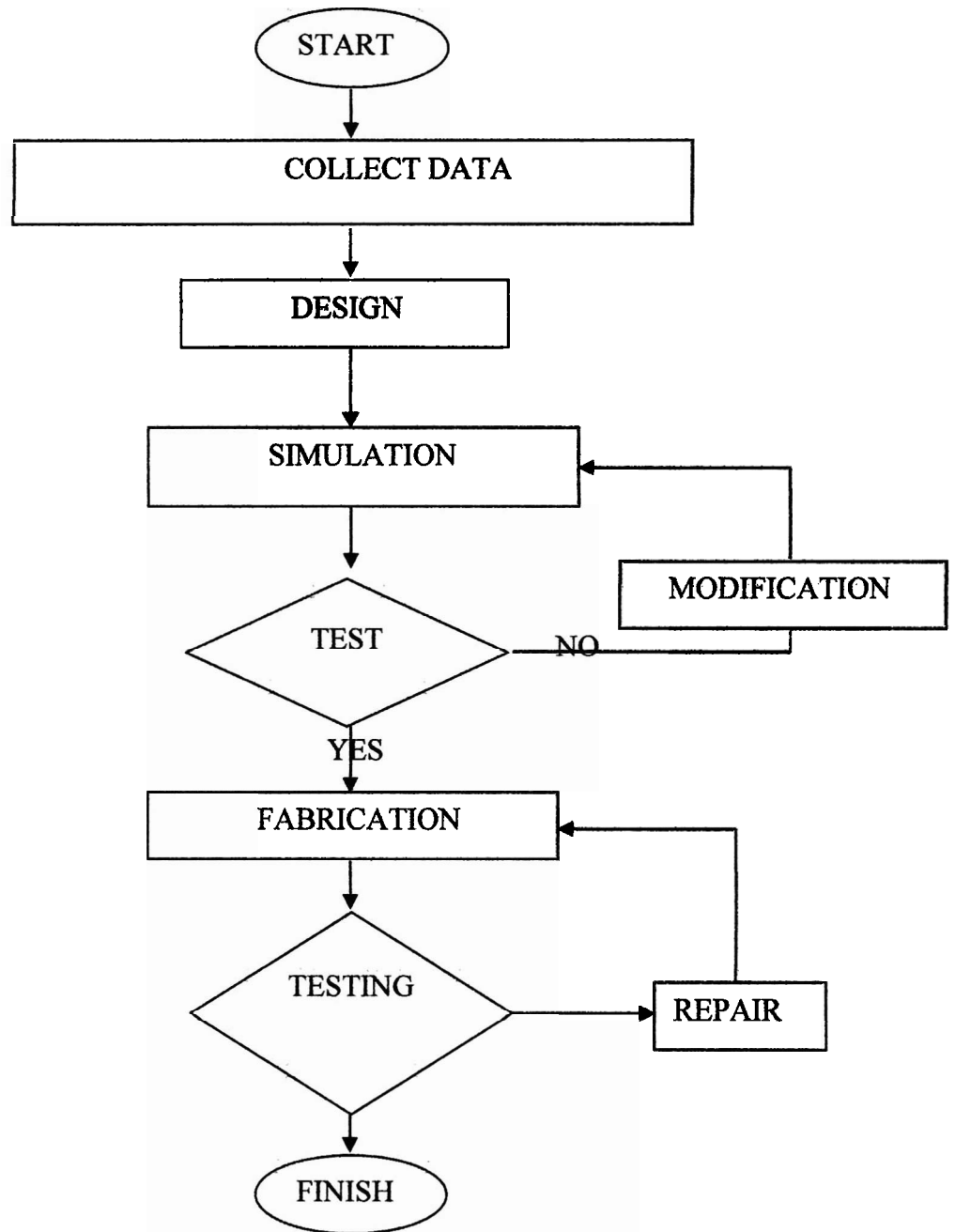


Figure 1.1 Project Methodology in a Flowchart

The project methodology is divided into two parts which are hardware and software part.

- 1) All the information which relevance to the system, PIC micro-controller, and sensors are collected. Then receiving and transmitting about this system need to be understood. With all the information have been gathered, a suitable PIC micro-controller and sensors need to be decide in this stage before designing the project.
- 2) The hardware and software part need to be design and develop due to the objectives of this project. A simple hardware part is design and assembly language programming for PIC micro-controller needed to be governing before creating the source code.
- 3) After the hardware and software part have been created, it will tested so that any mistakes or errors that occur during this stage can solved.
- 4) If both hardware and software part are success, the hardware is design into PCB and software programming is burn into PIC micro-controller.
- 5) Then, the connection between them is tested.
- 6) If the connection is fail between both parts, it will troubleshoot to find the problem so that any mistakes or errors that occur during this stage can be solved.
- 7) Final report preparation and draft will send to supervisor for observation and comment.
- 8) Final report sends to faculty.

CHAPTER II

LITERATURE REVIEW

2.1 Background Study

This chapter provides some examples, case studies and other relevant works were done by other people in the past. Besides, it focuses on the various theory and basic knowledge used in the project. Many researchers have presented the block diagram and the synthesis of system. Therefore, a low cost, user-friendly, open source system software package is needed to design.

2.2 Block Diagram

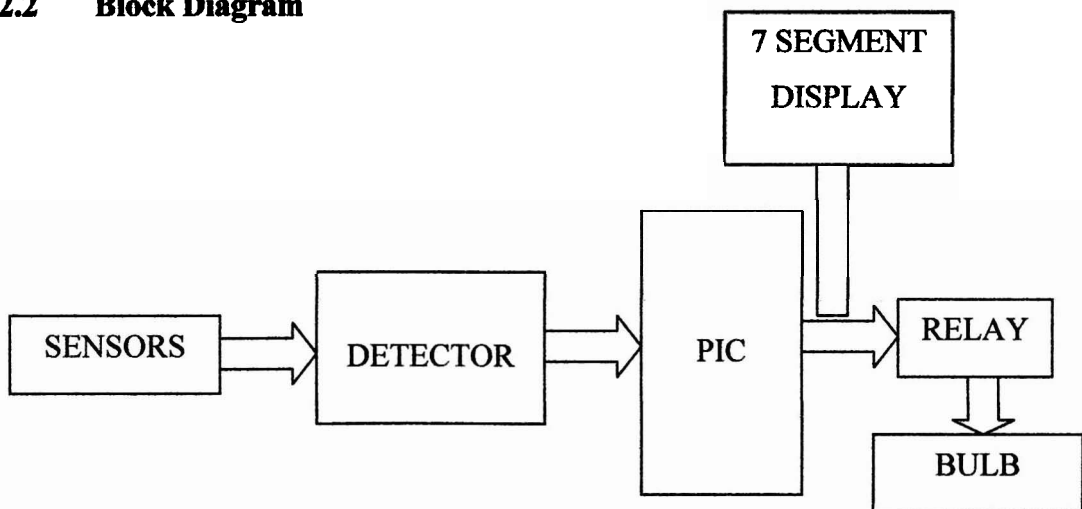


Figure 2.1 Blok Diagram for Automatic Switch Controller

2.2.1 Power Supply System

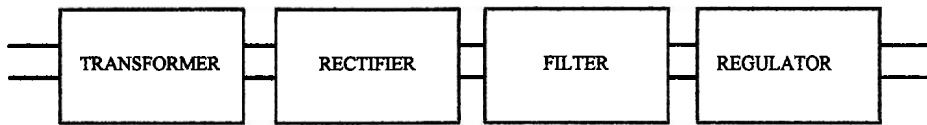


Figure 2.2 Typical Power Supply Systems.

The figure 2.2 shows a typical power supply system. It comprises off transformer, rectifier, filter, and regulator. The ac voltage, typically 240Vrms, is connected to a transformer, which step that ac voltage down to the level for the desired dc output. A diode rectifier provides a full wave rectified voltage, which is initially filtered by a simple capacitor to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation [1].

A regulator circuit is then provide a fixed dc voltage which remains the same dc value even if the input dc voltage varies or the load connected to the dc voltage changes. This voltage regulation is usually obtained using one of a number of popular voltage regulator IC units [1].

Instead of using the typical power supply, one has an alternative to use a battery as a power supply. A battery is a combination of galvanic cells for generating an electric current. Batteries can be divided into primary and secondary types. The former category includes alkaline and carbon zinc mercuric oxide, silver oxide and lithium primary batteries. The secondary batteries include nickel cadmium, nickel metal hydride and lead acid. Typically the size of battery is in proportion to the size of the gadget or equipment it is used in[1].

2.2.1.1 Transformer

The transformer is a passive device that changes voltage, current or impedance to the required parameters. The intensity of this flux is determined by the number of turns in the coil multiplied by the current. It is also affected by the magnetic conductivity of the area around the coil. This magnetic conductivity is permeability. The force needed to create the flow is called magneto motive force. To get the current to flow from one winding to another, the magnetic force must be changed. A transformer is composed of a core, windings, and insulation, which are determined by the power requirements and the frequency of operation [1].

2.2.1.2 Rectifier

From the figure 2.2, the purpose of the rectifier is to convert the incoming ac from a transformer or other ac power source to some form of pulsating dc. It takes current that flows alternately in both directions positive and negative. The rectifier circuit may be classified into two categories, which are half wave and full wave rectifier [1].

2.2.1.3 Regulator

Regulator is used to provide stable output voltage level under varying load and input condition. At dc and low frequency they perform much like ideal voltage source with very low output impedance, good line regulation and ripple rejection. Due to the inherent reactive parameters within the regulator and the connecting cable, output impedance usually increases with frequency [1].