FUTURE CLASSROOM SYSTEM

BY

MUHAMMAD HAZMAN BIN KAMARUZAMAN

MOHAMMAD ASYRAF BIN MOHAMMAD NADZRI

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Dedicated to,

__Thanks to Allah,__

For give me a good health and strength while making this report.

__My beloved father and mother,__

Kamaruzaman Bin Mohd Basir & Hasimah Binti Abdul Talib

Mohammad Nadzri Bin Arshad & Rozita Binti Mohd Noor

Who has always been my epitome of love and always pray for my strength to finish up this report.

__My beloved relatives,__

My siblings,

Thank you for your support and pray.

__The person who has been very understanding and helpful,__

Mister Muhammad Majdi Bin Saad

For the support and guidance. Hope that I always be remembered.

__My unforgettable friends,__

My housemate, my classmate and all DEP students intake June 2016,

Our struggle not yet ends.

Finally, friends that always together during this third years study,

Hopefully achieved what we aspired.

ACKNOWLEDGEMENTS

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

'In the name of Allah, Most Gracious, Most Merciful'.

First of all, all praises be to Allah SWT for giving us the opportunity to learn new things in completing this project entitled 'FUTURE CLASSROOM SYSTEM'

The completion and success of this project are not possible without the assistance, guidance and encouragement from many individuals. On the very outset of this project report, we would like to extend our sincere and heartfelt obligation towards all the personals who have helped us in this endeavor. We would like to express our heartiest gratitude and extremely thankful to our supervisor, En. Mohd Majdi bin Saad for her conscientious guidance, supervision, and encouragement which has helps us in completing this project. Next, to Seberang Perai Polytechnic especially to the Electrical Engineering Department, we would like to extend our gratitude for giving us the opportunity to make this project.

Last but not least, we would like to acknowledge with a deep sense of reverence, our gratitude towards our parent and friends, for their constant supports morally and financially. Any omission from this acknowledgment does not mean lack of gratitude from us. May Allah bless everyone that contributed to our project, *In Sha Allah.*

ABSTRAK

Pembaziran elektrik adalah salah satu masalah utama yang kita hadapi sekarang hari. Di rumah kami, sekolah, kolej atau industri kita melihat bahawa kipas / lampu terus walaupun terdapat tiada siapa di dalam bilik atau kawasan / laluan. Ini berlaku disebabkan oleh kecuaian atau kerana kita terlupa untuk menghidupkan lampu luar atau apabila kita berada dalam tergesa-gesa. Untuk mengelakkan semua keadaan itu kami telah direka projek ini dipanggil "automatik pengawal lampu bilik dengan bilangan pelawat". Projek ini mempunyai dua modul, yang pertama dikenali sebagai "counter Pelawat Digital" dan modul kedua dikenali sebagai "Bilik automatik cahaya pengawal". konsep utama di sebalik projek ini dikenali sebagai "counter Pelawat" yang mengukur bilangan orang yang memasuki dalam mana-mana bilik seperti dewan seminar, bilik persidangan, bilik darjah. Fungsi ini dilaksanakan dengan menggunakan sepasang sensor inframerah. paparan LCD diletakkan di luar bilik memaparkan nilai ini orang kiraan. Ini kiraan orang akan incremented jika seseorang memasuki dalam bilik dan pada masa itu lampu dihidupkan. Dan dengan cara terbalik, orang kiraan akan menyusut jika seseorang meninggalkan bilik. Apabila beberapa orang di dalam bilik adalah sifar, lampu di dalam bilik dimatikan menggunakan antara muka relay. Dengan cara ini Relay melakukan operasi "bilik automatik cahaya pengawal". Sejak projek ini menggunakan 2 sensor inframerah, ia boleh digunakan sebagai dwiarah orang kaunter juga.

ABSTRACT

Wastage of electricity is one of the main problems which we are facing now a days. In our home, school, colleges or industry we see that fan / lights are kept on even if there are nobody in the room or area / passage. This happens due to negligence or because we forgot to turn lights off or when we are in hurry. To avoid all such situations we have designed this project called "Automatic room light controller with visitor counter". This project has two modules, first one is known as "Digital Visitor counter" and second module is known as "Automatic room light controller". Main concept behind this project is known as "Visitor counter" which measures the number of persons entering in any room like seminar hall, conference room, classroom. This function is implemented using a pair of Infrared sensors. LCD display placed outside the room displays this value of person count. This person count will be incremented if somebody enters inside the room and at that time lights are turned on. And in reverse way, person count will be decremented if somebody leaves the room. When number of persons inside the room is zero, lights inside the room are turned off using a relay interface. In this way Relay does the operation of "Automatic room light controller". Since this project uses 2 infrared sensors, it can be used as Bidirectional person counter as well.

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CHAPTER 1

INTRODUCTION

This project is to make a controller based model to count number of persons visiting particular room and accordingly light up the room. Here we can use sensor and can know present number of persons.

In today's world, there is a continuous need for automatic appliances with the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life .Also if at all one wants to know the number of people present in room so as not to have congestion. This circuit proves to be helpful.

This Project —FUTURE CLASSROOM using ARDUINO UNO is a reliable circuit that takes over the task of controlling the room lights as well us counting number of persons/ visitors in the room very accurately. When somebody enters into the room then the counter is incremented by one and the light in the room will be switched ON and when any one leaves the room then the counter is decremented by one. The light will be only switched OFF until all the persons in the room go out. The total number of persons inside the room is also displayed on the seven segment displays.

The ARDUINO UNO does the above job. It receives the signals from the sensors, and this signal is operated under the control of software which is stored in ROM. Microcontroller ARDUINO UNO continuously monitor the Infrared Receivers, When

any object pass through the IR Receiver's then the IR Rays falling on the receiver are obstructed , this obstruction issensed by the ARDUINO UNO.

1.2 Research Background

Wastage of electricity is one of the main problems which we are facing now a days. In our home, school, colleges or industry we see that fan / lights are kept on even if there are nobody in the room or area / passage. This happens due to negligence or because we forgot to turn lights off or when we are in hurry. To avoid all such situations we have designed this project called "Automatic room light controller with visitor counter". This project has two modules, first one is known as "Digital Visitor counter" and second module is known as "Automatic room light controller". Main concept behind this project is known as "Visitor counter" which measures the number of persons entering in any room like seminar hall, conference room, classroom. This function is implemented using a pair of Infrared sensors. LCD display placed outside the room displays this value of person count. This person count will be incremented if somebody enters inside the room and at that time lights are turned on. And in reverse way, person count will be decremented if somebody leaves the room. When number of persons inside the room is zero, lights inside the room are turned off using a relay interface. In this way Relay does the operation of "Automatic room light controller". Since this project uses 2 infrared sensors, it can be used as Bidirectional person counter as well.

1.3 Motivation

My motivation to undertake this project is due to my experience and observation of the inefficiencies of the current system which is counting number of persons/ visitors in the room very accurately. In today's world, there is a continuous need for automatic

appliances .With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. Also if at all one wants to know the number of people present in room so as not to have congestion, this circuit proves to be helpful.

1.4   Problem description

The aim of this project is to count the objects (persons) entering and leaving the room and also switch the room light accordingly. If we consider an office.or a conference hall or any other room, we need to turn on the lights whenever anybody enters the room. This is true even in the day time at some places like conference halls or offices where a good brightness levels are desired. Also, the lights should be turned off by the last person leaving the room. The problem is, when the first person is entering a room, he should search for switch board and then for the right set of switches among hundreds of switches corresponding to lights fans, etc of the conference hall. This is a daunting task. While leaving the hall, we cannot guarantee that the last person turns off the lights. Even if he attempts to do it, he again faces the problem the first person had faced. We should not expect them to do that work going through the switching rigmaroles

1.5   System objectives

The objective of this project is to make a controller based model to count number of persons visiting particular room and accordingly light up the room. Here we can use sensor and can know present number of persons. In today's world, there is a continuous need for automatic appliances with the increase in standard of living, there is a sense of

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urgency for developing circuits that would ease the complexity of life. Also if at all one wants to know the number of people present in room so as not to have congestion. This circuit proves to be helpful

1.6   System Scope

This project is not limited to a specific application or a specific operating environment, but it can be easily implemented wherever such an application is needed. This circuit uses a microcontroller which ensures the flexibility of the circuit, due to which this circuit can easily be integrated or assembled with other modules or circuits where ever required. All the components required are readily available in the market and the circuit is easy to build. The significant feature of this project is that it detects the entry and exit of visitors from a single door itself

1.7   System Solution

To avoid this problem, we have made a circuit which automatically switches ON/OFF the room light depending on the number of people in the room. This circuit keeps track of number of visitors. If the number of visitors is greater than zero, then it turns ON all the lights. Else, it turns OFF all the lights automatically. It does not require any manual intervention.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this project we had use IR sensor as a transmitter and receiver, easy to detected student who entrance and exit into a classroom, then the LCD will be function as counting on it and display number of student. So it can give most benefit to a lecturer to manage the attendance on class. Other then yet, this project will give saving more on electrical energy, does the automatic on or off a facilities.

The problem of electrical waste will be reduces. 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.
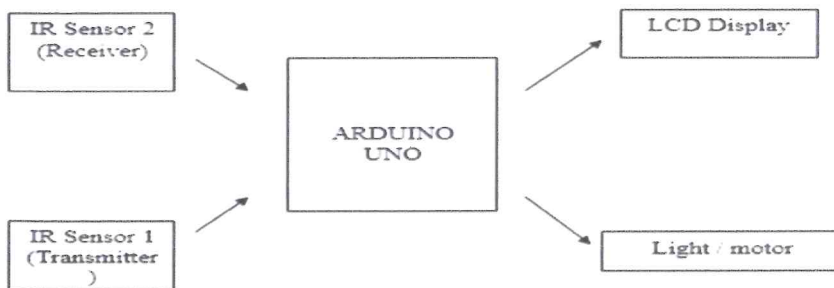
2.2 Block Diagram

Figure 2.2 : Full system block diagram

This system controlled by ARDUINO UNO is a reliable circuit that takes over the task of controlling the room lights as well us counting number of persons/ visitors in the room very accurately. When somebody enters into ther oom then the counter is incremented by one and the light in the room will be switched ON and when any one leaves the room then the counter is decremented by one. The light will be only switched OFF until all the persons in the room go out. The total number of persons inside the room is also displayed on the seven segment displays.

2.3 Sensor Section

Two IR sensor modules which contain IR diodes, potentiometer, comparator (Op-Amp) and LED's potentiometer is used for setting reference voltage at comparator's one terminal and IR sensors sense the object or person and provide a change in voltage at comparator's second terminal. Then comparator compares both voltages and generates a digital signal at output.

2.4 Control Section

Arduino UNO is used for controlling whole the process of this visitor counter project the outputs of comparators are connected to digital pin number 14 and 19 of arduino. Arduino read these signals and send commands to relay driver circuit to drive the relay for light bulb controlling.
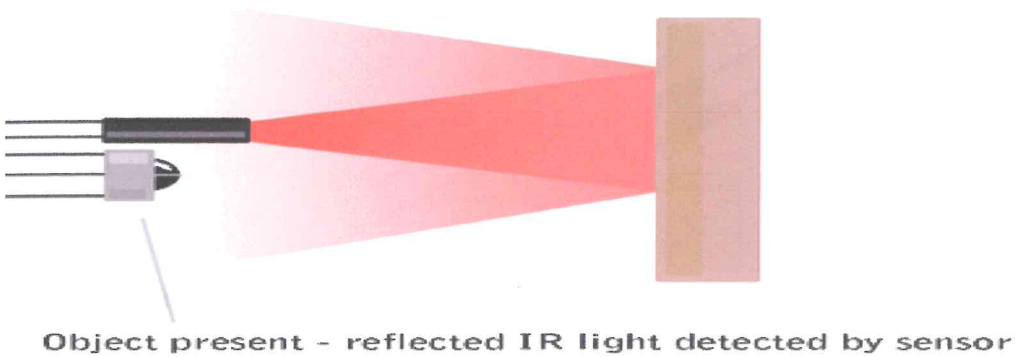
2.5 Display Section

Display section contains a 16x2 LCD. This section will display the counted number of people and light status when no one will in the room.

2.6 Relay Driver Section

Relay driver section consist a BC547 transistor and a 5 volt relay for controlling the light bulb. Transistor is used to drive the relay because arduino does not supply enough voltage and current to drive relay. So we added a relay circuit to get enough voltage and current for relay. Arduino send commands to this relay driver transistor and then light bulb will turn on/off accordingly.
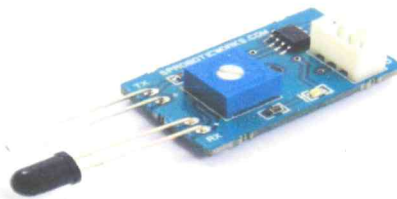
2.7 Understanding IR Sensor

IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold.

No object present – no IR light detected by sensor

Object present – reflected IR light detected by sensor

2.8 Component Of Project

2.8.1 IR Sensor

IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED

bounces off the object and into the light sensor. This results in a large jump in the

intensity, which we already know can be detected using a threshold.

2.8.2 Resistor

A resistor is a passive two-terminal electrical component that implements electrical

resistance as a circuit element. In electronic circuits, resistors are used to reduce

current flow, adjust signal levels, to divide voltages, bias active elements, and

terminate transmission lines, among other uses.
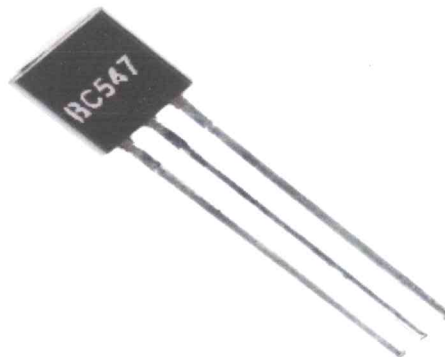
2.8.3 LCD 16x2
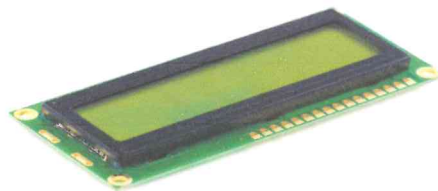
A liquid-crystal display (LCD) is a flat-panel display or other electronic visual display that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly

2.8.4 Relay
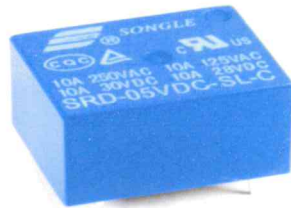
The control circuit functions as the coupling between the input and output circuits.

2.8.5 Transistor

A transistor is a semiconductor device used to amplify or switch electronic signal and electrical power. Is is composed of semiconductor material usually with at least three terminals for connection to an external circuit.
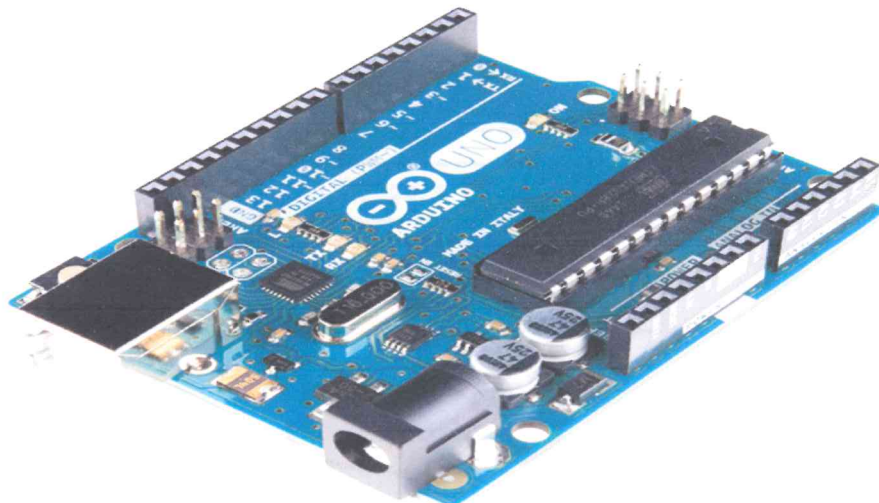
2.8.6 Bulb

An incandescent light bulb is an electric light with a wire filament heated to a high temperature, by passing an electric current through it, until it glows with visible light.

2.8.7 T – Block
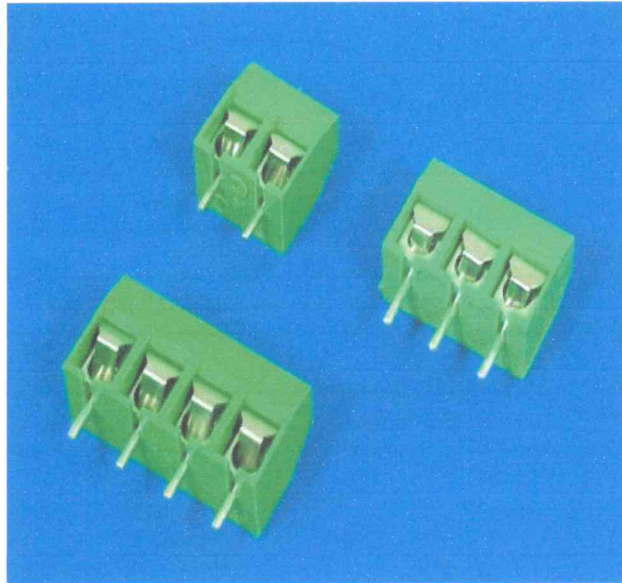
A terminal block is a screw-type electrical connector where the wires are clamped
down to the metal part by a screw.

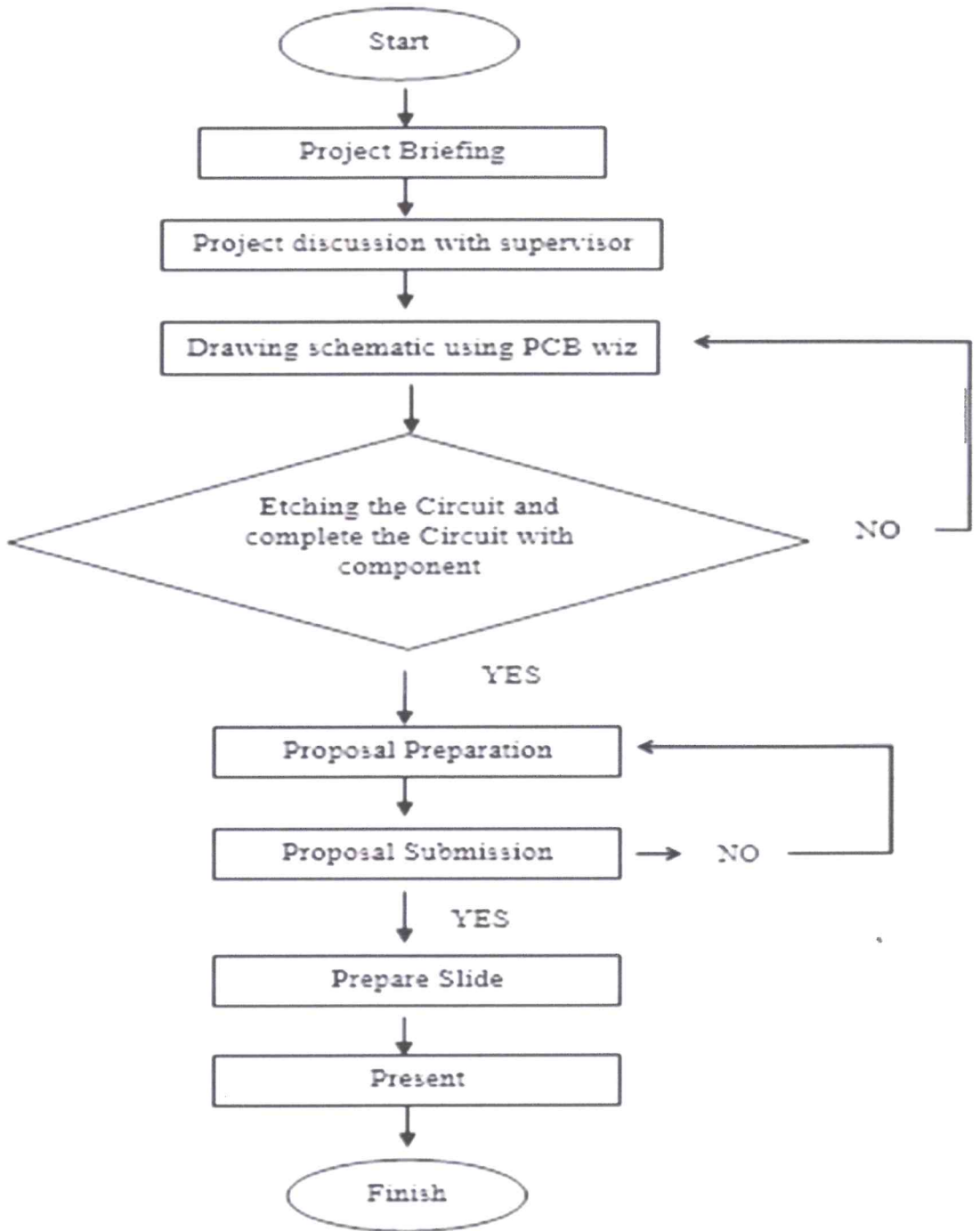**2.8.8 Arduino UNO microcontroller**

2.9   FLOWCHART OF PROJECT

Figure 2.9a : Flowchart of project

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CHAPTER 3

METHODOLOGY

3.1   Introduction

Methodology can be the 'analysis of the principles of methods, rules, and postulates employed by a discipline', 'the systematic study of methods that are, can be, or have been applied within a discipline' or 'a particular procedure or set of procedures.

Methodology includes a philosophically coherent collection of theories, concepts or ideas as they relate to a particular discipline or field of inquiry. Methodology refers to more than a simple set of methods, rather it refers to the rationale and the philosophical assumptions that underlie a particular study relative to the scientific method. This is why scholarly literature often includes a section on the methodology of the researchers.

Each step of project is a process to complete the project. Every step must be followed one by one and must be done carefully. If some error occurs it can make.

A project probably could not operate or do not look neat and perfect. Before the project finish, various processes need to be done according to proper procedures to ensure that projects do not have any problems. Among the measures the works done in preparing this project are:

☐   Process of designing circuit.

☐   Circuit board trace

☐   Soldering process in circuit board.

3.2   Gantt Chart

PROJECT PLANNING																
ACTIIVITY	**JUNE 2016 (SEMESTER 5)**															
	Jun	July				Aug.				Sept				Oct		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Project Briefing	▮	▮														
Project discussion			▮													
Drawing schematic				▮	▮											
Etching circuit						▮	▮									
Fabricate Circuit							▮	▮								
Testing Circuit								▮	▮							
Proposal										▮	▮					
Present Proposal and Preliminary Result												▮	▮			
Report writing													▮	▮	▮	
Prepare slide															▮	
Present																▮

3.3   Flow Chart
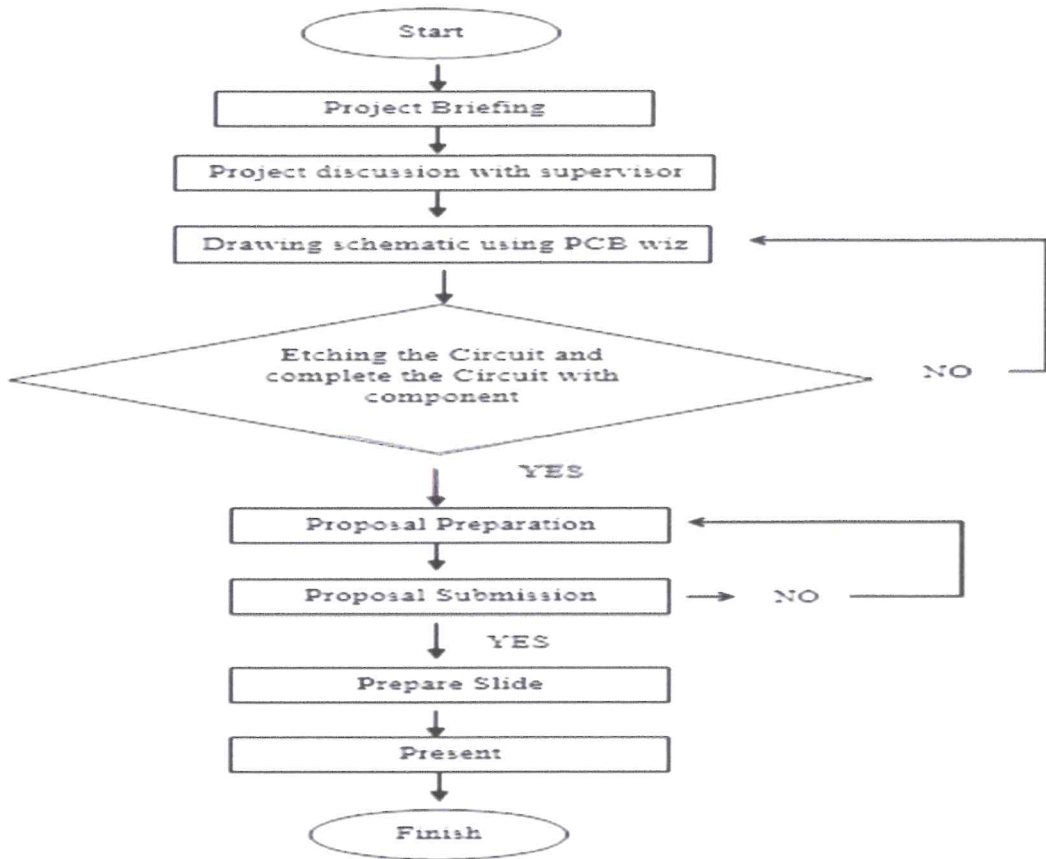
3.4   Usage of Proteus Software

PCB WIZARD allows professional engineers to run interactive simulations of real designs, and to reap the rewards of this approach to circuit simulation. And then a range of simulator models for popular micro-controllers and a set of animated models for related peripheral devices such as PIC and LCD displays, resistor, and more. It is possible to simulate complete micro-controller systems and thus to develop the software for them without access to a physical prototype. In a world where time to market is becoming more and more important this is a real advantage.

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3.5 Arduino Software

Coding

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(13,12,11,10,9,8);
#define in 14
#define out 19
#define relay 2
int count=0;
void IN()
{
    count++;
    lcd.clear();
    lcd.print("Person In Room:");
    lcd.setCursor(0,1);
    lcd.print(count);
    delay(1000);
}
void OUT()
{
  count--;
    lcd.clear();
    lcd.print("Person In Room:");
    lcd.setCursor(0,1);
    lcd.print(count);
    delay(1000);
}
void setup()
{
  lcd.begin(16,2);
  lcd.print("Visitor Counter");
  delay(2000);
  pinMode(in, INPUT);
  pinMode(out, INPUT);
  pinMode(relay, OUTPUT);
  lcd.clear();
  lcd.print("Person In Room:");
  lcd.setCursor(0,1);
  lcd.print(count);
}
```

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```
void loop()
{

  if(digitalRead(in))
  IN();
  if(digitalRead(out))
  OUT();

  if(count<=0)
  {
    lcd.clear();
    digitalWrite(relay, LOW);
    lcd.clear();
    lcd.print("Nobody In Room");
    lcd.setCursor(0,1);
    lcd.print("Light Is Off");
    delay(200);
  }

  else
    digitalWrite(relay, HIGH);

}
```

3.6   Process Of The Circuit Designing

3.6.1   Design The Circuit Diagram

After decide what kind of project that want to build. I need to make a research about the circuit, electronic component that I need to used, hardware and so on. These things actually can help us to make a better in designing circuit. For example, I need to know the size, foot of component, polarity of the component, the component method compilation and etc to make a circuit diagram.

In the first step in Circuit Designing process is make a circuit diagram that can be use in the next process. Among steps in the circuit diagram are:-

1.   Before the circuit is produced, the things that need to be emphasized are the position of symbols and components used in the Schematic circuit. Once know the entire production circuit, the circuit can be drawn using special software, namely Proteus ISIS Professional.

2.   Then, make sure that the connection of the component is correct.

Below is the designation circuit for the board 1, they is the main board to controlling instruction for FUTURE CLASSROOM SYSTEM.
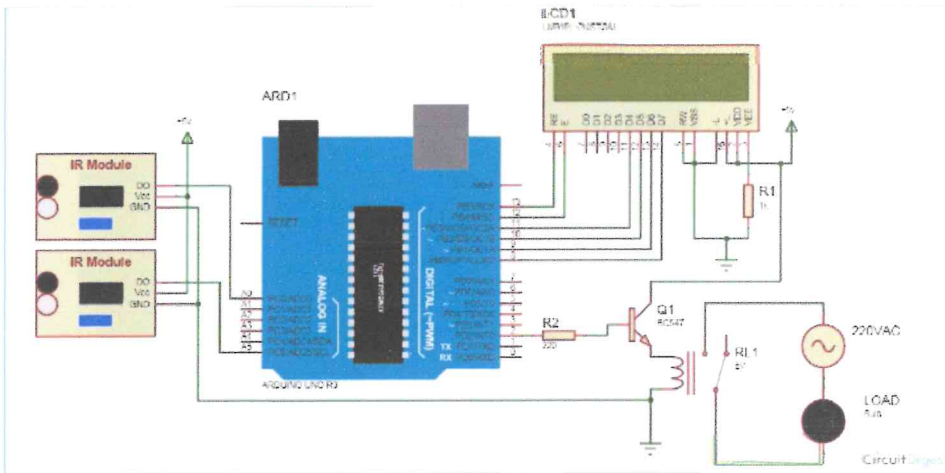
Figure 3.5.1a : Circuit Diagram

3.7   Etching

Etching is a "subtractive" method used for the production of printed circuit boards. Acid is used to remove unwanted copper from a prefabricated laminate. This is done by applying a temporary mask that protects parts of the laminate from the acid and leaves the desired copper layer untouched. Etching is where the excess copper is removed to leave the individual tracks or traces as they are sometimes called. Buckets, bubble tanks, and spray machines lots of different ways to etch. Many different chemical solutions can be used to etch circuit boards. Ranging from slow controlled speed etches used for surface preparation to the faster etches used for etching the tracks. Some are best used in horizontal spray process equipment while others are best used in tanks.