ELECTRICAL AND ELECTRONIC APPLIANCE USING RADIOFREQUENCY SIGNAL

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DECLARATION FORM

"This paper is our performance own. Each division and appendix we enclose is from the source those stated and with the permission parties involved."

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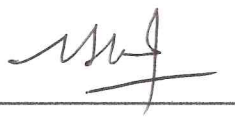

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ACKNOWLEDGEMENT

I would like to thank to God, whom with His willing giving me the opportunity to complete this Final Year Project which is title Electrical and Electronic Appliance using RadioFrequency Signal. This final year project report was prepared basically for student in final year to complete the undergraduate program that leads to the diploma of Engineering in Electronic (Computer). This report is based on the methods given by the polytechnic.

Firstly, I would like to express my very great appreciation to, Encik Nor Alam Bin Mahmud, a lecturer at Seberang Perai Polytechnic (PSP) and also assign, as my supervisor who had guided be a lot of task during two semesters session December2015/ June 2016. I also want to thanks the lecturers and staffs of Electrical Department for their cooperation during I complete the final year project that had given valuable information, suggestions and guidance in the compilation and preparation this final year project report.

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ABSTRACT

Generally operate (switch on/off) all the electrical and electronics appliances such as fan, light, cooler, air conditioner, and so on through switches of the regular switch board. This manual switching of any home appliance is an inconvenient method for physically disabled or elders or even for normal young guys when frequent switching operation is required. Thus, this conventional manual switching method has to be overcome by an easier method of switching. This can be done using an advanced switching method like a remote control for electronic home appliances. We can use the unconventional remote control technology for controlling the home appliances easily without using the fixed wall switch boards. This work presented here is to controlled independent home electrical appliances through RF based remote system. From any place without any line of sight around the house, RF based wireless remote control system can change the state of the electrical appliances either in on state or off state. The controlling circuit is built around RF transmitter and RF Receiver modules which are operating along with encoder IC and decoder IC with few passive components. The four different channels at the encoder are used as input switches and the four channels at the decoder output are connected to the appliances through a relay. Here the circuit is powered with 12V. The main objective of this work is to build the circuit without any programming skill and to make it work without line of sight requirement using the RF technology.

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

The aim of this project is to design a circuit such that one can control home or industrial appliances using the help of remote. Using remote to control appliances reduces human efforts without compromising on efficiency. It also saves time. This circuit can be operated up to a distance of 50 meters depending upon the remote which we use. Radio remote is used to control distance objects using a variety of radio signals transmitted by remote control device.

1.2 STATEMENT OF THE PROBLEM

We generally operate (switch on/off) all the electrical and electronics appliances such as fan, light, cooler, air conditioner, and so on through switches of the regular switch board. This manual switching of any home appliance is an inconvenient method for physically disabled or elders or even for normal young guys when frequent switching operation is required. Thus, this conventional manual switching method has to be overcome by an easier method of switching. Moreover, this can be done using an advanced switching method like a remote control for electronic home appliances. Operating them manually is a tedious job and again hectic sometimes.

1.3 OBJECTIVES

The aim of the project is to control the home appliances easily without using the fixed wall switch boards. This project enable to control independent home electrical appliances through RF based remote system. This project also help the aged and disable person life easier and comfort. Other than that, a remote controlled device promarily

saves a lot of time and energy. Its significance in today's world is immence when people don't have to unnecessarily waste their time in operating the appliance by being near to the appliance. They can operate it while they're engrossed in whatever task they're doing and don't have to bother leaving it in between.

1.4 SCOPE

The final year proposal entitled "Electrical and Electronic Appliance using Radio Frequency Signal" based on control the home appliances easily without using the fixed wall switch boards. This is very smart and intelligent instrument useful for all age groups and has a variety of uses in almost all the areas where instruments need to be automated and controlled as per the human need and enhance facility. This instrument is basically to regulate and overcome all the obstacles for control over the instrument. It is possible that the operating range and the instrument operability in terms of number of instruments can be increased.

1.5 SIGNIFICANT PROJECT

The significant of this final year project is "Electrical and Electronic Appliance using Radiofrequency Signal" is the one of project that help all aged people to do their work more easily and automatically. After that, all this manual work is replaced by a single remote control even the aged and disable person can do the task like a normal person. Much related work has been reported for the same function by different groups with different approaches.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

With the advancement of technology, number of equipment's and modern household appliances increases to make life easier and comfort. Operating them manually is a tedious job and again hectic sometimes. If one can control devices like TV, fan, light or a music system with a remote from a distance place just by pressing the button, life will become simpler.

2.2 STUDIES ON DESIGN

Here we have used modules to make wireless remote. Using this remote, we can control the appliances within the range of 50 meters. This project has two sections, one is transmitter section and the other is receiver section. At transmitter section, we use encoder and at receiver section, we use decoder.

When we press any key in the remote, the transmitter section generates the corresponding RF signal and this signal is received by the receiver section, hence it switches the corresponding appliance.

A four channel encoder/decoder pair is used in this system. The input signals at the transmitter section are taken from the four switches and the output signals at the receiver are indicated by the four LED's corresponding to each switch.

Features:

- RF transmitter and receiver
- Resistors
- Push to OFF buttons
- OptoCoupler
- Relay
- Diode
- Capacitor
- Terminal block

RF Modules:

This module operates at radio frequency. The Radio frequency range is 27MHZ.In this system, RF modules use ASK (Amplitude Shift Keying) modulation. Transmission through RF is better than IR because, the RF signal can travel for longer distances as compare to infrared. And IR mostly supports line-of-sight mode, RF signals can travel even there is an obstruction. RF transmission is more reliable and stronger as compare to IR. The chosen pair of RF Transmitter and receiver should have same frequency. The transmission speed of these modules is 1Kbps to 10Kbps.

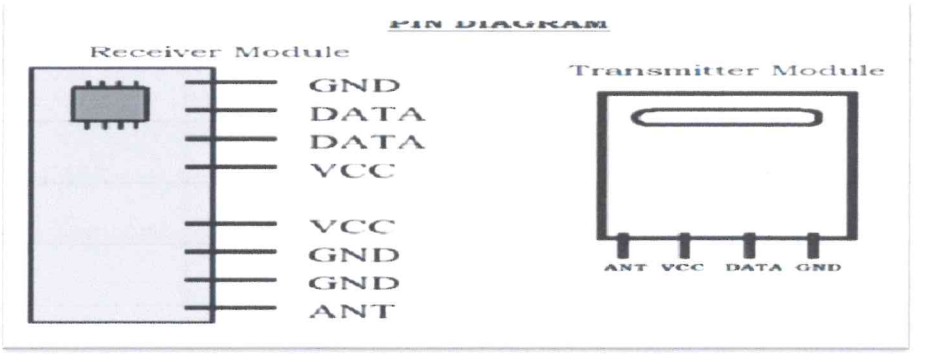


Figure 2.2.1 SCHEMATIC OF RECEIVER MODULE AND TRANSMITTER MODULE

Switch:

A switch opens or closes an electrical circuit. If the circuit is open, no electricity flows. If the circuit is closed, electricity flows through the circuit .A light switch is commonly used. When you turn the switch on the circuit closes and electricity flows through the light .When you turn the switch off, the circuit is opened and the flow of electricity stops, making the light go out.

Figure 2.2.2 Switch

Resistor:

Resistors in a circuit are to control the flow of current to other components. Take an LED (light) for example; if too much current flows through an LED it is destroyed. So a resistor is used to limit the current.

Figure 2.2.3 Resistor

Relay:

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low- power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. A relay switches one or more poles, each of whose contacts can be thrown by energizing the coil, SPDT-Single Pole Double Throw, a common terminal connects to either of two others. Including two for the coil, such a relay has five terminals in total.

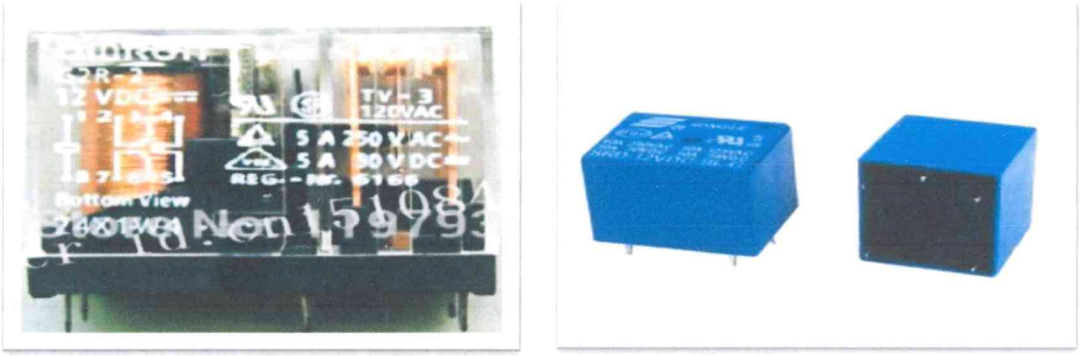


Figure 2.2.4 Relay

Optocoupler:

An optocoupler, also known as an Opto-Isolator or Photo-coupler, is an electronic component that interconnects two separate electrical circuits by means of light sensitive optical interface. A common type of opto-isolator consists of an LED and phototransistor in the same opaque package. Usually opto-isolators transfer digital (on-off) signals, but some techniques allow them to be used with analog signals.

Figure 2.2.5 Optocoupler

Diode:

The most common function of a diode is to allow an electric current to pass in one direction (called the diode's forward direction), while blocking current in the opposite direction (the reverse direction). Thus, the diode can be viewed as an electronic version of a check valve. This unidirectional behavior is called rectification, and is used to convert alternating current (AC) to direct current (DC), including extraction of modulation from radio signals in radio receivers these diodes are forms of rectifiers.

Figure 2.2.6 Diode

Capacitor:

Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, an ideal capacitor does not dissipate energy. Instead, a

capacitor stores energy in the form of an electrostatic field between its plates.

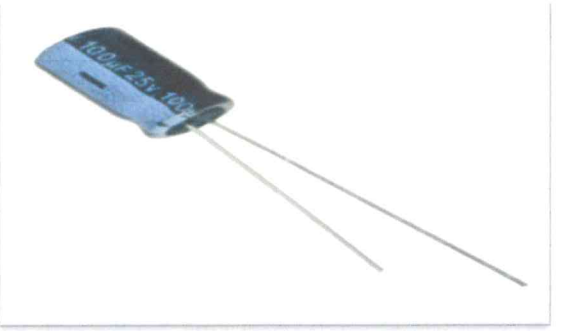


Figure 2.2.7 Capacitor

Terminal block:

A terminal block (terminal strip) is a modular, insulated block which connect one or more circuits to another. The connections are typically made by a screw or clamp lowering onto a bare wire in order to complete the connection.

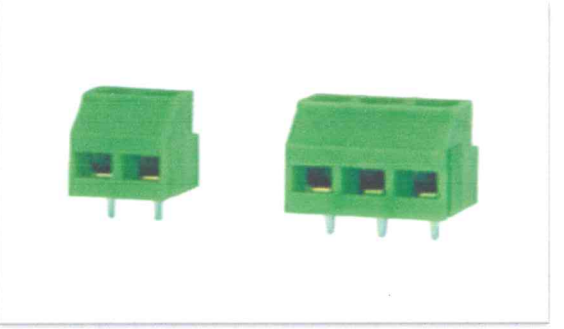


Figure 2.2.8 Terminal Block

CHAPTER 3
METODOLOGY

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 process needs to be done according to proper procedures to ensure that projects do not have any problems.

Among the measures the work done in preparing this project are.

- ♣ Process of designing circuit.
- ♣ Circuit board trace
- ♣ Soldering process in circuit board.

3.2 SELECTION OF TITLE

Selection of topics is the very first step was done before the start of the work associated with the project. The project title should be sought as appropriate to the level of Diploma is a final project during the course of study in the Diploma in Electronic

Engineering (Computer).

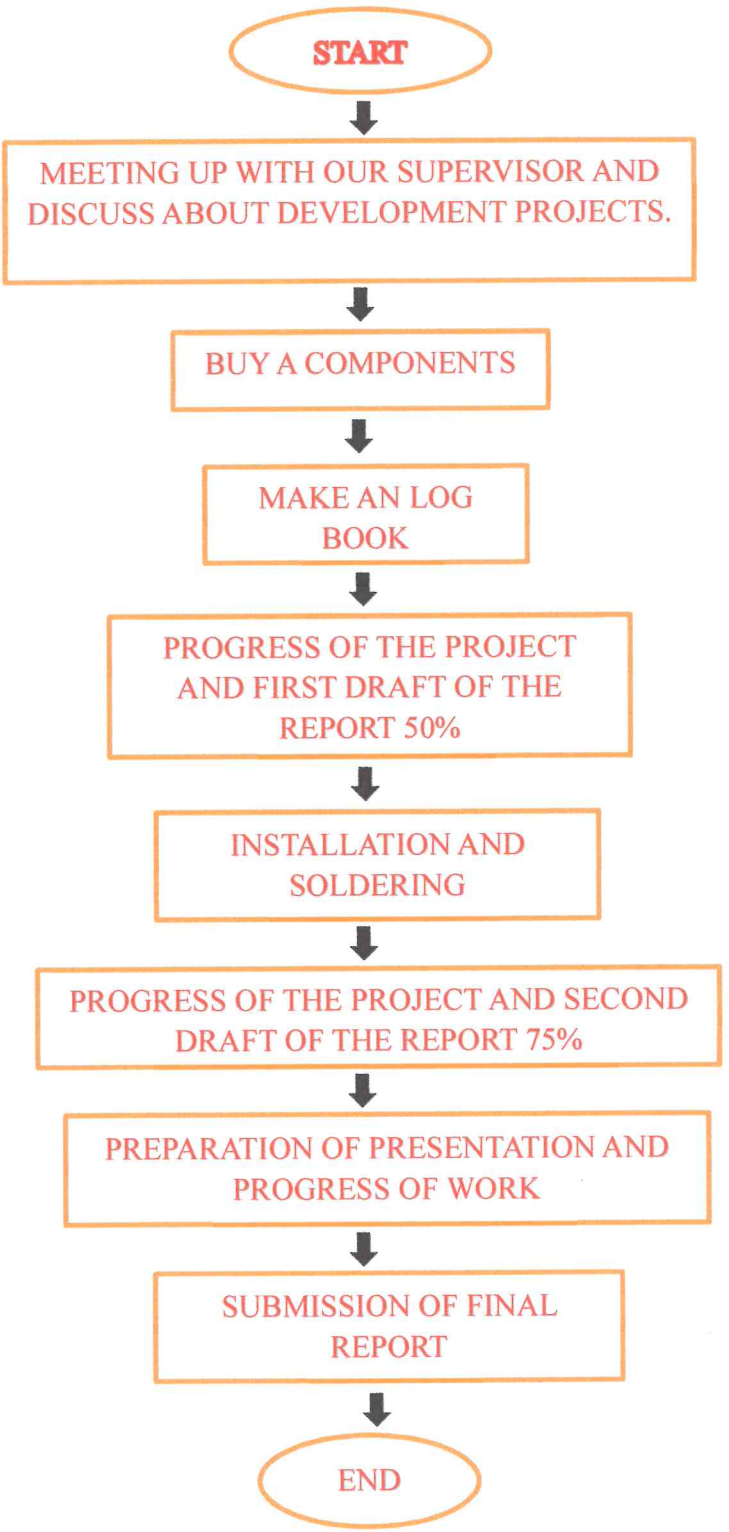
In addition, the selection of appropriate projects to help power their creative and innovative thinking as well as it symbolizes the level of consciousness of a person and how high the level of individual knowledge in aspects involving the use of electrical and electronic equipment. After the project is selected, the title to the project should be selected based on its ability to attract others to know more about the project closely. Title capable of attracting the attention of others symbolizing the beginning of the project status.

After the topics are selected, steps through again is to select circuits associated with the project to be made. In addition, identify the components involved with the circuit should be done properly so that it is readily available and does not pose a huge problem to get it. This is because the components that are difficult to be found will have an impact on the projects to be made because it would probably take a long time to get it.

3.3 FLOW CHART

While doing work for the completion of this project, we have done some advance planning before doing this project. Flow chart below shows some of the plans for this project. A flow chart is designed for smooth running of this project as well as helps solve problems step by step. The flow chart was used in analyzing, designing, documenting or managing a process or program.

Among the items listed are looking for ideas to design the project is a set the title of the project, designing the circuits and circuit analysis. Furthermore, we also estimated the cost of the project, buying the components used, install components and perform soldering circuit. Circuit testing is also performed to ensure that the system functions properly.


START
MEETING UP WITH OUR SUPERVISOR AND DISCUSS ABOUT DEVELOPMENT PROJECTS.
BUY A COMPONENTS
MAKE AN LOG BOOK
PROGRESS OF THE PROJECT AND FIRST DRAFT OF THE REPORT 50%
INSTALLATION AND SOLDERING
PROGRESS OF THE PROJECT AND SECOND DRAFT OF THE REPORT 75%
PREPARATION OF PRESENTATION AND PROGRESS OF WORK
SUBMISSION OF FINAL REPORT
END

3.3.1 GANTT CHART

No.	Activity	Week														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Planning For Final Project																
2.	Analyzing the needs for final project																
3.	Search and buy components																
4.	Development of the project																
5.	Recommendations for the final project completion.																
6.	Testing and Troubleshooting																
7.	Checking the neatness of the project																
8.	Report Writing																
9.	Preparation for presentation and final report																
10.	Presentation																

3.4 DRAW SCHEMATIC DIAGRAM OF CIRCUIT USING PCB WIZARD

PCB Wizard is a powerful package for designing single-sided printed circuit boards (PCBs).It provides a comprehensive range of tools covering all the traditional steps in PCB production, including schematic drawing, schematic capture, component placement, automatic routing, and Bill of Materials reporting and file generation for manufacturing.

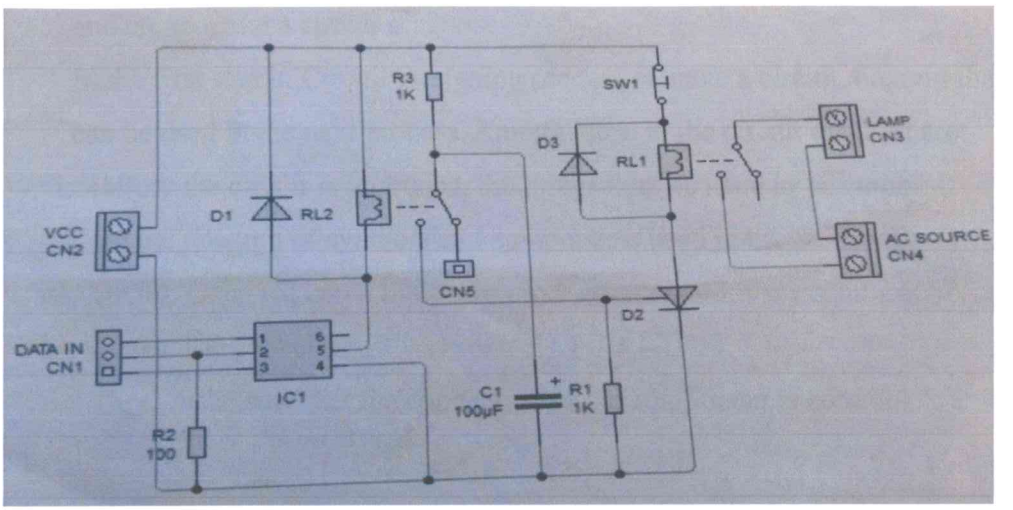


Figure 3.4.1: PCB lighting control circuit

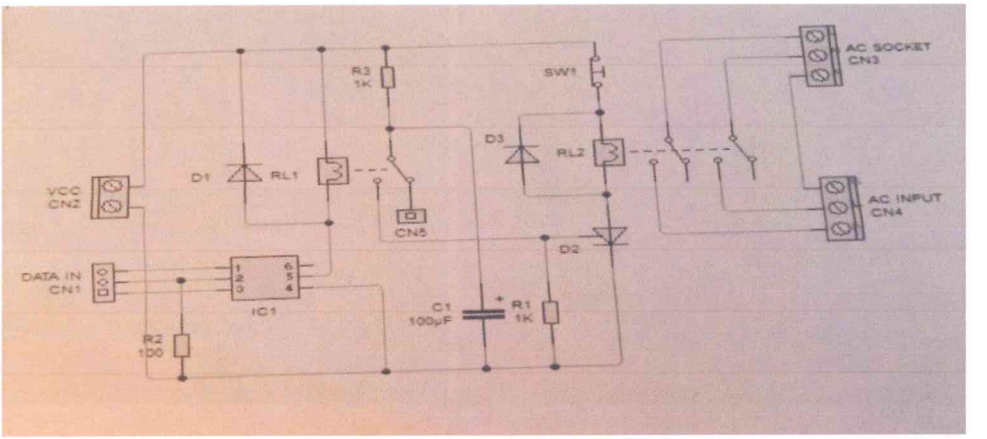


Figure 3.4.2: PCB Socket control circuit

3.5 Process Of The Circuit Designing

3.5.1 Design The Circuit Diagram

After decide what kind of project that we want to build. We need to make a research about the circuit, electronic component that we need to used, hardware and so on. These things actually can help us to make a better in designing circuit. For example, we 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 used in the next process. Among steps in the circuit diagram are:-

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

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

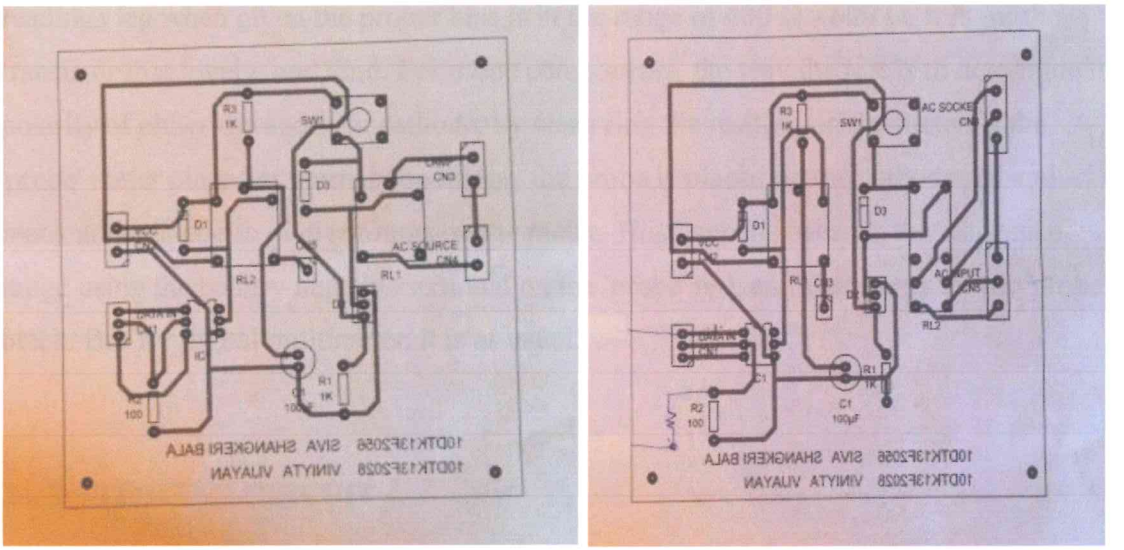


Figure 3.5.1: circuit Diagram

3.6 TESTING COMPONENTS AND CIRCUITS

The second step is to get the components associated with the circuits involved in the project. Once all the components are available, these components need to be tested whether it is in good condition or otherwise. This is to ensure that no problems will arise when testing on circuits that have been made.

3.6.1 INTEGRATION TESTING

Before the components are assembled and soldered on the PCB, it must first be tested. The testing process is done to select the components and obtain components that are really good and lovely and avoid getting poor quality components such as shortcuts and do not work. Component test process is performed using various meter (multimeter) in the range of Ohm. For components that lovely resistor value must be close to the value that has been imprinted on his body. For transistor component, the value of resistance readings leg when given the proper bias is in the range of 400 Ω - 600 Ω. It is for the transistor that lovely and kind. For diode components, the way the test is to determine the polarity of either the anode or cathode, by observing the reading on the meter. If the 'probe' meter placed at normal conditions, the probe is placed on the cathode red and black at the anode to give readings on the meter. This happens because the resistance range using the battery negative terminal on the 'probe' red, and vice versa for the 'probe' black. But for digital multimeter, it is as usual.

3.6.2 TESTING CIRCUIT

In the test circuit, it is done by installing all the components on the board test (project board) and use a multimeter. It is done to ensure that the circuits and components are in good condition. It is important for the recovery and ensuring that the components will be used later does not cause any problems.

3.7 PRODUCE PCB (PRINTED CIRCUIT BOARD)

For producing printed circuit boards (PCB) is good, the we must use all their creativity optimally, to transfer the schematic to PCB and after that tighthen neatly into a box 'casing'. We been using a computer software which is called as "PCB DESIGNER 5.4" By using this software which neatly printed circuit PCB can be generated. Here are

the steps for the preparation of this PCB :

3.7.1 THE PCB CIRCUIT

Design a circuit that will be applied to the PCB from a schematic diagram that already exists. This process should be done on a sheet of graph paper accordingly. Design a circuit that is not or has less jumper ' jumper '. After that, the circuit was printed out using the printer type "laser". Tracing paper used to print circuits that are ready to be installed must be of the type of parchment paper. Printed circuit completed earlier, lined with a sheet of carbon paper. It is used for producing the trace when the process of laying the PCB circuit. Get a piece of PCB boards are about as large as the circuit that was produced earlier. Then print paper in the PCB circuit board. Then stick on it, the paper should be scrubbed with a hot scrub. It is to get carbon sketches had to be attached to the circuit on the PCB board to be used.

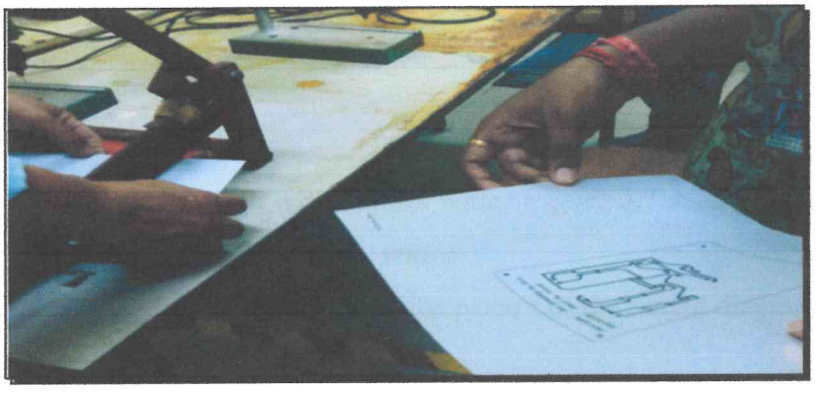


Figure 3.7.1: Circuit design on a sheet of graph paper

3.7.2 LETTERING

There are 3 types of lettering used, namely IC footprint, component (shaped holes) and circuit / track. Lettering will be traced to the PCB board seeks to avoid the tracks and the parts needed from eroded by acid will be used during the etching.

Dab lettering component / IC is required to place / point indicated by the proportion of carbon which has sequester before. Then, put a hand truck lettering, contiguous with lettering components. Upon completion of this process lettering, the circuit is ready it will be checked again to get a circuit that is absolutely perfect and accurate as of early circuit schematic and PCB (circuit trace).

3.7.3 ETCHING PROCESS

i. Wash with copper water to eliminate the effects of dust and fingerprints and other dirt. Then dry and avoid holding the copper board.

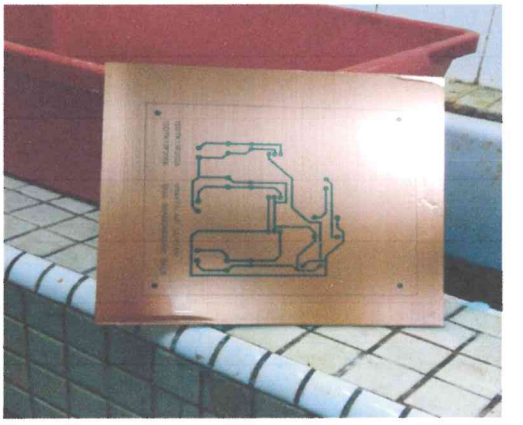


Figure 3.7.3: Process wash with copper water Figure 3.7.3: After wash with Copper water

ii. By using carbon paper and the pattern of the circuit diagram, draw the pattern on copper board circuit diagram.

iii. After completion painted pattern circuit diagram, remove the carbon paper and the pattern of the circuit diagram. With the aid of the circuit diagram and pattern, Paint line circuit paths with pen etching or regular paint is not soluble in water or can also use nail polish. Then pat dry.

iv. Once the paint is dry, soak into the liquid solvent. Dosage is 1 oz per 6 "x 4" size PCB in lukewarm water. Copper water part shall be at the top in order to facilitate the eroded portion visible for obtaining circuits that have been sketched earlier.

v. Shake the former solvent during soaking. (This process takes approximately 30 minutes or more). if the time for etching copper is too long for a small space, use the new solution. a liquid solvent (etching solution) can be used several times until the eroding power is lost.

vi. When all the parts board had unwanted soluble in liquid solvents, washing circuit boards. After reconstitution, the board said as copper printed circuit boards, ' pcb '.

vii. Remove the effects of which are painted with paint thinner / solvent paint. Then wash and dry.

viii. After that 'PCB' is ready to drilled to create hole and components may be mounted and soldered.

Figure 3.7.3 : Etching Process

3.7.4 PROCESS FOR PERFORATIONS HOLES / PEN DRILL

Prior to punch a hole is made, the source terminal or point hole marked with center punch. This is done to simplify the process of drilling.

Equipment needed to drill a hole on the PCB board :

i. Mini drill

ii. Hole punch

iii. Hammer

Steps to punch a hole on the PCB board :

i. Selection of drill time should be appropriate to the size of the component to be installed. The size of the hole that must be taken is the size of the hole for components such as diodes, resistors and transistors.

ii. Polystyrene is used as the base to avoid contact with a work desk mini drill punch when the process is done.

iii. Hole punching process is done carefully and meticulously so that the copper circuit was dietching had not torn or damaged.

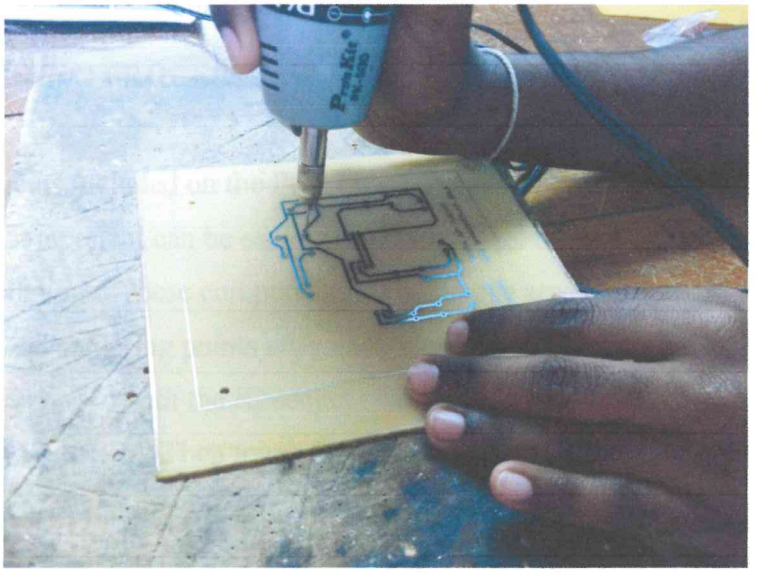


Figure 3.7.4 : Process punched a hole in the PCB board

3.8 INSTALLATION COMPONENTS IN PCB

During the installation process components, several steps before and after installation to be done to produce a perfect installation components. These steps are very important and should be done with great caution and careful. Some measures will be

carried out on the circuit is ready in 'etching'.

3.8.1 PERSISTENCE CIRCUIT TESTING

The test is performed after the PCB was ready dietching. It is also done by using a multimeter with a range of obstacles. It serves to keep track of who has made are in good condition, nice and always connected. The range on the multimeter set to x 1 0 Ω. Prob is contacted to the two ends of each track or connectors tested. If the indicator showed zero resistance, then the track was in a contiguous state. If the pointer on the multimeter does not move, then track it is broken or not connected.Circuits and components that are ready to be tested will be mounted on the PCB and soldered.

3.8.2 SOLDERING PROCESS

Components included on the PCB board. Player tapered tip is used to bend the legs so that the component can be easily fitted into place. Some of the rules followed during the installation of these components. Brazing eye area cleaned. Switch to heat the soldering tools and soldering points after heat, cover with tin soldering bit tip.
Soldering process began with the IC socket solder and soldering bit should be subject to regular on foot IC socket. Then touch the lead to the end of the soldering bit in the opposite direction. When looking at the lead had melted and flowed over the hole PCB and IC's foot, lift re-soldering. This process must be done with caution because of the distance between the legs of the IC it is close. There is a process of soldering resistors. Use the player to bend the legs tapered nozzle resistor of 60 degrees for easy incorporation into the PCB holes. The process is the same as the process of soldering soldering IC socket foot. After the excess component resistor soldered feet shall be cut with a cutter (cutter). The same process is carried out to walk capacitors, transisitor, diodes and all connection wires to the switches, buttons, fuses and other terminal. Also make sure that the polarity of the diode component is soldered properly before. After completion of the soldering process used switch off the power supply and clean the soldering using a wet sponge. Then the legs of that component shall be deducted.