

SECURITY ROBOT

**MUHAMMAD AMIRUL BIN ABD MALEK
(10DTK15F1058)**

**AFIO BIN SAPRI
(10DTK15F1055)**

**DIPLOMA KEJURUTERAAN ELEKTRONIK (KOMPUTER)
JABATAN KEJURUTERAAN ELEKTRIK & ELEKTRONIK
POLITEKNIK SEBERANG PERAI**

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POLITEKNIK SEBERANG
PERAI
KEMENTERIAN PENDIDIKAN
MALAYSIA
JALAN PERMATANG PAUH
13500 PERMATANG PAUH
PULAU PINANG
MALAYSIA



Tel: 04-538 3322
Faks: 04-538 9266
Laman Web: www.psp.edu.my
Facebook: politeknik.edu

Security Robot

<u>NO.</u>	<u>NAME</u>	<u>REGISTER</u>
1.	MUHAMMAD AMIRUL BIN ABD MALEK	10DTK15F1058
2.	AFIQ BIN SAPRI	10DTK15F1055

DEPARTMENT OF ELECTRICAL ENGINEERING

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Automation Security Robot

BY

MUHAMMAD AMIRUL BIN ABD MALEK (10DTK15F1058)

AFIQ BIN SAPRI (10DTK15F1055)

A proposal project submitted in fulfilment of the requirement for the award of the diploma of Electrical Engineering (Computer) Department of Electrical Engineering Polytechnic Seberang Perai (PSP).

JUN 2017

PROJECT REPORT COMFORMATION

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We hereby declare that the work in this report is our own except for quotations and summaries which have been duly acknowledged.

Student : 

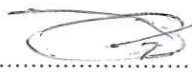
MUHAMMAD AMIRUL BIN ABD MALEK (10DTK15F1058)

Date : 2.11.2017

Student : 

AFIQ BIN SAPRI (10DTK15F1055)

Date : 2.11.2017

Supervisor : 

ENCIK SAZALI BIN HUSIN

Date : 2.11.2017

Dedicated to,

Our beloved father and mother,

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

Our beloved relatives,

Our siblings,

Thank you for your support and pray.

The person who has been very understanding and helpful,

Pn.Nasrolayuze Binti Mohd Saad

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

My unforgettable friends,

My housemate, my coursemate and all DTK students intake June 2014,

Our struggle not yet ends.

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

Hopefully achieved what we aspire

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful, the utmost thanks to Allah with His Greatest power, I have successfully completed this report *Alhamdulillah*. A special acknowledgement and appreciation goes to my supervisor, Mr. Sazali Bin Husin for his supervision, commitment, professionalism, advice and guidance in assuring my project succeed.

I also want wish the most gratitude to mom, father and family in helps me financially, advice, guidance and in spirit so that I successfully completed this final year project. Without support and inducement from them, I do not can finish my final year project successfully. Thank you I say also to my friends that also directly involved or indirect in giving advice, inducement and skills that they shared with me.

Hoped with knowledge that I own from complete my final year project, can I used in nature job later. May Allah repay their good merit that directly involved and indirect in helps me to complete this final year project. Thank you for everything.

ABSTRACT

The project report is to design and implement a wireless ventilation cleaner. The wireless ventilation cleaner is designed to make the ventilation cleaning process easier than using the manual. The idea is basically to have a relay to control such a sweeper to clean the ventilation space and deliver the output to the Arduino that will handle the movement of the wireless ventilation cleaner. By using a wireless ventilation cleaner, users can only turn on the wireless ventilation cleaner for human-controlled cleaning and can be seen through the camera. The methodology and scope of the study was carried out by conducting a literature review and research on various relay, driver motor, Arduino, and Arduino programming. The wireless ventilation cleaner will have several criteria that are efficient, orderly and user-friendly, that meet the human needs.

Wireless ventilation cleaner is a technology that is created and easy to use. As we can see, at present people do not have the time to clean the ventilation space neatly because of lack of time, and they find it difficult to handle from time to time. The difficulty of washing the ventilation space is in terms of time, size of the human body of different sizes. Therefore, this will have an adverse impact on the environment and the ventilation space will look dirty and unpleasant. wireless ventilation cleaner can clean the house more secure. It will move and roll through the camera placed on a wireless ventilation cleaner robot. wireless ventilation cleaner robot with this help, it will help people clean the ventilation room cleanly

Therefore, wireless ventilation cleaner is to help and encourage people to care for and clean the home environment easily. With the help of relays, it will act as a switch, when it is pressed means it works and when it presses the STOP button, it will stop this all is a program of arduino. This system will inspire, indirectly, involved and support the public to take responsibility for maintaining ventilation space. This is a great innovation for the whole community. This project will be implemented using Arduino UNO R3 using Arduino Software

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Robotics today are advancing to the point where many tasks that used to be for humans only have been supplemented by machines that can do the same tasks faster and safer than their human counterparts. Factories are using automated robots that do repetitive tasks all day long leaving the more skill oriented tasks for qualified personnel. Nowadays, some modern households have small autonomous vacuum cleaners that patrol the house cleaning while no one is actually controlling them. Of course these products have their limitations. A human is always needed to verify that the robot is doing its job appropriately. We don't really want to leave people out of checkpoints and quality control, but the robots can do the majority of the grunt work for society to provide a safer, cleaner, and potentially better place to live for all humanity. With the advancement and ever shrinking foot print of microcontrollers and central processing units more power and features can be fit on to smaller devices. This project intended to take advantage of the advancements in the electronics fields to create a functional patrol security guard robot. The research process has been completed, design criteria have been chosen, objectives and constraints have been set, and prototype building and implementation has been completed.

1.2 PROBLEM STATEMENT

- When people sleep, they not aware of intruders into their home.
- Use to many money to hire a guard
- Reduce a human resources

1.3 OBJECTIVE

The goal of project is to ensure the movement of Security Robot. The main objective to ensure the successful of the project is as follows:

1. To develop the circuit and hardware including the module for motor control
2. To develop the ultrasonic sensor measure the distance of target objects or materials through the air using “non-contact” technology.

1.4 SCOPE OF THE PROJECT

Sumo Robot controlled by using android device is a robot that the movement can be control by using android device as the console. The scopes in this project are stated below:

1. Limitation range of the Bluetooth connection between 5-20 meters.
2. Software application to control the robot car developed using Arduino programming.
3. Monitoring are limited for the indoor area only.
4. This robot car only can move on the flat surface.
5. This robot is measured 15x15 cm and it weigh 500g.

CHAPTER 2

LITERATURE REVIEW

2.0 INTRODUCTION

In this chapter, a review of previous related projects will be discussed. This study is a tool to generate some ideas about how this project works based on the achievement of the related projects and also to think about the advantage of the proposed solution. This may help in problem solving skills and options required for design and develop Security Robot by using Autonomous robot concepts

2.1 RELATED PROJECT

In this part, a review of related project will be discussed in order to achieve on the implementation of the project base on the related project.

2.2 METHOD OF PROGRAMMING LANGUAGE TO DEVELOP ANDROID APPLICATION

There were various ways of programming language that can be used to develop an android application such as Arduino programming based on a study of development android application. At the each type of this programming language will also need to do in Arduino programming language to compile the source code and then it's zipped into single file on the device.

2.3 MICROCONTROLLER

Microcontroller also one of the main part in this project, its generally used to control the robot part such as DC motor and other components. Normally, a PIC16 a microcontroller has been used during our studies but based on related project, they used ATmega32 microcontroller to control the motor, gather data from sensors and interface a serial Bluetooth module. In this part, the comparison between PIC18 and ATmega32 microcontroller has been made. Normally, ATmega32 microcontroller been used in the Arduino board. Thus, both microcontroller are good but the usage of which microcontroller that been depending on the needs of the projects.

	PIC 16F877A	ATMega32
Specification	Pin Count : 40 pin PDIP Program memory :14KB or 8K 14-bit flash Max crystal speed: 20MHz RAM bytes : 368 EEPROM Bytes ;256 Timers: 2 x 8 bit, 1 x 16 bit Digital communication : 1xA/E/USART Capture/compare/PWM: 2 x CCP ADC : 8ch, 10 bit Comparators :2	40-pin PDIP package Max speed : 16MHz or 16MIPS 32 Kbytes of Flash 1024 bytes EEPROM 2Kbytes internal RAM 2x8-bit Timer/Counters 1x16-bit Timer/counters 4x PWM channels 8x 10-bit ADC channel 1x USART
Advantage	Very good internal reference unit for comparator. The programming can be erased and written a lot more times	Internal Vref for ADC. Timer can be prescaled to 1024. Differential mode ADC with

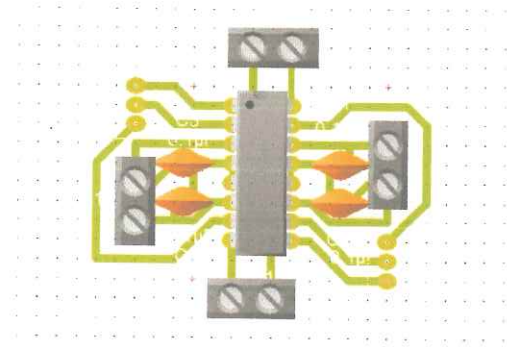
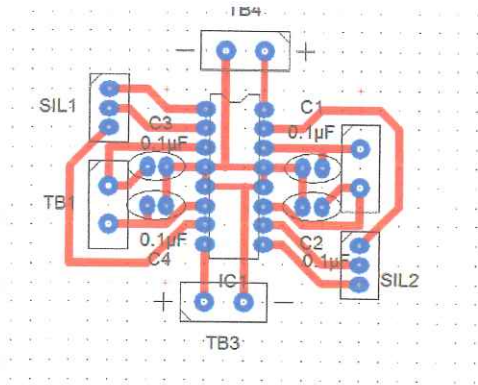
	The price is much lower compare to ATMega32	<p>gain 1x, 10x or 200x.</p> <p>Comparator can be multiplexed to all analog inputs.</p> <p>Compare and PWM modules on each timer.</p>
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Table 2.1: Comparison between PIC 16F877A and ATMega32

2.6 CONNECTION

There were various type of connection between Android and the Security robot such as, wireless connection or direct via USB. Observation from related project using the autonomous robot. Controlling with autonomous connection much easier to use as the function of the automatic in microcontroller programming software, for example when the ultrasonic sensor detected robot will measure the distance of target objects or materials through the air using “non-contact” technology. They measure distance without damage and are easy to use and reliable.

2.7 CIRCUIT IN PROTEUS PROFESSIONAL FOR GATBOT



This is the circuit layout in the PCB Wizard. We chose to create the circuit using PCB Wizard rather than Proteus because PCB Wizard is much more easier. The circuit consists of IC L293D, 4 capacitors, 4 terminal blocks and 2 SILs. We changed the pad to 0.08 mm to every pins at the IC.

Chapter 3

Methodology

INTRODUCTION

In this project, Students are learned the process of circuit design by using PCB wizard, the process of covering the circuit in PCB (Ultra Violet process and Laminating process). We learned process of etching, process of drilling and soldering. A Printed Circuit Board (PCB) is a structure used to connect and support electronic components. PCBs have conductive pathways through which different components are connected across the board. These pathways are etched from copper sheets. To ensure that the copper layer does not conduct a signal or current, it is laminated into a substrate

PCB mount process using the circuit under UV light for attaching the printed circuit earlier. The process of UV light on the PCB board takes about 15 to 12 minutes. After the UV light circuit, go on doing the circuit to prevent circuit developer damaged.

Laminating process is a bit difference compare with Ultra Violet (UV) process. Circuit boards that are composed of various layers are known as multi-layer PCBs. These layers can be either thin etched boards or trace layers. In both cases, they are bonded with lamination. For lamination, the internal layers of the PCB are subjected to under extreme temperature (375o F) and pressure (275 to 400 psi). This procedure is implemented when laminating with a photosensitive dry resist. Later, the PCB is allowed to cure at a high temperature. Finally, the pressure is slowly released and the lamination material is slowly cooled.

1.1 Step Preparation Projects

Here is the sequence of process that need to be follow all the step to make the projects

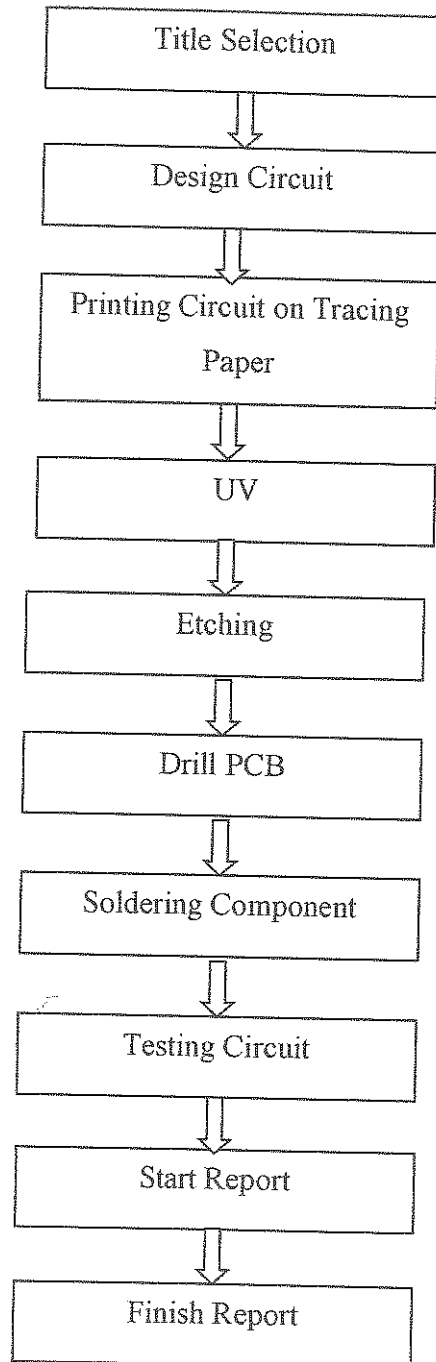
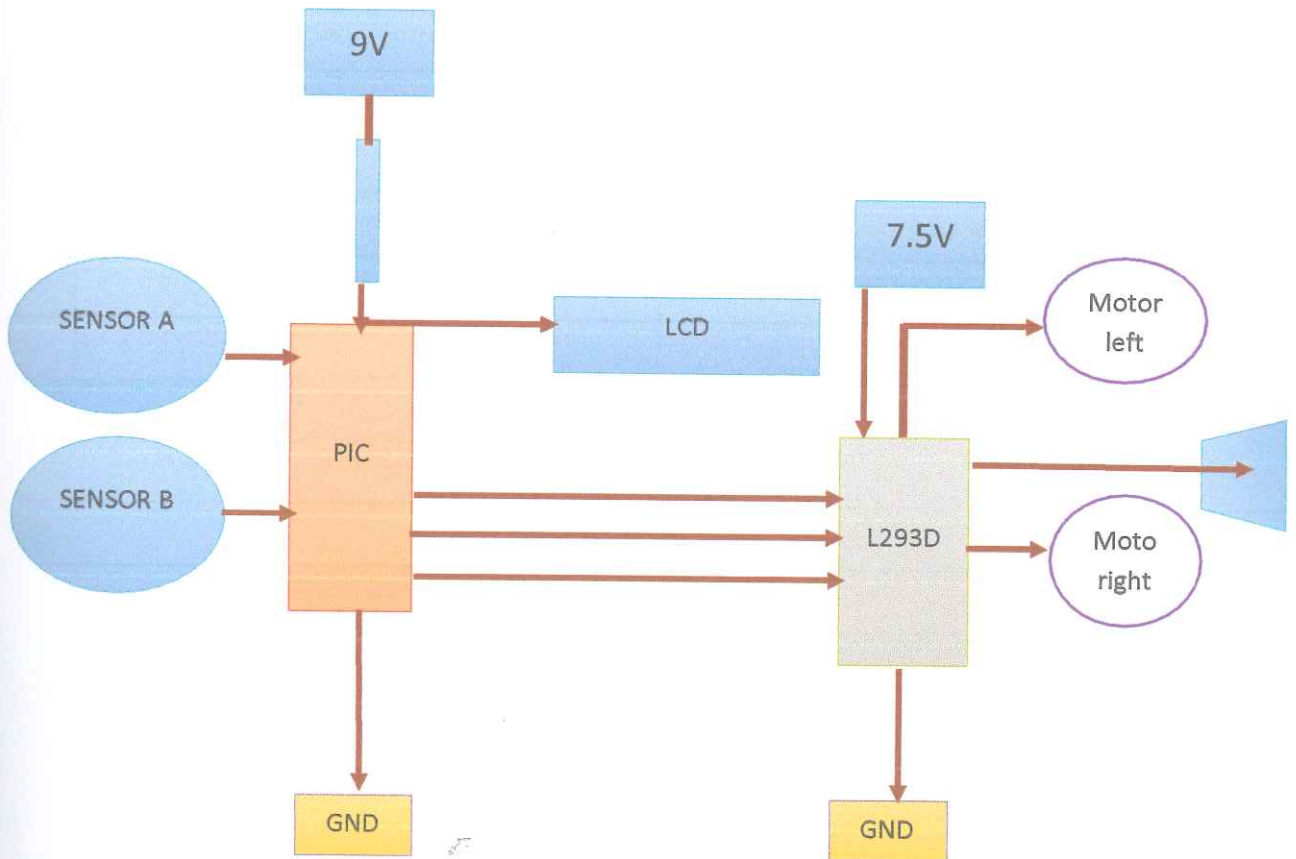


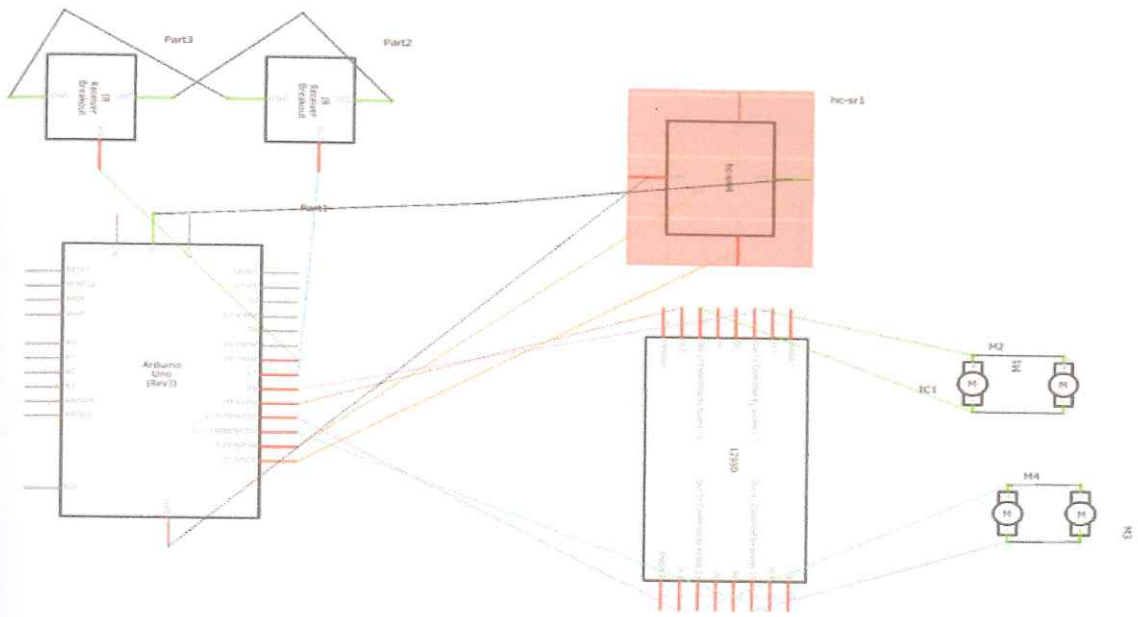
Figure 1.1a: Step preparation projects

1.2 Research Design

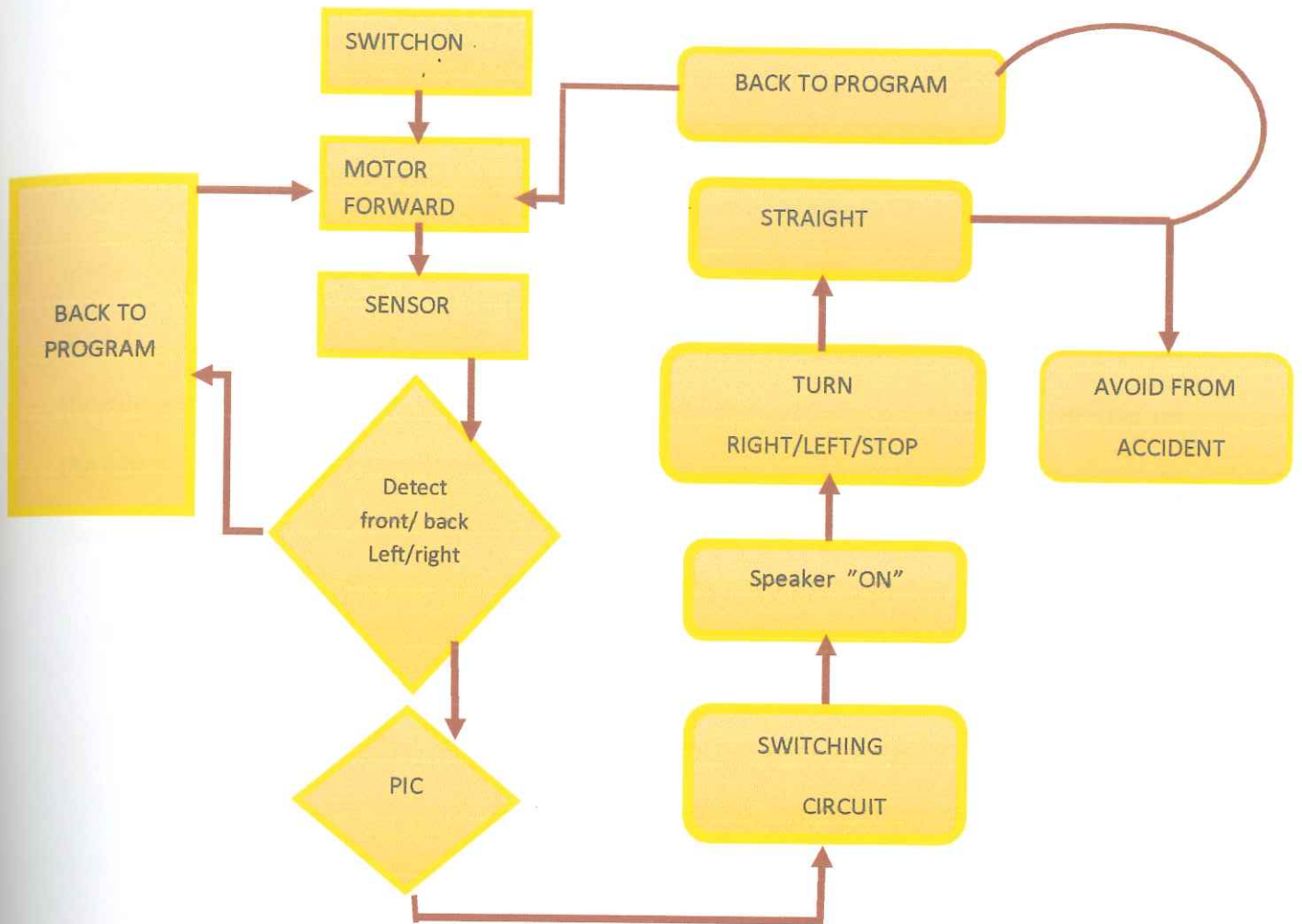
3.2.1 Block Diagram



3.2.2 Schematical Diagram



3.2.3 Flow Chart



3.3 Arduino and Ultrasonic Distance Measurement

Ultrasonic sensors are great tools to measure distance without actual contact and used at several places like water level measurement, distance measurement etc. This is an efficient way to measure small distances precisely. In this project students have used an **Ultrasonic Sensor** to determine the distance of an obstacle from the sensor. Basic principal of ultrasonic distance measurement is based on ECHO. When sound waves are transmitted in environment then waves are return back to origin as ECHO after striking on the obstacle. So students need to calculate the travelling time of both sounds means outgoing time and returning time to origin after striking on the obstacle. As speed of the sound is known to us, after some calculation we can calculate the distance.

3.3.1 Ultrasonic



Ultrasonic sensor HC-SR04 is used here to measure distance in range of 2cm-400cm with accuracy of 3mm. The sensor module consists of ultrasonic transmitter, receiver and the control circuit. The working principle of ultrasonic sensor is as follows:

1. High level signal is sent for 10us using Trigger.
2. The module sends eight 40 KHz signals automatically, and then detects whether pulse is received or not.

- If the signal is received, then it is through high level. The time of high duration is the time gap between sending and receiving the signal.

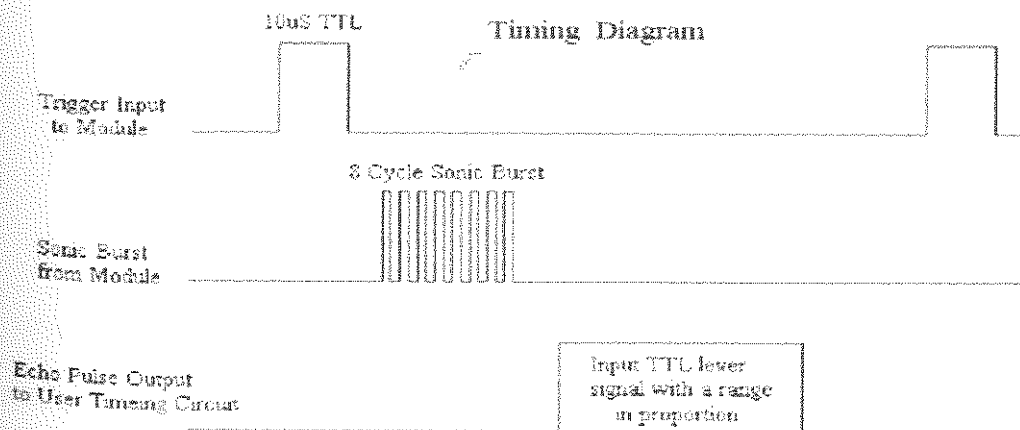
$$\text{Distance} = (\text{Time} \times \text{Speed of Sound in Air (340 m/s)}) / 2$$

3.3.2 Timing Diagram

The module works on the natural phenomenon of ECHO of sound. A pulse is sent for about 10us to trigger the module. After which the module automatically sends 8 cycles of 40 KHz ultrasound signal and checks its echo. The signal after striking with an obstacle returns back and is captured by the receiver. Thus the distance of the obstacle from the sensor is simply calculated by the formula given as

$$\text{Distance} = (\text{time} \times \text{speed}) / 2.$$

Here students have divided the product of speed and time by 2 because the time is the total time it took to reach the obstacle and return back. Thus the time to reach obstacle is just half the total time taken.



Instruments Research

-Instruments Research students are using PCB Board Drilling Machine, PCB Board Laminating Machine, PCB Etching Mesin, Soldering Iron and Lead and Ultraviolet Machine.

3.4.1 PCB Board Drilling Machine



Figure 3.3a

- ❖ Holes through a PCB are typically drilled with small-diameter drill bits made of solid coated tungsten carbide. The drilling is performed by automated drilling machines with placement controlled by a drill tape or drill file.

3.4.2 PCB Board Laminate Machine



Figure 3.3b

- ❖ Circuit boards that are composed of various layers are known as multi-layer PCBs. These layers can be either thin etched boards or trace layers. In both cases, they are bonded with lamination. For lamination, the internal layers of the PCB are subjected to under extreme temperature (375o F) and pressure (275 to 400 psi). This procedure is implemented when laminating with a photosensitive dry resist. Later, the PCB is allowed to cure at a high temperature. Finally, the pressure is slowly released and the lamination material is slowly cooled.

3.4.3 PCB Board Etching Machine



Figure 3.3c

- ❖ Is the process of removing areas of copper from a sheet of printed circuit board material to recreate the pads, signal traces and structures according to patterns from a digital circuit board plan known as a layout files. Similar to the more common and well known chemical PCB milling process, the PCB milling process is subtractive: material is removed to create the electrical isolation and ground planes required.

3.4.4 Soldering and Iron Lead



Figure 3.3d

- ❖ Soldering is a process in which two or more metal items are joined together by melting and then flowing a filler metal into the joint—the filler metal having a relatively low melting point. Soldering is used to form a permanent connection between electronic components

3.4.5 Ultra Violet Box (UV)



Figure 3.3e

- ❖ PCB mount process using the circuit under UV light for attaching the printed circuit earlier. The process of UV light on the PCB board takes about 15 to 12 minutes. After the UV light circuit, go on doing the circuit to prevent circuit developer damaged.

3.5 Usage of PCB Wizard Software



Figure 3.4a

PCB Wizard software is a powerful package for designing single-sided and double-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, and component placement, automatic routing, build of Materials reporting and file generation for manufacturing. In addition, PCB Wizard 3 offers a wealth of clever new features that do away with the steep learning curve normally associated with PCB packages.

3.6 Implementation

Step 1 is the process of circuit design using PCB wizard

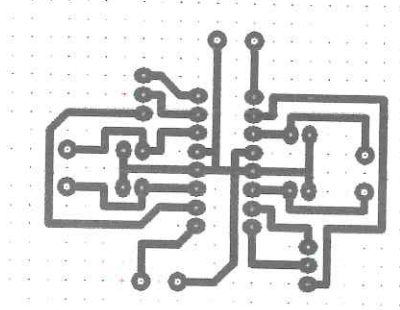


Figure 3.5a

Step 2 is the process of covering the circuit in PCB

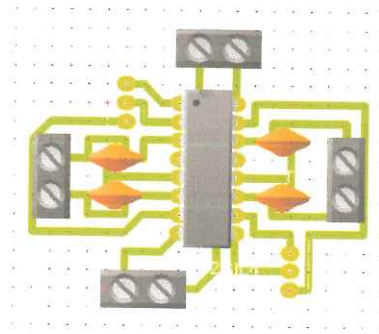


Figure 3.5b

Step 3 is the process Print Circuit by using Ultraviolet Machine

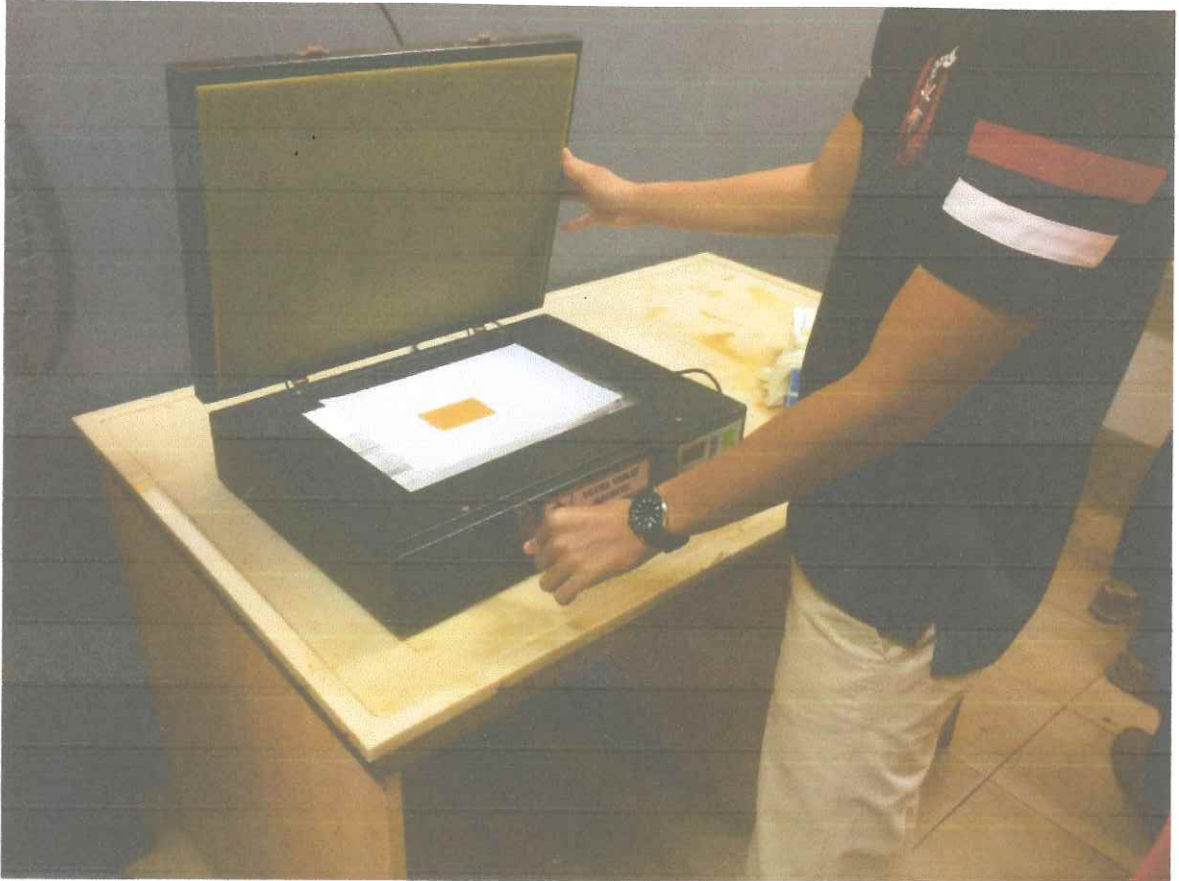


Figure 3.5c

- ❖ Student print the circuit onto tracing paper and put it into the ultraviolet machine and let it trace/print the circuit onto the PCB Board.