DRAWBOT

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DIPLOMA OF ELECTRICAL ENGINEERING
(COMPUTER)
DEPARTMENT OF ELECTRICAL ENGINEERING
POLYTECHNIC SEBERANG PERAI
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Penghantaran Laporan Ini Adalah Untuk Memenuhi Keperluan Untuk Penganugerahan Diploma Kejuruteraan Elektronik (Komputer) Di Jabatan Kejuruteraan Elektrik Politeknik Seberang Perai

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This project report title "Drawbot" has been submitted, reviewed and comfirmed as meeting the condition andrequirement of waiting projects as required.

Reviewed and approved by:

Name of supervisor: En Fadlilhisham Bin Ahmad

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Date: 24 OCTOBER 2017

"We declare that this is the result of our own except for each of which we explained the source"

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ABSTRACT

This final project is entitled drawbot. It is the robot that will draw with regular marking pens on piece of paper. The project focuses on drawing a circle. The objective of this project is to design the drawbot using arduino Bluetooth controller. To make the movements for drawing, dc motor is used as a

joints. In this particular project, arduino controller is programmed into the instructions to control the DC motor as we use. The drawbot will be able to draw the circle when the button is initiated and then back to initial condition. This project is using the arduino software to create the program of drawbot. This software emulator of the microcontroller will always suffer limited simulation from the combination device interaction with the circuit. This project is meant to be in industries such as drawing pattern of 'kain batik' and logo.

APPRECATION

First and foremost, I wish to express our sincerely appreciation to my supervisor, En Fadlisham for encouragement, guidance, critics and supports given throughout the progress for this project. Without his support and interest, this project would not have been the same as presented here. In preaparing this report, I was in contact with many people research, academicians and practioners. They have contributed toward my understanding and supports us for the whole semester 5. Thanks for their encouragement, love and emotional supports that they had given to us.

CONTENT

CHAPTER 1

INTRODUCTION

1.0 Background project

For our project, we had choose an idea to make a "drawbot". We choose drawbot because it's interesting as the robot will draw something on a sheet of paper. Besides, it use arduino. In project, we make a sumo robot that also using arduino and we think we can apply the sumo robot into a drawing robot. We have make an observation on drawbot and we can conclude its easily to produce and the budget to make drawbot is quite low as we are students, we don't actually have enough money to make an expensive robot.

1.1 Problems Statement

We all know that it take times to draw something and it become messy if we didn't get the accurate size and hight. It also use human energy to drawing and make human have less time to rest. A draw really take such a long time to be done. It also same as we use a computer to draw as it also use human energy. And also it's a bit complicated to use computer or manually drawing.

1.2 Objective

- A drawing can be done in a short time.
- To get an accurate size, length and height.

- Can produce a lot of drawing.
- Less human's energy used.

1.3 Scope Project

The project scope for implementation this project :

- Use arduino Bluetooth as a controller.
- Accurate length and height.
- Use marker pen and dc motor to lift the pen.
- Setup at coding using Arduino software.

1.4 Summary

By applying this Drawbot idea, we will can help facilitate the work of drawing with the large quantities of the same size and shape especially in the textile industry. It can save a lot of time to able to produce a number of forms in a short time.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Before starting this project, we have made the observation and study of all aspects available on Arduino, relay board and. There are various aspects that need to be addressed so that the products have a high capacity as well as cost savings. Among the things that are concern is the selection of Arduino, relay board, analyse the existing design, along with advantages and disadvantages of each tools and combination of Arduino. Below we have mentioned some of the study and research that we can do.

2.1 Materials

There are some Materials that are use in our project such as:

2.1.1 DC Motor and tyres

Figure 2.1.1: DC motor and tyres

DC motor with right angled drive reduction gerbox and rubber tyred wheel. This unit is ideal for robot or toy vehicle construction. Ideal for Arduino and other development systems. Light weight plastic construction gearboxmetal motor rated at 3-6VDC and soft rubber tyre. Wheel can fit to the left or right of the gearbox and motor can be run in both forward and reverse directions.

Features:

Voltage: 3-6VDC
Current: 80-150mA
No Load Speed: 3V-125 rev/min5V-200 rev/min6V-230 rev/min
Load Speed: 3V-95 rev/min5V-160 rev/min6V-175 rev/min
Output Torque: 3V-0.8kg.cm5V-1.0kg.cm6V-1.1kg.cm
Wheel Diameter: 65mm including tyre
Wheel Width: 25mm
Gearbox/Motor Dimensions: 20mm x 22mm x 65mm
Weight: 50grams

2.1.2 Marker pen

Figure 2.1.2 :Marker pen

To draw a shape produce by the drawbot. The pen was located at the center of the body. We make a hole at the perspek to insert the pen

2.1.3 PERSPEK

Figure 2.1.3 Perspek

A solid transparent plastic made of polymethyl methacrylate (the same material as plexiglas or lucite).

2.1.4 Nat& Screw

Figure 2.1.4 Nat& Screw

To join the PCB Board with the perspex.

2.2 Components

There are some components that are use in our project. Such as:

2.2.1 Arduino UNO

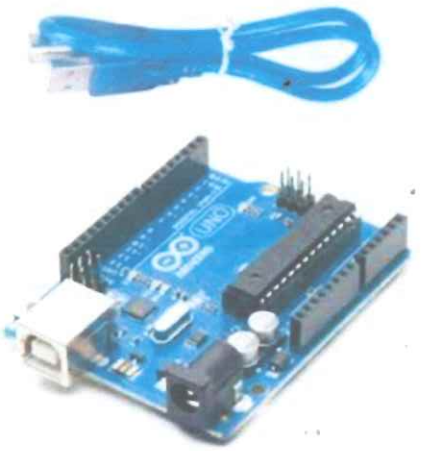

Figure 2.2.1 Arduino UNO

Arduino is an open source, computer hardware and software company, project and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The boards are equipped with sets of digital and analog input/output pins that maybe interfaced to various expansion boards and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus(USB) on some models, which are also used for loading program from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languagees C and C++. The arduino project provides an integrated development environment (IDE) based on the processing language project.

2.2.2 Printed Circuit Board(PCB)

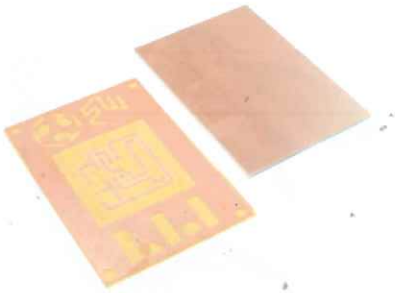

Figure 2.2.2 Printed Circuit Board(PCB)

Circuit boards or printed circuit boards (PCB) are thin plates containing electronic components. The plate allows circuit components to transfer information and signals between each other as well as information to external devices. In this project we used PCB cooper.

2.2.3 Bluetooth

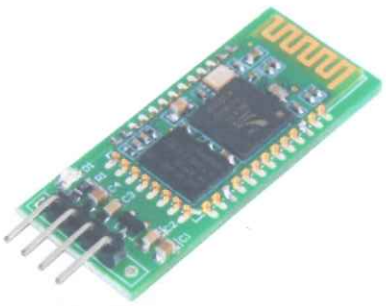

Figure 2.2.3 Bluetooth

Bluetooth is a wireless technology standard for exchanging data over short distances . We use bluetooth to control the drawbot using a button in arduino bluteeoth application.

2.2.4 Jumper

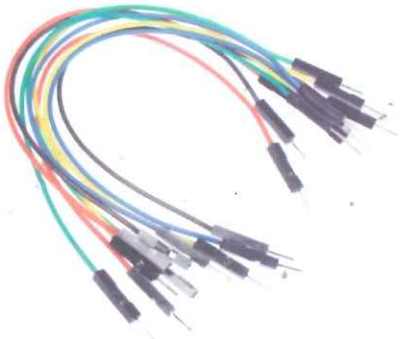

Figure 2.2.4 Jumper

A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire, or DuPont cable – named for one manufacturer of them) is an electrical wire or group of them in a cable with a connector or pin. We used to connect the wire at PCB to arduino board.

2.2.5 Capacitor

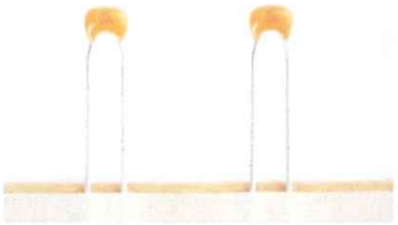

Figure 2.2.5 Capacitor

Capacitors are used in electronic circuits as low-pass, high-pass and band filters. A filter is a circuit that allows current and voltage of a specified frequency and waveform to pass through. We used 0.1 uFceramic capacitor in the circuit.

2.3 Summary

The components and material was choose with precisely and correctly to make a good product. The arduino uno was used in this project because it easily programmable then other arduino.

CHAPTER 3

METHODOLOGY

3.0 Introduction

This chapter is discussed about the methodology that has been used to complete this project. It was planned properly by getting the correct information from various sources from references book ,journal, articles, internet and others. It also include interview session with our supervisor to get the information, advices and guidelines to complete this proposal report. All of the data and useful information were determined to analyzed to get the best result. Generally there are several level to reach the complete product analysis which is

1) Design analysis to the available product.
2) Design concept based on the sketching and analysis drawing.
3) Produce the product concept.
4) Produce the real concept.

3.1 Milestone Table

Other than that, we will explain about planning table. According to planning job table topic, we will show our Gantt chart during development this project. Gantt chart also known as milestone table that is use to show time start and end time for task 1 project. The duration of each job or task can be display in Gantt chart. It is a popular type of bar chart that illustrates a project

schedule. Terminal elements and summary elements comprise the work breakdown structure project.

Gantt chart have become a common technique for representing the phases and activities of a project work breakdown structure, so they can be understood by a wide audience.

Although a Gantt Chart is easily comprehended for small project that fit on a single sheet or screen, they can become quit unwieldy for project with more that about 30 activities. Large Gantt chart may not suitable for most computer displays.

WEEK / ACTIVITY	WEEK2	WEEK3	WEEK4	WEEK5	WEEK6	WEEK7	WEEK8	WEEK9	WEEK10	WEEK11	WEEK12	WEEK13	WEEK14	WEEK15
BRIFING LECTURER														
FINAL PROPOSAL														
PROJECT PROPOSAL														
CIRCUIT														
DESIGN														
TESTING														
PREPARING														
PRESENTATION														

3.2 Flow Chart

Flow Chart Plan of Project:

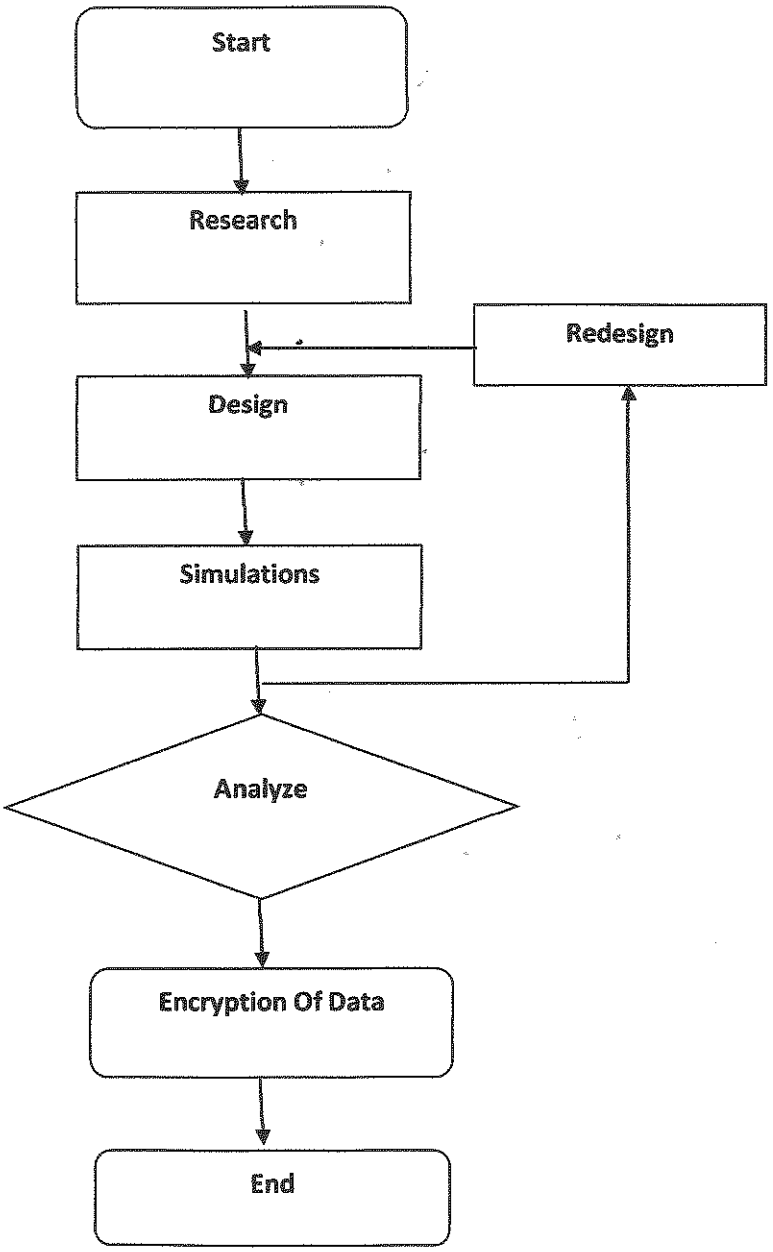

Figure 3.2.1: Flowchart Diagram

Process or methods used in the selection of the title is a way to find problems that

often occur at this time to solve the problem.

3.3 Flowchart Project:

3.3.1 Start:

At the start of the project we chose the title for the project that we want to produce. We refer to the internet and also our supervisors and also enlightened way to select projects that are appropriate to the given theme.

3.3.2 Research:

After obtaining approval from our supervisor for selecting projects, We create a study on the circuit and also study each component on the circuit to ensure that we understand the function of the project.

3.3.3 Design:

After we review the projects that we want to do, we sketch the project used PCBs software.

3.3.4 Simulation:

After we made a circuit a PCBs software, we make a simulation of the circuit diagram for the layout of the PCB board.

3.3.5 Analyze:

Next we analyse the circuit layout sketch. We found that battery cannot be run in the PCB layout. We find an approach or how to change the circuit components are appropriate with a terminal block that we wanted.

3.3.6 Data Encryption:

We tested the project again for the final state. And we found out USB port doesn't work, we changed again the USB port with correct connection of wires.

3.3.7 End:

Our project is completed tested circuit.

3.4 Draw Schematic Diagram of circuit using proteus.

PROTEUS V8.4 allows professional engineers to run interactive simulation of real designs ,and to reap the reward of this approach to circuit simulation .And then a range of simulator models for popular micro-controller and a set of animated models for related peripheral devices such as CT-ARDUINO UNO and LCD display , resistor and more.IT is possible to simulate complete micro-controller system and thus to develop the software for them without access to a physical prototype.IN a world where time to market is becoming more important this is a real advantage .Structurally, 6 Professional separated into two main components ,which ISIS 7

Professional and ARES 7 Professional ISIS 7 Professional mainly involved on circuit designing and simulation .In our project we use Proteus to design a schematic diagram.

3.4.1 Simulate the Circuit Using Proteus

After completing the circuit assembly and configuration ,now its time to verify whether the source code compiled is virtually accurate or not.Proteus offer a whole lot variety virtual devices.IN fact,simulation using oscilloscope and fuction generator can be done using Proteus .Even virtual hyperterminal is provided to demonstrate how your code perform in real world without eally doing the hardware section yet.

3.5 Process of Circuit Design.

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 use 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 software namely Proteus ISIS Professional.

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

3.6 Etching

Etching is a "subtractive" method used for the production of printed circuit boards. Acid is used to remove unwnted copper from a prefabricated laminate. This is done by applying a temporary mask that protects part 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 as they are sometimes called .Buckets, bubble tanks and spray machines lots of different ways to etching, but most firms currently use high pressure conveyerised spary equipment .Many different slow controlled speed etches used for surface preparation to the faster etches used for etching the tracks. Some are best used in horizontal spary process equipment while others are best used in tanks.

3.6.1 Risk Of Etching

i. There is a risk of injuries due to the chemicals involved.

ii. The quality of the result depends on several factors which you won't be able to master completely by using good machinery.

iii. There is the problem of waste disposal. Toxic chemicals require a proper disposal service.

3.6.2 Safety

Since the work involve dangerous chemical and power tools,we will need to take the necessary safety precautions:

i. Wear safety equipment during the whole process-gloves,protection glasse,and an apron .

ii. Work near an emergency eyewash station ,a first aid box and a phone .

iii. Familiarize yourself with the proper use of all equipment and tools in the lab-if you are unsure of anything ,ask a supervisor of the project.

3.6.3Etching Process

Etching is the process of using acid to remove coppers that not need on the PCB (PRINTED CIRCUIT BOARD). This acid is Acid Ferric Chloride III. is used to remove that coppers

3.7 The steps of the etching process are:

i. Print the schematic onto transparent paper and cut it with the same size of PCB board.

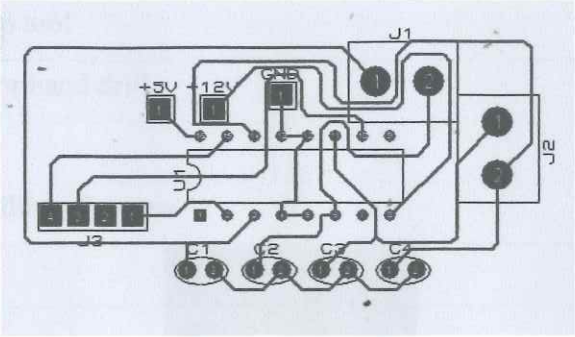

Figure 3.7.1 Printed schematic circuit

ii. Stick the schematic diagram on PCB board.

iii. Paste the etching circuit onto transparent paper with UV Board using expose machine. It's to make PCB paper joined with board.

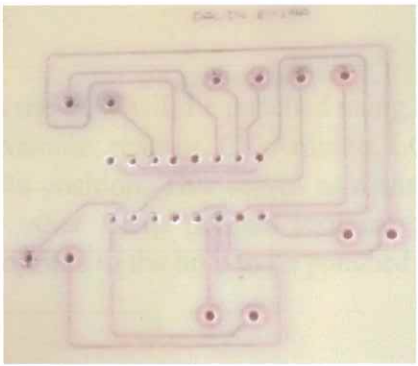

Figure 3.7.2 Circuit on PCB after etching

3.8 Drilling Process

3.8.1 Material and Equipment:

- Bench clamp or support
- Dot punch or sharp tool
- Drilling machine or hand drill
- 1mm bits

3.8.2 Introduction of Drilling Process

Figure 3.8.2:Drilling

After the etching process finished, the PCB will be punched using hand drilling machine. Hole is necessary to mount component (example; resistor, CT-Arduino, LCD and etc). Before drilling, a dot punch is used to mark the hole position. This serves as a shallow guide for the drill bit to align easily while drilling. Any other sharp pointed tool can be used to do the marking. Points/eye drill used must be appropriate to the hole to be punched between 0.75 to 1.0mm.

The purpose of this process is to facilitate the installation work on the circuit components of the PCB. During drilling ,do not be pressed too strong because it may cause eye drill broken up and dangerous for the people around. hold the drill steady and drill in straight slowly. The hole be drilled with little force applied.

3.9 Insert the Component

Foot of component was inserted into the drilled hole that has been completed that are installed must be inspected prior to use multimeter to find out whether these components are in good condition or not. This process is quite important because we should insert the component correctly to avoid from circuit failure. Besides, some components have their own pole like diode, capacitor and other else. After finished the inserting process, we check it once again with schematic to make sure all the component were at the position or holes.

3.10 Soldering Process

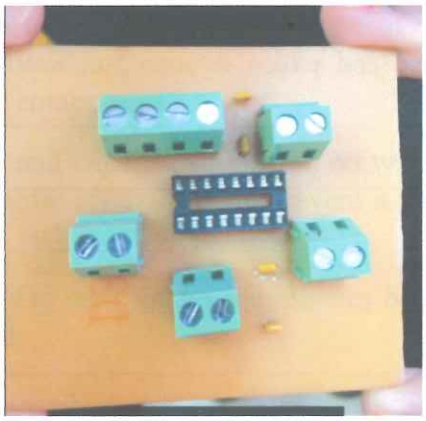

Figure 3.10.1:Circuit that had been solder

Soldering is defined as "the joining of metal by a fusion of alloys which have relatively low points'.in other words, we use a metal that has a low melting point. In other words, we use a metal that has a low melting point to add here the surface to be soldered together. Soldering is more like gluing with molten metal than anything else. Soldering is also a must have skill for all sorts of electrical and electronics work. It is also a skill that must be taught correctly and developed with practice.

3.10.2 Step to Solder:

i. Quickly remove the tip of the soldering iron from Heat up the soldering iron for five to 10 minutes, allowing the iron to reach maximum operating temperature. If the soldering iron has two temperature settings selectable with a switch, select lower temperature when soldering small electronic components to a board and select the higher temperature when soldering heavier wires. Apply a small amount of solder to the tip and rotate so the entire tip become lightly covered with a thin layer of solder. This is called "tinning "the tip.

ii. Connect the two surfaces to be soldered together so the metal parts are touching. If soldering wires, simply twist the two wire ends together so they don't pull apart while seat the component wire into the holes of the circuit board where the component is to be placed.

iii. Touch the hot tip of the soldering iron to all metal parts touching together so they are evenly heated. Allow the surface to heat for just three to five second, then touch the tip of the solder to the heated metal amount of solder to floe onto the metal components or wire unit just enough solder has been applied to cover the entire surface of the wire or components.

iv. The soldered surface and wipe the tip of iron on wet sponge immediately to remove solder. Wiping the solder off the tip will prevent it from burning a black coat on the soldering iron tip.

v. Allow the solder joint to cool for several minutes before applying power to the wire or the device soldered.

3.11 Circuit testing

Figure 3.11.1 :Testing the circuit