INTELLIGENT DUSTER

SITI NUR ATIKAH BINTI MOHAMMAD SAAD

10DEP15F1024

NURSYUHADA BINTI MOHD NASIR

10DEP15F1006

ELECTRICAL ENGINEERING DEPARTMENT

SEBERANG PERAI POLYTECHNIC

JUNE 2017

ANNOUNCEMENT

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

.....

(SITI NUR ATIKAH BINTI MOHAMMAD SAAD)

DATE: 2 OCTOBER 2017

.....

(NURSYUHADA BINTI MOHD NASIR)

DATE: 2 OCTOBER 2017

Approved by supervisor:

.....

JUNAINAH BINTI ABD. KADIR
Ketua Program
Diploma Kejuruteraan Elektrik & Elektroni
Jabatan Kejuruteraan Elektrik
Politeknik Seberang Perai
Pulau Pinang

(PUAN JUNAINAH BINTI ABD KADIR)

DATE : 2 OCTOBER 2017

ABSTRACT

This project is about Intelligent Duster. It involve hardware and software. Circuit of this project is simple which contains Arduino, Bluetooth module and magnet bar. During do the sumo robot we decided to make a white board eraser that could automatically clean. We also wanted it to be able to work on whiteboard and easy to use for anyone. Our white board cleaning robot was inspired by sumo robots. White boards are important to the future of education because they make collaborative work easier and are also useful in many other professional settings. Our white board cleaning robot is easy to use and can be used on white boards in classroom.

ACKNOWLEDGEMENT

Alhamdulillah, we were very grateful to the almighty Allah S.W.T for giving us the key and opportunity to accomplish our Final Year project.

We would like to take this opportunity to express gratitude to our dedicated supervisor, Pn Junainah Bt Abd Kadir for her guide that help this project at very stage and getting things done by sharing her valuable ideas and knowledge.

We have to appreciate the guidance given by other supervisor as well as the panels especially on our project presentation that has improved our presentation skills and thank you to their comment and advices.

Our deepest thanks to our dearest family which is always supports and prays on us throughout this project. Their blessing gave us the high-spirit and strength to face any problem that had occurred and to overcome them appropriately.

CONTENT

CHAPTER 1

INTRODUCTION

1.1 Introduction

We had made a major modification of our final project, the Intelligent Duster in previous entry with something which is more useful. Thus, our current activity was set up to refining our prior project into something that give meaningful effect to us as a student and lecturer. These are the common instructional materials that instructors have been using nowdays in classroom. The goal of this project is made of this robot help to clean the whiteboard without used energy. Besides that, this robot support eco-friendly product.

1.2 Project Background

Most of the people nowadays use white boards in classes or meeting rooms. They write a lot and erase every time when they finish. There are some disadvantages from erasing the whole board physically with your hand, like wasting some time, doing effort, not professional in some meetings for important people to do it themselves and it makes your hands more dirty after using it. Moreover, some people find it hard to reach all the parts of the board especially when it is mounted on a high distance from the ground. In this circuit we have used the circuit of sumo robot to move the duster that we make in project 1. Here we are using Bluetooth to control the robot. If we want to left we just press button left in application Arduino Bluetooth that we install from play store. To moves the robot we using 4 pin for connection to Arduino which is forward, reverse, right and left. So that it is good way to eraser the whiteboard.

1.3 Project scope

- The limitation Intelligent duster robot is suitable for half of white board to clean.
- The intelligent duster can only erase on rough surface of whiteboard.
- The limit for white board position is within 30-50 degrees.

1.4 Problem Statement

A study was being conducted our upper project that entitled Intelligent Duster based on with sparked idea from our monitoring and observation on human way of life nowdays. We wanted a project that was not only impressive and innovation but also something practical. What the first noticed was that during long lectures, had to pause to erase the boards every time the boards were full. It would be much more efficient time wise to have a bot do the erasing on a board while the lecture on another. Then, project ease people with less height and less effort to erase whiteboard. It would be much more efficient time wise to have a bot do the erasing on a board while the professor lectures on another. Furthermore, with the existence of this project it able facilitate more work to carry out with long distance.

1.5 Objective of Project

The main objective of this project can be describe as :

- To help disabled person to erase whiteboard without holding a duster.
- Saving energy to clean the whiteboard while lectures using another whiteboard.

1.6 Project Scope

Scope of project is divided into two sections.

For hardware section, the focusing area is

a) To stick magnet on the whiteboard

For software development, the focusing area is :

b) Program the Arduino by using C language

c) Build sample of program to burn the program Arduino.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A literature review is a body of text of text that aims to review the critical points of current knowledge and or methodological approaches on a particular topic. Literature reviews are secondary sources, and as secondary sources, and as such, do not report any new or original experiment work.

In this project a review of existing fire-detector types has been carried out along with the development of a low cost, portable, and reliable microcontroller based automated fire alarm system for remotely alerting any fire incidents in household or industrial premises.

Hence, systematic and detailed planning must be planning must be arranged for produce a complete and perfect project. First step that we need made it, was design daub (sketching) to get the real image of machine that we want to be produced. Due to this, the work design and study that we made is a continuing process and it involving problem solving activity creatively namely which is known as literature study.

2.2 SOFTWARE

2.2.1 Proteus Design Layout

The Proteus Design Suite is an Electronic Design Automation (EDA) tool including schematic capture, simulation and PCB Layout modules.

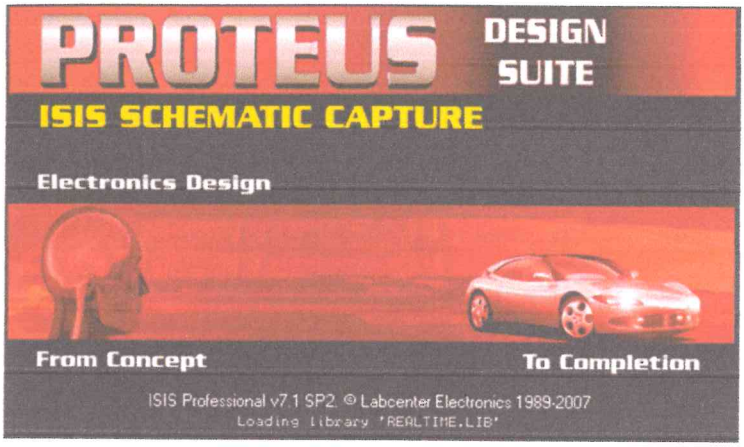


Figure 2.2.1

The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an autorouter and basic mixed mode SPICE simulation capabilities.

2.2.2 Arduino Uno

The Arduino project provides the Arduino integrated development environment (IDE), which is a cross-platform application written in the programming language the Arduino IDE supports the language C and C++ using special rules to organize code. The Arduino IDE supplies a software library called wiring from the wiring project, which provides many common input and output procedures. A typical Arduino C/C++ sketch consists of two functions that are compiled and linked with a program stub () into an executed cycle executive program:

Stup() : a function that runs once at the start of a program and that can initialize stings.

Loop() : a function called repeatedly until the board powers off.

After compiling and linking with GNU tool chain, also with IDE distribution, the Arduino IDE employs the program argued to convert the executable code into a text file in hexadecimal codding that is loaded into the Arduino board by a loader program in the board's firmware.

2.3 DEVICE USE

2.3.1 Arduino Uno microcontroller

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The project is based on microcontroller board design on microcontroller board design, produced by several vendors, using var0ious microcontrollers. These system provide sets of digital and analog Input/Output (I/O) pins that can interface to various expansion boards (termed shields) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an intergrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++. Figure 2.3 is shown Arduino Uno.

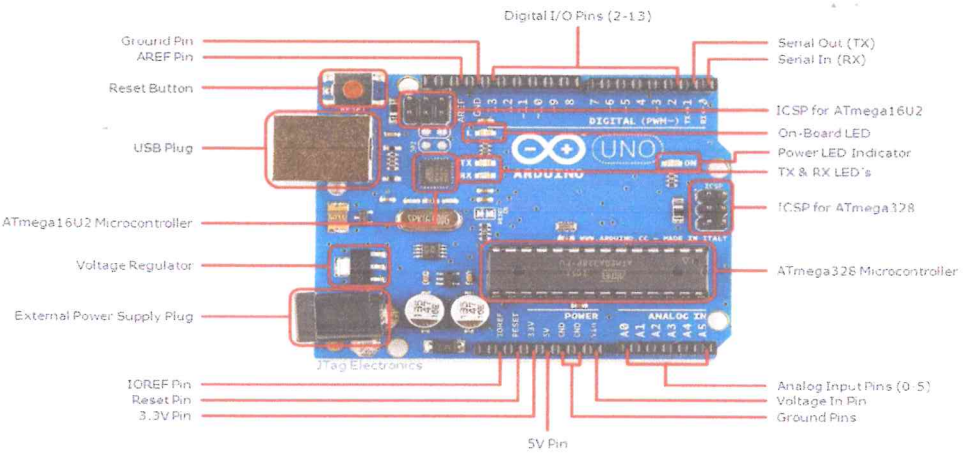


Figure 2.3.1

2.3.2 Bluetooth HC-06

The HC-06 module only can be a slave. This makes it only useful for say connecting a notebook as a master to a robot with a slave module e.g. for a wireless serial bridge.

- **KEY**: according to the data sheet, need to pull-up this pin while power-on-reset of the module to enforce AT mode.
- **VCC** is indicated in the range of 3.6V-6V. The module worked for me both with 3.3V and 5V.
- **GND**: Ground
- **TXD**: serial output of the module, to be connected to RX of the microcontroller. Note that this signal is using 3.3V logic level
- **RXD**: serial input of the module, to be connected to the TX of the microcontroller. Note that this signal is using 3.3V logic levels.
- **STATE**: connected to LED2 (Pin32) of the module, but no meaning. At least on my module the pin was always low, regardless if paired or not.

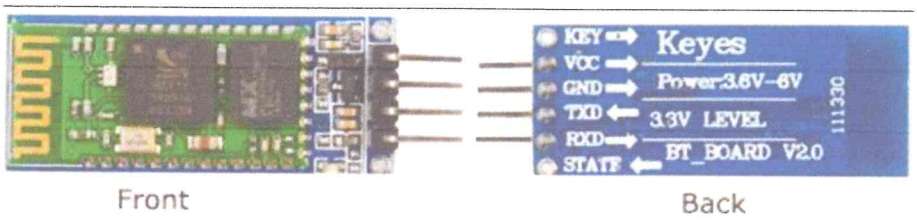


Figure 2.3.2

2.3.3 9v Battery

The main function is to turn on or off the power of electricity flowing through wires. Wires are used to join parts of a circuit. Electricity flows through wires. Its main function is to provide electrical items the power they need to work, provided by battery.

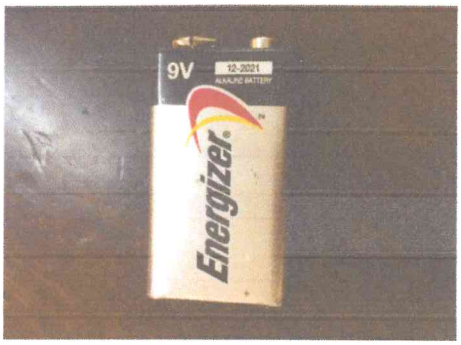


Figure 2.3.4

2.3.4 DC motors

This small yet powerful motor is great solution for small robot, example balancing robot.

Figure 2.3.4

2.3.5 T-BLOCK

A terminal block is a screw-type electrical connector where the wires are clamped down to the metal part by a screw. It is a connector which allows more than one circuit to connect to another circuit. It often contains two long aluminium or copper strips that are designed to connect different components. These strips create a bus bar for power distribution that is sent to the connected components. A barrier strip is composed of several screw terminals. There are many applications that use terminal blocks & barrier strips. Screw-type terminals are often used in order to connect a chassis ground, like on a surge protector. Several public address systems use them for speakers and other inputs and outputs. Screw terminals are very widely used in electricity wiring, to connect switches, and for connecting major appliances to plugs at home.

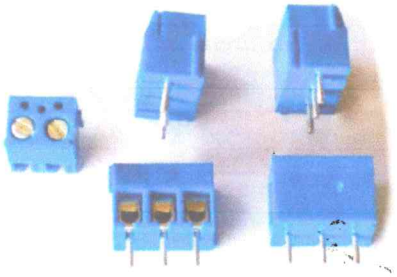


Figure 3.3.5

2.3.6 Magnet Bar

The function of bar magnets is to pick small metallic object like metal shavings or nails and screws as magnetic stirrings rods laboratory applications and as magnets on refrigerators.

Figure 2.3.6

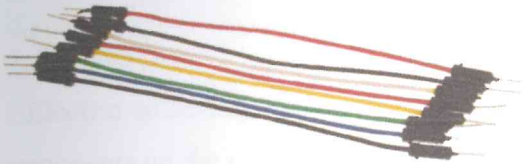
2.3.7 JUMPER WIRE

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 at each end, which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering. Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

Types of jumper:

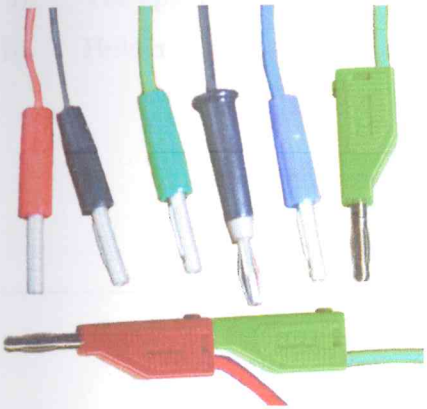
- There are different types of jumper wires. Some have the same type of connector at both ends, while others have different connectors. Some common connectors are:

- **Solid tips** – are used to connect on/with a breadboard or female header connector. The arrangement of the elements and ease of insertion on a breadboard allows increasing the mounting density of both components and jump wires without fear of short-circuits. The jump wires vary in size and colour to distinguish the different working signals.
- **Crocodile clips** – are used, among other applications, to temporarily bridge sensors, buttons and other elements of prototypes with components or equipment that have arbitrary connectors, wires, screw terminals, etc.
- **Banana plugs** – are commonly used on test equipment for DC and low-frequency AC signals.
- **RJnn** – are commonly used in telephone (RJ11) and computer networking (RJ45).
- **RCA connectors** – are often used for audio, low-resolution composite video signals, or other low-frequency applications requiring a shielded cable.
- **RF connectors** – are used to carry radio frequency signals between circuits, test equipment, and antennas.



Solid tips

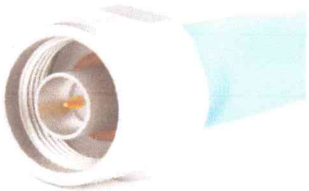
Crocodile clips



Banana plugs

Radio Corporation of America (RCA)

Registered Jack(RJnn)



Radio frequency connector(RF)

Figure 2.3.7

2.4 TOOL

2.4.1 Electric Soldering Tools and Soldering Stand

Electric soldering tools used to do the work of installing or removing soldering electronic components on the circuit. It is also used to specify a wire connector permanently. The power the used for soldering electronic components is 15 W – 25 W (low power). Soldering tools is divided into three main sections

I. The solder head
II. The upper heater
III. Holder

Figure 2.4.1

The soldering stand is a tool that used to put electrical soldering tool to prevent accidents such as burns, exposed to plastic components and so on.

2.4.2 Tin Soldering

Tin soldering is used during the soldering process is carried out. During the soldering is done, tin soldering is required to connect or attach a foot hole in the component on the PCB board (printed circuit board). Soldering tin is made of an alloy consisting of a mixture of tin and lead. Tin filled with material along fine wire wire in the hole to faciliate soldering.

Figure 2.4.2

2.4.3 Sucker

A sucker tin soldering is used at the time of inhalling tin soldering work overload, do not use and continued on rhe foot tin component in PCB board (Printed Circuit Board).

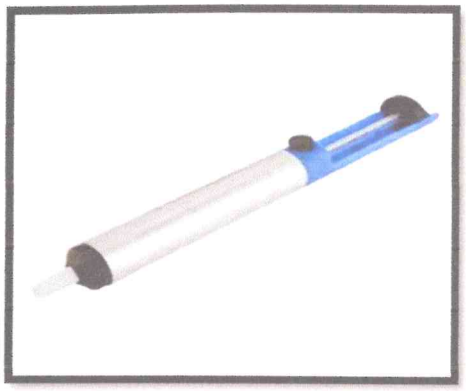


Figure 2.4.3

2.4.4 Drilling Machine

Drilling machine table is used to punch holes in the PCB board. This machine is sitable for use because of its small size and convenient in this punching process. Drill bit used to drill a hole.

Figure 2.4.4

2.4.5 Etching Machine

Etching machine is used for corrosive parts that are not needed during fabrication circuit automatic clothesline. Corrosive liquid used for etching unnesessary parts on the circuit board.

Etching Machine

Figure 2.4.5

2.4.6 Ultraviolet Machine

Ultra violet machine used for clapped schematic diagram of tracing paper on the circuit board with the appropriate temperature.

Figure 2.4.6

2.4.7 3D Design Printed

3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the object is created. Each of these layers can be seen as a thinly sliced horizontal cross-section of the eventual object.

3D printing is the opposite of subtractive manufacturing which is cutting out / hollowing out a piece of metal or plastic with for instance a milling machine.

3D printing enables you to produce complex (functional) shapes using less material than traditional manufacturing methods.

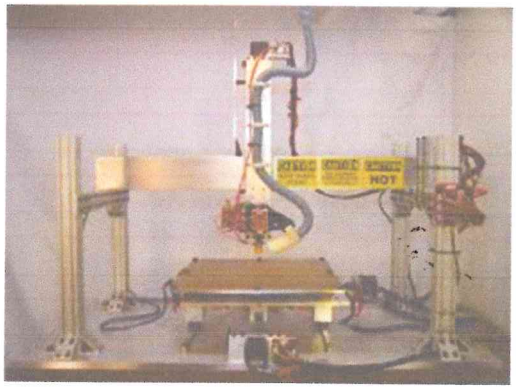


Figure 2.4.7

CHAPTER 3

METHODOLOGY

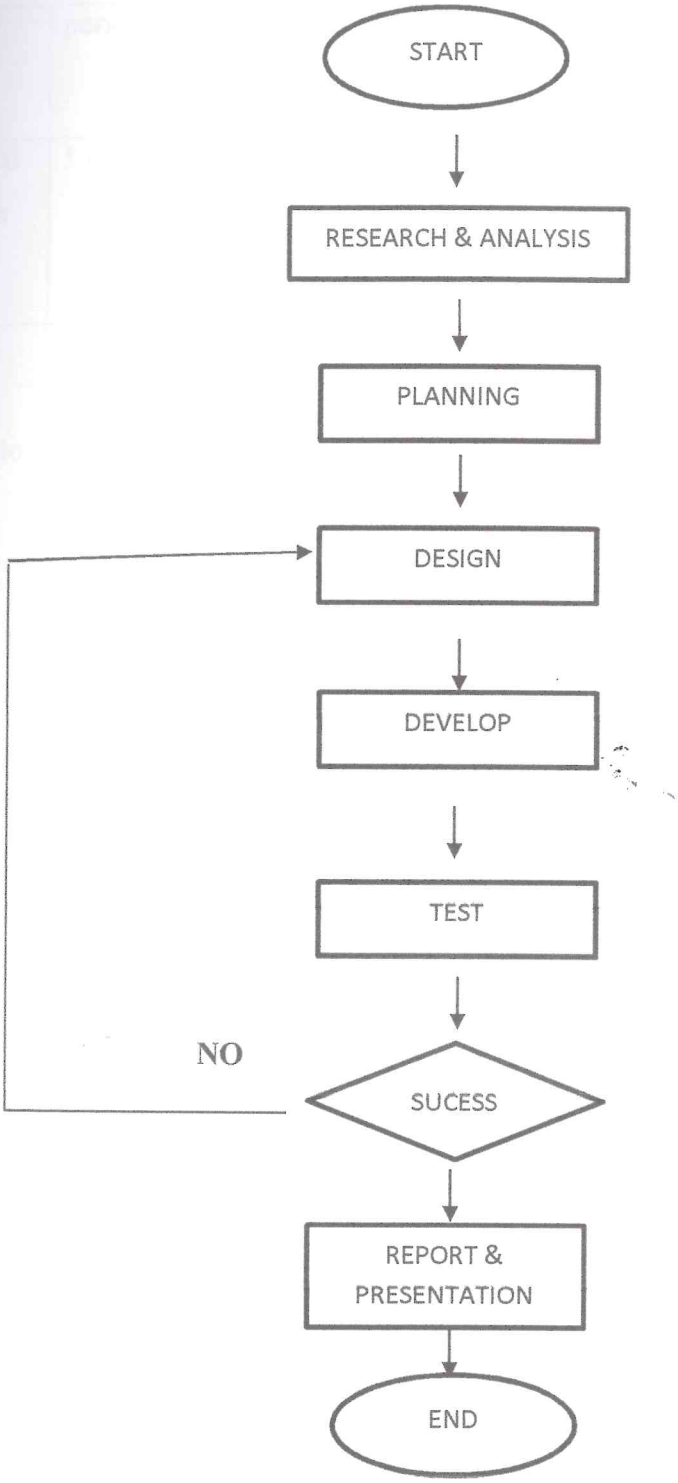
3.1 Introduction

Methodology is the work carried out as appropriate and continuity of the project. Current procedures are the steps to implement the methodology which generated. To ensure that these projects implemented smoothly, systematic measure should be planned in advance the correct sequence. Manner in between steps taken are as follows.

- Design analysis
- Cost analysis
- Material analysis

Discuss and explanation idea work to be done because it is important in the execution of a project. Discussion design supervisor must be in order explain her brilliant idea. Therefore, in this project planning schedule as Gantt charts very important and effective to ensure the real project was progressing as planned was done.

3.2 Flow Chart



Flow chart of project selection.

3.3 Gant Chart

NO	Activity	period	Start date	Dateline	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Introduction of the project	1 day															
2	Meeting with supervisior	Every week															
3	Buys the component	3 week															
4	Sketch the PCB	2 week															
5	Etching and drill, and soldering component	5 week															
6	Writting report	2 week															
7	Presentation	1 day															

3.4 Process Of The Circuit Designing

3.4.1 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:-

i. 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.

ii. 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 Intelligent Duster System.