SMART DUSTBIN

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by

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A proposal project submitted in fulfillment of the requirement for the award of the diploma of Electrical Engineering (Computer) Department of Electrical Engineering Polytechnic Seberang Perai (PSP).
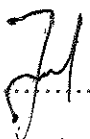
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JUNE 2017

This project title "Smart Dustbin Robot" has been submitted, reviewed and confirmed as meeting the conditions and requirement of writing project required.

Reviewed and approved by:

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Date: 1 / 11 / 17

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ABSTRACT

"SMART Dustbin MONITORING USING GSM" is one of the bins automatic system where is a new creation that can be used by all levels of society, particularly for people with disabilities. In addition, the trash is also equipped with a system of transmission of information through short messages (SMS). It has been modified to make the connection between the bins with Global System for Mobile Communications (GSM). This system will provide information orders (SMS) to the management of waste cleaning to make cleanup or garbage collection which is full. Dustbin Monitoring Project Using Smart GSM will also facilitate the management of cleaning in a supermarket or shopping complex to make the monitoring of bins is full. With this project it can reduce the problem of trash filled up and overflowing bins that are not managed well or not makes cleaning the trash that was littered with trash. The project will operate if it is full of garbage, trash will give an audible signal and at the same time it will enable the Global System for Mobile Communications (GSM) and the information is sent through short message (SMS) to the management of cleaning. However, this automated garbage bins still much to be improved and made improvements in terms of operation and system aspects there in.

ABSTRAK

"SMART Dustbin MONITORING USING GSM" adalah salah satu ciptaan baru yang boleh digunakan oleh pelbagai lapisan masyarakat, terutamanya orang-orang kurang upaya (OKU). Tambahan pula, SMART Dustbin ini dilengkapi dengan sistem short messages atau lebih dikenali sebagai SMS. Sistem tersebut telah diubah suai supaya bersesuaian dengan SMART Dustbin dengan mengunakan (GSM) yang bermaksud Global System for Mobile Communications. Fungsi sistem berikut adalah untuk memberi notifikasi kepada pengguna bahawa dustbin telah penuh muatan dan sampah-sampah perlu dibuang. Ini amat berguna jika digunakan dalam skala yang lebih besar seperti kedai runcit atau kompleks membeli-belah. Projek kami ini akan mengurangkan masalah sampah berlebihan muatan yang tidak terurus. Apabila sampah telah lebih muatan, sistem akan memberi signal dimana notifikasi akan dihantar melalui sistem SMS kepada pengguna. Walau bagaimanapun, SMART Dustbin ini masih banyak yang boleh diperbaiki dari segi operasi dan aspek system.

DEDICATION

Dedicated to,

Thanks to God,

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

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,

Mr. Fadlihisham Bin Ahmad,

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

My unforgettable friends,

Our housemate, our coursemate and all DTK students intake June 2015,

Our struggle not yet ends.

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

Hopefully achieved what we aspired.

ACKNOWLEDGEMENT

Alhamdulillah, thank you Allah because of His blessing, we finally complete and finish final year project successfully.

During the process to complete project objective, we do a lot of research either by using internet, reading past year thesis, reference books and journal. With the guidance and support from peoples around us, we finally complete the project due to the time given. Here, we want to give credit to those who helped us to achieve what we had achieved in final year project.

We would like to express sincere and gratitude and respect towards our project's supervisor, Mr. Fadlihisham Bin Ahmad for his kind, encouragement and suggestions. Without his continued support and interest, the project would not be like what it likes today. May Allah bless and reward him for his sincere, endeavour and contribution in the way of knowledge.

We also want to thanks to our beloved parents because without them, I will not be able to do well in final year project. They did give we a lot of support, both from money and moral support to help we continue for what we had started on.

Thank you to all lecturers, staffs, friends and all who has directly and indirectly involved on this project. Your helps and cooperation will never be forgotten. May Allah bless and reward them for their sincere, endeavour and contribution in the way of knowledge.

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3   METHODOLOGY

4   PROJECT ANALYSIS AND DISCOVERY

5   DISCUSSION

6   CONCLUSION AND SUGGESTION

CHAPTER 1

INTRODUCTION

1.1 Project Background

Nowadays many people prefer to shop in supermarkets because there are a variety of goods from raw materials to cook up household items. With the presence of many visitors to the supermarket will generate a lot of waste disposal problems and can lead to the trash cannot cope with the amount of waste that much that sometimes it overflows. This is because the cleaning of waste management is not very sensitive to the situation full of trash. Most of the available bins of supermarkets or public areas not be collected on time and sometimes it was full of trash rapidly due to the many visitors who shop at supermarkets. So the model is designed bins to resolve this issue. When found bins are full, short message will be sent to the garbage collector to collect the waste.

In this project is combines knowledge in the field of telecommunications and computing. Sending short messages via a modem that is GSM (Global System for Mobile Communications) mobile phones to be used and studied and practiced to this project. The project also uses the C programming to PIC was also used and studied and applied to the control circuit.

1.2 Problem Statement

The world today is moving fast along with the rapid flow of technology. A long with it, people have to move fast so it not misses out by modernity technology that available in the world today. Now with changing this time is need to make some application or product that very useful for all segment of society without thinking their status.

If seen in the market most of dustbins are manually operated and it will use leg and hand for open the cover of dustbin that can allow a person to dispose the rubbish. But it very difficult for the persons with disabilities. This dustbin is not user –friendly system dustbin because it only can use for normal people and not for person with disabilities.

In the hypermarket it will more of dustbin that be prepared, it will make easy to people for dispose of rubbish. But some time, when the rubbish is overloading the management team cleanup is slow to take the action for the collected rubbish. This is because cleaner not accept the instruction or information about the overflow rubbish inside the dustbin. For monitoring the dustbin it still use the old-fashioned way and it is not very efficient for this age, so created this project can make the work clean faster and easier.

Other problem that can see is many people not interested to use dustbin for littering because they not interesting to came near the dustbin. So this project can attract attention people to use dustbin because it very easy to use and it is a very modern system.

1.3 Objective

The purpose of this project is to provide some project that can monitor the dustbin using the new technology.

1. To develop a prototype of the smart dustbin monitoring system, when the trash inside the dustbin is full it will automatically detect by the sensor system.

2. To develop a system that can send information from one place to another place without any limitation.

3. To integrate the project of dustbin that uses the communication system for sending information data and it also can provide the user-friendly system.

1.4 Scope of Project

The project is about monitoring the dustbin inside the hypermarket. This project is more suitable for area inside hypermarket or in the specific area. The focus of this project is make easy for cleaner collect the overload garbage without waste of time, they will came collect when get the message.

The projects have use Arduino Uno Board because it can control the sensor, motor and GSM to run the function. This project has use software and hardware component. For the software application it will apply to active the component and run the application GSM to make the connection between dustbin and management. The message full rubbish will send to supervisor for the information and will be notified to cleaner for collect the rubbish.

On the order hand, to order word the limitation of this project
- This project a focus on the hypermarket or specific area
- The dustbin will with controlling by Blue Ard application.
- This dustbin will only send the message to department of cleaning management
- The project will become user-friendly that can use for all type of people whether normal or persons with disabilities.

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1.5 Definition of Term

There are several definition that are explain more deeply about the equipment that are used in this project.

i. Definition Arduino Uno

We use Ardunio Uno is a microcontroller board based on the Atmega328P.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. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start. This type Arduino is cheap and easy to programmable to this project.

ii. Definition of GSM

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA).

iii. Definition of (PCB) Layout

We use a printed circuit board [PCB] because it can mechanically support and electrically connects electronics components using conductive tracks, pads and other features etched from copper sheets laminated onto a non- conductive substrate.

iv. **Definition of Sensor**

A sensor is a device that detects and responds to some type of input from the physical environment. The specific input could be light, heat, motion, moisture, pressure, or any one of a great number of other environmental phenomena.

v. **Definition of Cable and Wire**

Cable and wire is commonly should be used in project to transmit electricity to the project to power up.

1.5 SUMMARY

This product is a cheap and useful product where it can be use for security reason. The intension that we choose for data backup security for office privacy files or documents. This project will enhance knowledge about the process to make a smart dustbin. While doing this project, students can also gain knowledge and learn about security system. In conclusion, a good project should be high reliability, case of the use and reasonable cost that can be received by user. The project has reach aspects that can been submitted and it has the potential to become good equipment.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Before starting this project, we have made the observation and study of all aspects available on Arduino, Sensor and chassis are various aspects that need to be addressed so that the products have a good efficiency as well as cost savings. Among the things that are concern is the selection of Arduino, sensor and Bluetooth. We also analyzed the existing design, along with advantages and disadvantages of each tools and combination of Perspex, motor DC with wheel and plastic board. Below we have mentioned some of the study and research that we can do.

2.1 Materials

There are some materials that are used in our project. Such as:

i) ARDUINO UNO

We use Arduino Uno is a microcontroller board based on the ATmega328P. 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. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start. This type Arduino is cheap and easy to programmable to this project.

Fig 2.1. Arduino UNO

ii) (PCB) LAYOUT

In this project we use printed circuit board (PCB) because mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from copper sheets laminated onto a non-conductive substrate. PCBs can be single sided (one copper layer), double sided (two copper layers) or multi-layer (outer and inner layers). Multi-layer PCBs allow for much higher component density. Conductors on different layers are connected with plated-through holes called vias. Advanced PCBs may contain components - capacitors, resistors.

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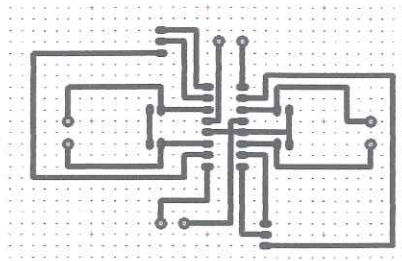
Fig 2.2. Layout

iii)   SENSOR

The mobile vacuum cleaner robot requires 3 sensors to detect obstacle. The requirement of sensor is able to detect object at least in 10cm in distance. Each sensor has their own function signal and difference priority.

Fig 2.3. Ultrasonic Sensor

iv)   Arduino HC 05 Wireless Bluetooth Serial Port TX RX Module

Connect Arduino Board with PC by Bluetooth to send and receive data.

Fig 2.4. Wireless Bluetooth Module

v)   YELLOW SMART CAR ROBOT 3V-6V MOTOR DC WITH WHEEL.

Motor DC converts direct current electrical energy into mechanical energy so that the wheel can move. Thus we need 2 wheels for the movement of smart dustbin robot.

Fig 2.5. Motor DC

vi)   Ceramic Capacitor

A fixed-value capacitor in which ceramic material acts as the dielectric. 4 ceramic capacitor is used for building vacuum robot that contain value 0.1Uf.
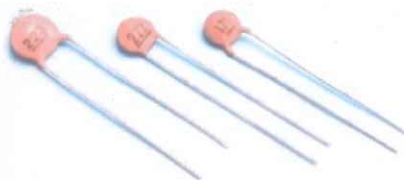
Fig 2.6. Ceramic Capacitor

vii)   **Breadboard Jumper Wire & Male-Female Jumper Wire**

A conducting wire used to transfer electrical signals between two points in a circuit. The wire can either be used to modify circuits or to diagnose problem within a circuit.

Fig 2.6. Jumper Wire

viii)   **6*AA 1.5V 9V BATTERY HOLDER**

A compartment or chamber for holding a battery which cover with a device for making and breaking the connection in the circuit.

Fig 2.7. Battery Holder

ix)   **Mini Sim900 Module**

GSM is an open and digital cellular **technology** used for transmitting mobile voice and data services operates at 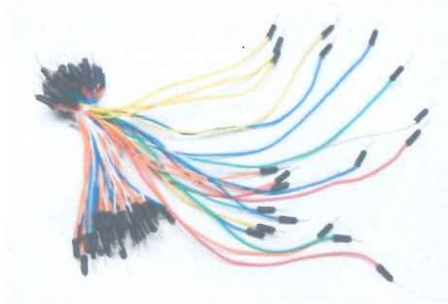the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. **GSM** system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose.

Fig 2.8. GSM Module

h) L293D IC

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction.**L293D** is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single **L293D** IC. Dual H-bridge Motor Driver integrated circuit (IC).

Fig 2.9. IC L293D

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CHAPTER 3

METHODOLOGY

3.0 Introduction

This chapter discussed the methodology that has been used to complete this project. It was planned properly by getting the correct information from various sources from references such as books, journals, articles, World Wide Web 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 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.
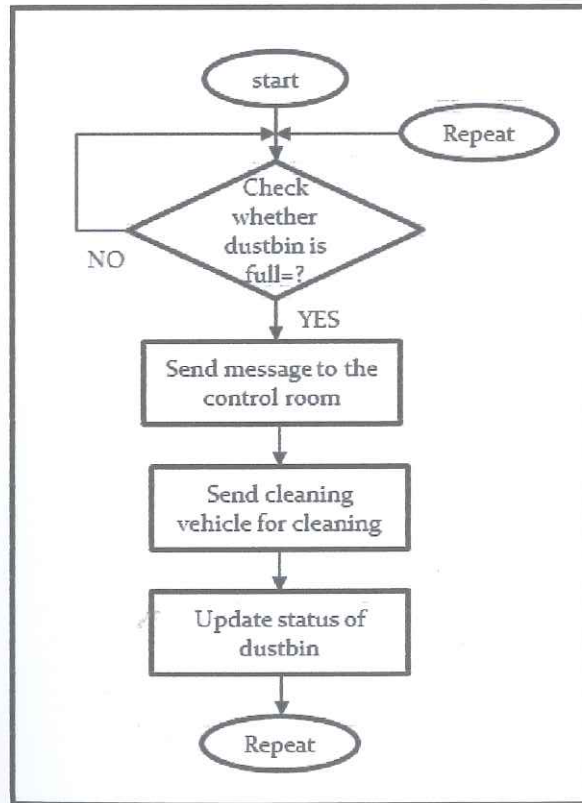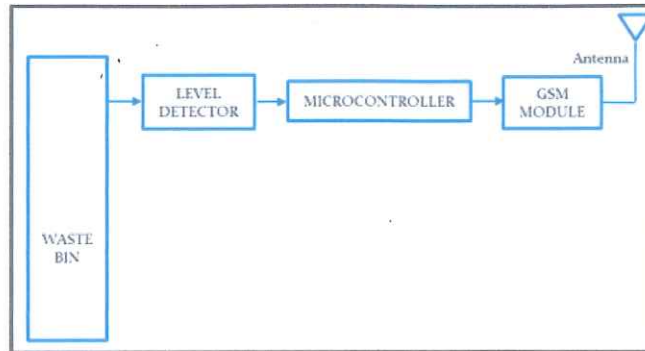
FIGURE 3.1 : BLOCK DIAGRAM FOR SMART DUSTBIN ROBOT

FIGURE 3.2: PROJECT FLOW CHART

```
        ┌─────────────┐
        │  Start the  │
        │   project   │
        └──────┬──────┘
               │
               ▼
    ┌─────────────────────┐
    │  Identify the problem │
    └──────────┬──────────┘
               │
               ▼
    ┌─────────────────────┐
    │   Identify title and │
    │       planning       │
    └──────────┬──────────┘
               │
               ▼
    ┌─────────────────────┐
    │        Design        │
    └──────────┬──────────┘
               │
               ▼
    ┌─────────────────────┐
    │       Develop        │
    └──────────┬──────────┘
               │
               ▼
    ┌─────────────────────┐
    │         Test         │
    └──────────┬──────────┘
               │
               ▼
          ◇ Success? ◇
               │
               ▼
    ┌─────────────────────┐
    │      Report and      │
    │     Presentation     │
    └──────────┬──────────┘
               │
               ▼
        ┌─────────────┐
        │     End     │
        └─────────────┘
```
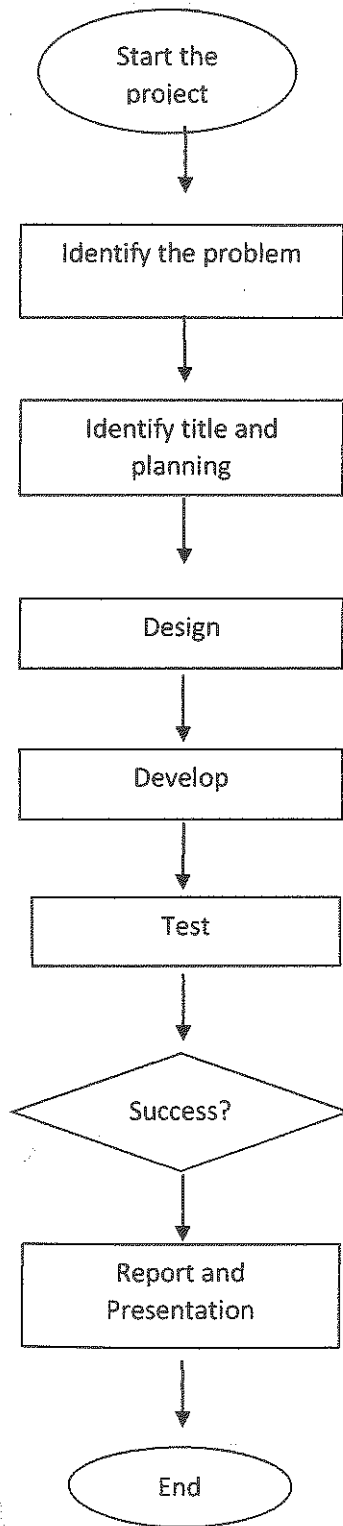
3.3   Gantt Chart

ACTIVITY	WEEK														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BRIEFING LECTURER	■	■													
PROJECT TITLE CONFIRMATION			■	■											
PROGRESS WITH INITIAL PROPOSAL				■											
PROJECT PROPOSAL					■	■									
CIRCUIT						■	■	■							
DESIGN									■	■					
TESTING										■	■	■			
PREPARING													■	■	
PRESENTATION															■

■	PLANNING
	ACTUAL WORK

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 7Professional 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.
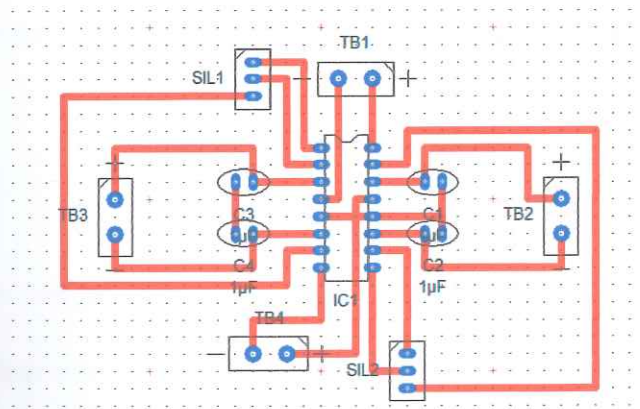

Fig 3.4. Schematic Diagram

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3.5 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 function generator can be done using Proteus .Even virtual hyper terminal is provided to demonstrate how your code perform in real world without really doing the hardware section yet. We're just clicked on the play button to run the circuit and error can be detected after doing this part.


Toolbar of Proteus simulation.

3.6 Process of Circuit Design.

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 so on 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 software namely ISIS 7 Professional and ARES 7 Professional.

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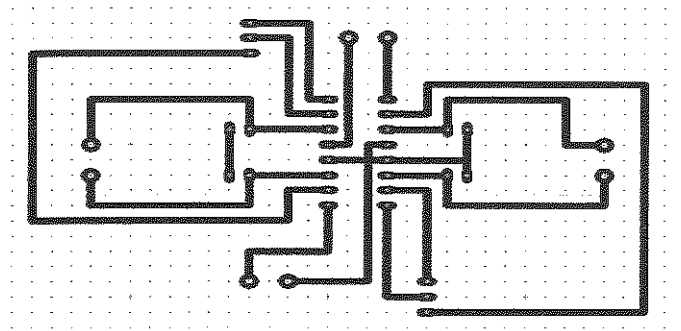
3.7 Etching

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 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 etch, but most firms currently use high pressure spray equipment. Many types of etches varies 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.

3.8 Risk of Etching

i. There are 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.

3.9 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 glasses 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, it is best to ask a supervisor of the project.

3.10 Etching 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 the coppers

(PCB) Developer and is Acid Ferric Chloride16

The steps of the etching process are:

i.   Print the schematic onto transparent paper and cut it with the same size of PCB board.
ii. Stick the schematic diagram on PCB board.
iii. Paste the etching circuit onto transparent paper with UV Board using laminating machine. It's to make PCB paper joined with board.
iv. This process takes about 120 second (2 minutes).
v.   Put our PCB Board in High Pressure Spraying Machine.

Figure 3.5 High pressure spraying machine