PLANT MOISTURE MONITORING SYSTEM

NURUL NAJUA BT CHE OMAR
SYAFIKA DAYANA ABU BAKAR
HANIS ATHIRAH BT BAHAUDIN

DEPARTMENT OF ENGINEERING ELECTRONIC
(COMMUNICATION)

JUNE 2018

ABSTRACT

Plants moisture monitoring system is a simple and easy to watering the plant. As we can see, nowadays people do not take care of their plant due to the lack of time, and they find it difficult to handle and water their plant time to time. Objective of this project is to design low cost automatic plant moisture monitoring system. Next is, to design automatic plant irrigator monitoring system. Applying Arduino Uno Micro-controller with the soil sensor, water pump and LCD. This system is ideal for monitoring the moisture level of an urban garden or our plant. With the help of humidity, it will give the water automatically to plant. It will detect the condition of the soil to alert the owner about the condition of their plants. At the end of the project, the result shows the condition of the soil at the LCD screen. It will show whether the result is dry or humid. The condition of dry is, where the sensor detect more than 1000vm (volume metric). Then, the condition of soil when it is humid is when the sensor detect less than 1000vm (volume metric). As the conclusion, Arduino Uno act as controller to the whole system. This is also reduced chances of error in modification. This system is suitable for gardener out there.

ABSTRAK

Sistem pemantau kelembapan tumbuhan adalah sistem yang ringkas dan mudah untuk menyiram tumbuhan. Seperti yang dapat kita lihat, pada masa kini orang tidak dapat menjaga tumbuh-tumbuhan mereka kerana kekurangan masa, dan mereka mendapati bahawa sukar untuk mengendalikan dan menanam tumbuhan meraka dari semasa ke semasa. Objektif projek ini adalah untuk merekabentuk system pemantauan kelembapan autamatik dengan kos yang rendah. Seterusnya ialah, untuk merancang sistem pemantauan pengairan yang automatik. Projek ini menggunakan Arduino Uno Micro-controller dengan sensor tanah, pam air dan LCD. Sistem ini sesuai untuk memantau tahap kelembapan tanaman. Ia akan mengesan kelembapan tanah untuk memberi amaran kepada pemilik mengenai keadaan tumbuhan mereka. Pada akhir projek ini, hasilnya menunjukkan keadaan tanah pada skrin LCD. Ia akan menunjukkan sama ada hasilnya kering atau lembap. Keadaan kering adalah dimana, sensor akan mengesan tahapnya yang melebihi 1000vm (isipadu metrik). Keadaan tanah apabila lembap adalah apabila sensor mengesan tahapnya yang kurang daripada 1000vm (isipadu metrik). Kesimpulannya, Arduino Uno bertindak sebagai pengawal kepada seluruh sistem ini. Ini juga mengurangkan kemungkinan kesalahan dalam pengubahsuaian.Sistem ini sesuai untuk tukang kebun di luar sana.

CONTENT

LIST OF TABLES

LIST OF DIAGRAMS

LIST OF SHORT FORM

LCD	Liquid Crystal Display
ISIS	Schematic Intelligent Input System
ARES	Advance Routing Editing Software
PCB	Printed Circuits Boards
PVC	Polyvinyl Chloride Pipe
IC	Integrated Circuit

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Plant Moisture Monitoring is the system that used Arduino Uno as the controller to control the whole project. LCD screen used to display the condition of the soil. So, studies have shown that many of our lawn and garden irrigation systems are poorly planned and have a very inefficient watering schedules and need to repairs.

Hopefully, the tips and suggestions offered will provide us with the tools necessary to create a beautiful landscape while saving water, time, and money. Plants properly watered are healthy with more blooms, resilient foliage, and an increased resistance to pests and disease. The amount and frequency of watering varies and is dependent upon weather, soil conditions, and type of plant.

Plant water needs, irrigation system design and components, as well as irrigation scheduling must all be considered when creating, or modifying, your lawn or garden irrigation system.

1.2 RESEARCH BACKGROUND

In today's environment, many of us are carrying a heavier workload than we used to and feeling the crunch. You might not be able to control your workload, but you can control how you react to it. You can choose to be overwhelmed, or you can choose to accept where you are today, while taking steps to improve your situation. In order to cope with all the situations, as a human being need to be prepared with fresh ideas and surround ourselves in a harmony surrounding. There is a way that can help to enhance

ourselves and to relax our mind. It is just by having houseplants. When you want to enhance interior spaces with houseplants, you are not just adding greenery. These living organisms interact with your body, mind and home in ways that enhance the quality of life.

1.3 PROBLEM STATEMENT

Nowadays, automatic plant irrigator system or monitoring system is commonly applied in agriculture such as domestic gardening. In this industry, automatic plant monitoring system usually used to supply water to maintain soil moisture so plant can grow well.

Unfortunately, there are still gardeners or farmers who maintained use manually watering technique because not all of them afford to buy the system. Over watering possibility would occur if this manual process is still practiced. It will cause the plant drawn if supply too much water for them. Sometime, manual technique can make the process of water late reaches or does not reach the roots of plant and this will cause the plant get died.

So that, an automatic plant irrigator or moisture monitoring system is the good solution to overcome this problem. It is not only provided the controller that allows the user to set their irrigator system operation.

1.4 OBEJCTIVE

Objective of this project is

1. To design automatic plant irrigator monitoring system.
2. To design low cost automatic plant moisture monitoring system.
3. Applying Arduino Uno microcontroller with soil moisture sensor, pump and LCD.

1.5 SCOPE AND LIMITATION

This plant moisture monitoring system covers an area around 1 ½ per feet. This project is more focused on the spinach plant that use to determine the moisture level of a soil. It is provided 50 milli litres.

1.6 CHAPTER SUMMARY

In order to solve the problem that are facing now, we proposed a smart moisture plant system called as 'Plant Moisture Monitoring System". This system is a simple way and easy to use Instead of using traditional or manual way to watering their plants. We proposed some ideas that injected some intelligent on it to make it more intelligent by the helps of internet. For the system functionalities, we will make sure that the user will be satisfied when using this system. We will provide a very user-friendly system to use. I will use moisture sensor and LCD to display what the plant need.

CHAPTER 2

LITERATURE REVIEW

2.1 CHAPTER INTRODUCTION

There is a lot of different irrigation and plant moisture monitoring systems on the market, but there are all have some sort of deficiency lack in certain points. As we could see, some over watering the plant, some timer systems will water even when it is not necessary. Different with the other product that is already available on the market, I believe that my system "Plants Moisture Monitoring System" are much more unique as it is able to interact with the plant and system. At the same time will allow the owner to keep track about the growth of their plant.

2.2 CONCEPT

Traditionally plant is grown in mold or dirt, potted and being placed at the "laman rumah". Due to this, plant is dependent on regular nurturing as the owner will need to water them daily and in the same time they need to make sure that their plant will be provided with the right amount of sunlight and water in order to stay alive and grow well. Here is some of the existing system that already in the market and some of it are. Systems like Moisture Matic make use of a sponge wick to keep watering for up to 7 days. Self-Watering Probes use a ceramic sensor to measure when the plants need watering.

2.3 PREVIOUS RESEARCH

2.3.1 AUTOMATIC PLANT WATER IRRIGATION

a) This tool is made to automatically spray the chili plants using land sensor and Arduino Uno sensors. Based on the land have been set according to the needs of chili plant, this appliance also equipped with LCD (Liquid Cristal Display) which can show whether soil conditions are moist or dry according to the readings of the soil moisture sensor in the form of values at LCD.

b) The Alt is also equipped with Water pump for watering the chili plants, this Tool very useful for human beings today, because with this tool man does not it is necessary to water the chili plants manually every day, for that tool can be applied to humans who like to plant the chili in the room or planting in a small garden in front of the porch of the house and elsewhere is closed.

c) With this background it will be planned a tool Plant sprinkler automatic Chill with soil moisture sensor then processed by Arduino Uno and in instruction to LCD to display the value soil moisture according to soil.

2.3.2 ADVANTAGES VS DISADVANTAGES

a) Advantages

-Can save energy in watering the plant every day

-Easy to install

b) Disadvantages

-Hard to troubleshooting

-low efficiency

2.3.3 DIAGRAM OF PROJECT

Figure 2.1 System Trial Process

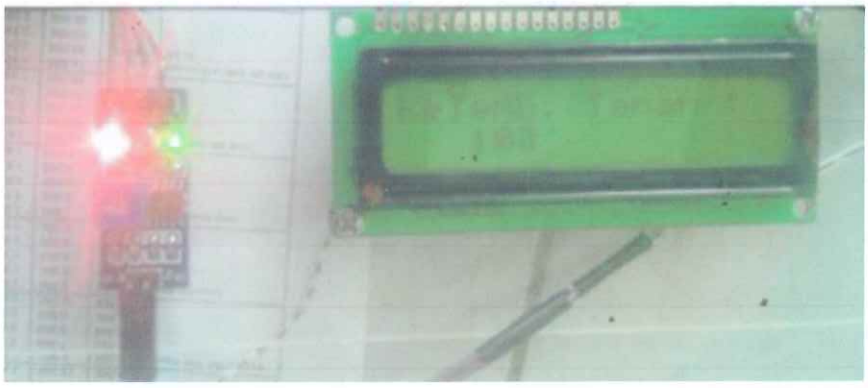

Figure 2.2 Humidity 103vm

Figure 2.3 Humidity 111vm

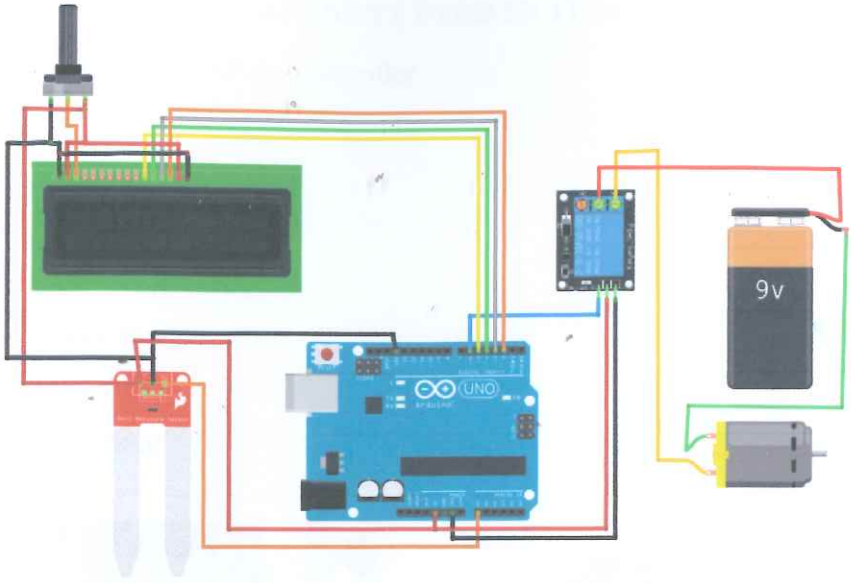

Figure 2.4 Design of the Automatic Plant Water Irrigation

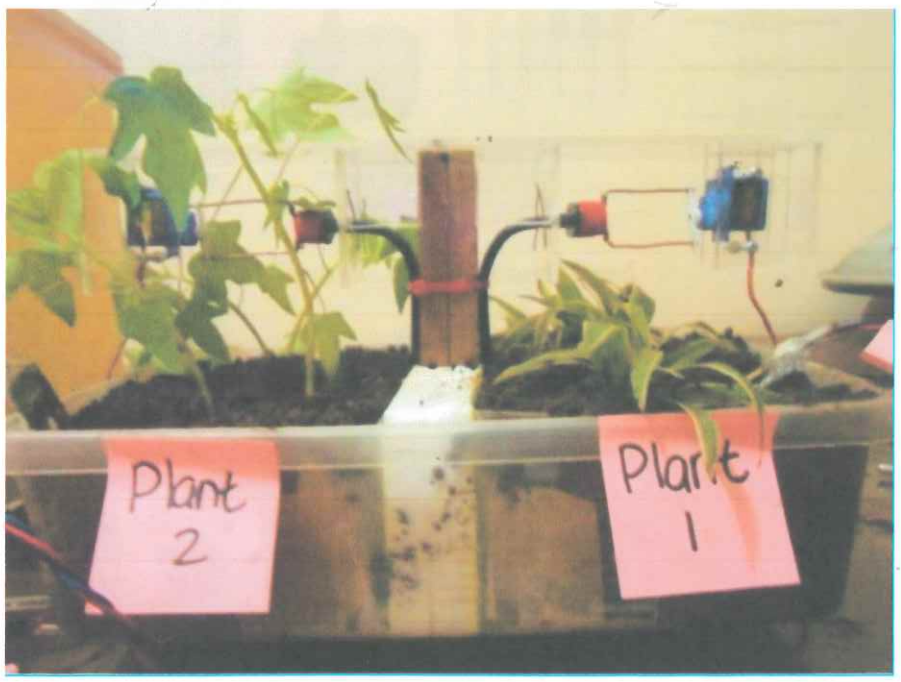

Figure 2.5 Result of the Project

2.3.4 TOOLS AND COMPONENT USED IN THIS PROJECT

a) Arduino Uno Micro-controller
b) Arduino software
c) Moisture sensor
d) Relay Circuit
e) LCD Screen Display
f) Water Pump
g) Resistor
h) Transistor

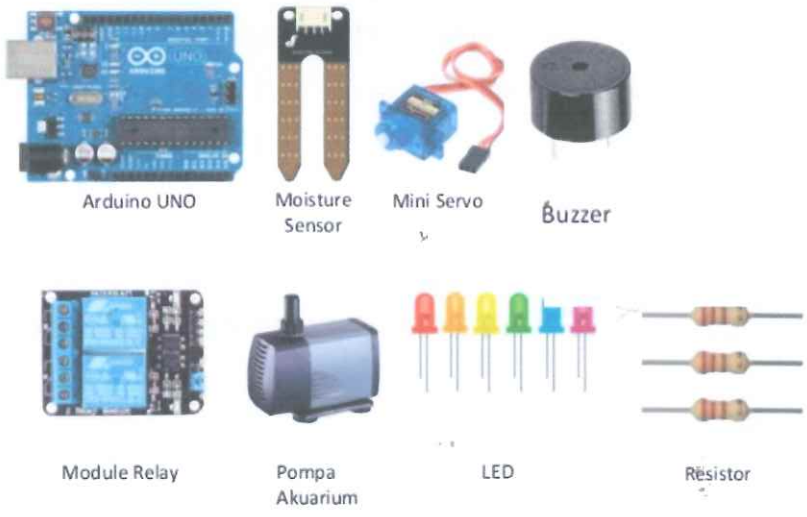

Figure 2.6 Component Used

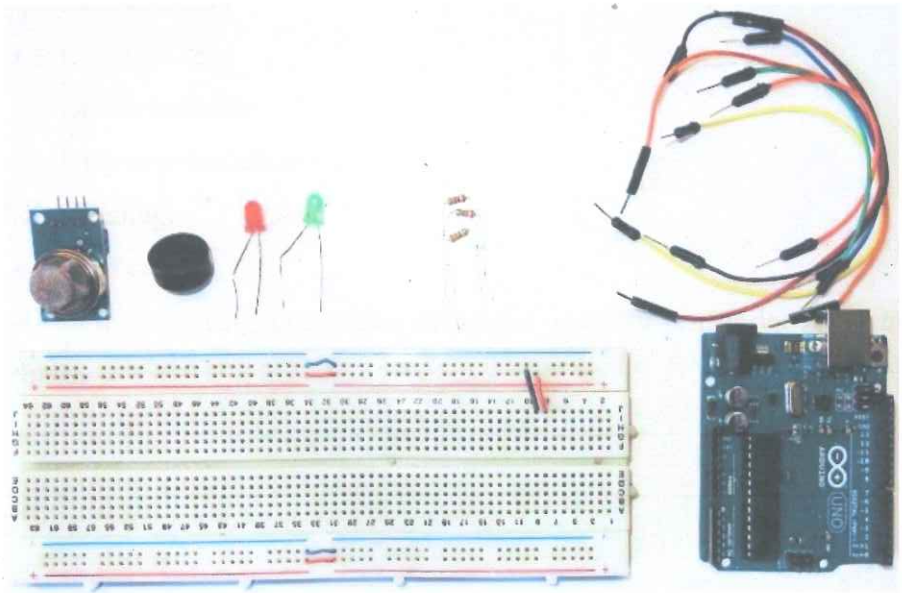

Figure 2.7 Tools Used

2.3.5 COMPARISON WITH OUR PROJECT

a) Plant Moisture Monitoring is the system that used Arduino Uno as the controller to control the whole project. It is more focus to measure the level or volume matric of the soil.
b) This project cover area around 1 ½ per feet. Provide 50 milli litters.
c) Consist LCD (Liquid Crystal Display) which can show whether soil condition is dry or humid.
d) Relay will turn on the water pump when the sensor detects the condition of the soil is dry. Then it will always turn off the water pump when the the sensor detects the condition of the soil is humid.
e) With this alternative, it will make the gardener will easy to managed their time managing the plant.

2.3.6 ADVANTAGES VS DISADVANTAGES

a) Advantages
   - Only measure the soil condition
   - Low cost
   - Easy to install
   - Cover an area
   - Good controller
   - Easy to troubleshooting

b) Disadvantages

   -Low efficiency

   -Error in displaying a condition of the soil when the sensor detect too many times.

2.3.7 DIAGRAM OF PROJECT

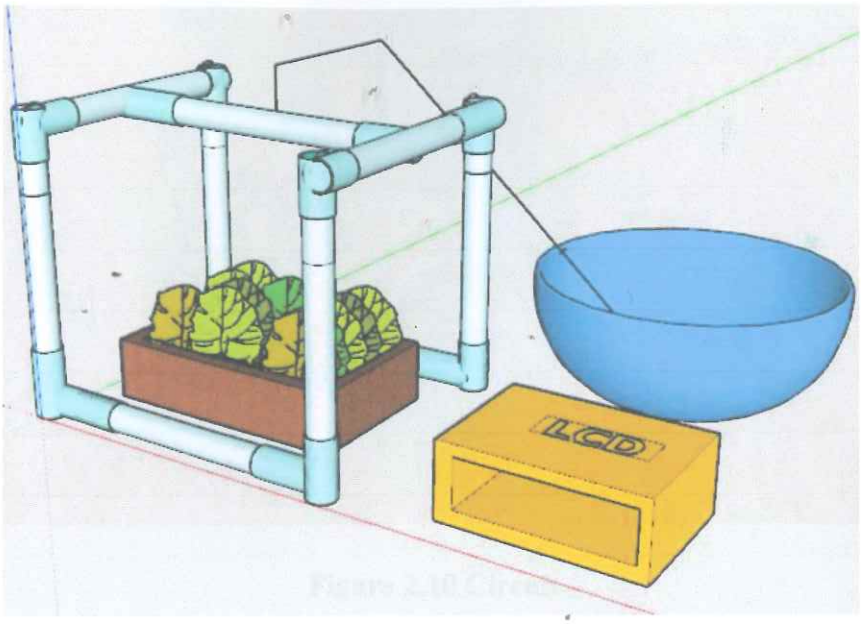

Figure 2.8 Design the Prototype use Google Sketch-Up

Figure 2.9 Full Project

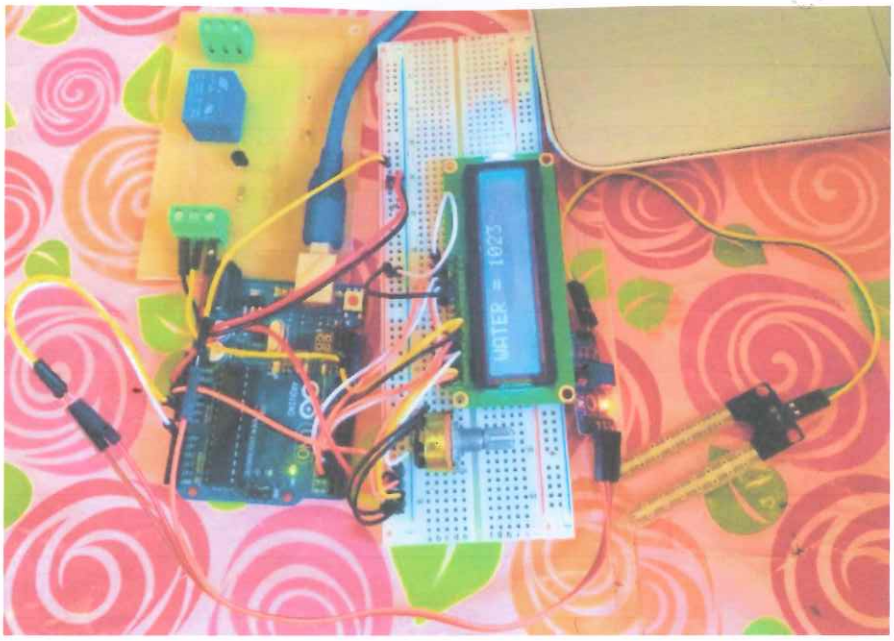

Figure 2.10 Circuit

2.3.8 COMPONENT REQUIRED

a) Arduino Uno Micro-controller
b) Relay
c) T-Block
d) Bread Board
e) LCD Display
f) Soil Sensor
g) Variable Resistor
h) Jumper wire
i) Transistor
j) Resistor

2.4 CHAPTER SUMMARY

In conclusion, we can know about the previous history and the background Plant Moisture Monitoring System. So, we can learn from the past history and be more able to develop a project to create a new solution to know the level of the moisture of soil. We also can know the concept or theory of Arduino while doing this project. It is a good knowledge for us to learn deeply about Arduino.

CHAPTER 3

METHODOLOGY

3.1 CHAPTER INTRODUCTION

This plant moisture monitoring system will enable the user to take care of their plant. So that it will ease them to keep track the condition of their plant in a more effective way. In addition, improve their ways to manage and adjusting the action that they need to do for their plant especially when the owner is not at home to take care of their plant.

As an example, this system will generate watering system by automatically. By using this plant moisture monitoring, it can track condition of the plant easily ensuring the water that being given to the plant is enough. Owner could adjust the setting and schedule to water the plant according to the performance of it. In addition, users can find the existing data and information about their plant through make a setting of their coding on Arduino Software.

This project is designed according to the needs of an individual which it will help the user that use this system to take care their plant. Also help the user or to monitor their plant more efficiently and effectively no matter where they are, either at home or they are outside. Other than that, this system also will help to keep track information regarding to them. At the same way could enhance and make things easier for the owner of taking care their plant compared to the manual way. It could also help to assign action which will need immediate action about their plant condition. Thus, the user will easily water their plant through their portable device and at the same time retrieve information with ease and faster.

3.2 DESIGN

This block diagram shows a sensor which is use in this project is, soil sensor as the input. Soil sensor will detect the condition of the soil whether it is dry or humid. To control the whole system of this project is Arduino Uno Micro-Controller. Arduino can reduce a chance of error in modification. Lastly the LCD display as the output to show a condition of the soil. And the water pump will be turn on when the sensor detects the condition of the soil is dry.

Block diagram for Plant Moisture Monitoring System

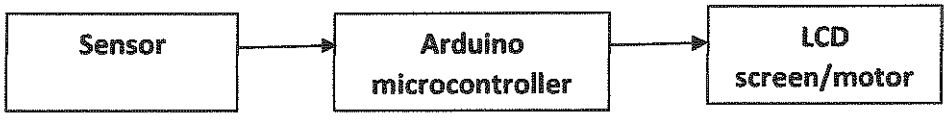

Figure 3.1 Block Diagram

3.2.1 GANT CHART

BIL	PROJECT PROGRESS	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Design the structure of the projeet.														
2	Complete the structure with component material														
3	Fix the coding into the project														
4	Trial proses. (Testing project)														
5	Assistance and Discussion														
6	Submission of Final Report														
7	Preparation for Presentation														
8	Presentation														

Figure 3.2 Gantt Chart

3.2.2 FLOWCHART

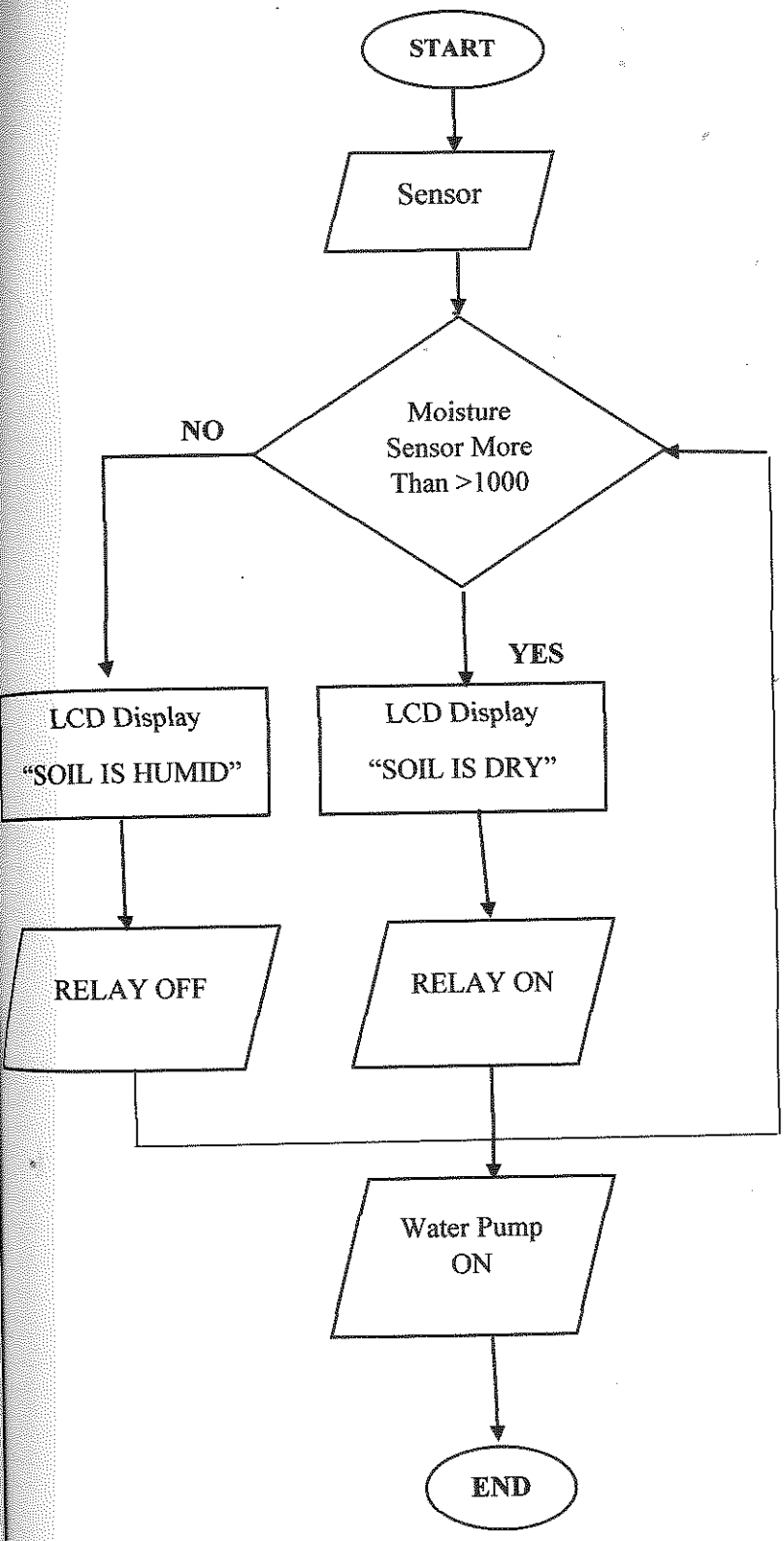

Figure 3.2.2 Flowchart

3.2.3 FLOWCHART EXPLANATION

For our project, we planned our project that we named it as "Plant moisture monitoring system". So, we should understand how to made our project become useful in this project. The component required is moisture sensor, Arduino micro-controller, LCD Screen, Relay (act as switch), Water pump, resistor, Moisture Sensor as the input that can be detect condition of the soil, whether the soil is in wet or dry condition.

Next, if the soil moisture measure more than 1000 volume matrix. LCD will display "SOIL IS DRY". Then, relay will start automatically to operate to turn on the water pump. If the sensor detected the condition of the soil in humid condition which is less than 1000vm, there is no change. The relay will always turn off. To get the display, we need to upload the full coding to load to Arduino Microcontroller to make it function very well.

3.2.4 PROTEUS 8

For this project "Plant Moisture Monitoring System", the design of relay circuit is use PROTEUS 8 to run interactive simulations of real designs, and to reap the rewards of this approach to circuit simulation. To design a relay circuit, combination of Proteus 8 which is consist ISIS and ARES and Arduino Application can make it works successfully. By using Proteus, the design can insert the Arduino Micro-controller and a set of animated models for related peripheral devices such as LCD display, resistor, transistor and more. To make it work, Arduino Application help the simulation by insert the coding for relay. After the design of the relay circuit function, it can continue to etching the design.

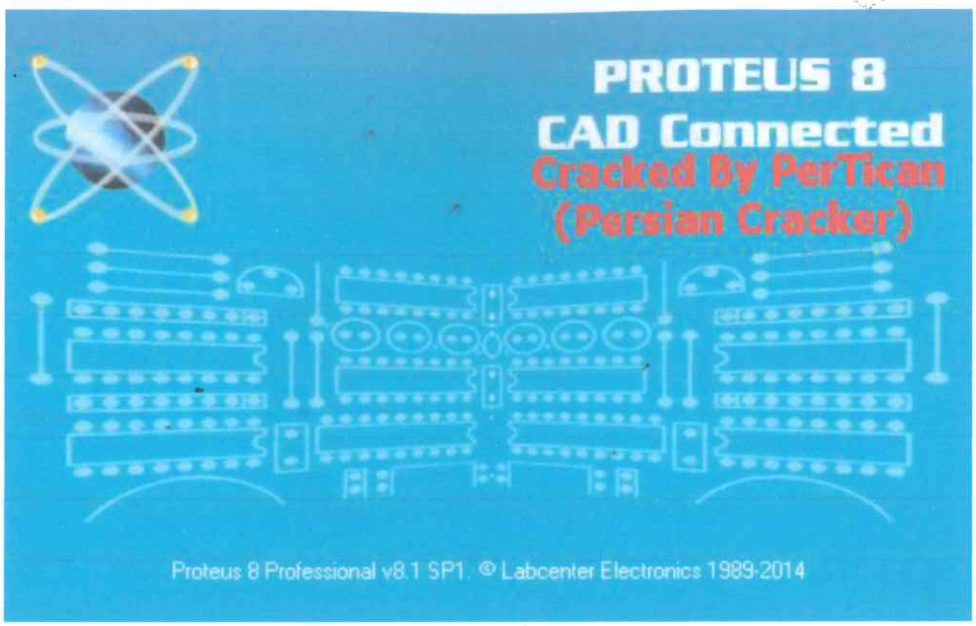

Figure 3.4 Proteus 8 Software

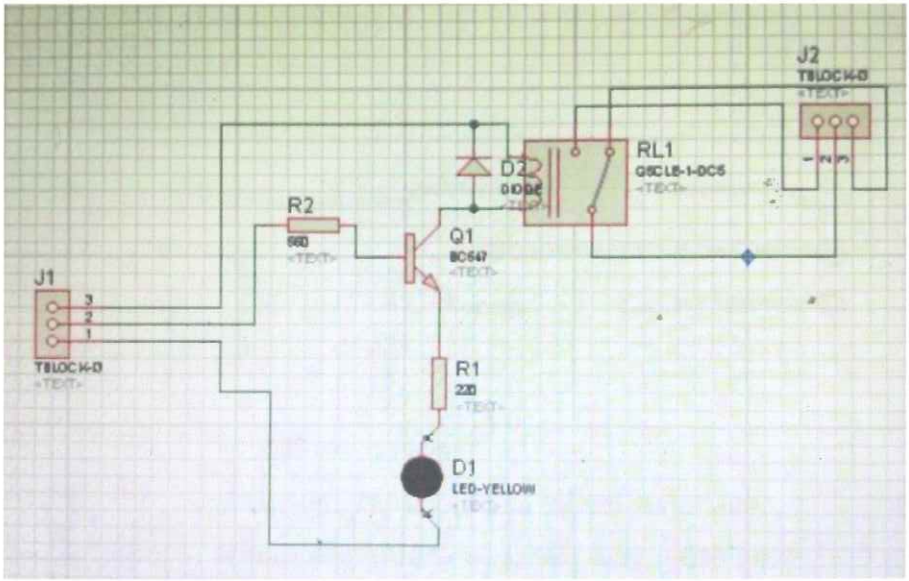

Figure 3.5 Step one (Design the Relay Circuit)

3.2.5 ETCHING

To "Etching" should have the circuit design that already printed on the glossy paper, cooper board, iron. Etching is method used for the production of printed circuit boards. Acid Ferric Chloride is used to remove unwanted copper and with the acid so that the unwanted copper will remove. This is done by applying a temporary mask that protects parts of the laminate from the acid and leaves the desired copper layer untouched.

Since the work involves dangerous chemicals and power tools, so need to take the necessary safety precautions by wear a safety equipment during the whole process and always familiarize with dangers around. Use Etching Machine to remove the useless cooper. With the acid so that the unwanted copper will remove. After Acid remove unused copper, take the PCB to wash with clean water.

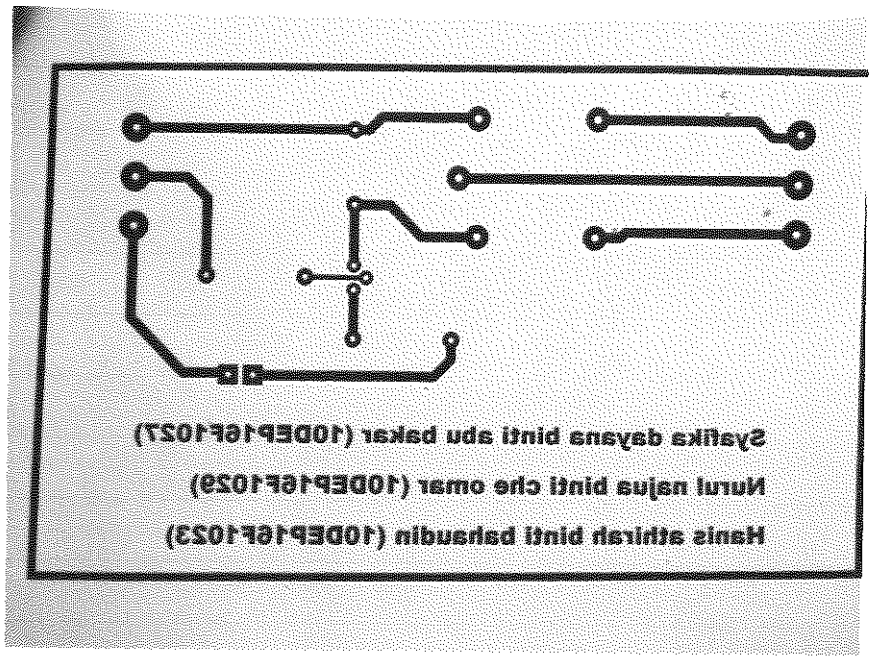

Figure 3.6 Step two (Print on the Glossy Paper)

Figure 3.7 Step 3(Paste on the PCB Board using Iron)

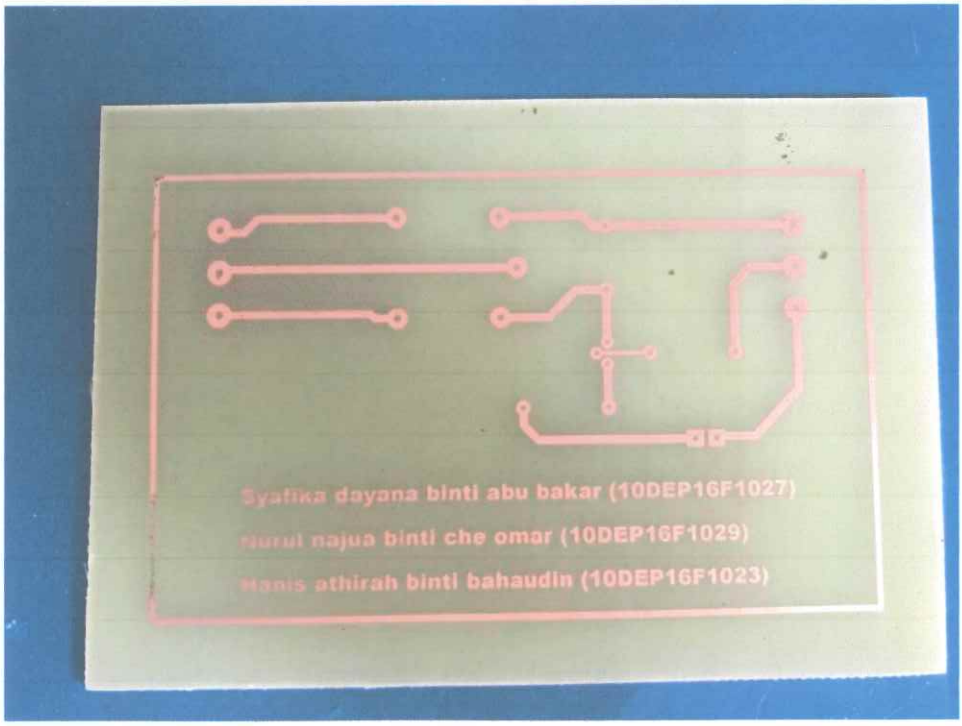

Figure 3.8 Circuit After Etching