



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF HIGH TECH ELECTRICITY
SYSTEM IN AGRICULTURE FIELD**



This report submitted in accordance with requirement of the Universiti
Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering
Technology (Industrial Electronics) (Hons.)

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

by

NOOR AKMAL B. ABD MAJID

B071310077

FACULTY OF ENGINEERING TECHNOLOGY 2016

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: DEVELOPMENT OF HIGH TECH ELECTRICITY SYTEM IN AGRICULTURE FIELD

SESI PENGAJIAN: 2015/16 Semester 2

Saya **NOOR AKMAL B. ABD MAJID**

mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. ****Sila tandakan (✓)**

☐

SULIT

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)

☐

TERHAD

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

☐

TIDAK TERHAD

Disahkan oleh:

Alamat Tetap:

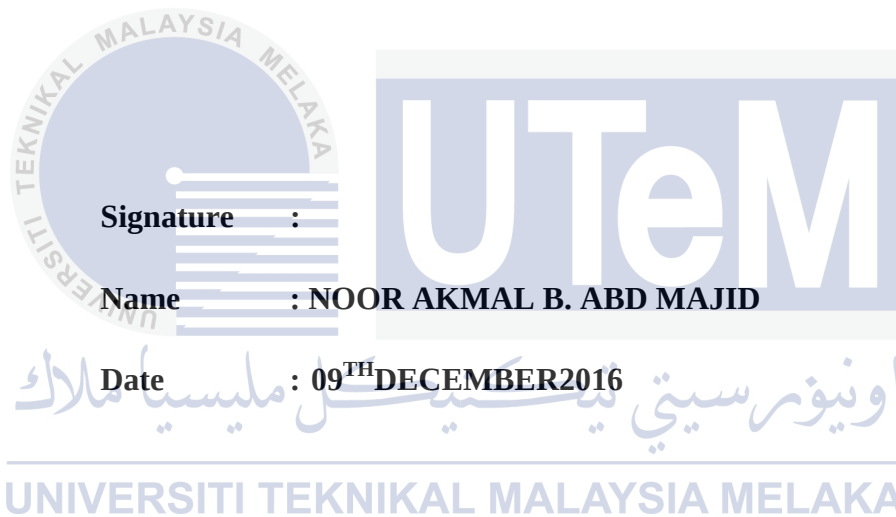
Cop Rasmi:

Tarikh: _____

Tarikh: _____

DECLARATION

I hereby, declared this report entitled “Development of High Tech Electricity System in Agriculture System” is the results of my own research except as cited in references.



APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Industrial Electronics) (Hons.). The member of the supervisory is as follow:



ABSTRACT

Economic development nowadays more complex with technological advances that make life simpler. On this day, most people rely on various types of information technology in the conduct of a project as well as research and among these examples as channel through the voice activated car and many others. This ongoing project focuses on the concept of greenhouse plant cultivation with unlimited basic resources such as water and sunlight. The aim of this system is designed to build a highly capable system where the resources provided by nature will be able to maintain the plant. The exterior of this project contain of main control box which serves to control the water pump and lamp, also have some sort of sensor to measure the temperature of the soil and the greenhouse. Sensors are used to measure the temperature of the soil in turn will send a signal to the main control panel where connect to the arduino and the next will turn on either the light or the pump and turn off the process when it is appropriate. Overall, the project is carried out to generate the construction of greenhouses, run the experiment and state how the system works in a greenhouse.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

ABSTRAK

Kemajuan ekonomi pada masa kini seiring dengan kemajuan teknologi yang menjadikan kehidupan semakin ringkas. Pada hari ini kebanyakan masyarakat bergantung kepada pelbagai jenis teknologi dalam mencari maklumat bagi melakukan sesuatu projek serta penyelidikan dan diantara contoh tersebut seperti kereta yang diaktifkan melaluli suara serta lain-lain lagi. Projek yang dijalankan ini memberi tumpuan kepada penanaman tumbuhan berkonsepkan rumah hijau dengan sumber asas yang tidak terbatas seperti air dan juga cahaya matahari. Sistem yang direka ini bertujuan membina satu sistem berkeupayaan tinggi dimana sumber yang dibekalkan akan dapat mengekalkan sifat semulajadi tumbuhan tersebut. Bahagian luar projek ini terdapatnya kotak kawalan utama dimana berfungsi mengawal pam air serta lampub dan juga mempunyai beberapa jenis sensor bagi mengukur tahap suhu tanah serta rumah hijau tersebut. Sensor yang digunakan bagi mengukur suhu tanah seterusnya akan menghantar isyarat kepada panel kawalan utama dimana terletak arduino dan seterusnya akan menghidupkan sama ada lampu atau pun motor pam serta mematikan proses tersebut apabila suhu yang sesuai. Secara keseluruhannya, projek yang dijalankan bagi menghasilkan kerja membina rumah hijau, menjalankan ujikaji serta menyatakan bagaimana sistem didalam rumah hijau tersebut berfungsi.

.

DEDICATIONS

To my beloved parents, family members and friend.



ACKNOWLEDGMENTS

In The Name Of Allah, the Most Beneficent and the Most Merciful. A deep sense of thankfulness to Allah SWT who has given me the full strength, ability and patience to complete this Bachelor Degree Project as it is today.

Firstly, I would like to take this opportunity to put into words my deepest gratitude and appreciation to my the project supervisor, Mr Hasrul Nisham Bin Rosly for his support, guidance, patience, encouragement and abundance of ideas during the completion of this project. Secondly, special thanks to both honourable panels, for their comments, invaluable suggestions and outstanding deliberations to improve the project during the project presentation.

I would also like to express my extraordinary appreciation to my family especially to my parents, Puan Norzalida Binti Alias and also to my family members for their invaluable support along the duration of my studies until the completion of this Bachelor Degree Project. Finally yet importantly, thanks to my beloved friends who are directly or indirectly contributed due to their supports and guidance and helped greatly to point me in the right direction until the completion of this Bachelor Degree Project.

TABLE OF CONTENT

Abstrak	i
Abstract	ii
Dedication	iii
Acknowledgement	iv
Table of Content	v
List of Figures	vi
List of Table	vii

CHAPTER 1

1.0 Introduction	1
1.1 Problem Statement	2
1.2 Objective	2
1.3 Scope	3
1.4 Project Outline	4

CHAPTER 2

2.0 Introduction	5
2.1 Smart Agriculture and Controlling System	5
2.2 Research from Previous Project	6
2.2.1 Design and Implementation of the Greenhouse Monitoring System Based on GSM and RF Technologies	7
2.2.2 Automated Control System for Arduino and Android	8

Based Intelligent Greenhouse.

2.2.3 Design of Intelligent Greenhouse Environment Monitoring System	9
Based on ZigBee and embedded technology.	
2.2.4 Intelligent Agriculture Greenhouse Environment Monitoring System	9
Based on IOT	
2.3 Hardware and Software Review	10
2.3.1 Arduino Controller	11
2.3.1.1 Introduction to Arduino	11
2.3.1.2 Arduino UNO	11
2.3.1.3 Advantages of Arduino UNO	12
2.3.2 Water Pump	13
2.3.2.1 1000 L/H Submersible Water Aquarium Pump	13
2.3.3 Relay 5v dc - 240v ac	14
2.3.4 Sensor	15
2.3.4.1 Humidity Sensor	15
2.3.4.2 Moisture Sensor	15
2.3.4.3 Temperature Sensor	16
2.4 Conclusion	17
 CHAPTER 3	
3.0 Introduction	18
3.1 Project planning and Development	18 - 19
3.2 Flow Chart	20
3.3 Identification Part	21
3.4 Design Stage	21

3.5	Testing	22
3.6	Analysis	23
3.7	Summary	23
 CHAPTER 4		
4.0	Introduction	24
4.1	Result	24 - 28
4.2	Discussion	28 – 44
 CHAPTER 5		
5.0	Introduction	45
5.1	Conclusion for Chapter 1	45- 46
5.2	Conclusion for Chapter 2	46
5.3	Conclusion for Chapter 3	46 - 47
5.4	Conclusion for Chapter 4	47
5.5	Conclusion for Chapter 5	47 – 48
5.6	Commercialization Potential	48
REFERENCE		49 – 50
APPENDICES		51
APPENDIX A		

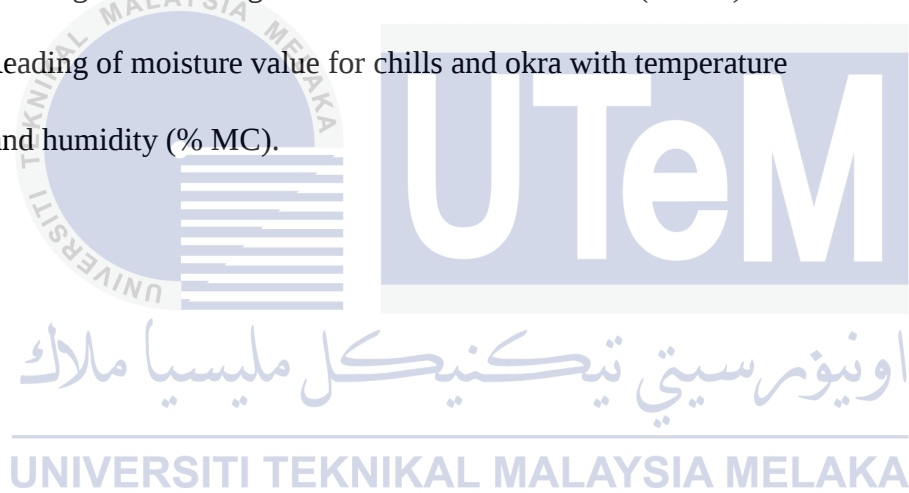
LIST OF FIGURES

Figure 1.1: The Flowchart of the System	3
Figure 2.1: The monitoring node hardware circuit diagram	7
Figure 2.2: The sink node hardware circuit diagram	7
Figure 2.3: The structure of the control system	8
Figure 2.4: The overall system block diagram	9
Figure 2.5: The structure of the system	10
Figure 2.6: The Architecture of Arduino Uno	12
Figure 2.7: 1000 L/H Submersible Water Aquarium Pump	14
Figure 2.8: Relay 5v dc - 240v ac	14
Figure 2.9: Humidity Sensor	15
Figure 2.10: Connection of Moisture with Arduino	16
Figure 3.1: Process flow of the project	19
Figure 3.2: Stage of completing the project	20
Figure 3.3: Block connection diagram of the project	22
Figure 4.1: The front view of the greenhouse model	25
Figure 4.2: The top view of the greenhouse model	25
Figure 4.3: The high condition of the greenhouse model	26

Figure 4.4: The low condition of the greenhouse model	26
Figure 4.5: The wet range soil of the greenhouse model	27
Figure 4.6: The normal range soil of the greenhouse model	27
Figure 4.7: The dry range soil of the greenhouse model	28
Figure 4.8 Graph reading of moisture sensor for 8/9/2016	29
Figure 4.9 Graph reading of moisture sensor for 9/9/2016	30
Figure 4.10 Graph reading of moisture sensor for 10/9/2016	31
Figure 4.11 Graph reading of moisture sensor for 11/9/2016	31
Figure 4.12 Graph reading of moisture sensor for 12/9/2016	32
Figure 4.13 Graph reading of moisture sensor for 13/9/2016	33
Figure 4.14 Graph reading of moisture sensor for 14/9/2016	33
Figure 4.15 Graph reading of moisture sensor for 8/9/2016	35
Figure 4.16 Graph reading of moisture sensor for 9/9/2016	36
Figure 4.17 Graph reading of moisture sensor for 10/9/2016	37
Figure 4.18 Graph reading of moisture sensor for 11/9/2016	37
Figure 4.19 Graph reading of moisture sensor for 12/9/2016	38
Figure 4.20 Graph reading of moisture sensor for 13/9/2016	39
Figure 4.21 Graph reading of moisture sensor for 14/9/2016	39
Figure 4.22 Graph reading of average moisture versus time	42
Figure 4.23 Graph reading of average moisture value with temperature and humidity.	43

LIST OF TABLE

Table 4.1: Reading of the moisture for chills value versus time (% MC).	29
Table 4.2: Reading of the moisture for okra value versus time (% MC).	35
Table 4.3: Reading of the average value for okra (% MC).	41
Table 4.4: Reading of the average value for chills (% MC).	41
Table 4.5: Reading of the average moisture value versus time (% MC).	42
Table 4.6: Reading of moisture value for chills and okra with temperature and humidity (% MC).	43



CHAPTER 1

INTRODUCTION

1.0 Introduction

The agriculture field is one of the important need in the economic aspect, it become necessities because the agriculture activity all around the world demanding a produce such as plant. This type of economic nowadays becomes more efficient and modern with the like of greenhouse system. The greenhouse produce become more productive by all due to its produce and quality of the product. In addition of that in Malaysia there have many placed using this concept to growing plant at any place in different ways of plant, there also have several weaknesses and cause problem to the user such as fungus or insect and need to be improved. In this project that has been doing is about the new technology of greenhouse system. The new system that will created based on the wireless sensor that have been used to monitor all the progress of plant growth like the moisture of the soil, humidity and also temperature of the greenhouse. The purpose of this project is to solve the problem that been faced especially the farmers. This project is to share the new idea about the high tech greenhouse system in order to get the quality produce. Furthermore it can give the farmers continuously produce for the plant to growth without thinking especially the condition of temperature and soil. This project will use a few sensors as prototype. In order to use this system farmers can control any device electronic for example lamp, water sprinkle and sensor by using the control panel outside the house. Finally by using this sensors farmers get to know on the condition of the soil whether the condition

suitable so that the plant can growth according to the desired level that of the plant itself. The desired level has been show on the control panel outside of the box outside.

1.1 Problem Statement

There are a lot of problem regarding the growing environment in the green house system. Therefore, the main idea to produce this project is based on the problem that were faced by the farmers and government that related in agriculture field, because environment changes in seasons bring about changes in the external and internal temperature of the greenhouse. These changes compel the grower to view things inside and outside the greenhouse differently. Although the idea is to attempts to keep the temperature inside the greenhouse uniforms. A change of the temperature because outside temperature increase out of comfort range or air move through greenhouse for cooling that bring unbalance temperature in different area will give different temperature due to the condition of the soil. The other problem view, farmers with fungus spores and small insects which is effect the growth of the plant and this give the plant with any outside or dangerous poison or disease.

1.2 Objective

Those objectives evaluated to assist and completing this project:

- a. To design advance technology system that given continues source.
- b. To builds new green technology system source using an Arduino.
- c. To create a model based on new green technology system and concept.

1.3 Scope

The scope for this project to build HIGH-TECH systems in order to give continuous source to the plant so it will growth with the same condition according to its nature. At the outside of the box will be a control panel with the water pump that been used to pump the water for the water sprinkler and for controlling the light. In this project also there has been used of sensor to measure the level of temperature inside the greenhouse, humidity and also moisture of the soil. The sensor used in order to detect the level of moisture of the soil and after that will transmit the signal to the control panel for light to be turn on and off according to desired level of soil condition. Humidity also been use to detect if there any water in the air that can effected the growth the plant. All of these sensors has been control by Arduino that been connect to the circuit and give many advantage when using it such as open source, not so expensive for the cost, lower power consumption and lastly has many reference in order to create the coding for program. The Figure 1.1 shows diagram which represents the activity diagram of system. It shows the process of flow of activities.

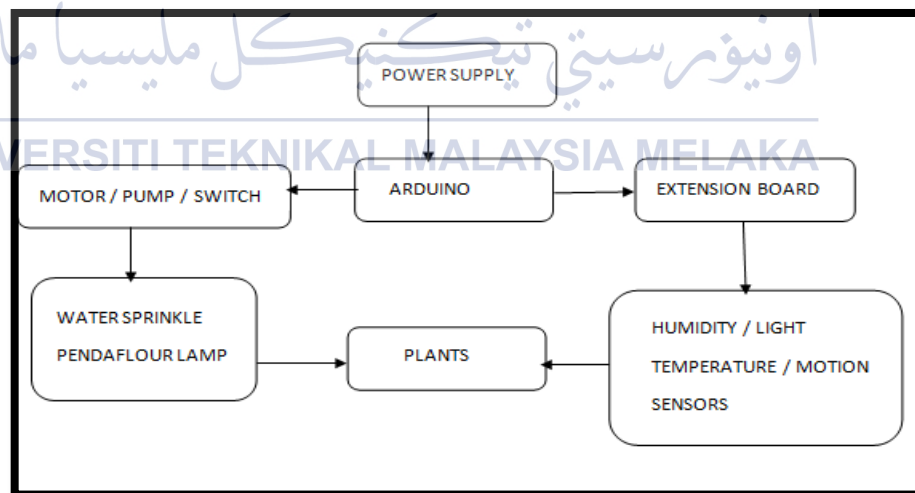
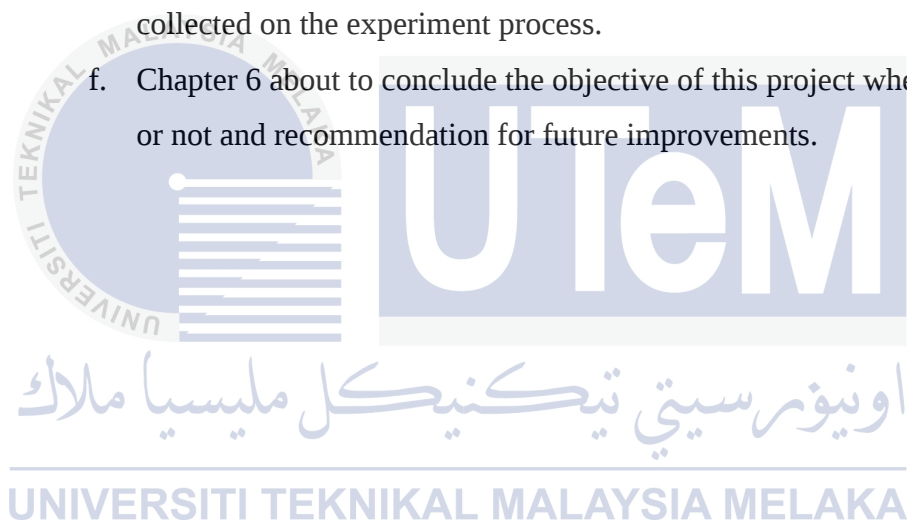


Figure 1.1: The Flowchart of the System

1.4 Project Outline

- a. Chapter 1 about describes the project, a problem statement, objective and also the scope of this project.
- b. Chapter 2 been explained briefly about the literature review regarding and relate to this project
- c. Chapter 3 process of construct and define the methodology that to be conduct that relate with practical and theory.
- d. Chapter 4 about the result and analysis regarding the experiment that been doing.
- e. Chapter 5 constructs the discussion of the result and analysis that been collected on the experiment process.
- f. Chapter 6 about to conclude the objective of this project whether achieve or not and recommendation for future improvements.



CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In this chapter, the literature review contains the information and also the idea for completing this project being discussed. There are many resource had been taken for this project such as books, journal, and also website. Beside, information about circuit, hardware and software which use in the project also include. This chapter also makes the study about the previous project in order to make some adjustment to improve or take some idea for this project. This kind of thing being very important and useful to complete the project that created.

2.1 Smart Agriculture and Controlling System

Greenhouse technology has been in many style of farming that improves from one type to another type. The use of electricity is the main source of energy that been use now days and become one of the factors that related to energy source and it connected in many things such as agriculture. In this project the main focus to the plant growth by using this source by implement the green house concept. There are prototype based on the wireless and microcontroller device has been created. In order using this it can automatically control by setting the desire level according to surrounding. Hence the saving of electricity can be more efficient and effective by using the greenhouse concept.

As the technology evolved over the last decade the world is becoming increasingly to face the problem of high-quality food shortage. One way to solve partially this problem is to use intelligent information technology for growing plants using intelligent greenhouse technology (Teslyuk, Denysyuk, Kernytskyy, & Teslyuk, 2015). In order to prevent these losses, various ways have been developing such as greenhouse system and also hydroponic ways. Therefore the use of wireless sensor and Arduino would be controlling the electrical used and minimum the maintenance. Thus this project to introduce the development system facilitates for farmers to optimize the usage electricity by using this smart system.

The plant that growth will be given the source like water and sun continuously according to it needed. Cultivation technique of greenhouse is the way to growth of plant that does not depend on the surrounding and keep the best of preserve environment by artificially controlling the environment(Kang et al., 2008). Thus the prototype to gives the owner or farmer minimize losses because of temperature balance and also living thing.

2.2 Research from Previous Project

Research from other previous project was needed in order to complete this project. It was very helpful to improve the system that has been revealed before this. In the other reason some of the technologies that been used in the previous project and other help from other studies in order to get use about the function and to master the technology that have been used in order to complete the project.

2.2.1 Design and Implementation of the Greenhouse Monitoring System Based on GSM and RF Technologies

In this previous project there has been another way in order to monitoring the system in greenhouse by using GSM and RF technologies which is radio frequencies that been closed communication. This communication also by using integrated the radio frequency. Radio frequency technology regional environment information monitoring network and combine with GSM remote communication. These system also consists of three part of hardware which is Hardware Design of Monitoring Nodes, Hardware Design of Sink Node and lastly remote communication that been referred to GSM network. The architecture of both systems has been shown in figure 2.1 and figure 2.2.

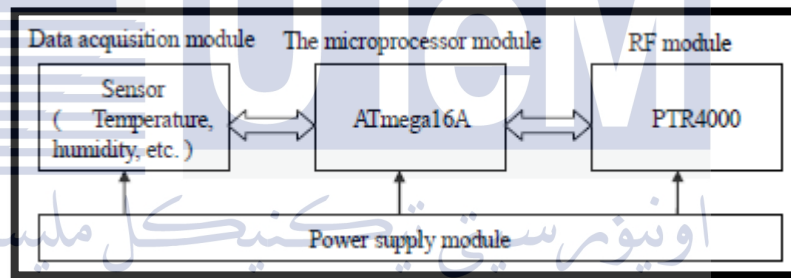


Figure 2.1: The monitoring node hardware circuit diagram.

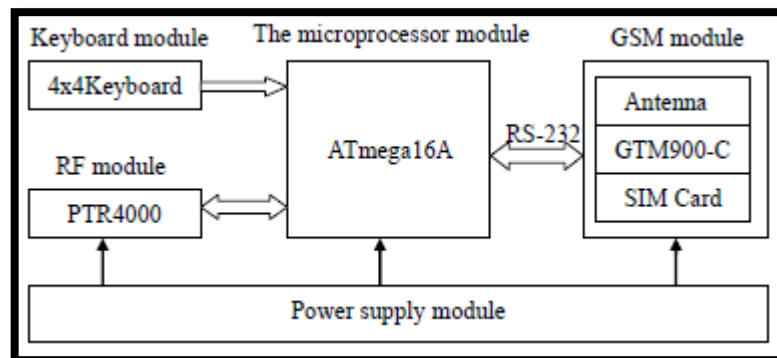


Figure 2.2: The sink node hardware circuit diagram.

2.2.2 Automated Control System for Arduino and Android Based Intelligent Greenhouse.

In this project there used of Arduino and Android for controlling the system based on intelligent greenhouse. This system created to control of the intellectual greenhouse, collect statistics on system performance, system time setting. The data that has been collected from sensor, actuator and current activities that been doing during that time. It also communicates in two ways between the android and Arduino microcontroller that transmit the signal after receiving from the actuator and sensor used. The structure of control system has been shown in figure below.

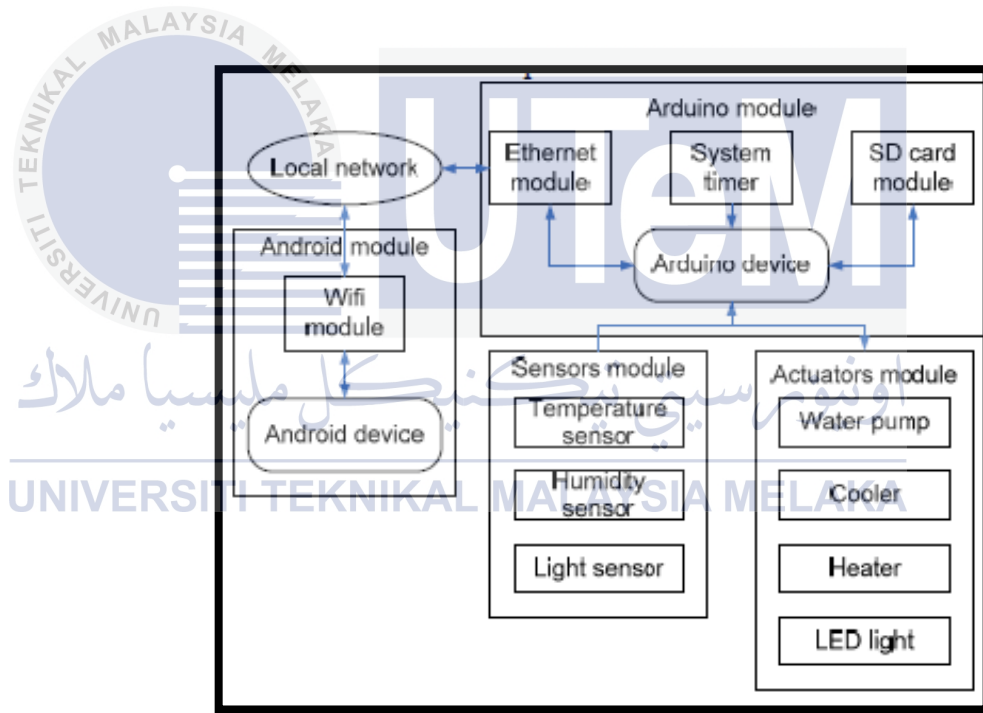


Figure 2.3: The structure of the control system

2.2.3 Design of Intelligent Greenhouse Environment Monitoring System Based on ZigBee and embedded technology.

In this project based on to design the greenhouse environment monitoring system also but using ZigBee and embedded technology. These system been created in order to meet requirement and sustained of crop growth in greenhouse precision agriculture. Wireless ZigBee network also used of multiple sensor such as humidity and temperature. It also set the warning in order to meet the actual condition. Figure below show the overall system block diagram at figure 2.4.

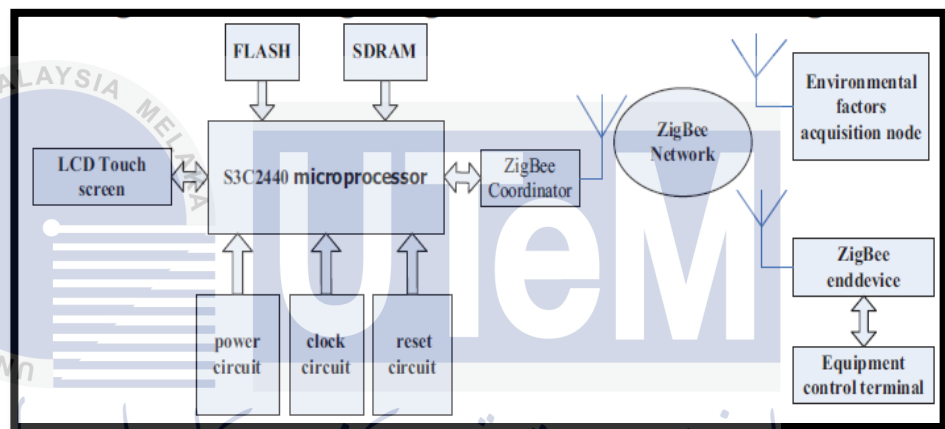


Figure 2.4: The overall system block diagram

2.2.4 Intelligent Agriculture Greenhouse Environment Monitoring System Based on IOT

This project of greenhouse monitoring system used another method which is IOT (Internet of Thing). The objective of these systems to control the climatic condition for crop and there are several advantage for system such as low cost also low power consumption. Sensor also used in this project to collect the information like temperature, humidity and

pressure inside the greenhouse. Figure 2.5 show the structure of the system.

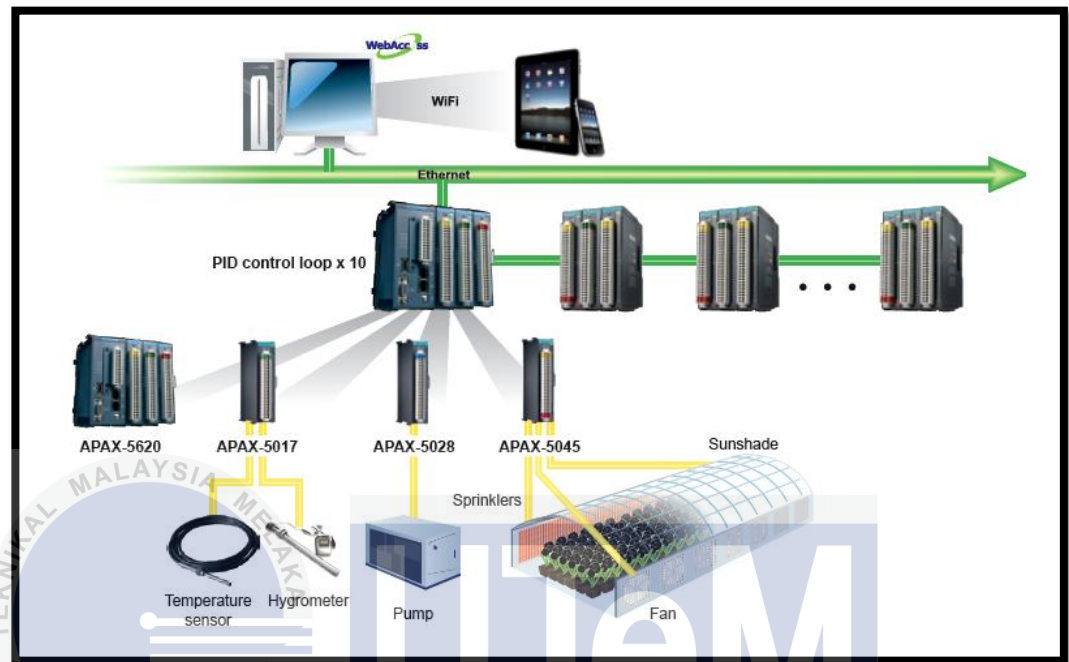


Figure 2.5: The structure of the system

2.3 Hardware and Software Review

These parts to review about hardware and software that will use on these project. This part is very important as it will explain some critical information about the parts and also the components for the hardware. There also with some knowledge with the regard of the software.

2.3.1 Arduino Controller

2.3.1.1 Introduction to Arduino

Arduino is an open source computer hardware and software company, project and user community that created and produced as microcontroller basic component in order to build digital device and also create interactive object that can sense and controlling object in this world.

The projects create start from microcontroller board design, created by a few person with use several type of microcontrollers. This design has the I/O pins provided that can be connects with multiple type of board (“shields”) and also with other circuit. The features of the board with serial communication interface, USB connection for several model and function as the connector in order to loading the program from personal computer. In order to program the microcontroller, also came with (IDE) stand for an integrated development environment based on processing project and includes with the support of C, C++ programming language.



2.3.1.2 Arduino UNO

Arduino is an open-source microcontroller platform with development environment that implements Processing/Wiring language. The Arduino Uno R3 is a microcontroller board based on the ATmega328 (AVR architecture). It has. DC power supply can be used to generate it using USB port from external. Flash Rom memory that connected to integrated USB and other device. The ATmega328 also supports I2C (TWI) and SPI communication

On other thing to maximize the performance, the AVR using the Harvard architecture has been divide the memories and buses for the program and data. Instructions in the program memory are executed with a single level pipelining. AVR ports Read-Modify Write when used as general digital I/O ports. The output buffer has stronger symmetrical drive to drive the LED to display the output. Design of modular allows easy integration with other hardware (displays, motors, and keyboard) and AVR microcontroller easy to program it.

Figure 2.6 shows the architecture of Arduino Uno which is it features all the components which modern microcontrollers

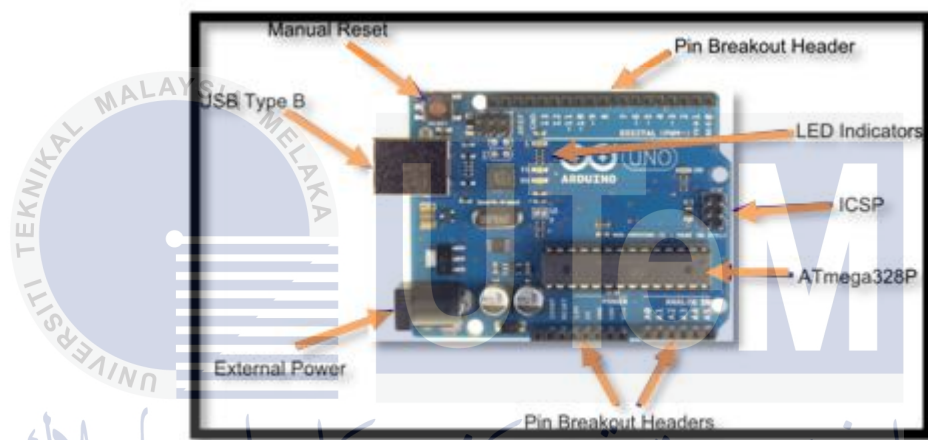


Figure 2.6: The Architecture of Arduino Uno

2.3.1.3 Advantages of Arduino UNO

Since the inception of the Arduino it is not a micro-controller anymore but an ecosystem and environment which are ported to different architectures. There are the characteristic of Arduino Uno :

- i. Debugging.
 - The Arduino Environment provide easy debugging process program which is cross-platform and is accepted by every member of the family.
- ii. No programmer or dumping flash by dirty ways,
 - With most of the companies already providing on-board debugger still compared to a lot of microcontroller (8051). It does not need datasheet in order to detect the address of microcontroller or function interrupt.
- iii. Design
 - Design of the board is very carefully crafted for beginners be it Moron Switch or ISP header to the polarity of power, the chances are steep that you would be blow it.
- iv. Libraries:
 - A lot of libraries and IC's have already been built for the same which is crucial a lot of times.

2.3.2 Water Pump

2.3.2.1 1000 L/H Submersible Water Aquarium Pump

AQ 1000 is a water aquarium that been used in this project to inject and delivered the water to the spray. In this project also the connection of this water pump will be connect with the relay because voltage that been supply is on AC voltage. The voltage that be used in this circuit is DC. The voltage that been supply by the motor with range from 220v to 240v with frequency 50 – 60Hz. The other characteristic of this pump with power delivered of 15W, flow max 800L/H and height max with 1M.



Figure 2.7: 1000 L/H Submersible Water Aquarium Pump

2.3.3 Relay 5v dc - 240v ac

Since the Arduino operates at 5V, it cannot control these higher voltage (120-240V) devices directly. However, we can get around this problem by using a 5V relay to switch the 120-240V current and programming the arduino to control the relay. The relay circuits need to attach with arduino I/O port then 5v voltage given to activate the relay in condition of normally open to normally close.



Figure 2.8: Relay 5v dc - 240v ac

2.3.4 Sensor

2.3.4.1 Humidity Sensor

Humidity is one of the sensors in the project that being used detects the presence of water in air. The greenhouse environment being control when the desired level does not match, spray will automatically turned on and turned off if the desired level reach or exceed from the level wants. Figure 2.9 show the component of sensor.

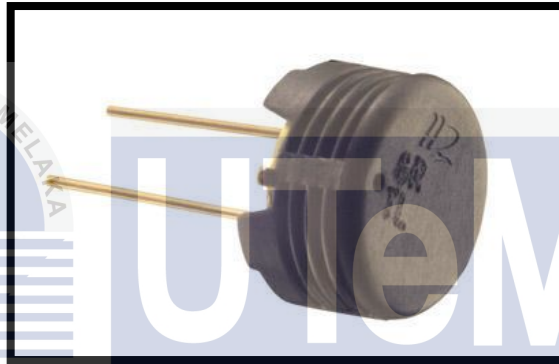


Figure 2.9: Humidity Sensor

2.3.4.2 Moisture Sensor

Another sensor that been use in this project is moisture sensor that can be used to detect the moisture of soil or judge if there is water around the sensor. Sensor been connect with arduino circuit and the program to detect conditions of soil. There are several features for this sensor such as soil sensor based on soil sensitivity, easy to use and lastly it comes with 2.0cm X 6.0cm grove. Figure 2.10 show the connection of moisture sensor with Arduino.

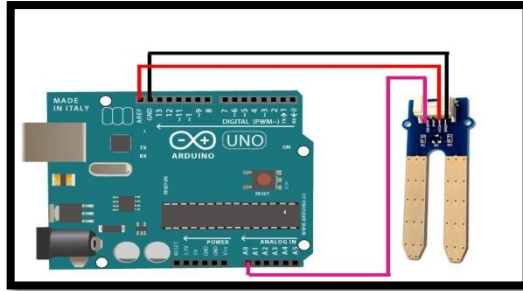


Figure 2.10: Connection of Moisture with Arduino

2.3.4.3 Temperature Sensor

The other sensor used is temperature sensor to measure necessitates that the sensor be shielded from the sun and lights, and that a constant stream of air moves by the sensor. These sensors use a solid-state technique to determine the temperature. By precisely amplifying the voltage change, it is easy to generate an analog signal that is directly proportional to temperature in greenhouse technology. Figure 2.11 shows connection of temperature sensor with Arduino.

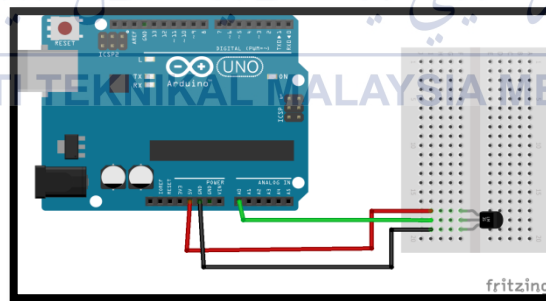


Figure 2.11: Connection of temperature sensor with Arduino

2.4 Conclusion

In this comprehensive literature review, there is an outline on the theories and information accordance to the topics. This project has been more focusing in the greenhouse monitoring system using wireless network that being control by Arduino. In order for example of plant growth the sample of plant is chilies. The step in order to familiar about this plant is gets to know about the setting or the characteristic of the plant such as the suitable temperature to growth. These project more focusing to maintain the range of temperature level for the plant by giving continuous source that is water and sun that been generate from the light in the model. Controlling all the wireless sensor and component by using arduino UNO and this component will be the main part in order to connect all the software and the hardware part in order to activate the system. This circuit also using the relay module and relay circuit in order to convert the AC voltage for the motor pump to DC voltage that been connected to Arduino. Then relay act as the operation system by activate it, so the motor will start to turn on for the water sprinkle. All of this information and method is based on previous research done but it also been the reference to improve and overcome the problem the existing project. Lastly about this literature review had given and provided some guidance in order to find the main element and component that need to be used to set up the project, creating and design this project until it finished.

CHAPTER 3

METHODOLOGY

3.0 Introduction

In this chapter, will brief and show on the process flow of the project and the method that been used in order to completing this project. There are several method that been used and this method has been analyze and make as reference such as monitoring by using android, RF signal, embedded and IOT technology been used to completing this project. In addition of that the development of the project also by using hardware and software such as Arduino that been using to control all components for monitoring the system. There are also several software such as fritzing for assemble and labview in order for simulation been use but the main part it came back on the Arduino.



3.1 Project planning and Development

Before the project start, the timeline being planned in order to manage and how the project will be done. This project has been divide into two semesters with 15 week each semester and for the first 15 week it all about the report writing and planned the flow of the report. These report start from chapter 1 until chapter 3 that contain literature review and methodology. Other 15 week for second semester will more focus on building the hardware. Lastly in other to complete this project, the result interpretations and elaboration of discussion will be compiles with conclusion at the end of this project.

There is process flow about the project by using the equipment and all components. Figure 3.1 show the process of the project with the equipment used.

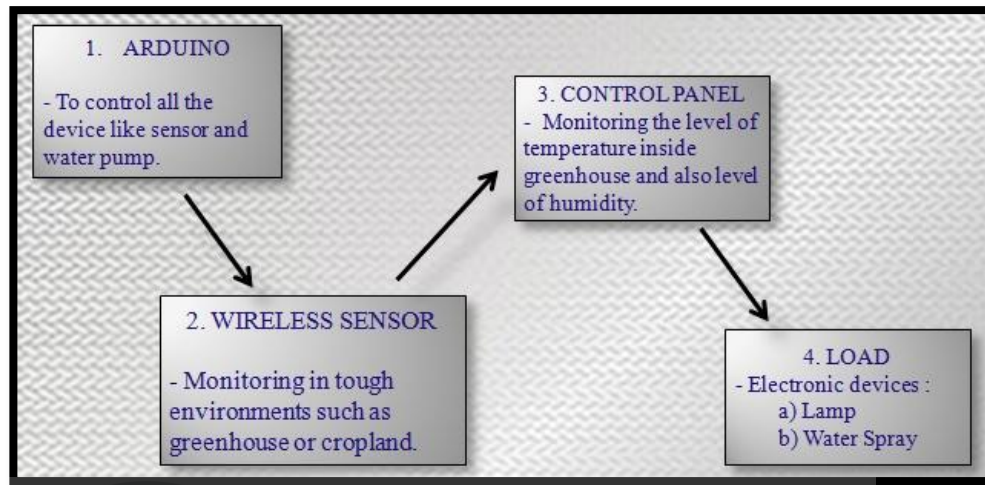


Figure 3.1: Process flow of the project

In this project, there have been several methods in order to finish it. One of the ways that been used by using the reference about the previous journal. This become the guideline to improved the previous project and studies to come with the best solution of the problem that been faced. In this project there has been the flow of the process that needs to be followed. Firstly about the arduino that been the main component of the system that control all the instruction of the wireless sensor, pump and also the lamp. In this greenhouse system also using the wireless sensor such as the moisture and humidity for getting the reading that been needed. In order of that this kind of sensor being used to monitor condition within rough such as cropland. The next process come to the control panel which is monitor the level inside the greenhouse by display the reading of the soil, humidity and temperature at certain time that being set. Monitoring of this plant growth also been divided into two type which is okra and also chilly. Lastly for the process, about the load or output of this system that contain lamp and also water pump that function if the condition is out of normal range. The figure 3.2 shows the stage of completing the project.

3.2 Flow Chart

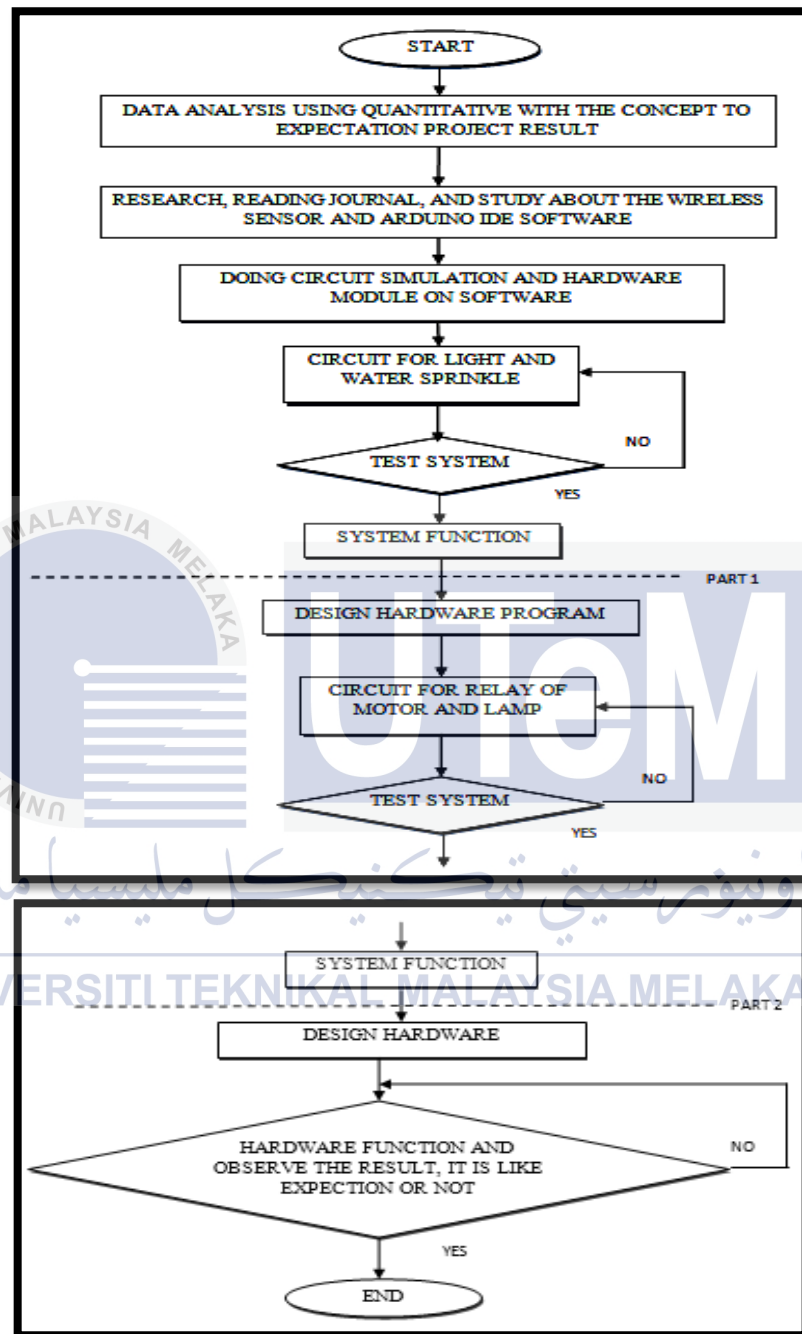


Figure 3.2: Stage of completing the project

3.3 Identification Part

The concept of this greenhouse based on the idea of mushroom cultivation, where it growth without the source of water and sun. These concepts has been applying in the project but has been some improvements such as the control of the temperature range, the source give continuous to overcome the problem in the previous project before.

3.4 Design Stage

In this part will be discussing and show the design process of the model for greenhouse system. Firstly, the component that been used in this project consist of several important part such as arduino, wireless sensor and also the output part like water pump and lamp. The design stage divide into two parts and start with by collecting data by using quantitative, then been study through journal for the wireless sensor also the previous project. Next thing come to the part of doing the simulation circuit for the software and hardware for the light and also water pump. The system then came for the testing and if the system does not functioning well it will be back to the circuit construction. After all the thing in stage one complete and it coming to stage two with the first process by start designing the hardware program which is relay circuit for the motor and lamp. This program will be in order to activate the lamp and pump by referring to the reading of the moisture sensor that has three ranges and two condition of the plant. The plants consist of chilly and then okra that have range for wet, normal and dry. After that, came to design hardware part which is the connection for the output. The reason by using relay for this circuit is to step down and convert the ac voltage of 240 to on 5v dc that been used for the arduino to start and trigger the relay. Then the system also being test and if there is no trouble then system will be functioning well. Lastly the result been observe, it is like expectation or not and the figure 3.3 shows the block connection diagram of the project.

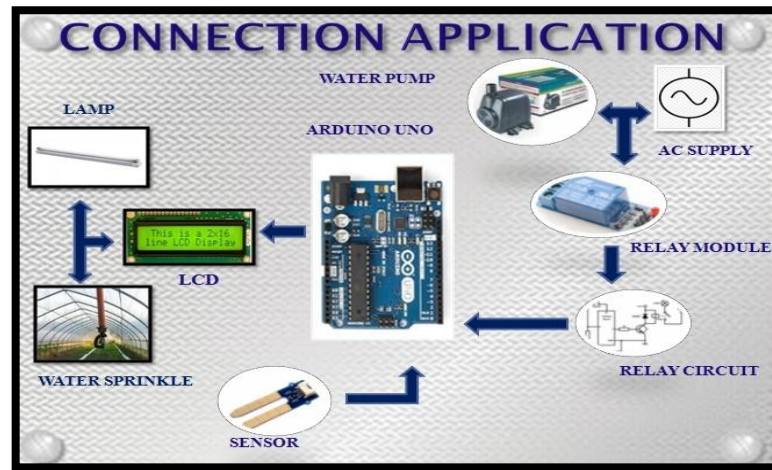


Figure 3.3: Block connection diagram of the project

Figure 3.3 shows that the block diagrams for this system of greenhouse technology. The input and output sees that connection with the arduino as the main part of this connection. Firstly for input which is wireless sensor consist of temperature, humidity and moisture sensor. This all input being connect with the port of arduino of 6 for humidity and temperature. Then for the output part consist of motor pump, lamp and also the lcd display and all the output for lamp and motor need to connected with relay module especially motor to lower the voltage from 240v Ac to 5v dc before connect to arduino. Lastly for the lcd display that connect to the 6 port of arduino which is port 12, 11, 5, 4, 3 and 2 and also the indicator of this project which connect to port 13, 10 and A1.

3.5 Testing

This stage of the HIGH TECH system will be tested and improvement will be done as well. The entire field required to fulfill the design of HIGH TECH will be checked

3.6 Analysis

Analysis is study of the properties of design part. As the expected result the proposed system is used in order to make improvement and giving the new ways compare to the previous in the agriculture field when it come to this concept. This HIGH TECH system will help the most especially farmers in order to farming process. Lastly, this system include report that can be the reference in order to improve or overcome the problem when came to the part to assemble the laboratory component.

3.7 Summary

As the conclusion, every project will have different methodologies that will be conducted in order to make the project successful and working as the plan. In generally, the methodologies have been divided into parts such as planning, implementing and analyzing. During planning phase, lots of reading activities required and some researchers are done thorough several resources such as books, journals, reference papers, internet sources in order to obtain information and data about the related projects. For hardware and software requirement, the information about the functions and the operations are also need to be study. The process of checking and testing are also followed in order to complete the implementation phase. Finally is the analyzing phase. The project will be analyzed the full system of the design in term of detectable range and delay. Every process of completing the project will be wisely managed in order to get the best result.

CHAPTER 4

RESULT & DISCUSSION

4.0 Introduction

This chapter consists several section which is the results analysis and drawing from the early until the finished to achieve the objective target. The design of greenhouse system need to follow the entire characteristic based on the objective that has been set before. All the parameter that has been important and get the precise value of moisture for the condition of the soil and the other value like temperature, also humidity. In this project the analysis was done to the condition of the soil with connection to the moisture sensor then control by arduino.

4.1 Result

In this experiment result show several picture of the condition for moisture temperature soil with the value of each condition. This part also has been giving the draft of the project development in order to switch from one condition to another. The entire picture has been show in figure 4.1, figure 4.2, figure 4.3, figure 4.4, figure 4.5, figure 4.6 and figure 4.7.



Figure 4.1: The front view of the greenhouse model

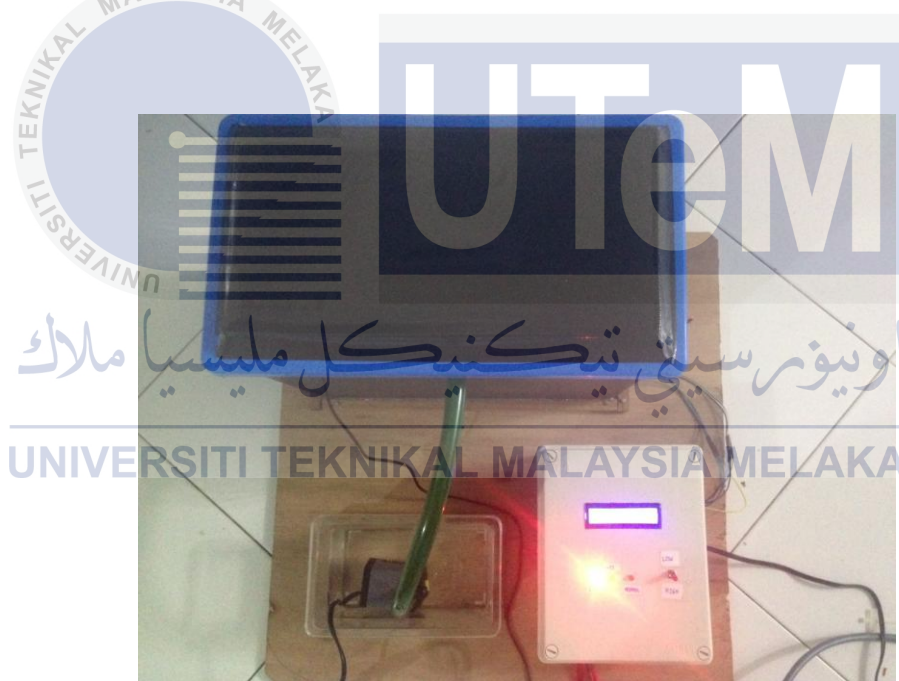


Figure 4.2: The top view of the greenhouse model



Figure 4.3: The high condition of the greenhouse model

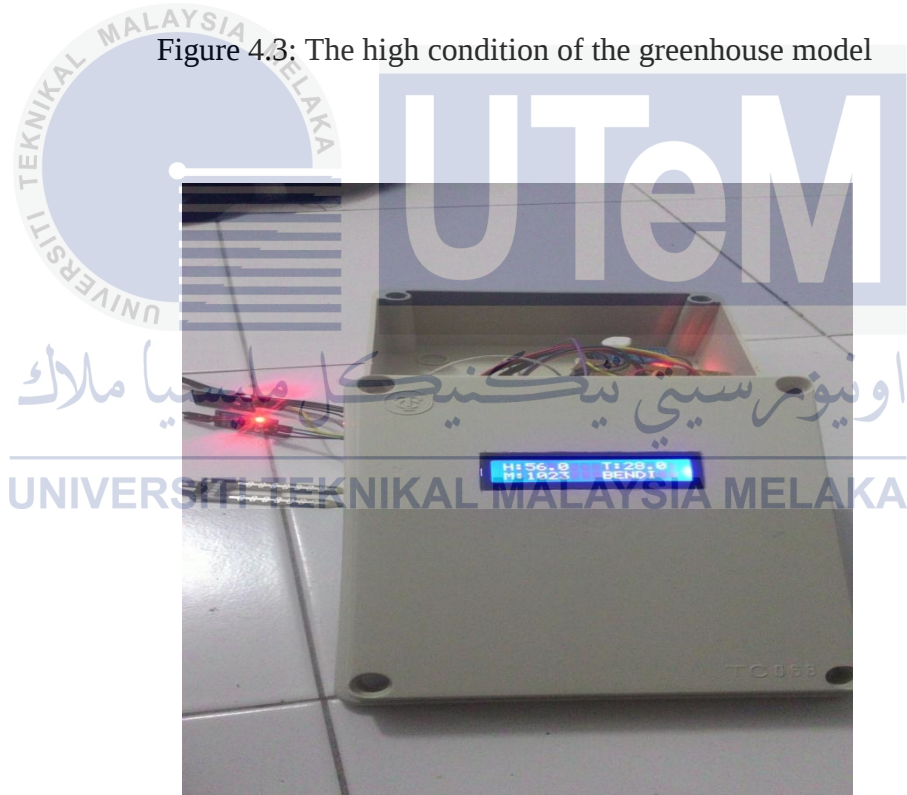


Figure 4.4: The low condition of the greenhouse model



Figure 4.5: The wet range soil of the greenhouse model



Figure 4.6: The normal range soil of the greenhouse model

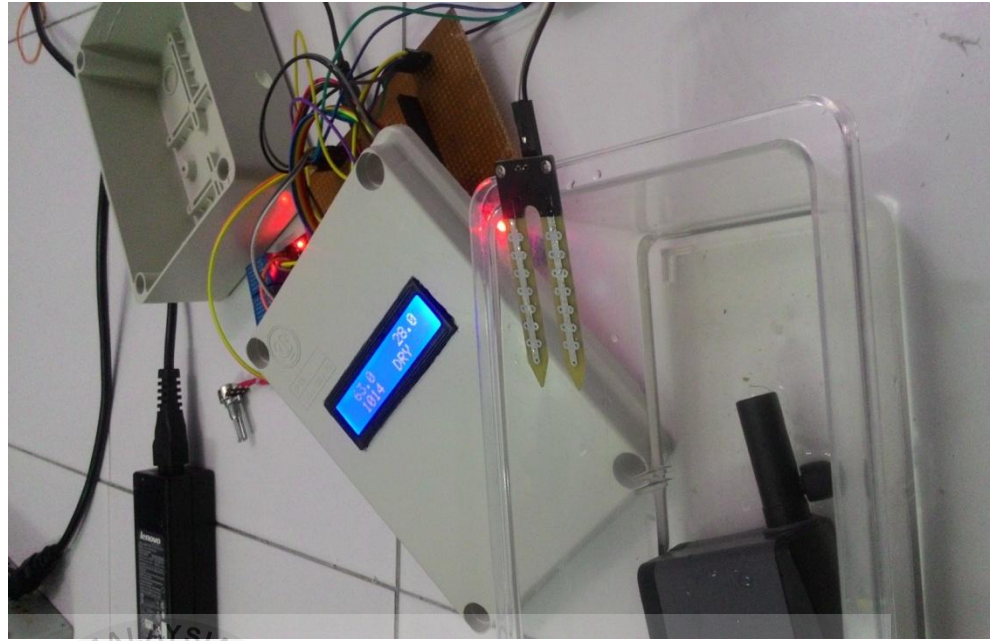


Figure 4.7: The dry range soil of the greenhouse model

4.2 Discussion

From the experiment that has been done, all the data for the moisture, humidity and also the temperature reading. All of three components have been compared but the most important thing is for the reading of the moisture versus time that shows the condition of the soil. From the condition of the soil and all other parameter taken has been tabulated in the table below. Table 4.1, 4.2, 4.3, 4.4, 4.5 and 4.6 below shows the reading for moisture, humidity, temperature and average moisture respectively.

Table 4.1: Reading of the moisture for chills value versus time (KPa).

CHILI	24-Oct	25-Oct	26-Oct	27-Oct	28-Oct	29-Oct	30-Oct
8:00am	85	70	68	45	56	86	88
9:00am	78	68	69	85	88	87	71
10:00am	77	65	85	77	57	88	70
11:00am	77	90	90	56	86	66	70
12:00pm	95	231	251	81	69	73	85
1:00pm	386	536	425	159	246	148	381
2:00pm	421	417	436	481	351	452	456
3:00pm	441	408	407	419	426	488	453
4:00pm	410	413	465	467	531	456	409
5:00pm	475	489	421	509	409	508	501
6:00pm	519	503	431	456	444	498	510
7:00pm	451	426	474	531	412	518	472
8:00pm	536	535	476	519	481	515	419
9:00pm	430	532	476	485	420	512	535
10:00pm	470	450	513	433	536	494	496
11:00pm	523	523	469	545	415	451	508

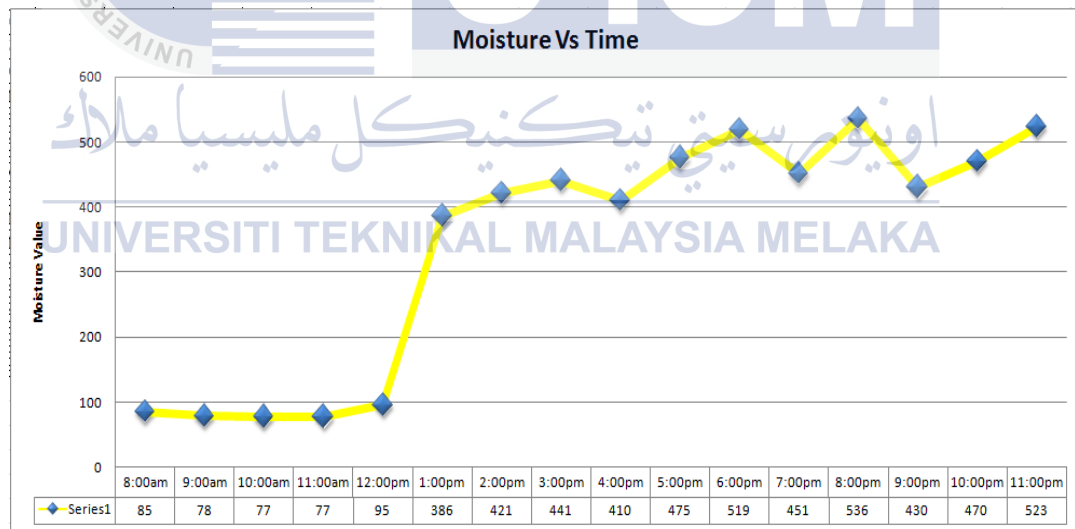


Figure 4.8: Graph reading of moisture sensor for 8/9/2016

Figure 4.8 show the reading of the soil start from 8a.m until 11p.m. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading change drastically. This condition happened due to the

weather that been so hot in the afternoon. Table 4.1 above shows reading of this soil condition that shows the increment of the reading start from 1p.m then continue increase until 4.00 pm then drop back before increase again.

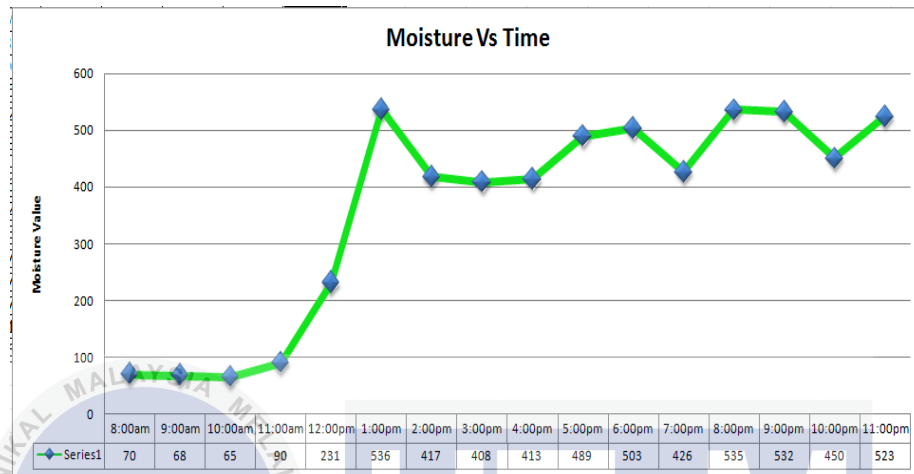


Figure 4.9 Graph reading of moisture sensor for 9/9/2016

Figure 4.9 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading change drastically with reading of 536 KPa compare to 231 KPa at 12.00 pm. This condition happened also due to the weather that been so hot in the afternoon. Table 4.1 above shows reading of this soil condition that shows the increment of the reading start from 1.00 pm then drop at 2.00 pm and almost maintain the condition then graph in fluctuate form.

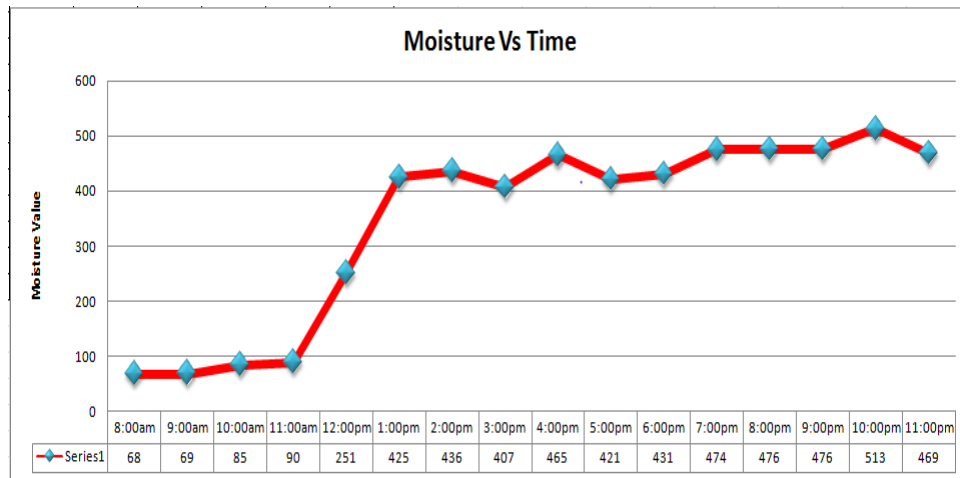


Figure 4.10 Graph reading of moisture sensor for 10/9/2016

Figure 4.10 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading change drastically with reading of 425 KPa compare to 251 KPa at 1.00 pm. This condition happened also due to the weather that been to hot in the afternoon. Table 4.1 above shows reading of this soil condition that shows the increment of the reading start from 1.00 pm then form of the graph fluctuate until 11.00 pm.

اونيورسيتي تيكنيكل مليسيا ملاك
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

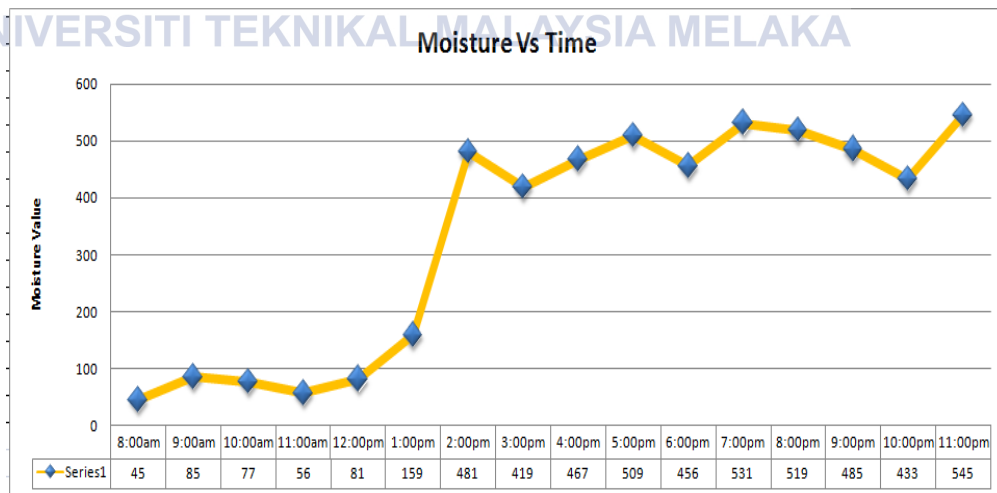


Figure 4.11 Graph reading of moisture sensor for 11/9/2016

Figure 4.11 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 2.00 pm the reading change drastically with reading of 481 KPa compare to 159 KPa at 1.00 pm. This condition happened also due to the weather that been to hot in the afternoon. Table 4.1 above shows reading of this soil condition that shows the increment of the reading start from 1.00 pm then condition become drop and increase mean fluctuate from hour to hour until 11.00 pm.

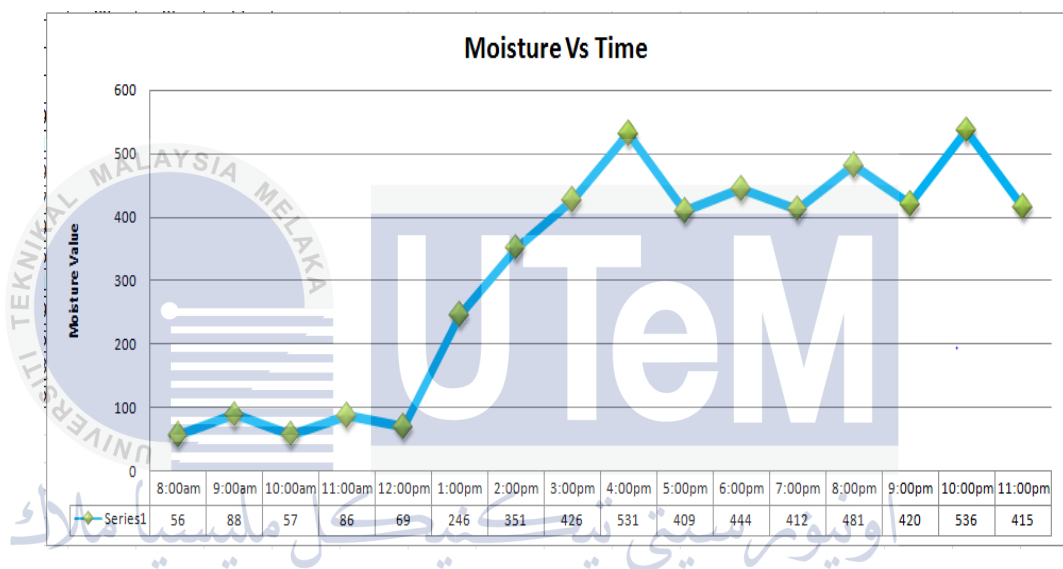


Figure 4.12 Graph reading of moisture sensor for 12/9/2016

Figure 4.12 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading increasingly with reading of 246 KPa compare to 69 KPa at 1.00 pm. This condition happened also due to the change of whether in the afternoon. Table 4.1 above shows reading of this soil then the reading continue to rise until at time 5.00 pm it will drop to 409 KPa from 531 KPa before increase mean fluctuate from hour to hour until 11.00 pm.

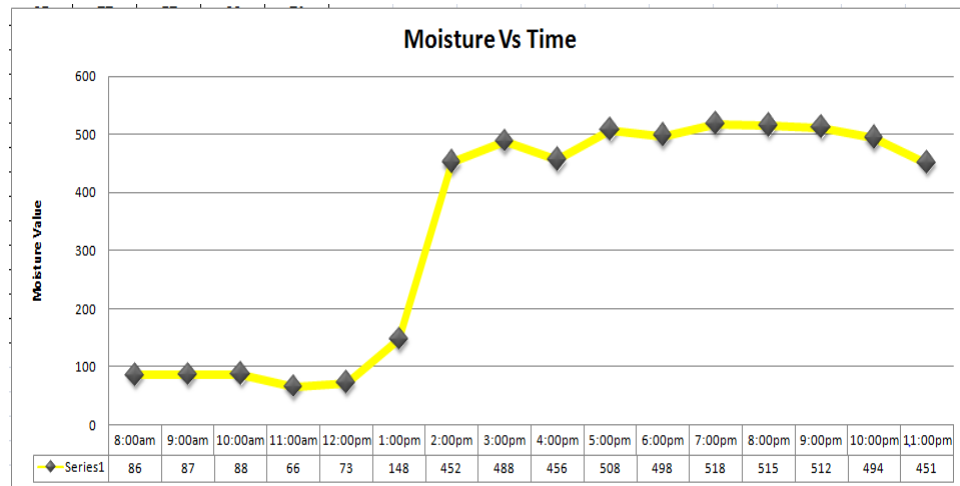


Figure 4.13 Graph reading of moisture sensor for 13/9/2016

Figure 4.13 show the reading of the soil start from 8a.m until 11p.m. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 2.00 pm the reading increasingly with reading of 452 KPa compare to 148 KPa at 1.00 pm. This condition happened also due to the change of whether in the afternoon. Table 4.1 above shows reading of this soil then the reading continue to rise until at time 4.00 pm it will drop to 456 KPa from 488 KPa before increase again than almost maintain at the same value from hour to hour until 11.00 pm.

اونيورسيتي تيكنيكل مليسيا ملاك
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

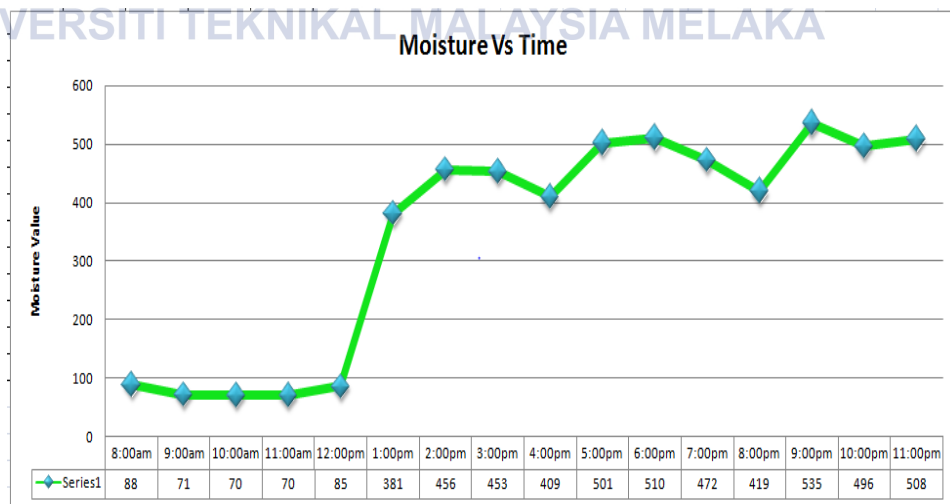


Figure 4.14 Graph reading of moisture sensor for 14/9/2016

Figure 4.14 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading increasingly with reading of 381 Kpa compare to 85 KPa at 12.00 pm. This condition happened also due to the change of whether in the afternoon. Table 4.1 above shows reading of this soil then the reading continue to rise until at time 4.00 pm it will drop to 409 KPa from 453 KPa before increase again than fluctuate from hour to hour until 11.00 pm.



Table 4.2: Reading of the moisture for okra value versus time (Kpa).

OKRA	24-Oct	25-Oct	26-Oct	27-Oct	28-Oct	29-Oct	30-Oct
8:00am	45	36	40	45	37	39	38
9:00am	46	38	42	49	35	52	42
10:00am	41	34	35	44	44	69	45
11:00am	38	48	42	37	30	66	37
12:00pm	40	45	50	40	41	154	36
1:00pm	120	145	161	159	158	148	186
2:00pm	146	178	124	213	354	263	259
3:00pm	254	313	314	366	312	488	361
4:00pm	398	400	457	412	569	521	409
5:00pm	414	457	430	397	361	396	412
6:00pm	354	416	431	377	357	412	385
7:00pm	396	355	523	410	415	324	251
8:00pm	534	320	420	413	306	460	463
9:00pm	430	510	455	621	513	312	421
10:00pm	451	487	387	524	482	524	410
11:00pm	513	527	509	544	461	483	508

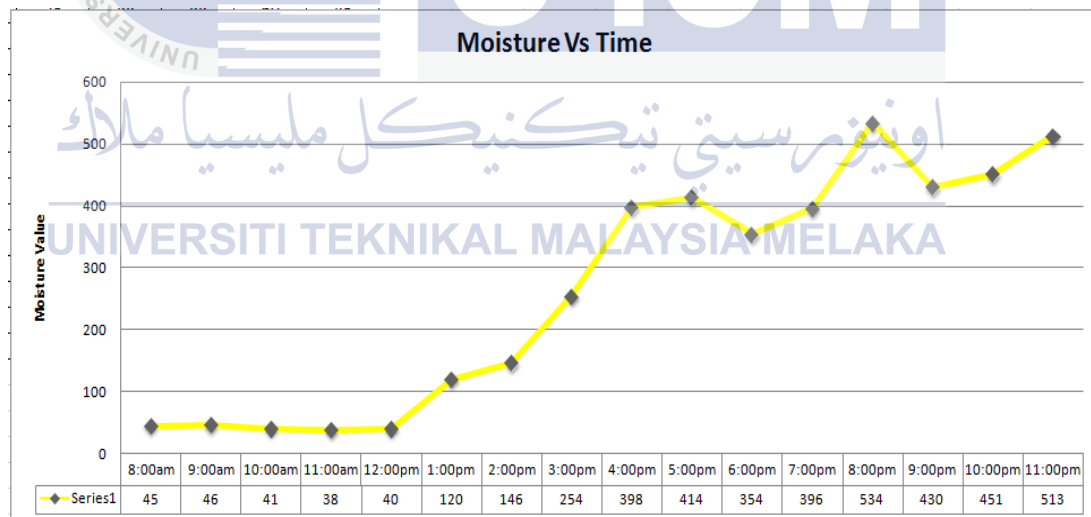


Figure 4.15 Graph reading of moisture sensor for 8/9/2016

Figure 4.15 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading change increase slowly until 4.00 pm it reach to

value of 398 KPa then decrease again at 6.00 pm. This condition happened due to the weather that been drop when come to this time. Table 4.2 above shows reading of this soil condition that shows the increment of the reading start from 7.00 pm then continue increase until 8.00 pm then drop back before increase again.

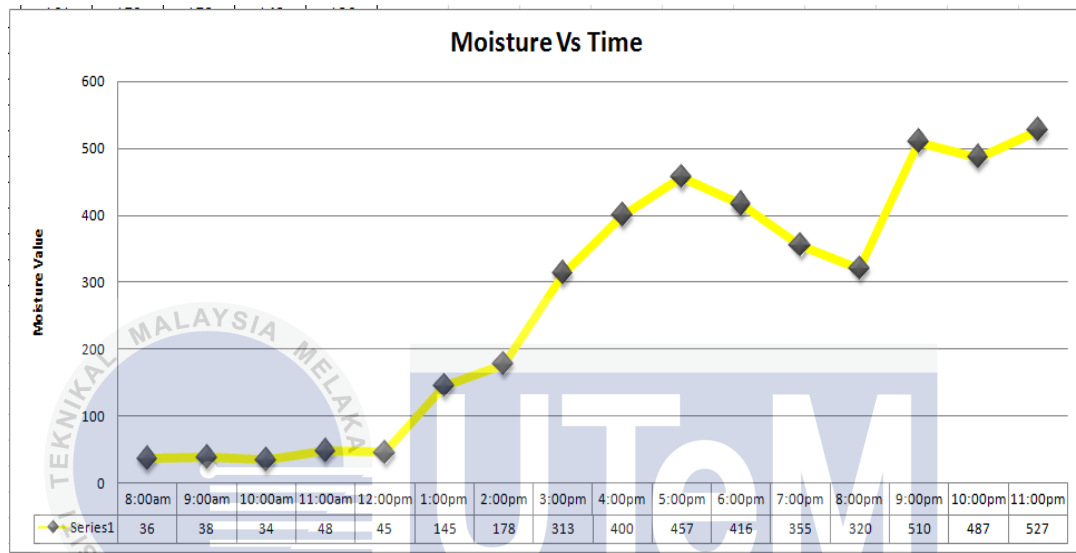


Figure 4.16 Graph reading of moisture sensor for 9/9/2016

Figure 4.16 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading change increase slowly from 1.00 pm until 5.00 pm it reach to value of 457 KPa then decrease again at 8.00 pm. This condition happened due to the weather that been drop when come to this time. Table 4.2 above shows reading of this soil conditions then show the increment of the reading start from 9.00 pm then continue increase until 11.00 pm.

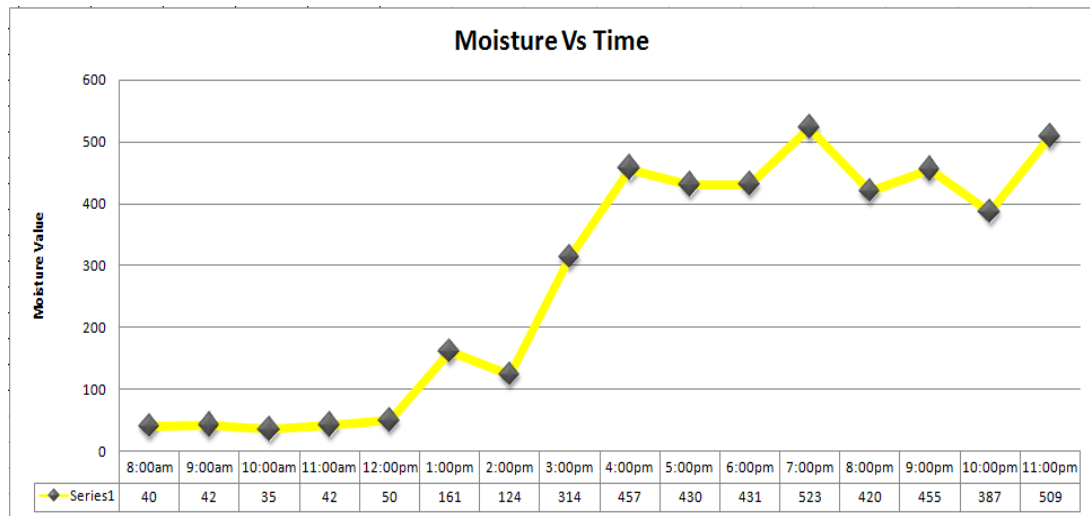


Figure 4.17 Graph reading of moisture sensor for 10/9/2016

Figure 4.17 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading change drop at 2.00 pm before raise again to value of 457 KPa at 4.00 pm. The maximum value of this condition value is at 7.00 pm with 523 KPa. Table 4.2 above shows reading of this soil condition of fluctuate value until 11.00 pm.

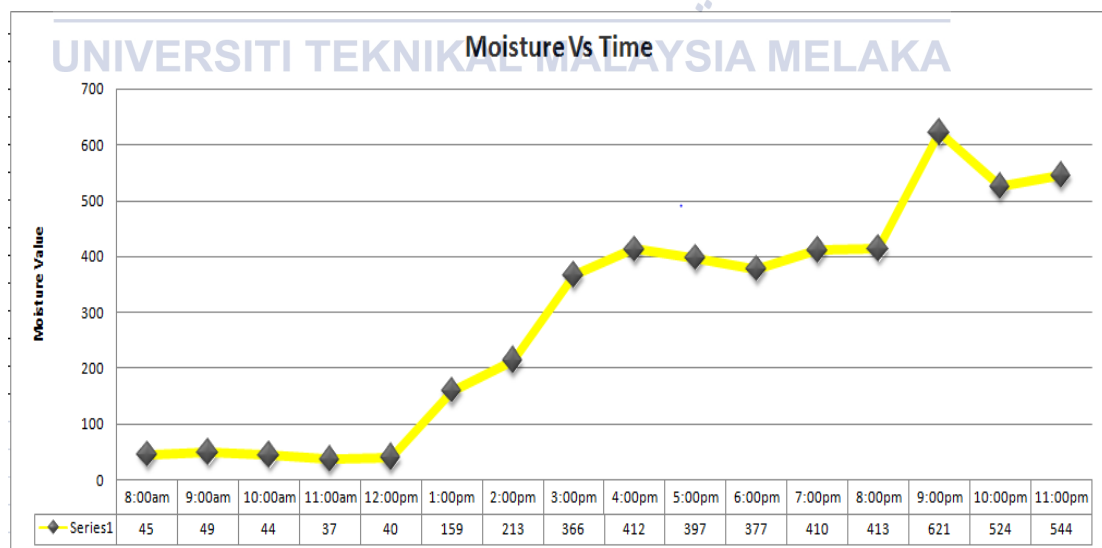


Figure 4.18 Graph reading of moisture sensor for 11/9/2016

Figure 4.18 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading increase to value of 159 Kpa that do not drastically before value almost equally same. The maximum value of this condition value is at 9.00 pm with 621 KPa. Table 4.2 above shows reading of this soil condition of fluctuate value until 11 p.m.

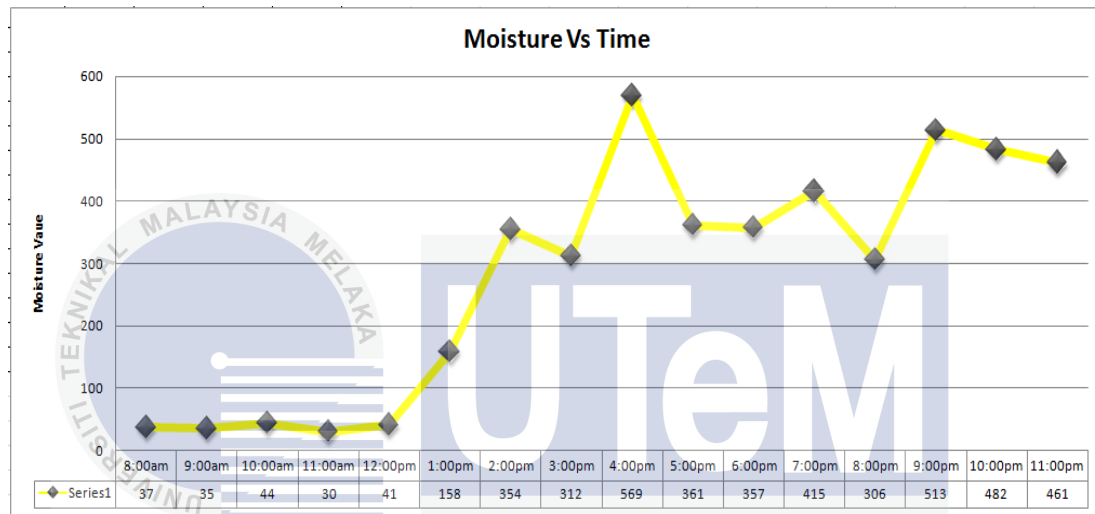


Figure 4.19 Graph reading of moisture sensor for 12/9/2016

Figure 4.19 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1.00 pm the reading increase to value of 354 KPa that drastically before value drop than drastically again increase with the higher among all hour with 569 KPa. Table 4.2 above shows reading of this soil condition of fluctuate value until 11.00 pm.

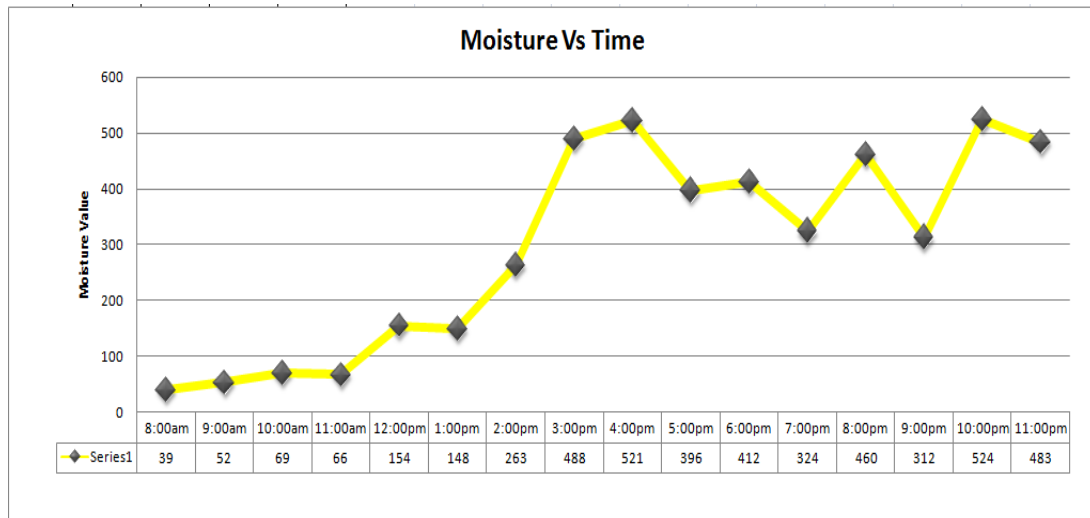


Figure 4.20 Graph reading of moisture sensor for 13/9/2016

Figure 4.20 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 12.00 pm the reading increase to value of 154 KPa that do not drastically before value almost equally same. Then rise again at 4.00 pm with value of 521 KPa. Table 4.2 above shows reading of this soil condition of fluctuate value until 11.00 pm.

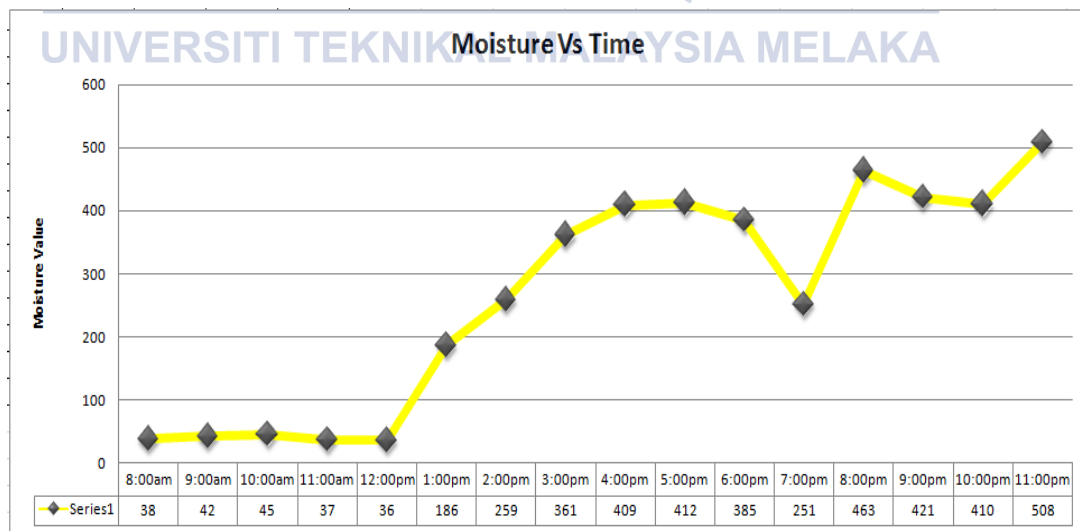


Figure 4.21 Graph reading of moisture sensor for 14/9/2016

Figure 4.21 show the reading of the soil start from 8.00 am until 11.00 pm. The moisture sensor has been used to measure the condition of the soil by taking the reading every hour but at 1p.m the reading increase to value of 186 KPa that do not drastically. Then drop at 7.00 pm on value of 251 KPa. Table 4.2 above shows reading of this soil condition of fluctuate value until 11.00 pm.



Table 4.3: Reading of the average value for okra (KPa).

OKRA	24-Oct	25-Oct	26-Oct	27-Oct	28-Oct	29-Oct	30-Oct	Average
8:00am	45	36	40	45	37	39	38	40
9:00am	46	38	42	49	35	52	42	43.42857
10:00am	41	34	35	44	44	69	45	44.57143
11:00am	38	48	42	37	30	66	37	42.57143
12:00pm	40	45	50	40	41	154	36	58
1:00pm	120	145	161	159	158	148	186	153.8571
2:00pm	146	178	124	213	354	263	259	219.5714
3:00pm	254	313	314	366	312	488	361	344
4:00pm	398	400	457	412	569	521	409	452.2857
5:00pm	414	457	430	397	361	396	412	409.5714
6:00pm	354	416	431	377	357	412	385	390.2857
7:00pm	396	355	523	410	415	324	251	382
8:00pm	534	320	420	413	306	460	463	416.5714
9:00pm	430	510	455	621	513	312	421	466
10:00pm	451	487	387	524	482	524	410	466.4286
11:00pm	513	527	509	544	461	483	508	506.4286

Table 4.4: Reading of the average value for chills (KPa).

CHILL	24-Oct	25-Oct	26-Oct	27-Oct	28-Oct	29-Oct	30-Oct	Average
8:00am	85	70	68	45	56	86	88	71.14286
9:00am	78	68	69	85	88	87	71	78
10:00am	77	65	85	77	57	88	70	74.14286
11:00am	77	90	90	56	86	66	70	76.42857
12:00pm	95	231	251	81	69	73	85	126.4286
1:00pm	386	536	425	159	246	148	381	325.8571
2:00pm	421	417	436	481	351	452	456	430.5714
3:00pm	441	408	407	419	426	488	453	434.5714
4:00pm	410	413	465	467	531	456	409	450.1429
5:00pm	475	489	421	509	409	508	501	473.1429
6:00pm	519	503	431	456	444	498	510	480.1429
7:00pm	451	426	474	531	412	518	472	469.1429
8:00pm	536	535	476	519	481	515	419	497.2857
9:00pm	430	532	476	485	420	512	535	484.2857
10:00pm	470	450	513	433	536	494	496	484.5714
11:00pm	523	523	469	545	415	451	508	490.5714

Table 4.5: Reading of the average moisture value versus time (KPa).

	AVERAGE MOISTURE															
	8:00am	9:00am	10:00am	11:00am	12:00pm	1:00pm	2:00pm	3:00pm	4:00pm	5:00pm	6:00pm	7:00pm	8:00pm	9:00pm	10:00pm	11:00pm
OKRA	40	43.42857	44.57143	42.57143	58	153.8571	219.5714	344	452.2857	409.5714	390.2857	382	416.5714	466	466.4286	506.4286
CHILLI	71.14286	78	74.14286	76.42857	126.4286	325.8571	430.5714	434.5714	450.1429	473.1429	480.1429	469.1429	497.2857	484.2857	484.5714	490.5714

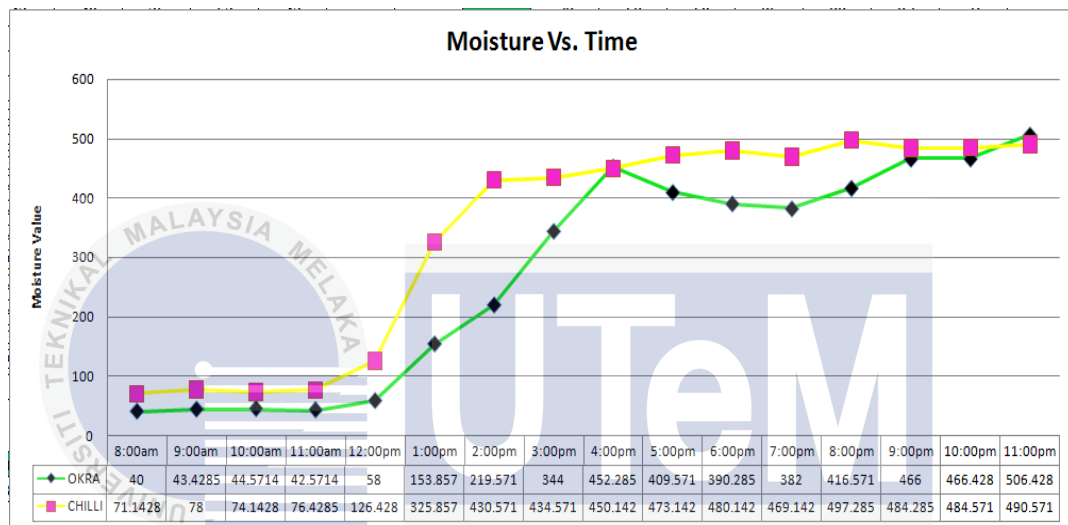


Figure 4.22 Graph reading of average moisture versus time

Figure 4.22 show the average value of moisture sensor reading between chills and okra from 8.00 am until 11.00 pm. The moisture sensor been used in taking data for every hour and data show that the value of this two type of plant below the normal condition with chilly goes below 100 KPa and okra below 50 KPa. Then graph increase at the same time of 12.00 pm with the value of the okra is 126.428 KPa and chills is 58 KPa that in range of normal condition of the soil. When came to 4.00 pm the reading almost same but value of okra above chills. After that time value of okra decrease but chills still on the increasing mode but drop at 7.00 pm., lastly the value of this two plant going same but also have slightly different and at the end going increase again.

Table 4.6: Reading of moisture value for chills and okra with temperature and humidity
(KPa)

	TEMP	HUMI	MC	MO
8:00am	26	52	71.14286	40
9:00am	26	53	78	43.42857
10:00am	28	26	74.14286	44.57143
11:00am	28	62	76.42857	42.57143
12:00pm	29	60	126.4286	58
1:00pm	29	57	325.8571	153.8571
2:00pm	29	55	430.5714	219.5714
3:00pm	29	54	434.5714	344
4:00pm	29	53	450.1429	452.2857
5:00pm	29	52	473.1429	409.5714
6:00pm	29	51	480.1429	390.2857
7:00pm	29	50	469.1429	382
8:00pm	28	53	497.2857	416.5714
9:00pm	28	53	484.2857	466
10:00pm	27	54	484.5714	466.4286
11:00pm	27	54	490.5714	506.4286

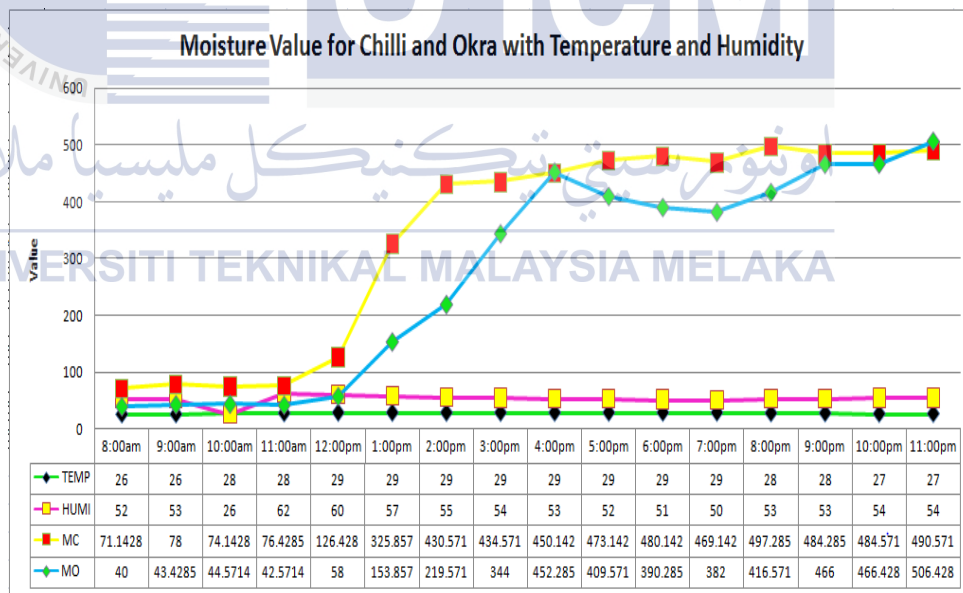


Figure 4.23 Graph reading of average moisture value with temperature and humidity

Figure 4.23 show the overall reading of the moisture average value with temperature and humidity from 8.00 am until 11.00 pm. The graph shows that the value of temperature and humidity almost the same value but with value that increase or decrease according to the temperature during that time.

Upon testing and also analysis, the reading of the moisture value that been in average show that the increasing value start at 12.00 pm for chills that drastically with the value of 126.428 KPa compare to 76.4285 KPa before, the reason is effecting by the change of weather with each getting hot. The reading continues to increase until 7.00 pm which drop due to the drop of humidity level and temperature level during that time. Meanwhile, reading after that time continues to start increase again before fluctuate toward the last value. Meanwhile for the moisture reading of okra show that the raising value start at 1.00 pm with the value of 153.857 KPa compare to value at 12.00 pm with wet condition, value just only 58 KPa. This situation happened due also to change of weather from wet to sunny day. The value getting to rises with the increase of temperature at 4.00 pm and drop down at 7.00 pm with value of 382 KPa. Lastly the reading continues to get up cause from the drop of temperature at night with only 27 Celsius compare before with 29 Celsius.

In all the graphical illustrations, the conclusion of this project show that the relationship between all the parameter that given the project data. The most relation that has been seen is between moisture and time that given the picture of the graph in two condition of plant which okra and chills.

CHAPTER 5

CONCLUSION & RECOMENDATION

5.0 Introduction

In this segment, the summaries that being made for the major part about High Tech Electricity system in Agriculture Field using several type of sensor to find the suitable condition for growing plant. The purpose of this project to give continues source for the plant growth. There are several sensors in this project have their own function in order to get the right reading of this greenhouse. Example of the important type of sensor is moisture which function to detect weather the reading of the soil are in many condition like to wet, dry or in normal and give exactly the right value within range. In order to of this project also being add with other thing like water sprinkler, lamp and lastly the important part arduino that controlling the instruction that connect with lcd display. Overall, system in the greenhouse project is a new innovation in engineering field and can bring the new concept to regard society. The program and prototype can help the scientific experts in obtaining data that accurate, compact and precise in order to bring the new creation.

5.1 Conclusion for Chapter 1

In the chapter 1, the summaries were made that to able study and develop the concepts of the greenhouse system and sensor that have been use in this project. This problem statement occurs in agriculture field which is change of season in this country that effect the growth of the plant. The problem also gives the condition of surrounding become differently inside and outside of it. These projects are building the system using an Arduino that be the important part. Using

this component in to control the input and output of the greenhouse and give the desired surrounding. Meanwhile the other problem comes with the fungus spore that also will be effecting the growth. Greenhouse system technology could probably resolve this problem. In this thesis, greenhouse system is develop for given continues source for system.

5.2 Conclusion for Chapter 2

In chapter 2, summary were made that to able study and researches the sources and concept of greenhouse system, multiple sensor, light source, water source and also moisture sensor as the main sensor for detection of soil level. Study made through website, magazine, books, journal and library. This research and study to complete the project to solve all problem that occurs. Through this study, there are many resource related to greenhouse technology implementation toward greenhouse system. Firstly, the understanding the basic structure of greenhouse technology and basic component greenhouse system. Apart from that, this study also on study about the microcontroller based on wireless sensor that been used. Then, processing method identified which occurred in this system that being control by setting the desired level of surrounding. After that, study about the light and water source that used light and water pump that being control by arduino. The entire source help greenhouse implemented concept by getting the accurate, compact and detailed set of data. Lastly all of this study and component that being apply more focusing to maintain the range the desired level of the plant itself that being generate by using continues source.

5.3 Conclusion for Chapter 3

In chapter 3, the summary was made that can be makes us step to complete the project and preparation of the report. Firstly, by finding the subject and title of the project then the goal that needs to be achieved. Secondly, conduct the research on subject chosen and source that relate to the topic that have been

choose. Thirdly, looking for the raw material and equipment used and conduct research on the component characteristic. Next is making the flow chart to complete the project according to time and in that time also need to avoid problem faced while do the experiment in laboratory to create the greenhouse system that given continues sources to carried out the data according to step for achieved objective. Fifthly, do the testing toward the project to get the accurate data, compact and also the detailed. Lastly, by writing the report need to be done as completion for this final thesis.

5.4 Conclusion for Chapter 4

In chapter 4, the summary were made that can make is the analysis of entire experiment. The analysis can being made is the performance of sensitivity approximate 100% and also approach. The differences of moisture sensor reading show the different of the sensor detect the level temperature of soil. Based on the 3 light source that being made, the best result come from yellow one which is the normal temperature with the range of >100 and <800 . The sensor has a maximum range of 1022 which sensitively of 100% and also approach the linearity 1. The better sensor can be detected the excellent performance of soil and the surrounding temperature of room.

5.5 Suggestion & Recommendation

In the future, the summary was made that is improvement ways a project by giving opinion and innovation to the project. Generally, every project has the advantage and disadvantage that distinctive to achieve the objective. Moreover, the use ideas and opinion can give new impact in innovating use of material that based on greenhouse system. Therefore, greenhouse system for greenhouse concepts need innovative become better to get the new improvement to get the correct data,

analysis and precise. Lastly the new improvement that can be makes by adding another function like GSM or Bluetooth and another application.

5.6 Commercialization Potential

The greenhouse system that been build up will be the future technology inn agriculture field. This project contain of control box that be the main function to control all the activities inside the greenhouse. The panel box contain of arduino that control the entire wireless sensor inside the house. This technology will be showing the advancing system that will make be commercialize by giving the continue source for the plant. Other than that the project will be available in the bigger scale of farming the plant or with other type of plant growing. Lastly in this project show that will be many other opportunities to be improved from time to time by depending to new technology in future years.

REFERENCES

- [1] Daniel W. Hart, Power Electronics, Tata McGraw-Hill, 2011, ISBN 0071321209, 9780071321204
- Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory 11th Edition, Pearson Education, 2013, ISBN 0133109046, 9780133109047
- [2] G. Barrenetxea, F. Ingelrest, G. Schaefer and M. Vetter, "Wireless Sensor Networks for Environmental Monitoring: The Sensor Scope Experience", *2008 IEEE International Zurich Seminar on Communications*,
- [3] J. Balendonck, J. Hemming, B. A.J. Van Tuijl, L. Incrocci, A. Pardossi and P. Marzalletti, "Sensors and Wireless Sensor Networks for Irrigation Management under Deficit Conditions (FLOW-AID)", *coordinated by Wageningen University and Research Centre in the Netherlands*, 2008
- [4] Tanaka, K.; Suda, T.; Hirai, K.; Sako, K.; Fuakgawa, R.; Shimamura, M.; Togari, A, "Monitoring of soil moisture and groundwater levels using ultrasonic waves to predict slope failures," *Sensors*, 2009 IEEE, vol., no., pp. 617,620, 25-28 Oct. 2009
- [5] K. Smarsly, "Agricultural ecosystem monitoring based on autonomous sensor system", *Agro-Geoinformatics (Agro-Geoinformatics)*,
- [6] Sun Rong-Gao, Wan Zhong and Sun De-Chao (2009). Greenhouse temperature and humidity intelligent control system. In: *Proceedings of the 3rd WSEAS Int. Conf. on Circuits, Systems, Signal and Telecommunications*. pp. 120-125.
- [7] Kamel Mesmoudi, Azedine Soudani and Pierre Emmanuel Bournet (2010). The determination of the inside air temperature of a greenhouse with tomato crop, under hot and arid climates. *Journal of Applied Sciences in Environmental Sanitation* 5(2), 117-129.

[8] Yuquan, M., Shufen, H., Qingzhu, W., "New Environment Parameters Monitoring and Control System for Greenhouse Based on Master-Slave Distributed", IEEE Conference Publications. Page(s): 31-35, 2010.

[9] Porciello, G. P. ; Doerr, D. "Advanced Process Control for Moisture Monitoring and Control Applications", IEEE Conference Publications. Page(s): 58-64, 1999.



APPENDICES

APPENDIX A- Source Code for Arduino



APPENDIX A

```
//delay(1000);

if(digitalRead(button)== HIGH)

{

if (moisture <= 100)

{

Serial.println("WET");

digitalWrite(relay,LOW); //UNTUK LAMPU

digitalWrite(relay2,HIGH);

lcd.setCursor(9, 1);

lcd.print("CILI ");

digitalWrite(kuning,HIGH);

digitalWrite(merah,LOW);

digitalWrite(hijau,LOW);

//delay(1000);

}

else if( moisture>100)

{
```

```

if(moisture>800)

{

  Serial.println("DRY");

  digitalWrite(relay,HIGH);

  digitalWrite(relay2,LOW);//UNTUK PAIP

  lcd.setCursor(9, 1);

  lcd.print("CILI  ");

  digitalWrite(merah,HIGH);

  digitalWrite(hijau,LOW);

  digitalWrite(kuning,LOW);

}

else{

  Serial.println("NORMAL");

  digitalWrite(relay,HIGH);

  digitalWrite(relay2,HIGH);

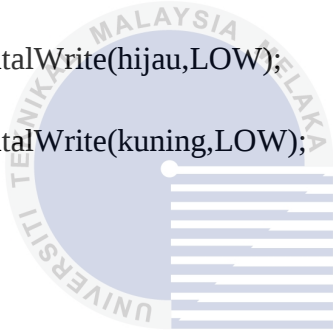

  lcd.setCursor(9, 1);

  lcd.print("CILI ");

  digitalWrite(hijau,HIGH);

  digitalWrite(merah,LOW);

```



اونيورسيتي تيكنيكل مليسيا ملاك

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

```
digitalWrite(kuning,LOW);
```

```
//delay(1000);
```

```
}
```

```
}
```

```
}
```

```
else
```

```
{
```

```
if (moisture <= 50)
```

```
{
```

```
Serial.println("WET");
```

```
digitalWrite(relay,LOW); //UNTUK LAMPU
```

```
digitalWrite(relay2,HIGH);
```

```
lcd.setCursor(9, 1);
```

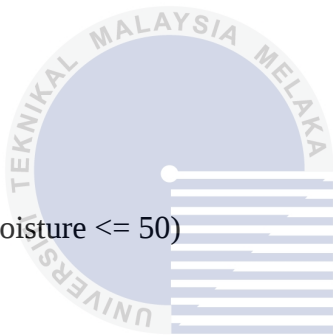
```
lcd.print("BENDI  ");
```

```
digitalWrite(kuning,HIGH);
```

```
digitalWrite(merah,LOW);
```

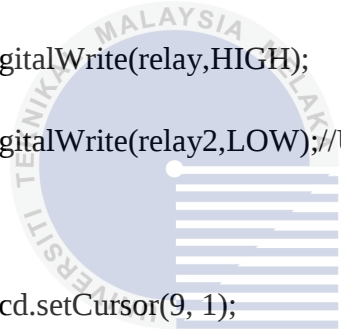
```
digitalWrite(hijau,LOW);
```

```
//delay(1000);
```



اونيورسيتي تيكنيكل ماليزيا ملوك
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

```
}  
  
else if( moisture>50)  
{  
  
    if(moisture>600)  
    {  
  
        Serial.println("DRY");  
        digitalWrite(relay,HIGH);  
        digitalWrite(relay2,LOW);//UNTUK PAIP  
  
        lcd.setCursor(9, 1);  
        lcd.print("BENDI");  
        digitalWrite(merah,HIGH);  
        digitalWrite(hijau,LOW);  
        digitalWrite(kuning,LOW);  
    }  
  
    else{  
  
        Serial.println("NORMAL");  
        digitalWrite(relay,HIGH);
```



اونيورسيتي تيكنيكل ماليسيا ملاك
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

