POLITEKNIK SULTAN

SALAHUDDIN ABDUL AZIZ SHAH

IOT SMART PLANT MONITORING

MUHAMMAD SYAMIM BIN

MOHAMMAD SHAFAWI

(08DJK20F1013)

JABATAN KEJURUTERAAN ELEKTRIK

PUAN SURIANI BINTI DAUD

SESI 1:2022/2023

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This report was submitted to the Department of Electrical Engineering as partial fulfillment of the award conditions

Diploma of Electrical Engineering

JABATAN KEJURUTERAAN ELEKTRIK

SESI 1;2022/2023

DECLARATION OF ORIGINALITY AND OWNERSHIP

IOT SMART PLANT MONITORING

1. Me, **MUHAMMAD SYAMIM BIN MOHAMMAD SHAFAWI(NO KP: 021002-03-0821)** is a student **Diploma Kejuruteraan Elektrik, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is addressed at**Persiaran Usahawan,Politeknik Sultan Salahuddin Abdul Aziz Shah,40150 Shah Alam,Selangor.**
   (Hereafter referred to as 'the Polytechnic').).

2. I acknowledge that the 'Above Project' and the intellectual property in it are the result of my original work/design without taking or copying any intellectual property from other parties..

3. I agree to allow ownership of the intellectual property of 'the Project' to 'the Polytechnic' to meet the requirements to obtain the award **Diploma Kejuruteraan Elektrik** to me.

Made and it truth recognized by;

MUHAMMAD SYAMIM BIN MOHAMMAD SHAFAWI)

…….

(Identification Card: 021002-03-0821)) MUHAMMAD SYAMIM

In front of me,

SURIANI BINTI DAUD () …….

As a project supervisor on the date: ……..…….) SURIANI BINTI DAUD

:

APPRECIATION

I would like to express his sincere appreciation to the project supervisor, for the guidance and discussion provided throughout the duration of this project..

This appreciation also goes to anyone who directly or indirectly helped in the production of this project..

ABSTRACT

Plant monitoring is seen as one of the most important tasks in any farming or agriculture-based environment. With the inception of Ambient Intelligent systems, there has been a rise in ambient intelligent based devices-Smart Homes and other similar technologies involving RFID has evolved over the past few years. Integration of such an ambient intelligent system with plant monitoring makes farming easier. In this paper, the implementation of a smart plant monitoring system is discussed. This makes us of the concept of ambient intelligence with the use of .Net Gadgeteer which, proactively handles the plant monitoring system. The given implementation works along with a cloud-based server and a mobile-based device (ideally Android/ /iOS device) which helps the user to control and see the status of the plant which is being monitored by the hardware device. The given circuitry detects changes in the moisture, temperature and light conditions in and around the plant, and performs a machine-based curation on the plant by providing necessary irrigation and illumination for the plant. The machine is also integrated with an active weather forecasting system which is deployed in the cloud-based server using advanced machines.

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Simbol	
f	Frekuensi
m	Jisim
P	Tekanan
r	Jejari

LIST OF ABBREVIATION

CeTRI	Centre for Telecomunication Research and Innovation

CHAPTER 1

INTRODUCTION

1.1 Introduction

The concept of a network of smart devices was introduced in 1982, with a modified coke machine that becomes the first internet-connected appliance. Between 1982 to 1999 many companies are working on IOT. But in 1999 IOT is introduced by British technology pioneer Kevin Ashton coined the term in his work at Procter and gamble. But the term IOT did not step up till 2011 later in 2014 it reached the mass market. IoT allows the objects that will connect through the internet with RFID (Radio Frequency Identification) communication method that includes wireless technology and sensors that can identify themselves uniquely. In the world of the internet, information play important role in everyone's life. Agriculture is speedily becoming a data-intensive industry, where farmers can collect and evaluate a large amount of information from a different device (i.e sensors) in order to become more efficient in production. In India, 83% of water is consumed by agriculture. If there are no plans for the usage of water in farms, then it causes a waste of water. So we need a system which will efficiently supply water. Arduino Uno is a microcontroller along with a moisture, temperature and humidity sensor that can monitor soil content and accordingly, it irrigates the field when needed. The proposed system uses microcontroller ATMEGA328P on Arduino Uno and IOT which enable farmers to remotely monitor the status of the motor installed on the farm by getting approximate information from the sensor thereby, making the farmers' work much easier as they can do other farm activities. And mostly this technique is driven by electrical power and on/off scheduling controlled

1.2 Background Research

Smart Farming System

Smart farming systems reduce waste, improve productivity and enable the management of a greater number of resources through remote sensing. In traditional farming methods, it was a mainstay for the farmer to be out in the field, constantly monitoring the land and condition of crops

1.3 Problem Statement

- Individuals busy and not have enough time to take care of plant
- Plant will be affected if you want to leave the house, for example back to the village/outstation

1.4 Research Objectives

- collect data on tree condition
- Created a tools to make it easier for individuals and farmer to manage crops
- Maintain plant soil moisture to ensure plant are always fertile

Scope of Research

- to collect data on the surrounding environment such as temperature and air humidity
- To check the soil conditions as well, which may help to start a better growth of a plant. It may support to control water usage and wastage of water

1.5 Project Significance

based on the study, this project has several significances, among of them are:

-Humidity Control,

-Automatic watering control

- Notifications about the state of the tree,

- Control the water pump remotely using the blynk application,

-Maintain the plant in good condition

1.6 Chapter Summary

Nowadays the air around us is quite worrying as a result of irresponsible human actions. so individuals need to play an important role to prevent the air from being polluted. one of the ways to restore fresh air is to plant trees around the house but there are some individuals who are always busy with work so there is no time to manage plants. therefore I have an idea by creating a tool to manage plants easily just by using a mobile phone. this system or tool can be used anywhere

CHAPTER 2

2 LITERATURE REVIEW

2.1 Introduction

In India, about 35% of the land was reliably irrigated. And 2/3rd part of the land is depending on monsoon for the water. Irrigation reduces dependency on monsoon, improves food security, and improves the productivity of agriculture and it offers more opportunities for jobs in rural areas. Farmers are facing problems related to the watering system how much water has to supply and at what time? Sometimes overwatering causes damage to crops and all as waste f water. Hence to avoiding such damage we need to maintain an approximate water level in the soil.

In this paper, the humidity sensor, moisture sensor, and temperature sensor are placed in root zone of plant and gateway unit (ESP8266) handles the sensor information and transmit data to a android application. This application is developed for measure the approximate values the of temperature sensor, humidity sensor and moisture sensor that was programmed into a microcontroller to control water quantity.

2.2 Smart kitchen

This project is suitable to check the soil conditions as well, which may help to start better growth of a plant. It may support to controlling water usage and wastage of water.

2.2.1 Previous Research

The system is developed for irrigation is on two ways: I) System Software II) System hardware Software is a web page designed by using PHP an the d hardware consists embedded system which monitors soil content. In this system open source Arduino boards along with moisture sensors, it is applicable to create devices that can monitor the soil moisture content and accordingly irrigating the fields as when needed. This system introduced a GSM-SMS remote measurement and control system for farms based on PC based database system connected with base station, which is developed by using a microcontroller, GSM module, actuators and sensors. It informs users about many conditions like status of electricity, dry running motor, increased /decreased temperature, water content in soil via SMS on GSM network or by Bluetooth. In practical the central station receives and sends messages through GSM module Values of temperature, air humidity and moisture which are set by central station are measure in every base station information is exchanged between far end and designed system via SMS on GSM network. A SIM with 3G data pack inserted into system which provide IOT features to the system. This system sets the irrigation time depending on reading from sensors and type of crop and it can automatically irrigate the field when needed, by using GSM-GPRS SIM900A parameter from sensor regularly updated on a webpage. This application makes use of the GPRS feature of mobile phone as a solution for irrigation control system. This system was used to cover lower range of land and not economically affordable

Table 2.1:Treatments to Improve Motor Skills in the Market

study	Study the true component
drawing	Draw the design of the project
Expert opinion	Ask the expert how to do this project

2.3 Control System Control System theory has played an important role in a set of mechanical or electronic devices that regulates other devices or systems by way of control loops. Typically, control systems are computerized. Control systems are a central part of industry and of automation.

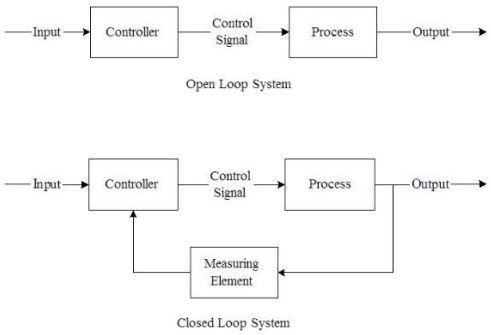


Figure 2.1: Block diagram of open loop and closed loop system

2.3.1 Microcontroller

A microcontroller an integrated circuit that contains a microprocessor along with memory and associated circuits and that controls some or all of the functions of an electronic device (such as a home appliance) or system.

2.3.2 Programmable Logic Control (PLC)

A programmable logic controller (PLC), or programmable controller is an industrial digital computer is a type of tiny computer that can receive data through its inputs and send operating instructions through its outputs.

2.3.3 Arduino & nodemcu 8266

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. NodeMCU is an open source platform based on ESP8266 which can connect objects and let data transfer using the Wi-Fi protocol. In addition, by providing some of the most important features of microcontrollers such as GPIO, PWM, ADC, and etc, it can solve many of the project's needs alone.

2.4 Chapter Summary

This section focusing on two different section, the first is fine motor skill development to know about the project that I have been choosing The second section is discovered about the technical part, including the selection of the type of controller.

CHAPTER 3

1 RESEARCH METHODOLOGY

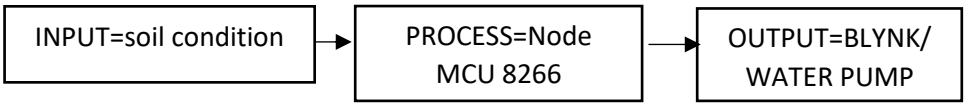
3.1 Introduction

To realize this Project as a ready to use product with security features, a very comprehensive plan is being implemented. A step by step procedure is done so that the Project can be completed within the stipulated time. This includes collecting mechanical part design data, circuit design testing and validation.

3.2 Project Design and Overview.

As mentioned in the previous chapter, the controller is designed using a closed loop system with the Nodemcu 8266 as the main controller. The design of the controller circuit using NODEMCU 8266 is realized using Proteus Software and then converted to PCB circuit.In proteus NodeMCU 8266 processes the input provided by the soil sensor and the output is water pump

3.2.1 Block Diagram of the Project



3.2.2 Flowchart of the Project 2

Error! Reference source not found. shows the circuit diagram of the whole system. It is show that soil sensor if detected condition soil will proceed to blynk.If no ,it will not proceed.Next NodeMCU 8266 process will proceed to water pump.

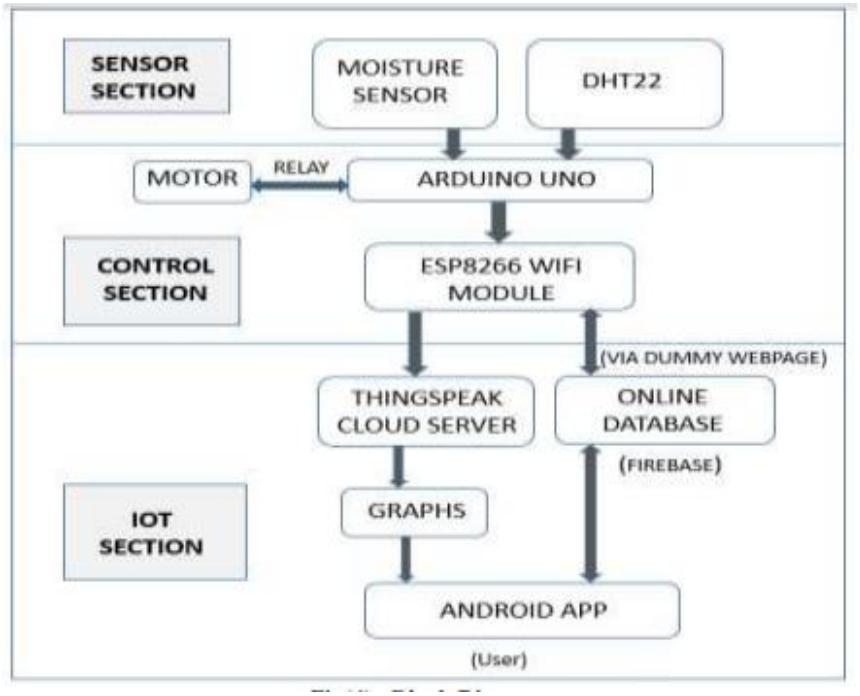


Figure 1.1: Block diagramm of operation of the system
*Images may be subject to copyright

3.2.3 Project Description

This project is a project for plant monitoring system.Condition of soil by sensor(soil mosture sensor) and the notification will be sent when the soil is dry ore the temperature is hot.

3.3 Project Hardware

As mention in the previous chapter, the designed controller is using NodeMCU 8266.Then, the output is notification on the blynk app and the water pump will on.

3.3.1 Schematic Circuit

Error! Reference source not found. shows the overall circuit diagram of this Project Smart Plant Monitoring

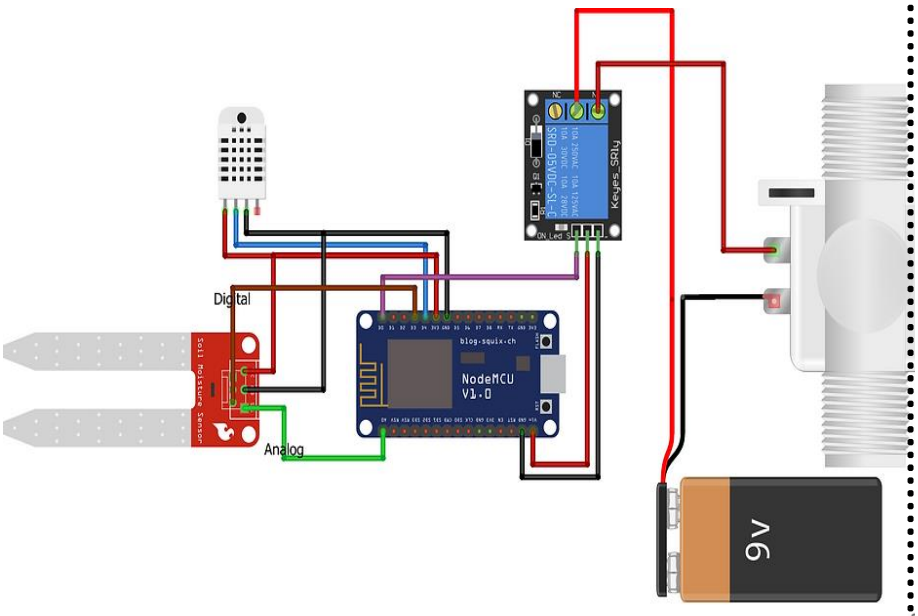


Figure 1.2: Circuit Diagram

*Images may be subject to copyright

3.3.2 Description of Main Component

3.3.2.1 Component 1

Soil sensor

Soil moisture sensors measure the water content in the soil and can be used to estimate the amount of stored water in the soil horizon.

3.3.2.2 Component 2

NODEMCU 8266

NodeMCU is an open source platform based on ESP8266 which can connect objects and let data transfer using the Wi-Fi protocol.

3.3.2.3 Component 3

BLYNK APSS

Blynk is an IOT application for android to control NodeMCU via internet

3.3.3 Circuit Operation

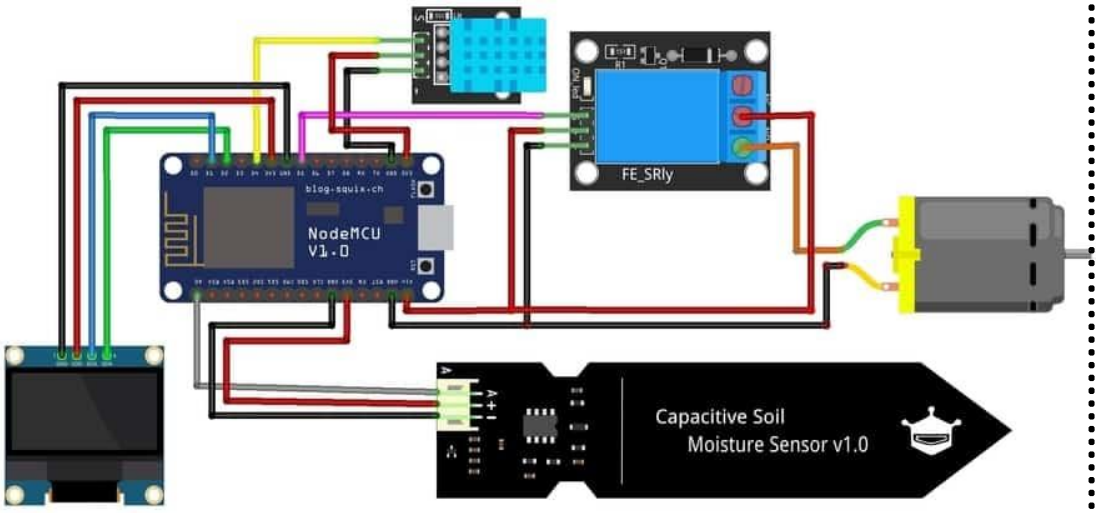


Figure 3.3; Circuit Operation

3.4 Project Software

-PROTEUS 8 PROFESIONAL

-SOFTWARE ARDUINO 1.8.9

-Blynk.application

3.4.1 Flowchart of the System

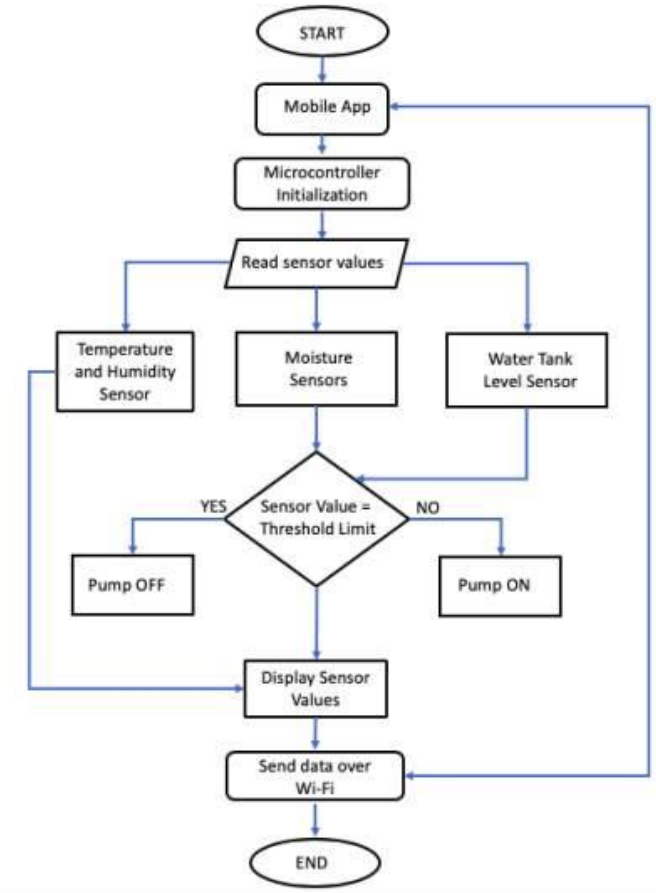


Figure 3.4;Flowchart system

3.4.2 Description of Flowchart

The flowchart is show that soil sensor if detected the wet soil will proceed to NodeMCU 8266.If no ,it will not proceed next NodeMCU process will proceed to Blynk and motor.

3.5 Prototype Development

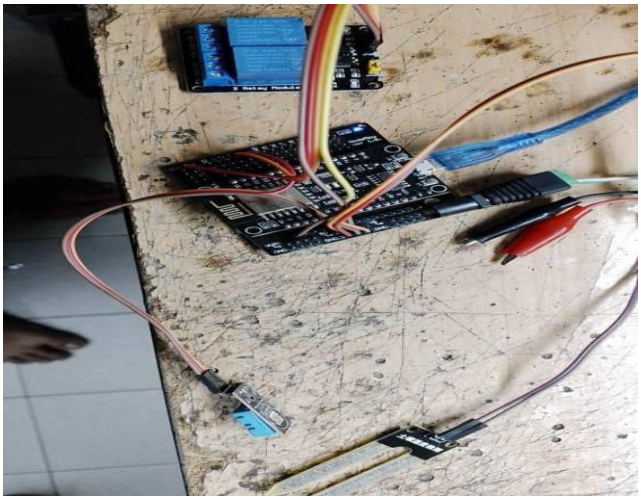


Figure 3.5 ;Prototype

3.5.1 Mechanical Design/Product Layout

Error! Reference source not found. shows the design of the product .

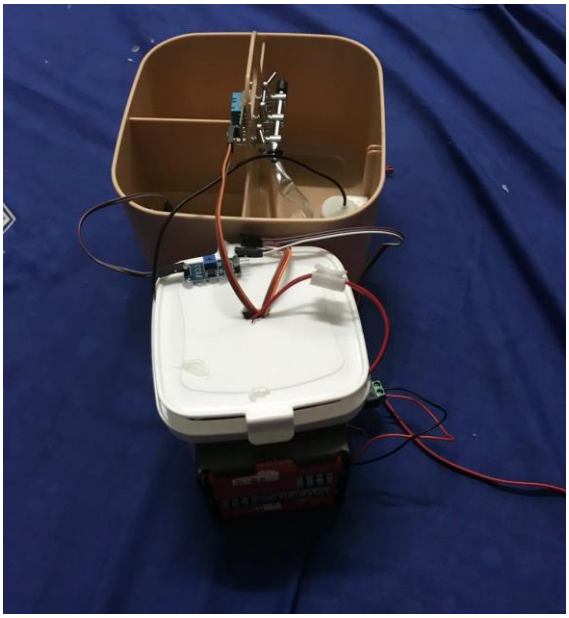


Figure 3.6: Mechanical Design

3.6 Sustainability Element in The Design Concept

In this project, no waste water has been applied we can save water and also make it easier for individuals to manage plants

3.7 Chapter Summary

. In this section focuses on the process and circuit of the project program. The first is some information from the main components in the simulation namely Soil sensor, water pump and NodeMCU 8266 used. Next is information about the design of the resulting project.

CHAPTER 4

4 PROJECT MANAGEMENT AND COSTING

4.1 Introduction

This project involves the cost of purchasing components and materials throughout its implementation. components involving cost are hardware NodeMCU 8266, Soil sensor module, 20 ways jumper wire, water pump, humidity sensor, and Relay. All of these components are purchased through online purchase methods to make it easier as well as save on costs.

The overall gross budget estimate for the implementation of this project is RM 159.00 and other expenses are at RM 50 according to this budget cost, this project is can be considered a less costly project compared to other projects that can cost over a thousand ringgit. The cost of the project is also in line with one of the key features of a good project developer that is low cost but have a high-quality project.

4.2 Ghant Chart and Activities of the Project

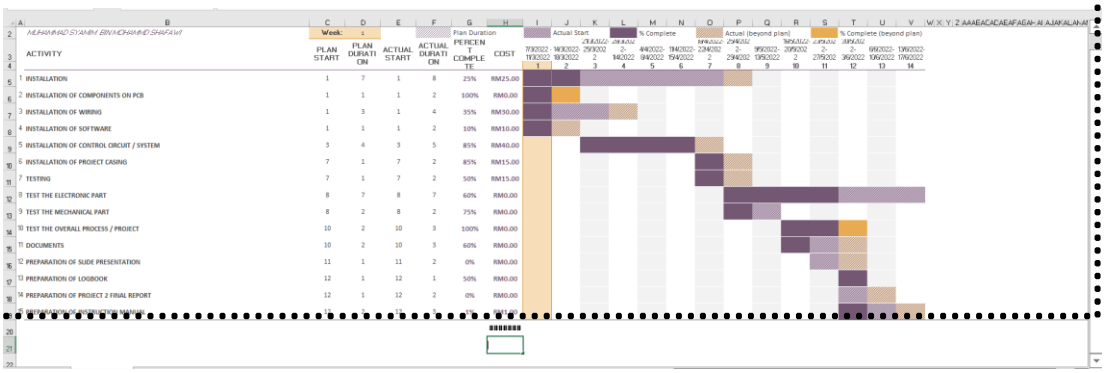


Figure 4.1;Ghant Chart

4.3 Cost and Budgeting

Table 4.1;Cost Of Project

No.	Component and materials	The unit price	Quantity	Total
1	NodeMCU 8266	RM 20.00	1	RM20.00
2.	Water Pump	RM 15.00	1	RM15.00
3.	Relay	Rm5.00	1	RM5.00
4.	SOIL Sensor module	RM 10.00	1	RM 7.00
5.	Battery	RM 6.00	4	RM 25.00
6.	20 ways jumper wire	RM 6.00	2	RM 12.00
7.	Model	RM27.00	1	RM27.00
8.	Other materials	RM 40	-	RM 40
			Total :	**RM 133.00**
	List of other costing			
1	Transportation			Rm25.00
2	Postage			RM15.00
3	Internet			RM10.00
			Total :	**RM50.00**
			Overall total	**RM201.00**

4.4 Chapter Summary

This section shows the program schedule project manufacturing travel process, First is the project milestones, and then the project cost is calculated throughout the project manufacturing and cost for the other list. The recommendation of the project is enough water supply.

REFERENCES

[1] M. S. Munir, I. S. Bajwa, M. A. Naeem, and B. Ramzan, “Design and implementation of an IoT system for smart energy consumption and smart irrigation in tunnel farming,” Energies, vol. 11, no. 12, p. 3427, 2018.

[2] H. Sattar, I. S. Bajwa, R. U. Amin et al., “An IoT-based intelligent wound monitoring system,” IEEE Access, vol. 7, pp. 144500–144515, 2019.

5 APPENDICES

APPENDIX A- DATA SHEET

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APPENDIX B- PROGRAMMING

```
2.1  #define BLYNK_PRINT Serial

2.2  #include <SPI.h>

2.3  #include <ESP8266WiFi.h>

2.4  #include <BlynkSimpleEsp8266.h>

2.5  #include <SimpleTimer.h>

2.6  #include <DHT.h>

2.7  #define BLYNK_PRINT Serial

2.8  #include <OneWire.h>

2.9  #include <DallasTemperature.h>

2.10 #define ONE_WIRE_BUS D2

2.11 OneWire oneWire(ONE_WIRE_BUS);

2.12 DallasTemperature sensors(&oneWire);

2.13

2.14 char auth[] ="----------------";          //Authentication code sent by Blynk

2.15 char ssid[] = "-------";                  //WiFi SSID

2.16 char pass[] = "-------";                  //WiFi Password

2.17

2.18 #define sensorPin D3

2.19 int sensorState = 0;

2.20 int lastState = 0;

2.21 #define DHTPIN 2
```

```
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE);
SimpleTimer timer;
void sendSensor()
{
  float h = dht.readHumidity();
  float t = dht.readTemperature();

  if (isnan(h) || isnan(t)) {
    Serial.println("Failed to read from DHT sensor!");
    return;
  }

  Blynk.virtualWrite(V5, h);  //V5 is for Humidity
  Blynk.virtualWrite(V6, t);  //V6 is for Temperature
}
void setup()
{
  Serial.begin(9600);
  Blynk.begin(auth, ssid, pass);
   pinMode(sensorPin, INPUT);
  dht.begin();

  timer.setInterval(1000L, sendSensor);
```

```
2.46    Serial.begin(115200);
2.47    Blynk.begin(auth, ssid, pass);
2.48     sensors.begin();
2.49  }
2.50  int sensor=0;
2.51  void sendTemps()
2.52  {
2.53  sensor=analogRead(A0);
2.54  sensors.requestTemperatures();
2.55  float temp = sensors.getTempCByIndex(0);
2.56  Serial.println(temp);
2.57  Serial.println(sensor);
2.58  Blynk.virtualWrite(V1, temp);
2.59  Blynk.virtualWrite(V2,sensor);
2.60  delay(1000);
2.61  }
2.62  void loop()
2.63  {
2.64    Blynk.run();
2.65    timer.run();
2.66    sendTemps();
2.67    sensorState = digitalRead(sensorPin);
2.68  Serial.println(sensorState);
2.69
```

```
2.70  if (sensorState == 1 && lastState == 0) {
2.71    Serial.println("needs water, send notification");
2.72    Blynk.notify("Water your plants");
2.73    lastState = 1;
2.74    delay(1000);
2.75  //send notification
2.76
2.77    }
2.78    else if (sensorState == 1 && lastState == 1) {
2.79      //do nothing, has not been watered yet
2.80    Serial.println("has not been watered yet");
2.81    delay(1000);
2.82    }
2.83    else {
2.84      //st
2.85      Serial.println("does not need water");
2.86      lastState = 0;
2.87      delay(1000);
2.88    }
2.89
2.90    delay(100);
}
```