POLITEKNIK

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SOIL MOISTURE DETECTOR

NAME:
MUHAMMAD SYAZRIL AZIM BIN WAN HASHIM

REGISTRATION NO:
08DJK20F2003

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

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This report submitted to the Electrical Engineering Department in fulfillment of the requirement for a Diploma in Electrical Engineering

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

CONFIRMATION OF THE PROJECT

The project report titled "Soil Moisture Detector" has been submitted, reviewed, and verified as a fulfills the conditions and requirements of the Project Writing as stipulated.

Checked by:

Supervisor’s name : EN. IDRIS BIN KAMARUDDIN

Supervisor’s signature:

Date :

Verified by:

Project Coordinator name :

Signature of Coordinator :

Date :

"I acknowledge this work is my own work except the excerpts I have already explained to our source."

1. Signature :

Name : **MUHAMMAD SYAZRIL AZIM BIN WAN HASHIM**

Registration Number : **08DJK20F2003**

Date :25/2/2023

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : SOIL MOISTURE DETECTOR

SESSION: 2 2022/2023

1. I, **1. MUHAMMAD SYAZRIL AZIM BIN WAN HASHIM (08DJK20F2003)**

   is a final year student of **Diploma in Electrical Engineering, Department of Electrical, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is located at **Persiaran Usahawan, Seksyen U1, 40150 Shah Alam, Selangor**. (Hereinafter referred to as 'the Polytechnic').

2. I acknowledge that 'The Project above' and the intellectual property therein is the result of our original creation /creations without taking or impersonating any intellectual property from the other parties.

3. I agree to release the 'Project' intellectual property to 'The Polytechnics' to meet the requirements for awarding the **Diploma in Electrical Engineering** to me.

Made and in truth that is recognized by;

a) **MUHAMMAD SYAZRIL AZIM BIN WAN HASHIM**	) .
	....………………………
(Identification card No: (021108-03-0707)	) **MUHAMMAD SYAZRIL AZIM BIN WAN HASHIM**

In front of me, **EN. IDRIS BIN KAMARUDDIN**	) .....………………
(Click here to enter text.)	) **EN. IDRIS BIN KAMARUDDIN**
As a project supervisor, on the date:	

ACKNOWLEDGEMENTS

I have made efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them. I am highly indebted to Aniesman BW for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project.

I would like to express my gratitude towards my parents & member of Aniesman BW for their kind co-operation and encouragement which help me in completion of this project. I would like to express my special gratitude and thanks to the industry people for giving me such attention and time.

My thanks and appreciations also go to my colleague in developing the project and the people who have willingly helped me out with their abilities.

ABSTRACT

This project is called Soil Moisture Detector. This product is used to measure soil moisture level. Some of those who are involved in the agriculture sector are having difficulties monitoring their soil moisture level. Not all of those who are involved in the agricultural sector can afford a soil moisture sensor because it is expensive and if the sensor's component broke, it cannot be replaced. The purpose of this innovation is to help farmers and gardeners monitor their soil moisture level easily. All plants need to be in a specific soil moisture level to grow. It is important to monitor the soil moisture level because it affects the plant growth. This product is affordable, and the components are replaceable. This soil moisture sensor uses a 9v battery to operate. The 9v battery can be either rechargeable or the normal 9v battery. ESP 32 is used as the main chip of this product and acrylic is used as the outer shell. This product requires a coding process to synchronize all the components and function properly. Surveys are carried out to get reviews of the product and the feedback is positive. A few upgrades can be made to improve this product. The casing design can be improved to make it more comfortable to hold and the sensor can be upgraded to a better sensor if it is possible.

ABSTRAK

Projek ini diberikan nama Soil Moisture Sensor. Produk ini digunakan untuk mengukur tahap kelembapan tanah. Sebahagian daripada mereka yang terlibat dalam sektor pertanian menghadapi kesukaran untuk memantau tahap kelembapan tanah mereka. Tidak semua yang terlibat dalam sektor pertanian mampu membeli sensor kelembapan tanah kerana ia mahal dan jika komponen sensor pecah, ia tidak boleh diganti. Tujuan inovasi ini adalah untuk membantu petani dan pekebun memantau tahap kelembapan tanah mereka dengan mudah. Semua tumbuhan perlu berada dalam tahap kelembapan tanah tertentu untuk membesar. Adalah penting untuk memantau tahap kelembapan tanah kerana ia menjejaskan pertumbuhan tumbuhan. Produk ini berpatutan, dan komponennya boleh diganti. Sensor kelembapan tanah ini menggunakan bateri 9v untuk beroperasi. Bateri 9v boleh sama ada boleh dicas semula atau bateri 9v biasa. ESP32 digunakan sebagai cip utama produk ini dan akrilik digunakan sebagai kulit luar. Produk ini memerlukan proses pengekodan untuk menyegerakkan semua komponen dan berfungsi dengan baik. Tinjauan dijalankan untuk mendapatkan ulasan produk dan maklum balas adalah positif. Beberapa peningkatan boleh dibuat untuk menambah baik produk ini. Reka bentuk selongsong boleh dipertingkatkan untuk menjadikannya lebih selesa untuk dipegang dan penderia boleh dinaik taraf kepada penderia yang lebih baik jika boleh.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

Symbol	meaning of symbols.
%	percent
(_)	bracket
+	plus/positive

LIST OF ABBREVIATIONS

Abbreviation	Meaning
RM	Ringgit Malaysia

CHAPTER 1

INTRODUCTION

1.1 Introduction

The product is made to monitor the soil moisture level which is known as "Soil Moisture detector ". People can monitor their soil moisture level for their plants growth because plants growth is affected by soil moisture level. This product can help people to manage their plants at the farm more systematically. The existing product on the market is expensive and if there is a component broken in the product, it cannot be replaced. These soil moisture sensor components can be replaced if the component is broken. Besides, the price of the components used is cheap. There are also some innovations made from the existing product.

1.2 Background Research

Good quality soil is the one with fertility and produces a productive effect. Factors such as the moisture and the soil pH can affect its fertility. Therefore, with a moisture soil sensor, it can determine the moisture and the soil ph. To ensure a better product with quality, we are making improvements to this existing product. For example, the sensor is without cover and not neat. Therefore, the idea is created for the sensor to be better than before, and more qualities are provided such as the cover for the sensor which makes the sensor look more neat and long lasting.

1.3 Problem Statement

a) It is hard to determine the soil moisture level.
b) Wasting the time for watering the plans because they are busy with their more important careers.

1.4 Research Objectives

The main objective of this project is to produce a user-friendly project by saving time for watering the plants as this can be controlled by phone.

More specifically the principal objective of this research is:

i. To design Make a budget soil moisture detector.
ii. Make it easier to determine the soil moisture level.

1.5 Scope of Research

This project is focusing on people who want to plant trees at home or anywhere but don’t have the time to take care of the plant.

1.6 Project Significance

The project was produced is intended to facilitate the determination of soil moisture levels. The moisture of our soil will quickly decrease if the soil is exposed to sunlight. This low soil moisture will cause stunted tree growth and result in the tree may die. Therefore, the production of this project will make it easier for the public to detect the level of soil moisture for their crops. Next, the project is to make it easier for people to water their crops. Once we detect the moisture remotely, we can also water the plants remotely. As we know now, people are too busy with their work. So, they did not have time to water their crops. They can use this project to water their crops. The problem of the public will be solved when using this project because the detection of soil moisture and watering can be done remotely using a mobile phone.

1.7 Chapter Summary

In this chapter, the ideas of the project have been explained. The objectives of the research made from the problem statements. The objective of this project is to help people to measure the soil moisture level of the soil and control the water of their plants.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Literature review can be defined as a process of prior research to assist in the design process of an object to be produced. Literature reviews are needed to help produce a product. Without doing research, a product to be manufactured does not meet current needs and usage. Therefore, this study is very important to determine which products are being used well. Through this research, deficiencies in existing products can be identified. Therefore, the product being designed is an invention to satisfy the requirements without causing problems with the product.

2.2 Research

2.2.1 Soil moisture sensor

A moisture sensor including in one embodiment a probe formed with a first cylindrical tube extending outward from a base and having a plurality of axially extending slots around the periphery thereof and a second slotted cylindrical tube extending outward from the base separated and insulated from the first tube and extending coaxially with the first tube. The tubes form an effective coaxial capacitor and are insertable into material to be sensed appear as a ground plane. In a second and third embodiment a member defining flat surfaces extends from a base forming in cross-section a volume with a square center and legs extending from each side thereof to an open peripheral end (John E.Walsh , July 2005).

2.2.2 Irrigation System with Soil Moisture based seasonal watering adjustment.

A soil moisture-based irrigation system includes a standalone irrigation controller with a seasonal adjust feature and a standalone weather station including at least one soil moisture sensor. The soil moisture-based irrigation system further includes a standalone soil moisture control unit operatively connected to the irrigation controller and the soil moisture sensor. The soil moisture control unit includes programming configured to calculate an estimated soil moisture requirement value using a signal from the soil moisture sensor and to automatically modify a watering schedule of the irrigation controller through the seasonal adjust feature based on the estimated soil moisture requirement value to thereby conserve water while maintaining plant health. (Peter J.Woytowitz & San Diego , October 2008).

2.2.3 Wireless Soil Moisture Meter Network

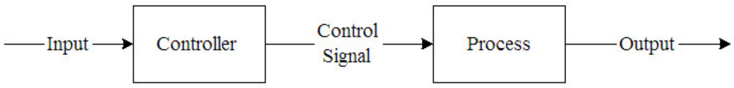
A wireless Soil moisture meter network includes a central display unit and a plurality of remote Sensor units. Each Sensor unit uses a probe to measure moisture content in Soil and uses a wireless transmitter to transmit the measurement through a wireless channel to the central display unit. The central display unit receives and displays the measurement in a format Selectable by a user. The user may add to or remove from the network a Sensor unit using a user interface of the central display unit. (Peter Ethan Staples & Hermosa Beach, January 2003)

2.2.4 The Intelligent plants watering system that a kind of Wi-Fi of mobile phone or PC control and control method thereof

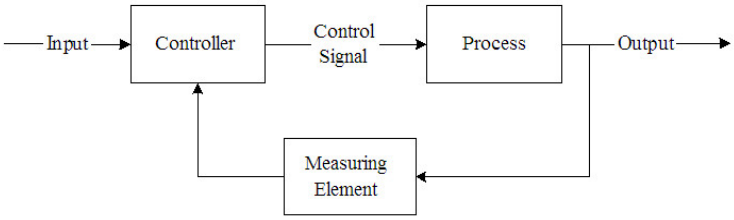
The invention discloses intelligent flower watering system and the control method thereof of a kind of Bluetooth of mobile phone or PC control, comprise signal acquisition process module, the input of signal acquisition process module is connected with soil humidity sensor and state modulator module, the output of signal acquisition process module is connected with module of watering, and the communication channel of signal acquisition process module is connected with terminal control module; Wherein, soil humidity sensor is for detecting flowers and plants soil moisture state; State modulator module is used for arranging presets threshold value of watering; The threshold value of watering that signal acquisition process module is used for the flowers and plants soil moisture received and potentiometer are preset compares, and is undertaken controlling the instruction that module of watering is opened or closed alternately by terminal control module and terminal installation. The present invention can obtain humidity in flowerpot in soil by soil humidity sensor, and module of watering can carry out unlatching or the close down of water pump according to soil moisture and the contrast of threshold value of watering, thus can monitor the state of flowers and plants in real time (Zhang Baiyi, March 2003).

2.3 Control System

A control system is defined as a system of devices that manages, commands, directs, or regulates the behavior of other devices or systems to achieve a desired result. A control system achieves this through control loops, which are a process designed to maintain a process variable at a desired set point.



Open Loop System



Closed Loop System

2.4 Microcontroller

Microcontrollers are embedded inside devices to control the actions and features of a product. Hence, they can also be referred to as embedded controllers. Microcontrollers can take inputs from the device they are controlling and retain control by sending the device signals to different parts of the device.

2.5 ESP32

ESP32 is a series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor or a single-core RISC-V microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. ESP32 is created and developed by Espressif Systems, a Shanghai-based Chinese company, and is manufactured by TSMC using their 40 nm process. It is a successor to the ESP8266 microcontroller. In this project, the ESP32 function is as a microcontroller that controls all systems.

2.6 Chapter Summary

In this chapter, the literature review has been explained. Literature reviews are needed to help produce a product. The research describes related to the project including about microcontroller as control system for this project. This research also discusses hotspot or Wi-Fi connection for this project so that this project can be controlled remotely.

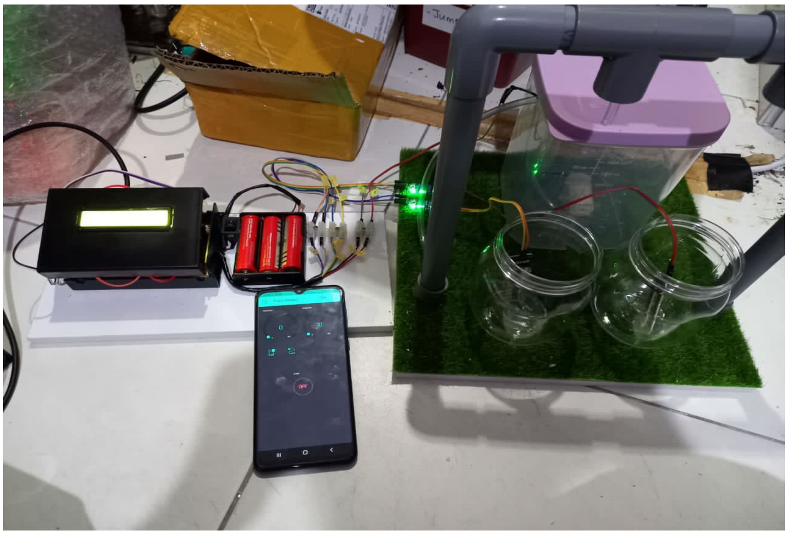
CHAPTER 3

RESEARCH METHODOLOGY

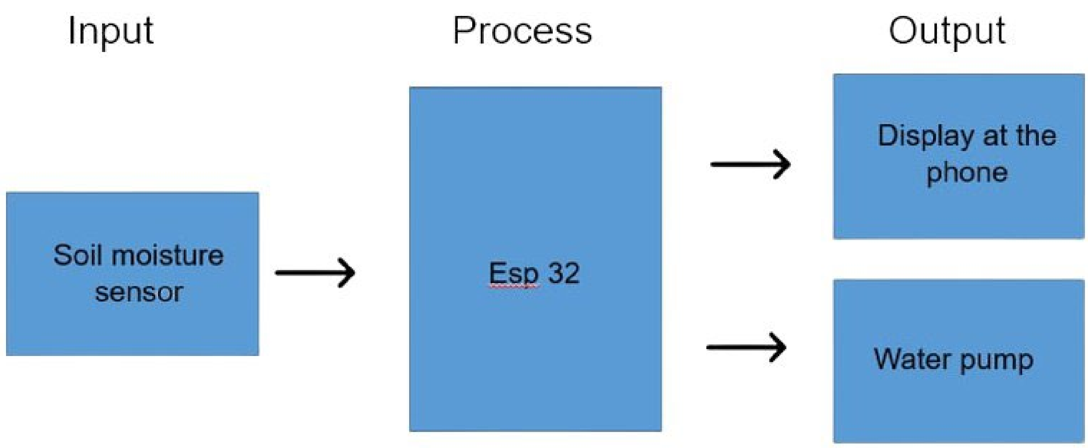
3.1 Introduction

To realize this project as a product that is ready to use with safety characteristics, a very comprehensive plan is undertaking. A step-by-step procedure is done so that the project can be completed in time. The research methodology will be explained.

3.2 Project Design and Overview.



3.2.1 Block Diagram of the Project



3.2.2 Flowchart of the Project 2

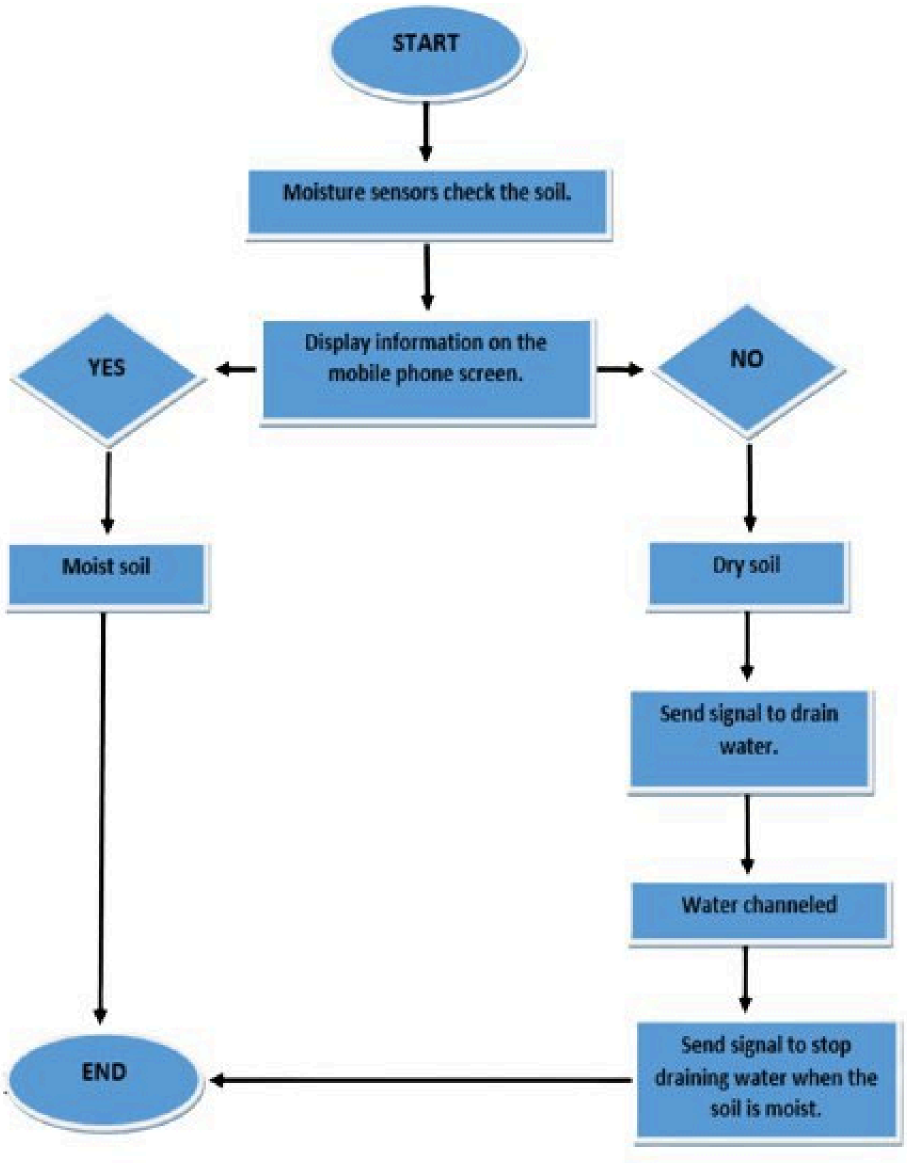


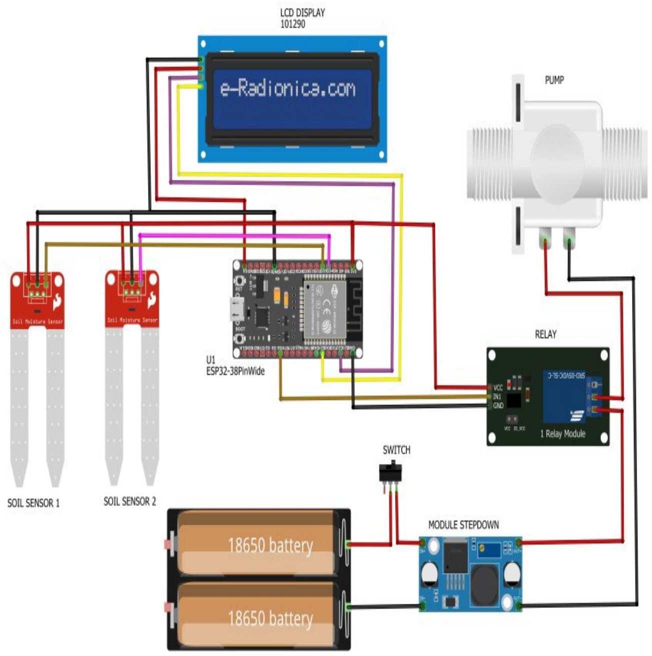
Figure 3.1: Flow chart of operation of the system

Start with START, sensor will check the level of moisture of soil. If (YES), it means that the level of moisture in the soil is normal. If (NO), it means that the soil is dry and needs the water. The signal will be sent and displayed at mobile screen phone, and we must ON the water pump to suck the water to channeled plants. And the last, the second signal will send to tell that the plants of level moisture are normal. We must OFF the water pump by clicking on button at mobile phone.

3.2.3 Project Description

The product is made to monitor the soil moisture level. People can monitor their soil moisture level for their plants growth because plants growth is affected by soil moisture level. This product can help people to manage their plants at the farm more systematically. The existing product on the market is expensive and if there is a component broken in the product, it cannot be replaced. These soil moisture sensor components can be replaced if the component is broken. Besides, the price of the components used is cheap. There are also some innovations made from the existing product. Soil moisture sensor, ESP32, switch, water pump was used as main components in these projects. I also used the app Blynk to display the value of soil moisture level on the mobile phone or laptop.

3.2.4 Schematic Circuit



3.2.5 Description of Main Component

Soil Moisture Sensor

Tensiometric and volumetric are the two primary sensor types that measure soil moisture. As the name implies, tensiometric sensors or probes measure soil moisture tension, or the potential soil moisture. Tensiometers are sensitive to soil properties by measuring how tightly a particular soil type retains water. Volumetric sensors measure the actual volume of water in the soil. Soil moisture sensors can work in tandem with your irrigation system by signaling the need for water and turning on the system, or they can prevent sprinklers from coming on if there's enough moisture in the soil.

Tensiometers

Tensiometer probes are water-filled tubes that you insert into the soil to the depth of plant roots. At the bottom of the probe is a porous ceramic tip, and at the top of the probe is an above-ground gauge. Water from the tube leaves the porous cap and enters the soil around it. As the moisture inside the tube reaches equilibrium with the soil moisture outside the tube, the moisture tension registers on the gauge. When soil is dry, a plant must use greater suction to extract the available water from the soil. The tensiometer gauge reflects this soil water suction -- the higher the reading, the drier the soil.

Gypsum Blocks

Another type of sensor that measures soil water tension is a gypsum block, also called an electrical resistance block. A porous block, typically made of gypsum, is placed on top of the soil, and must maintain firm contact with it. The block contains two embedded electrodes into which wires are inserted. The other ends of the wires penetrate the soil surface. As water moves through the block to maintain equilibrium with the soil moisture, the electrodes measure the electrical resistance that the water generates. A portable meter converts the resistance readings to water tension values.

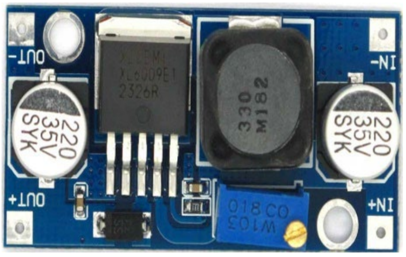
Time Domain Reflectometry

Time domain reflectometry (TDR) technology measures actual soil water content instead of soil water potential. Steel rods that you bury in the soil receive electrical signals from the TDR device. Sensors measure the signal's rate of return, which estimates how much water is in the soil. Dry soil returns the signal faster than wet soil. TDR soil moisture sensors provide accurate readings quickly and require minimal maintenance. On the downside, TDR sensors require data interpretation, and they may need different calibrations depending on varying soil makeup.

ESP32

ESP32 is a series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor or a single-core RISC-V microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. ESP32 is created and developed by Espressif Systems, a Shanghai-based Chinese company, and is manufactured by TSMC using their 40 nm process. It is a successor to the ESP8266 microcontroller. In this project, the ESP32 function is as a microcontroller that controls all systems.

Module step down.



A buck converter (step-down converter) is a DC-to-DC power converter which steps down voltage (while drawing less average current) from its input (supply) to its output (load). In this project, the function of module step down is lower the high voltage to 5v for water pump.

Relay

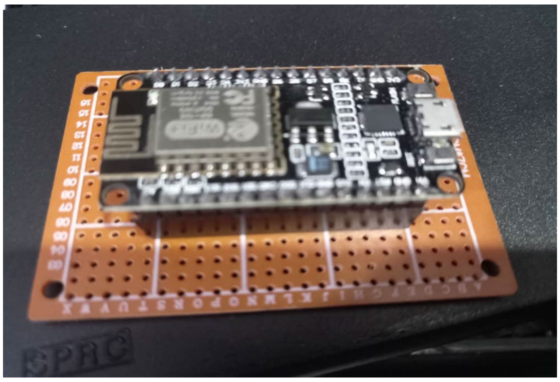
A relay is an electrically operated switch. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. In this project, the function of relay is To ON and OFF the water pump when receive the information from microcontroller through button switch at app Blynk.

3.3 Project Software

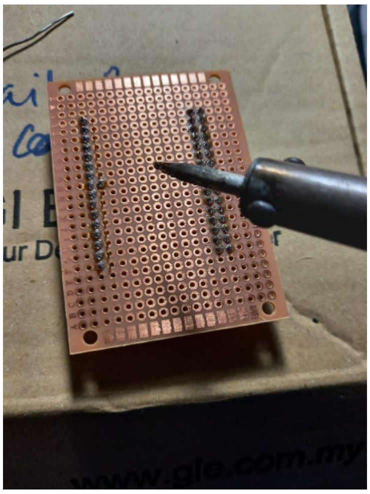
The Blynk app

The Blynk app is really an app editor. It allows you to create one or more projects. Each project can contain graphical widgets, like virtual LEDs, buttons, value displays and even a text terminal, and can interact with one or more devices. I used this app for my project. This app can install at play store. We must sign in first and after that, we include the programming of the project to the apps. The information will display at this app when receive the information from microcontroller. So, we can know about the soil moisture level of our plant. We also can ON or OFF the water pump when the water is needed or not.

3.4 Prototype Development



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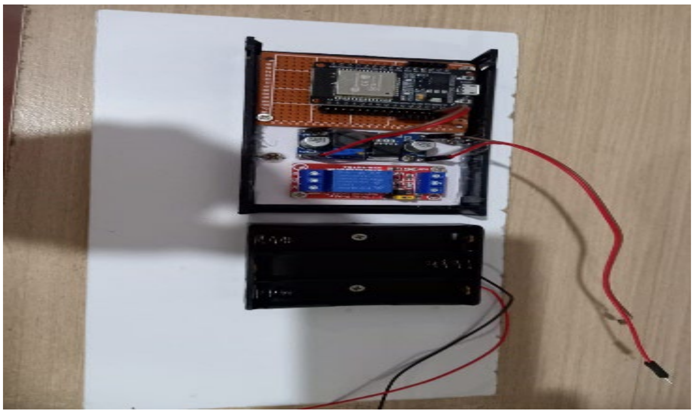


3.5 Chapter Summary

In this chapter, the research methodology has been explained. Block diagram and flow chart of the project was stated flow for this project. Schematic circuit also described to show the connection between components with other components until the circuit is complete. Main components such as soil moisture sensor, ESP32, module step down, relay used in this project. App blynk has been used in this project as the software of the project.

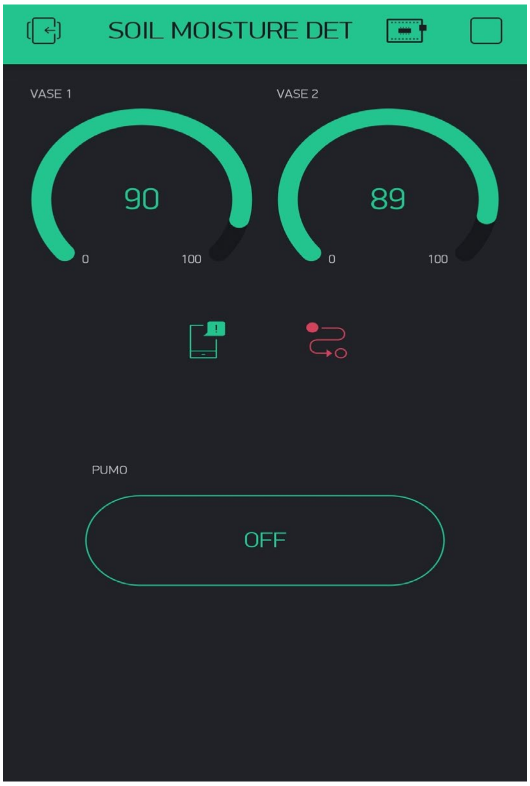
CHAPTER 4

RESULTS AND DISCUSSION

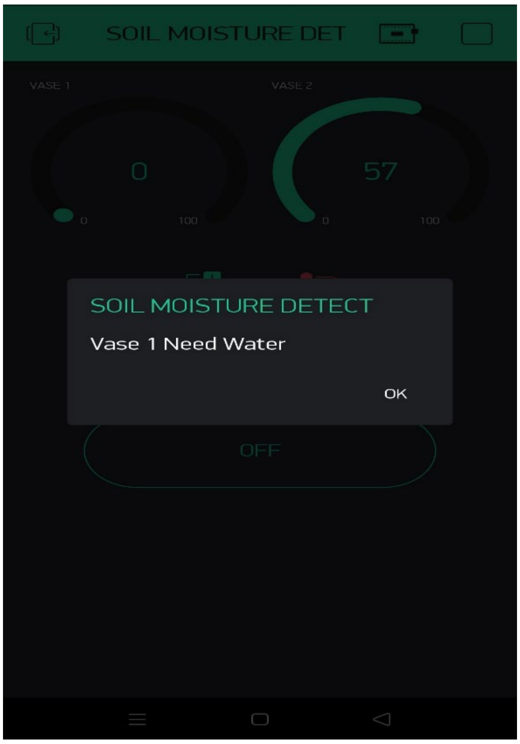
4.1 Introduction

This chapter combined data and analysis on soil moisture sensors and their material calculations. Data and analysis are important for this project to achieve the objectives and scope of the project. In this chapter, we want to show the successful results of component testing. We do some tests on soil moisture sensors in different areas to make sure the soil moisture sensor can work well.

4.2 Results and Analysis

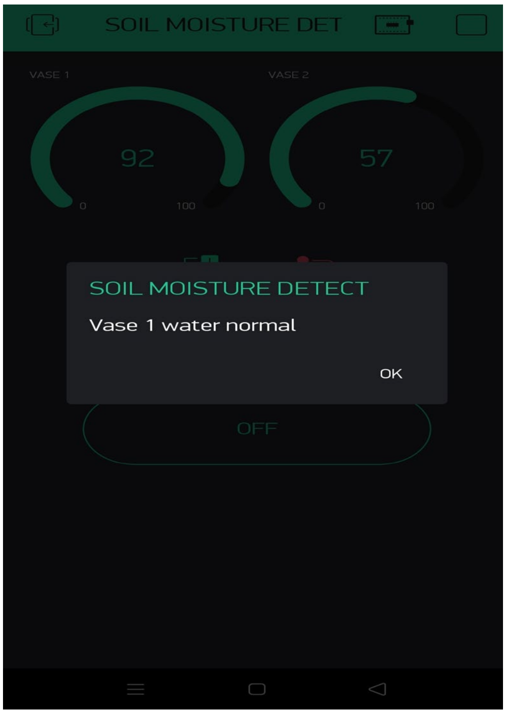


This is the app blynk is displayed on the mobile phone. It shows two vases, vase 1 and vase 2 which each show the level of moisture respectively. At the bottom is a switch for the water pump. We just need to tap it to ON or OFF water pump.

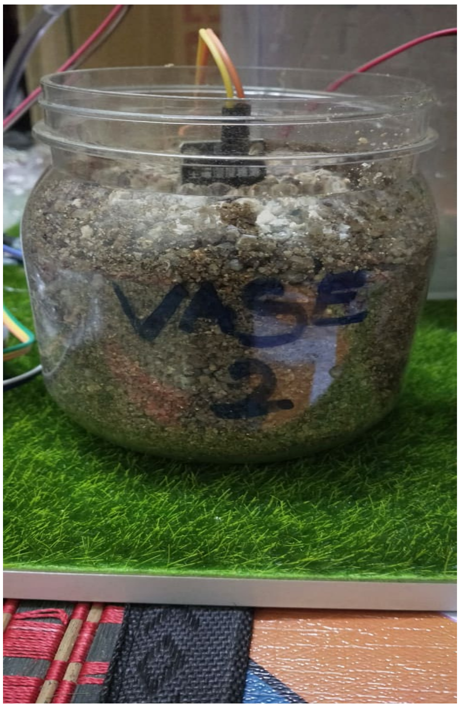


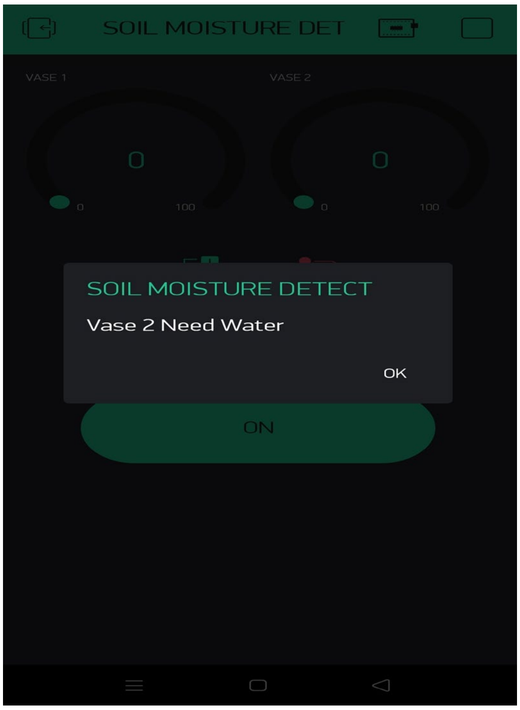
The app stated that the vase 1 soil is dry. So, water needed. We have to switch ON the waterpump.

After we tap the switch to ON the water pump, the water channeled.

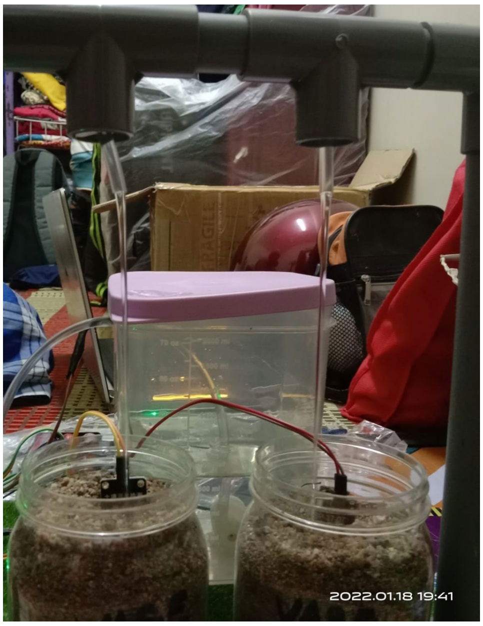


After the water channeled. The soil moisture is back to normal. We have to switch OFF the water pump.

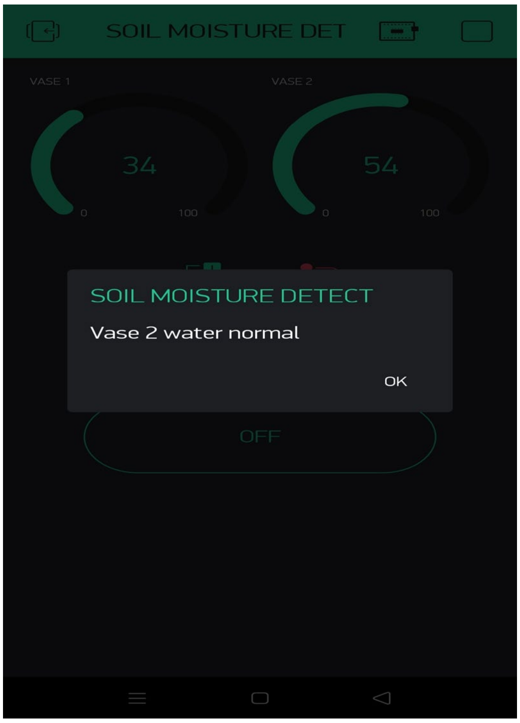




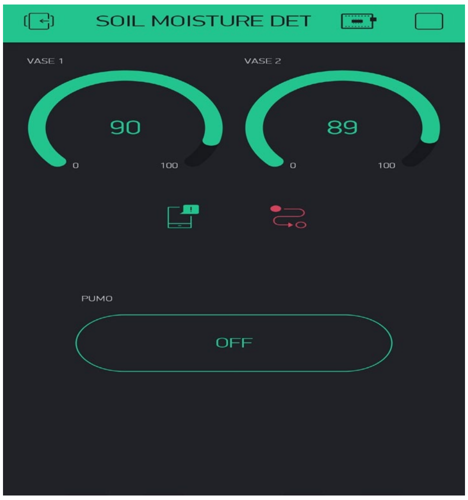
The app stated that the vase 2 soil is dry. So, water needed. We have to switch ON the waterpump.



After we tap the switch to ON the water pump, the water channeled.



After the water channeled. The soil moisture is back to normal. We have to switch OFF the water pump.



The soil moisture level is optimum

4.3 Discussion

As the discussion, I have run this project and it works well. The challenge faced when this project wants to run after completion is sometimes this project is not work. We find it difficult to identify problems related to the not works. After obtaining an opinion from the supervisor. I have divided my project into two parts, are control system of project and water pump control. To identify problems related to the project is very easy after dividing it into two parts. Internet coverage is very important because this project uses the internet entirely for work.

4.4 Chapter Summary

In conclusions for this chapter, analysis and study have been done on this project. However, there are some advantages and disadvantages of this soil moisture sensor and challenges have been taken as a space to make improvements to all existing shortcomings. In addition, development and modification will also be enhanced from time to time so that future generations can learn more about the main objectives of this project.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter describes the conclusions and upgrade plans for the project. From the project test result. Therefore, a discussion of all the test and analysis results will be explained in this chapter. Then, conclusions will be drawn based on the discussion plan.

5.2 Conclusion

In conclusion, the purpose of this "soil moisture detector" project is produced in line with the development of technology now where everyone is busy with their jobs without having time to plant a plant at home, especially those who like to plant the flowers. This is because the project this can control soil moisture by watering the plants remotely using a mobile phone only. If the project is commercialized, it is cheap because the components used to produce this project are cheap. So, everyone can afford it if it is commercialized later. This project is an innovation of an existing product with some added features such as replaceable components. Nowadays, technologies are widely used in industries. With technology, the soil moisture level can be determined quicker than the manual method. Therefore, it will save the All-people time to get the result.

5.3 Suggestion for Future Work

The project was produced is intended to facilitate the determination of soil moisture levels. The moisture of our soil will quickly decrease if the soil is exposed to sunlight. This low soil moisture will cause stunted tree growth and result in the tree may die. Therefore, the production of this project will make it easier for the public to detect the level of soil moisture for their crops.

Next, the project is to make it easier for people to water their crops. Once we detect the moisture remotely, we can also water the plants remotely. As we know now, people are too busy with their work. So, they did not have time to water their crops. They can use this project to water their crops.

The problem of the public will be solved when using this project because the detection of soil moisture and watering can be done remotely using a mobile phone.

After this product is invented, test run has been done. This product can read moisture level of the soil. The Soil Moisture Sensor in the analysis. For the upgrade plan, the design of the product's casing can be improved by making it more unique and easier to hold. The next upgrade that can be made to this product is improving the coding of this product to make the reading more accurate.

5.4 Chapter Summary

The conclusion and suggestion for future works have been explained. Suggestion for future works is very important to further improve this project so that it is more productive to help people in the field of tree planting at home or anywhere. The suggestion will be done after the project is fully completed later in a more systematic and orderly manner.

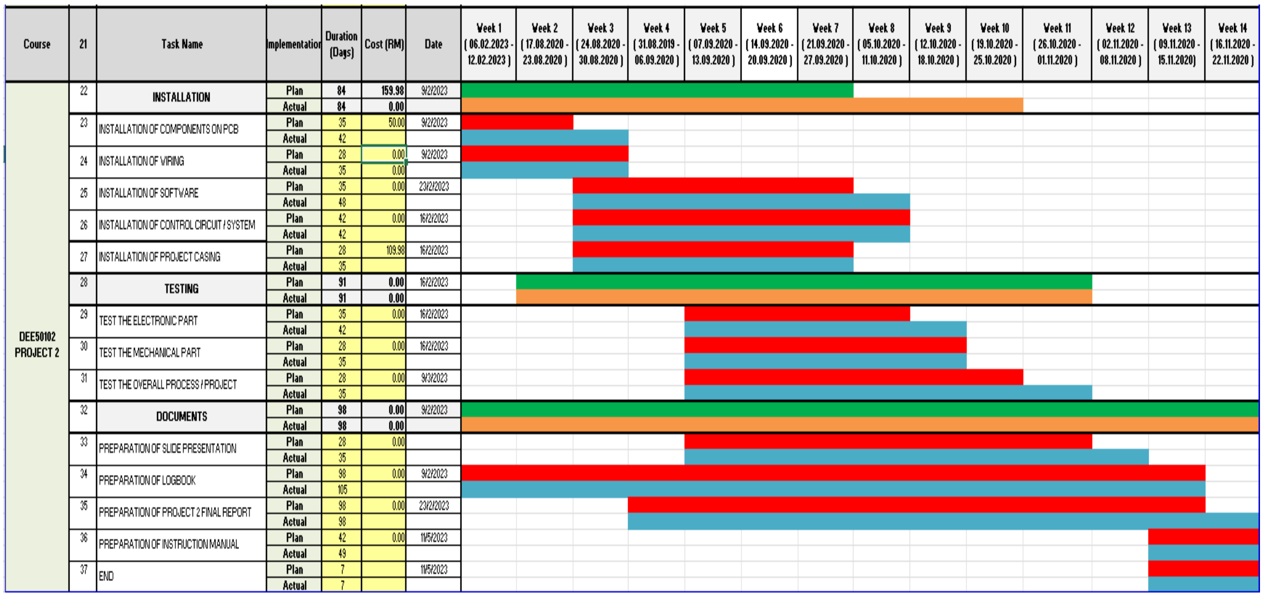
CHAPTER 6

PROJECT MANAGEMENT AND COSTING

6.1 Introduction

This chapter will explain about the Gant chart of project and cost budgeting of project. Gant chart will be stating about activity of project and duration time to finish of that project. The cost and budgeting of the project will explain the total cost to finish that project.

6.2 Gant Chart and Activities of the Project



Course	21	Task Name	Implementation	Duration (Days)	Cost (RM)	Date	Week 1 (06.02.2023 - 12.02.2023)	Week 2 (17.08.2020 - 23.08.2020)	Week 3 (24.08.2020 - 30.08.2020)	Week 4 (31.08.2019 - 06.09.2020)	Week 5 (07.09.2020 - 13.09.2020)	Week 6 (14.09.2020 - 20.09.2020)	Week 7 (21.09.2020 - 27.09.2020)	Week 8 (05.10.2020 - 11.10.2020)	Week 9 (12.10.2020 - 18.10.2020)	Week 10 (19.10.2020 - 25.10.2020)	Week 11 (26.10.2020 - 01.11.2020)	Week 12 (02.11.2020 - 08.11.2020)	Week 13 (09.11.2020 - 15.11.2020)	Week 14 (16.11.2020 - 22.11.2020)
DEE50102 PROJECT 2	22	INSTALLATION	Plan	84	159.98	9/2/2023														
			Actual	84	0.00															
	23	INSTALLATION OF COMPONENTS ON PCB	Plan	35	50.00	9/2/2023														
			Actual	42																
	24	INSTALLATION OF WIRING	Plan	28	0.00	9/2/2023														
			Actual	35	0.00															
	25	INSTALLATION OF SOFTWARE	Plan	35	0.00	23/2/2023														
			Actual	48																
	26	INSTALLATION OF CONTROL CIRCUIT / SYSTEM	Plan	42	0.00	16/2/2023														
			Actual	42																
	27	INSTALLATION OF PROJECT CASING	Plan	28	109.98	16/2/2023														
			Actual	35																
	28	TESTING	Plan	91	0.00	16/2/2023														
			Actual	91	0.00															
	29	TEST THE ELECTRONIC PART	Plan	35	0.00	16/2/2023														
			Actual	42																
	30	TEST THE MECHANICAL PART	Plan	28	0.00	16/2/2023														
			Actual	35																
	31	TEST THE OVERALL PROCESS / PROJECT	Plan	28	0.00	9/3/2023														
			Actual	35																
	32	DOCUMENTS	Plan	98	0.00	9/2/2023														
			Actual	98	0.00															
	33	PREPARATION OF SLIDE PRESENTATION	Plan	28	0.00															
			Actual	35																
	34	PREPARATION OF LOGBOOK	Plan	98	0.00	9/2/2023														
			Actual	105																
	35	PREPARATION OF PROJECT 2 FINAL REPORT	Plan	98	0.00	23/2/2023														
			Actual	98																
	36	PREPARATION OF INSTRUCTION MANUAL	Plan	42	0.00	11/5/2023														
			Actual	49																
	37	END	Plan	7		11/5/2023														
			Actual	7																

6.3 Cost and Budgeting


AISZZY ELECTRONICS

TEL 03-55244213

SALE INVOICE

SHOPEE

RECEIPT # CS00000889

SALESPERSON

CASHIER USER

TIME 15:46:00

ITEM	QTY	U/P	AMOUNT
AB-0009 ARDUINO UNO R3		48.50	48.50
BSL-0001 BREADBOARD 830 165MM X 55MM	1		9.50
DIS-ARD-0008	1		14.00
SEN-MOD-0073 SOIL MOISTURE SENSOR MODULE	1		11.00
BTH-0002 9V BATTERY CONNECTOR (SNAP) WITH DC PLUG	1	3.00	3.00
RES-POT-0003 WH148 B10K	1		2.00
9V BATTERY	1		12.50
JMW-10-0001 10CM FEMALE TO FEMALE	2		4.24
JMW-10-0003 10CM MALE TO MALE 10PCS	2	2.12	4.24

TOTAL QTY 11

SUB-TOTAL 109.98

DISC 0.00

TAX 0.00

ROUNDING 0.00

TOTAL 109.98

(2106137RAPGEVN) SHOPEE 109.98

CHANGE 0.00

GOODS SOLD ARE NOT RETURNABLE / REFUNDABLE. THANK YOU

COMPONENT	COST
All component that has been purchased with online	RM109.98
All component that has been purchased at shop	RM50.00
Total	RM159.98

6.4 Chapter Summary

The budget management and costing have been explained. Every action I take in completing this project has been recorded in the Gantt chart, including in terms of software and hardware. The purchase of project equipment is in two forms, online and bought directly at the store. Online purchase receipts have been placed in this chapter as evidence of completing this project.

REFERENCES

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Kidsense. (2017). Retrieved from https://childdevelopment.com.au: https://childdevelopment.com.au/areas-of-concern/fine-motor-skills/fine-motor-skills/

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Patakor, F. A. (2017). Advanced Motor Control. *Jounal of Electrical* , 205-211.

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APPENDICES

APPENDIX – PROGRAMMING

```
#include <LiquidCrystal_I2C.h>
#include <Wire.h>

// The serial connection to the GPS device
//SoftwareSerial ss(RXPin, TXPin);
float Speed=0;
float Altitude=0;
float flat, flon;
String dataString = "";
String DateString = "";
String TimeString = "";
int SEC=0,MIN=0,MTH=0,YEAR=0,HR=0,DY=0;
int Mileagex=0;


// Template ID, Device Name and Auth Token are provided by the Blynk.Cloud
// See the Device Info tab, or Template settings
#define BLYNK_TEMPLATE_ID           "TMPL682rRAZcz"
#define BLYNK_TEMPLATE_NAME         "Quickstart Template"
#define BLYNK_AUTH_TOKEN
"Qsx7CKozoj8POvTzPCHyQfBPXCu61miv"


// Comment this out to disable prints and save space
#define BLYNK_PRINT Serial


#include <WiFi.h>
#include <WiFiClient.h>
#include <BlynkSimpleEsp32.h>


LiquidCrystal_I2C lcd(0x27, 16, 2);


#define Buzz 12
#define TOUCH 14

#define PUMP 18
```

```
#define vCalibration 83.3
#define currCalibration 0.50

int mode=0;
int SECURITY=0;

// Potentiometer is connected to GPIO 34 (Analog ADC1_CH6)
const int potPin = 34;
const int potPin2 = 35;
const int potPin3 = 32;
const int potPin4 = 33;
const int potPin5 = 25;




float ADC1,ADC2,ADC3,ADC4;
float temperature = 25;
float h=0,t=0;
float hx=0,tx=0;
// variable for storing the potentiometer value
int potValue = 0;

int PIRSTAT=0;
int BIT=0;
int ALM1=0,ALM2=0,ALM3=0,ALM4=0;
int Ready=0;
int Ml=0;
String MinS="00";
String HourS="00";
String SecS="00";
int DataIn=0;
String DATA="";
String Temp1x="";
String PHx="";
String Temp2x="";
String Temp1y="";
String PHy="";
String Temp2y="";
String Temp3y="";
String Temp3x="";
String Temp4y="";
String Temp4x="";
String currentTime;
String currentDate;
String TimerGet="00:00:00";
int MODE=0;
int Hour=0;
int Min=0;
float VIB=0;
```

```
int Sec=0;
float SOIL1;
float SOIL2;
float LEVEL=0;
int ALM=0;
int Val=100;
int Index=0;
float CV=0;
int CKN=0;
//------------------------------------------------------------------
int TDIS=0;
int Rly1=0;
int wait=0;
int Rly2=0;
int Rly3=0;
int Rly4=0;
int Rly5=0;
int SW=0;
int PMP=0;


//------------------------------------------------------------

char auth[] = BLYNK_AUTH_TOKEN;

// Your WiFi credentials.
// Set password to "" for open networks.
char ssid[] = "SOIL";
char pass[] = "12345678";

BlynkTimer timer;

// This function is called every time the Virtual Pin 0 state changes

BLYNK_WRITE(V10)
{
  int pinValue = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly1=pinValue;
   if (pinValue==1){
    digitalWrite(PUMP,HIGH);
   PMP=1;


  }
   if (pinValue==0){
     digitalWrite(PUMP,LOW);
     PMP=0;
```

```
  }

  }

BLYNK_WRITE(V11)
{
  int pin2Value = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly2=pin2Value;

  // process received value
}
BLYNK_WRITE(V12)
{
  int pin3Value = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly3=pin3Value;

}

BLYNK_WRITE(V13)
{
  int pin4Value = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly4=pin4Value;


}

BLYNK_WRITE(V14)
{
  int pin5Value = param.asInt(); // assigning incoming value from pin V1 to a variable
  Rly5=pin5Value;

  // process received value
}
//-------------------------------------------------------------------------

// This function is called every time the device is connected to the Blynk.Cloud
BLYNK_CONNECTED()
{

}


void myTimerEvent()
{
   //---------------------------------------------------------------
static unsigned long timepoint = millis();


  if (millis() - timepoint > 1000U) //time interval: 1s
  {
```

```
  ADC1 = analogRead(potPin);
 ADC1= (5.0 * ADC1)/1024.0;  //convert the analog data to moisture level
 SOIL1=(ADC1)/5.0 * 100;
 SOIL1=(400-SOIL1)/400*100.0;


  ADC2 = analogRead(potPin2);
 ADC2= (5.0 * ADC2)/1024.0;  //convert the analog data to moisture level
 SOIL2=(ADC2)/5.0 * 100;
 SOIL2=(400-SOIL2)/400*100.0;



lcd.setCursor(0, 0);
 lcd.print("S1:");
 lcd.print(SOIL1,1);

  lcd.print(" S2:");
 lcd.print(SOIL2,1);

 lcd.setCursor(0, 1);
 lcd.print("PUMP: ");
 if (PMP==0){
   lcd.print("OFF    ");
 }
  if (PMP==1){
   lcd.print("ON    ");
 }
```

```
  //-----------------------------------------------------------

       Serial.print(SOIL1);
      Serial.print("\t");
       Serial.println(SOIL2);


delay(100);

Blynk.virtualWrite(V0,SOIL1);
Blynk.virtualWrite(V1,SOIL2);




  }


  //-----------------------------------------------------------
}

void setup()
{

  int i,k;

  pinMode(PUMP, OUTPUT);


lcd.begin();
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Initializing..");
  lcd.setCursor(0, 1);
  lcd.print("pls wait");




  delay(3000);




    lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Searching WIFI");
  lcd.setCursor(0, 1);
  lcd.print("pls wait...");
delay(1500);
```

```
delay(1500);
  Serial.begin(9600);





  Blynk.begin(auth, ssid, pass);
  // You can also specify server:
  //Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
  //Blynk.begin(auth, ssid, pass, IPAddress(192,168,1,100), 8080);

  // Setup a function to be called every second
  timer.setInterval(800L, myTimerEvent);


  delay(2000);
}

void loop()
{




  Blynk.run();
  timer.run();


}
```