



Faculty Of Electrical And Electronic Engineering Technology

DEVELOPMENT OF IOT BASED SMART GARDEN SYSTEM



اونیورسیتی تکنیکال ملیسیا ملاک

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Electronics) With Honors**

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DEVELOPMENT OF IOT BASED SMART GARDEN SYSTEM

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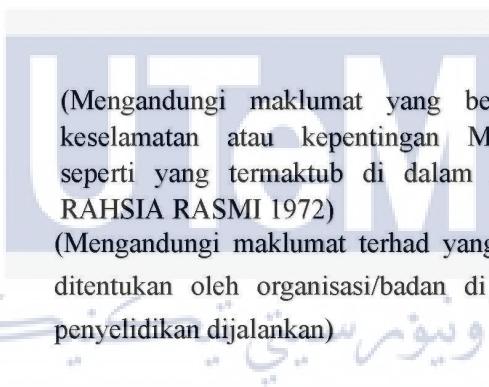
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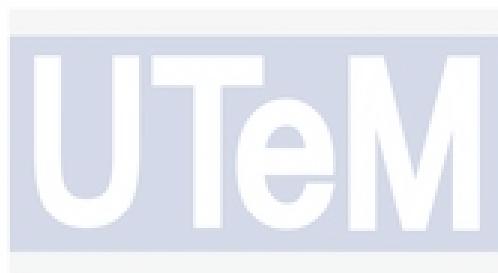


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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:



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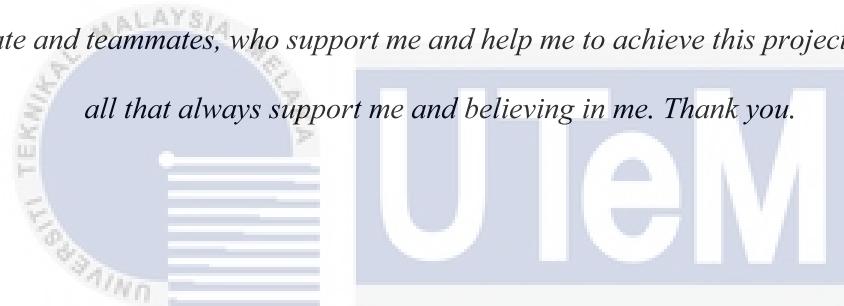
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DEDICATION

To my beloved mother, Kamariah Binti abas, I acknowledge it not enough to be proud without them that I have learned more valuable thing. Thus, dedicated to boths my parents who taught me that even the biggest task can be accomplished with step by step at a time and taught me that the best kind of knowledge to have is that which is learned for its own sake.

and

To my classmate and teammates, who support me and help me to achieve this project. A big thanks for all that always support me and believing in me. Thank you.



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ABSTRAK

Berkebun baik sebagai hobi dan hasilnya juga boleh dijadikan bekalan makanan yang sihat seperti sayur-sayuran, herba dan rempah ratus. Pada masa kini digalakkan untuk berkebun di sekitar rumah sebagai kempen kesedaran hijau. Walau bagaimanapun, kebanyakan mereka yang tidak mempunyai latar belakang pertanian akan menghadapi kesukaran untuk menanam tanaman yang mereka inginkan. Ini mungkin kerana kekurangan proses pemupukan dan pemeliharaan terhadap tanaman tertentu. Oleh itu, sistem yang akan dibangunkan ini iaitu “PEMBANGUNAN SMART GARDEN BERASASKAN IOT SISTEM” menggunakan pelbagai sensor untuk mengesan keadaan tanaman yang tumbuh seperti kelembapan tanah, suhu, pencahayaan serta menghantar data ke pelayan. Oleh demikian, data tersebut akan dapat dilihat melalui papan pemuka laman sesawang berserta boleh dicapai melalui pelbagai peranti seperti telefon pintar android, IOS dan juga komputer. Ia juga mengawal input seperti campuran air dan baja ke tanaman. Bukan hanya itu, aplikasi berasaskan laman sesawang dirancang untuk menganalisis dan memaparkan data yang dikumpulkan dalam bentuk grafik, carta dan angka untuk memberikan pemahaman yang baik dan mengesan tahap kesuburan tanaman.

ABSTRACT

Gardening is good as a hobby and the result can also be used as a supply of healthy food such as vegetables, herbs and spices. Nowadays it is encouraged to garden around the house as a green awareness campaign. However, most of those who do not have an agricultural background will have difficulty growing the crops they want. This may be due to the lack of fertilization and preservation of certain crops. Therefore, the system that will be developed is "SMART GARDEN DEVELOPMENT BASED IOT SYSTEM" uses various sensors to detect the condition of growing crops such as soil moisture, temperature, lighting and send data to the server. Therefore, the data will be visible through the dashboard of the website and can be accessed through various devices such as android smartphones, iOS and even computers. It also controls inputs such as mixing water and fertilizer into crops. Not only that, web -based applications. designed to analyze and display the collected data in the form of graphs, charts and figures to provide a good understanding and track the fertility level of the crop.

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TABLE OF CONTENTS

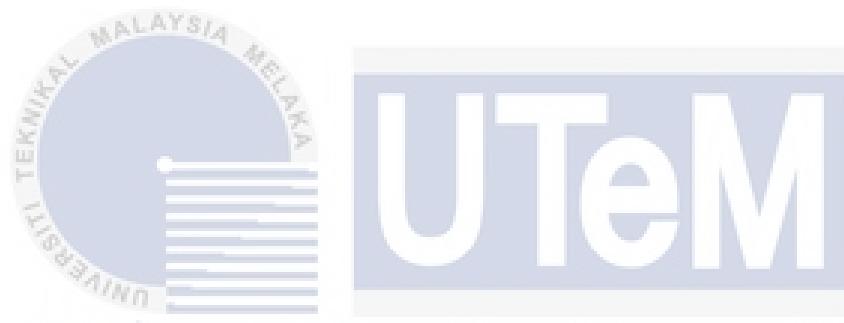
	PAGE
DECLARATION	3
APPROVAL	5
DEDICATION	6
ABSTRAK	7
ABSTRACT	8
ACKNOWLEDGEMENTS	9
TABLE OF CONTENTS	10
LIST OF TABLES	13
LIST OF FIGURES	14
LIST OF APPENDICES	17
CHAPTER 1	18
1.1. Background Of The Project	18
1.2. Problem Statement.....	19
1.3. Objective	20
1.4. Scope	20
1.5. Report Outline	21
1.6. Conclusion	23
CHAPTER 2	24
2.1. Introduction.....	24
2.2. Past Related Project Research.....	25
2.2.1. Smart Garden Monitoring System Using IoT	25
2.2.2. IoT based Trash Can Monitoring System for Smart Garden Cleanliness	26
2.2.3. IoT Based Garden Monitoring System.....	11
2.2.4. Intelligent Garden Planning and Design Based on Agricultural Internet of Things	12
2.2.5. Design and Build a Smart Garden Based on Internet Of Thing (IoT) with Telegram Bot.....	14
2.3. Table Of Comparison For Past Project Characteristics.....	16
2.3.1. Table of Difference between GSM and WIFI Modul	

NodeMCU.....	17
2.4. The Type Of Plant	18
2.4.1. Orthosiphon Stamineus (Misai Kucing)	18
2.4.2. Sissoo Spinach (Brazilian spinach).....	19
2.5. The Significant Component In The Main Controller	20
2.6. Component and Interface.....	20
2.7. Main Component Of The Project	22
2.7.1. Arduino Mega 2560	22
2.7.2. Soil Moisture Sensor	23
2.7.3. ESP8266-01 Wi-Fi Module	23
2.7.4. DHT11 Humidity and Temperature Sensor	24
2.7.5. Light Dependent Resistor (LDR) sensor.....	25
2.7.6. LCD 16x2.....	27
2.7.7. Cooling Fan 12v.....	28
2.7.8. LED.....	28
2.7.9. USB Plant Grow Light Sunlight White Full Spectrum Lighting	29
2.7.10. Relay	30
2.7.11. Water Pump Motor	31
2.7.12. Water Level Sensor (Ultrasonic).....	31
2.7.13. Water Flow Valve	32
2.7.14. Buzzer	33
CHAPTER 3	34
3.1. Introduction.....	34
3.2. Project Work Flow.....	34
3.3. Project Planning.....	35
3.3.1. Flowchart of the Project Development.....	36
3.3.2. Gantt Chart.....	37
3.4. Software Design.....	40
3.4.1. Flowchart of the Project	41
3.5. Project Requirement.....	42
3.5.1. Arduino IDE Software	42
3.5.2. Protues Software	43
3.5.3. WAMP Server.....	44
3.5.4. Visual Studio Code	45
3.6. Hardware Development	46
3.6.1. Design circuit for the Components	47

3.7. Conclusion	48
CHAPTER 4	49
4.1. Introduction.....	49
4.2. Analysis	49
4.3. Software Result.....	50
4.3.1. Development of Arduino	50
4.3.2. Development of Website Interface (UI) using Visual Studio Code	52
4.3.3. Development of Hosting Server (Cpanel).....	57
4.3.4. Development of Database Server (phpMyAdmin - MySQL)	58
4.3.5. Development of Design Circuit	59
4.3.6. Schematic Circuit.....	60
4.3.7. Development of PCB Design.....	61
4.4. Hardware Result	62
4.4.1. ESP 8266 Data Logging Send To Database Server	62
4.4.2. Soil Moisture Sensor Data Logging.....	63
4.4.3. Temperature Sensor DTH11 Data Logging	64
4.4.4. LDR Sensor Module (Light Dependent Resistor) Data Logging.....	65
4.4.5. Ultrasonic Sensor HC-SR04 (Water Level Storage) Data Logging.....	66
4.5. Conclusion	66
CHAPTER 5	67
5.1. Conclusion	67
5.2. Future Works	68
REFERENCES	69
APPENDICES	71

LIST OF TABLES

	PAGE
<i>Table 2.1.</i> Comparison past project	16
<i>Table 2.2.</i> Difference between GSM and WIFI Modul NodeMCU.....	17
<i>Table 3.1.</i> Gantt Chart PSM 1.....	38
<i>Table 3.2.</i> Gantt Chart PSM 2.....	39
<i>Table 3.3.</i> List of Software Used.....	42
<i>Table 3.4.</i> List hardware for system	46
<i>Table 4.1</i>	63



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LIST OF FIGURES

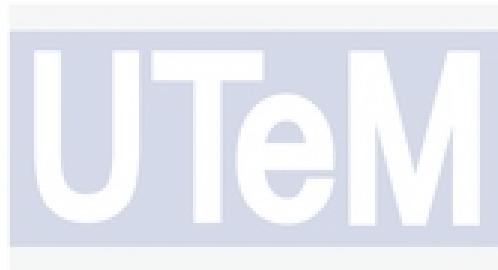
	PAGE
Figure 2.1. Flowchart for system work.....	25
Figure 2.2. System Model for IoT based Trash Can Monitoring System for Smart Garden Cleanliness	26
Figure 2.3. Design of the Hardware Model	26
Figure 2.4. Proposed System.....	12
Figure 2.5. Agricultural IoT framework.....	13
Figure 2.6. Hierarchy diagram of smart garden construction specification.....	13
Figure 2.7. Wiring hardware	15
Figure 2.8. Front View.....	15
Figure 2.9. Orthosiphon Stamineus (Misai Kucing)	19
Figure 2.10. Sissoo spinach (Bayam Brazil).....	19
Figure 2.11. Major components in sensor node.....	20
Figure 2.12. Arduino Mega 2560.....	22
Figure 2.13. Soil Moisture Sensor.....	23
Figure 2.14. ESP8266-01 Wi-Fi Module	24
Figure 2.15. DHT11 Sensor	24
Figure 2.16. Light Dependent Resistor Sensor	26
Figure 2.17. Light Dependent Resistor Sensor Pin and adjusting sensitivity	26
Figure 2.18. Graph of resistance vs illumination.....	26
Figure 2.19. LCD 16x2 Interfacing With Arduino Uno	27
Figure 2.20. 12V DC 120mm Quiet Cooling Fan Silent.....	28
Figure 2.21. light-emitting diode (LED)	29
Figure 2.22. USB Plant Grow Light Sunlight	30
Figure 2.23. 5V Relay Breakout Board.....	30

<i>Figure 2.24. DC-12V Pneumatic Diaphragm Water Pump Motor</i>	31
<i>Figure 2.25. Ultrasonic module.....</i>	32
<i>Figure 2.26. 12V Electric Solenoid Valve Magnetic DC N/C Water Air Inlet Flow Switch.....</i>	32
<i>Figure 2.27. Buzzer</i>	33
<i>Figure 3.1. Methodology Process</i>	35
<i>Figure 3.2. Flow Chart of Project Development.....</i>	36
<i>Figure 3.3. Flowchart for system work</i>	41
<i>Figure 3.4. Coding from Arduino IDE</i>	43
<i>Figure 3.5. Interface of Proteus 8 software</i>	44
<i>Figure 3.6. Wamp server interfacing</i>	45
<i>Figure 3.7. Visual Studio Code Interface.....</i>	45
<i>Figure 3.8. Overview of the circuit</i>	47
<i>Figure 4.1. Coding for Arduino Mega that using Arduino IDE.....</i>	50
<i>Figure 4.2. Coding for button function make it increase or decrease the value.....</i>	51
<i>Figure 4.3. Coding for detect ESP8266-01 module via Rx and Tx transmited</i>	51
<i>Figure 4.4. Interface of Visual Studio Code.....</i>	52
<i>Figure 4.5. Need Username and Password to access control panel.....</i>	53
<i>Figure 4.6. Overview Website interfacing Desktop View.....</i>	53
<i>Figure 4.7. Overview Website interfacing Responsive Mobile View</i>	54
<i>Figure 4.8. Main navigation for all function.....</i>	54
<i>Figure 4.9. Configuration panel interface</i>	55
<i>Figure 4.10. Graphic chart for temperature data every month</i>	55
<i>Figure 4.11. Bar chart for two types of plant-soil moisture data every month.....</i>	56

<i>Figure 4.12. Control panel hardware tester interface</i>	56
<i>Figure 4.13. Figure shows the files stored in Cpanel storage</i>	57
<i>Figure 4.14. Figure shows the size of a file storage unit and the values that have been used.....</i>	57
<i>Figure 4.15. The image shows the database used as well as the names of the tables in it.....</i>	58
<i>Figure 4.16. The picture shows the circuit design made to make the PCB board.....</i>	59
<i>Figure 4.17. The picture shows the circuit used to attach each component and sensor.....</i>	60
<i>Figure 4.18. PCB circuit top , bottom surface and Image in X-ray version</i>	61
<i>Figure 4.19. shows the speed rate according to the time of seconds taken by the ESP 8266 to send data and receive data.....</i>	62
<i>Figure 4.20. The chart shows the data taken in that month.....</i>	63
<i>Figure 4.21. Sample data for Different Volume of Water.....</i>	64
<i>Figure 4.22. Result on dashboard panel for monitoring and data logging the surrounding temperature</i>	64
<i>Figure 4.23.....</i>	65
<i>Figure 4.24. Show data when value of sensor LDR is more then 200 is dark and when below then 200 is bright</i>	65
<i>Figure 4.25.....</i>	66

LIST OF APPENDICES

	PAGE
Appendix 1. :	71
Appendix 2. :	71
Appendix 3. :	72
Appendix 4. :	72
Appendix 5. :	73
Appendix 6. :	73
Appendix 7. :	74



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CHAPTER 1

INTRODUCTION

1.1. Background Of The Project

The Smart Indoor Gardening System that utilizes IoT controllers runs plants throughout the year utilizing a gardening idea [1]. For the planter, controlling plant development is not possible in this day and age. One cannot maintain the fertility of the soil and the fertility of the plants at the same time. The overall goal of this system is to resolve the current issue with the Smart Indoor Gardening System. Systems are giving an optimal growing and thriving environment for the plant, especially in a nation with four distinct seasons [1][2]. The planter also helps grow top-quality, well-matured, and uninfluenced plants. More valued plant like herbaceous plant, which may be utilized for medical purposes, is employed for the system. Other than that, maintaining the soil's humidity to the level needed by the plant is all that is required. It is possible to keep the plant's illumination requirements for the full day. In addition, the device may also irrigate plants without having to closely watch the hydration level of the plants. Using Arduino Mega to control all [3] of the sensors while still using the DHT11, LDR, and DC water pump keeps the complexity down.

1.2. Problem Statement

There are a significant number of relatively common plant problems. The most prevalent difficulty experienced in maintaining a plant is that the plant produced is not of excellent quality, not fully developed, and impacted because the plant cultivated is not regulated and maintained effectively [3]. The needed amount of water for each plant is dependent on what sort of plant it is. To increase plant fertility, it must be avoided from too much water. To solve this problem, an automatic watering system will be provided to water the crops when necessary. Therefore, soil moisture can be maintained during the day and night

The humidity required for the plant during the day and night should be managed within the range required by the plants [4]. It is important to keep in mind that the illumination in addition to what is needed for the plant to develop, and the surrounding temperature, cannot be regulated. This project must keep track of the illumination and identify areas of superior technology in order to have a successful system that can produce excellent growing conditions for the plant [5].

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1.3. Objective

Based on the problem statement mention earlier, there is some objective that can be achieved. The objectives are:

1. To design the IOT based Smart Garden System by using Arduino and Web Application (Cloud Server).
2. To develop IOT based Smart Garden System which incorporates water-saving, power-saving solutions and facilitate crop care.
3. To analyze the performance of the system and comparison with a manual approach.

1.4. Scope

The project's goal is to design and build hardware for indoor gardening, then programme a system for indoor farming so that they may grow an immature, non-manipulated plant with decent-quality, ripe, and unaffected by their interventions. The plant used for the system is more to valuable plant like herbaceous plan, which may be utilized for medicinal purposes, such as Orthosiphon Stamineus [6]. Otherwise for second experiment plant is Sissoo spinach in Bahasa Malaysia is called "Bayam Brazil". Rooting at the nodes, Sissoo spinach (also known as Guatemalan spinach) grows to a height of around 30 centimetres (12 inches). It is not a seed that germinates and is thus not invasive. As long as the shade and pH range of the soil can be maintained, it tolerates vast ranges of nutrients, albeit it does require a significant quantity of nitrogen, organic matter, and water. Plants are vulnerable to being devoured by many types of caterpillar pests and slugs. Plants are propagated with softwood cuttings [7].

The systems are using Arduino Mega as the controller to control the system of the Smart Gardening System utilizing IoT Control Scheme. The system is using the fan and the AC bulb as the control element. The fan has circulated the air and keeps the temperature of the plants at the same level. To make sure the plant gets enough strength of light, the AC bulb is employed. There are three different types of sensors used in this system: a soil moisture sensor, a DHT11 temperature sensor, and an LDR sensor.

The moisture sensor will pick up on the level of moisture in the soil. The DHT11 temperature sensor will detect the surrounding temperature and use it to optimally address the plant's needs. In the end, the LDR sensor will pick up the light and adjust the level of light required by the plant.

1.5. Report Outline

Based on final report consist of 5 main chapters which includes chapter 1, 2, 3, 4 and 5.

The first chapter of the project begins with the introduction. the literature review that was conducted in Chapter 2 details the study. Chapter 3 describes the research approach. Chapter 4 deals with the examination of the results collected and the interpretation, as well as chapter 5, which comes right after, which deals with the full completion of the project. You will learn what the following statements mean through the summary of each chapter:

Chapter 1: introduction

This chapter is all about introducing, stating the problem, explaining the aim, and describing the scope of the project.

Chapter 2: Literature Review

Highlight materials like articles, journals, newspapers, conference papers, and magazines that were utilized in making this infographic. In addition, when it came to the comparisons for each research study, the project's benefits and drawbacks were considered.

Chapter 3: Methodology

This chapter focuses on the project's methodology and methods. This chapter explains the flowchart and the procedures required to complete the project. Everything needed and all the software will be provided.

Chapter 4: Result & Discussion

Over the course of this research, all relevant findings will be documented. All of the project's data will be collected and included in this section. Discussion includes both the existing and upgraded model's performance.

Chapter 5: Conclusion

This project report is now complete. It will sum up all the major results in this section. The ideas and suggestions for future work that are presented in this chapter will be added to the document.

1.6. Conclusion

In this experiment, we successfully verified that the Smart Garden system that connects the soil to the cloud and utilizes the Internet of Things (IoT) functions by linking various soil parameters to the cloud. We accomplished this by setting up a system that connects various soil parameters to the cloud, controlling it remotely through a website application. The system is built not only to monitor the sensor data, like moisture, humidity, temperature, and ultrasonic, but also to enact other functions when required, such as if the water level in the tank falls to a certain minimum level, then the motor is automatically turned on to run the water in the tank up to the maximum level.

Because it is inexpensive and simple to deploy, the start up and installation costs are both low, allowing the system to be used in many locations. In terms of sensor technology, the system has the capability to be raised to the next level, which assists consumers in utilizing their investment in an economic method. If sensor-installed soil nutrient levels can be regulated, the system may be changed to provide fertilizers to the garden with perfect precision. This technique will use less labor while also taking use of the existing water resources, ultimately resulting in a higher profit. Using the input that the system provides, the implementation of the gardening process will be improved.

CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

This chapter lists all of the components and all of the information involved in the Smart Gardening System using the IoT Controller Scheme [5]. The Arduino (Mega) will be controlling this project to create the optimum condition that is ideal for the plant to flourish. This chapter will go through an existing project to understand the specification, project design, conceptualization, and any information pertaining to the project. The flow of the system is based on the reviews that were made from the present project and the prior project.