Faculty Of Electrical And Electronic Engineering Technology

DEVELOPMENT OF IOT BASED SMART GARDEN SYSTEM

NUR HAMDI BIN RAMLEE

Bachelor Of Electronic Engineering Technology (Industrial Electronics) With Honors

2021

DEVELOPMENT OF IOT BASED SMART GARDEN SYSTEM

NUR HAMDI BIN RAMLEE

A project report submitted in partial fulfillment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours

Faculty of Electrical and Electronic Engineering Technology

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI TEKNOLOGI KEJUTERAAN ELEKTRIK DAN ELEKTRONIK

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : **DEVELOPMENT OF IOT BASED SMART GARDEN SYSTEM**

Sesi Pengajian : **2021/2022**

Saya ..... Nur Hamdi Bin Ramlee ..... mengaku membenarkan laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan (✓):

☐	**SULIT***	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	**TERHAD***	(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
/	**TIDAK TERHAD**	

Disahkan oleh:

HAMDI
(TANDATANGAN PENULIS)

Alamat Tetap:

No 23 , Jalan 3/12,
Taman Seri Duyong 3 ,
75460 Melakaa

Tarikh: 11 JANUARY 2022

(COP DAN TANDATANGAN PENYELIA)
IR TS MOHAMMAD AFIF BIN KASNO
Pensyarah
Fakulti Teknologi Kejuruteraan
Elektrik & Elektronik
Universiti Teknikal Malaysia Melaka

Tarikh: 11 JANUARY 2022

*CATATAN: Jika laporan ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali tempoh laporan ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I declare that this project report entitled “Development Of Iot Based Smart Garden System” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature	:	HAMDI ……
Student Name	:	NUR HAMDI BIN RAMLEE
Date	:	……11/01/2022……

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:

Signature	:	……Afif Kasno……
Supervisor	:	IR TS MOHAMMAD ‘AFIF BIN KASNO
Date	:	11 JANUARY 2022 ……

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.

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 di capai 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.

ACKNOWLEDGEMENTS

First and foremost, I would like to express my gratitude to my supervisor, Ir.Ts. Mohammad ‘Afif Bin Kasno for precious guidance, words of wisdom and patient throughout this project.

I am also indebted to Universiti Teknikal Malaysia Melaka (UTeM) for the financial support through “TUNTUTAN PERBELANJAAN PSM 2” which enables me to accomplish the project. Not forgetting my fellow colleague, for the willingness of sharing his thoughts and ideas regarding the project.

My highest appreciation goes to my parents, and family members for their love and prayer during the period of my study. An honourable mention also goes to my Mom for all the motivation and understanding.

Finally, I would like to thank all the fellow colleagues and classmates, the Faculty members, as well as other individuals who are not listed here for being co-operative and helpful.

TABLE OF CONTENTS

LIST OF TABLES

PAGE

LIST OF FIGURES

PAGE

LIST OF APPENDICES

PAGE

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 towater 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].

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.