UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF IOT CONSERVATORY MONITORING AND CONTROL SYSTEM FOR ROCK MELON FARM

This Report Is Submitted In Partial Fulfilment of The Universiti Teknikal Malaysia Melaka (UTeM) For Bachelor Of Electronics Engineering Technology (Industrial Electronics) With Honours

by

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Tajuk: Development of IoT Conservatory Monitoring and Control System for Rock Melon Farm

Sesi Pengajian: 2019

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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:

Signature: …….

Supervisor: TS. AHMAD NIZAM BIN MOHD JAHARI@ MOHD JOHARI

ABSTRACT

Rock melon has been growing fruit in Malaysia for over 10 years now. Rock melon is like same with honey dew but the different is the color of skin and content. Previously, Honey Dew planted on standard land by using horizontal cultivation, but this hybrid seed plant was less developed. The rock melon is very easy to plant and potentially generate profit but this crop entrepreneur needs to also make a high commitment if it wants to succeed. To ensure the growth of rock melon well, it requires the right specification of the required temperature, humidity and soil moisture. This project will create to control the parameter in the rock melon farm. All the output will trigger when the set up parameter in the system reach low or high that need for the rock melon farming. That's why we chose to develop a rock melon farm system to regulate the farm's temperature, humidity and soil moisture. Arduino UNO is the core of the system in this project. We also use IoT, which means Internet of Thing for mobile. With this project, we can control the temperature of rock melon farms and also humidity in a large scale.

ABSTRAK

Tanaman tembikai wangi telah berkembang lebih dari 10 tahun di Malaysia. Tembikai wangi seakan sama dengan tembikai susu, cuma bezanya pada warna kulit dan isinya. Sebelum ini tembikai susu yang ditanam di tanah biasa menggunakan cara penanaman mendatar tetapi tanaman benih hibrid ini kurang maju. Tembikai wangi ini sangat mudah untuk menanam dan berpotensi menjana keuntungan tetapi usahawan tanaman ini juga perlu membuat komitmen tinggi jika ia ingin berjaya. Untuk memastikan pertumbuhan tembikai wangi dengan baik, ia memerlukan spesifikasi yang betul iaitu suhu, kelembapan udara dan kelembapan tanah yang di perlukan. Projek ini di ciptakan untuk mengawal suhu, kelembapan udara dan kelembapan tanah di dalam kebun tembikai wangi. Kipas, penyedut air dan servo motor akan berfungsi apabila nilai yang di set dalam sistem mencapai tahap rendah atau tinggi daripada yang di perlukan untuk tanaman tembikai wangi. Itulah sebabnya kita telah membuat keputusan untuk mereka bentuk sistem ladang tembikai wangi yang boleh mengawal suhu dan kelembapan ladang. Dalam projek ini menggunakan Arduino UNO sebagai otak sistem. Kami juga menggunakan IoT, yang bermaksud Internet of Thing untuk mudah alih. Dengan adanya projek ini, kita boleh mengawal suhu ladang tembikai wangi dan juga kelembapan dalam skala yang besar.

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Bismillahirrahmanirrahim,

In the name of Allah S.W.T, The Most Compassionate and The Most Merciful,

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Next, I would like to express my appreciation to the individuals of my family for offering me with their moral assistance when this project is completed. They always provide me with comfortable and suitable surroundings so that I can complete this project with a peace in mind. They also encourage me when I'm feeling stressed out by the work load thus I can be stronger and bolder than ever before.

Finally, I would like to convey my gratitude to all my colleagues who have supported me to complete this project straight or indirectly. They shared their knowledge, ideas, opinions and tips regarding my project which have been a great help. They also helped in the process of writing the project report by providing me information regarding the formats and which parts to be included.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter introduces on background, problem statement, objectives, scope, significance and outline of this project. It will also give a brief on the conservatory monitoring and controlling system for rock melon farm.

1.1 Background

Farming has been proven to benefits us both mentally and physically. It does not only improve our physical health, but it also can improve our mental health as well. Farming can also be considered as a light exercise which can helps us to burn calories. It also has been shown to reduce feelings of pain and anxiety. Furthermore, farming will also help us growing fruits. It takes a lot of time and effort in farming. Daily activities such as working limits us from monitoring the plants. Most people do not have time to physically monitor their plants.

This automated system will ease those farmers who want grow rock melon fruit. It has similar concept to automated greenhouse which has been a trend. It will help them to monitor the fruit growth when they are not at home. This system will monitor the optimal requirement of the fruit growth in order to maintain the production quality. This system is created for those farmers who prefer in small and big scale farming. The purpose of the implementation of this system is to help the farmer to monitor the temperature, humidity and soil moisture of the farm.

An Arduino will be the main power behind this project. It will provide interface between the sensors, cloud and web application. The monitoring process will be done

continuously. For collecting real-time information, the heat, humidity and ground moisture detector will be used. These devices are incorporated with Arduino and Arduino processes and sends the information gathered via Wi-Fi to the cloud. The information can be obtained by the user through a internet application for further analysis. By monitoring the farm, the farmer can take further action to make sure that the farm under control. User will also then be notified about the farm via web server.

1.2 Problem Statements

A conservatory system is a complex system. Any significant changes in one climatic parameter may adversely affect another climatic parameter as well as the plant development process. To distribute sensors and actuators, installations at the conservatory involve a big number of wires and cables. Rock melon farming need a proper system to get a good results. This system will reduce the number of worker and easily to monitor and control the system without coming to the conservatory. Proposed this system for this project using IoT will make farmer can control their farm from far or wherever they are.

1.3 Objective

The goals of this project are important to confirm that the study follows the issue study solution. All goals of this project are shown below:

i. To study the parameter for monitoring and controlling system for rock melon farm.
ii. To design and develop monitoring and control system for conservatory in rock melon farm.
iii. To monitor the parameters needed for rock melon farming criteria through IoT.

1.4 Scope

The range of this research includes studying techniques for monitoring and controlling the conservatory environment. The aim of this project is to develop an IoT conservatory monitoring and control system using Arduino for the rock melon farm. The sensors that are temperature, soil moister and humidity will be used in this project. The temperature sensor senses either high or low temperature. If the temperature of reading is high, the fan will switch on to decrease the temperature. It will sense the amount of water needed in the soil for the soil moister sensor. If low, it will turn on the water pump. The last sensor for sensing the humidity value is the humidity sensor. If there is a high humidity value, the rooftop will open. This project will use Arduino as a microcontroller and it will analyze the data follows by the coding. User will receive a message through the Blynk app about the parameters reading in the conservatory. This system also will display in web server.

1.5 Project Significance

This project will improve the gardening and management process. Farmers usually need to manually monitor and control the plants to ensure that the plants grow in good condition. This project allow the farmer to monitor and control the plants growth without being physically present. This system also can reduce the cost of labour as we do not have to hire people to monitor the plants because we can monitor from far by our self. Besides that, this system also will help the farmer to increase their productivity. This system allows the farmer to take action on their farm even they stay far from the farm. What the best for this system is connect to the web interface and the farmer will notification about the parameters reading which are temperature, soil moisture and humidity. This project will give advantage to the society especially to the farmer when used this technology.

1.6 Project Outline

This project document includes three sections that explain the project concept and all the operations to achieve its goal momentarily. The arrangement of the report is shown below:

- In chapter 1 will explain about this project like background of this project, problem statement, objective, scope and the project significance.
- In chapter 2 will discuss on the literature review by the previous related project. This chapter also will discuss on the concept of Arduino, sensors and web application.
- The methods used in this project will be explained in chapter 3 from selecting the project title until the end of this project. It includes hardware and software development.
- The results of this project will explain in chapter 4. This chapter will cover all the results start from set up this project until this project finish. In this chapter also will explain the coding for this project's system.
- In chapter 5 just the conclusion of this project and the future work.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter is a project research that have contains a few papers linked to IOT Conservatory Monitoring and Rock Melon Farm Controlling study in both ways, software and hardware. It also has a short overview of the conservatory history as it is going to be the result of this project. To complete this section as well as the project, the sources of data are referred to as references to the user. This information was compiled from relevant sources including articles, journals, books and other related sources.

The related research information was studied to enhance the knowledge as it helps guide the project user.

All the project-related data is included in this section. All the helpful data will be gathered and used to complete this section as a guide. Some information from the studied sources relate to some important parts and topics related to this project as it will be useful for the project in both software and hardware elements.

2.1 Previous Project Research

To build a stronger conservatory monitoring and control system a lot of past projects varying from 2016 to 2018 have been researched in advance to raise knowledge of this subject. All data about the projects researched was summarized and included in the section below.

2.1.1 Greenhouse Monitoring Using IOT Technology

This project was proposed by Devendra R. Bodkhe, Pravin F. Rane, Mr. Yashpal gogia and Mrs. Warsha Kandlikar, all of them from National Institute of Electronics & IT, Aurangabad. This project aims at developing greenhouse monitoring using IoT technology. In green house technology they use some sensors and some controllers for maintaining required environment in house and help to increase productivity. It is like sensor of temperature, sensor of humidity, sensor of humidity, sensor of light and detector of magnet. In this project, many applications are used to control environment between greenhouse like as bulb, fan, motor and heater. All applications will control with respect to collect data of sensor and control the environment in the greenhouse. Sensors are used to measure physical quantities and send the signal to the processors (Bodkhe *et al.*, 2016).

There are four factors are majority get controlled by technology for best production in greenhouse. They are as follows:

2.1.1.1 Humidity

The humidity detector is used to measure humidity. If the environment's moisture is below the specified concentrations, sprays are automatically switched on and automatically switched off if the moisture amount exceeds the specified level sprays. But instead of a spray, they used CFL light here in this project to indicate the spray. Using GSM Module, a status or alert signal is also sent by the system to the user.

2.1.1.2 Soil Moisture

In order to detect soil moisture, they used a water pump and a soil moisture sensor. Two moisture sensor probes of the soil are used and placed in the soil. The device switches on the water pump until it hits the necessary amount when the detector

does not feel humidity in the soil. A notification with water pump status such as Motor On or Motor Off will also be sent to the owner.

2.1.1.3 Temperature

For sensing temperature, the temperature sensor is used. The device automatically switches on the fan when the temperature reaches a specified amount or critical amount and a signal is also sent to the owner for data about that parameter. In addition, the fan switches off automatically when the temperature arrives in ordinary range or drops below the specified level.

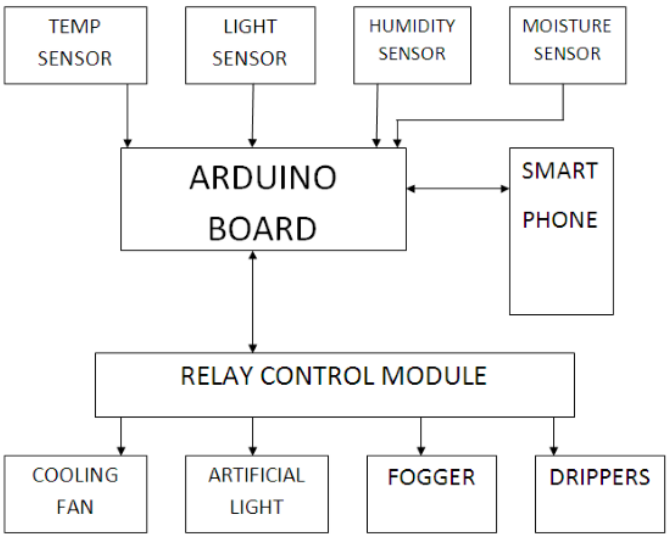

Figure 2.1: Block diagram of Proposed Remote Operating Station

2.1.2 Raspberry-Pi Based Automated Greenhouse

Kiran Ganesan, Uzma Walele, Namrata Hambire, Piyush Choughule and Deepthi Oommen, all from the Computer Engineering Department, Terna Engineering College Nerul, Navi Mumbai, have suggested this project. This system is designed to consist of different components, namely soil moisture, temperature, humidity and light detectors. These devices detect different parameters and are then transmitted to the Raspberry pi. After studying this, the program for specific environmental conditioning was written on to the raspberry pi. If needed, emergency lights can also control the desired light intensity for this environment. The soil humidity concentration is also controlled by switching on / off the water pump. By switching on the heater / cooler, the required temperature and moisture are preserved. As a result, the greenhouse environment is automatically controlled (Ganesan *et al.*, 2018).

The Web-based Climatic Condition Monitoring System is built which can be accessed through the internet anywhere and anytime. Web-based climate monitoring is one type of recorder that monitors a greenhouse room temperature, humidity, moisture and light and stores the data into a database and displays on the website of current temperature via a web server. With this system user can monitor the climate conditions in the greenhouse from anywhere remotely.

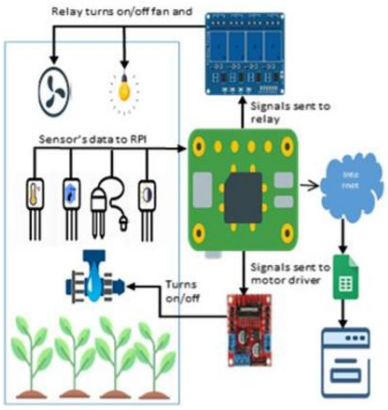

Figure 2.2: Architecture of automated greenhouse