UNIVERSITI TEKNOLOGI MARA SARAWAK

FINAL YEAR PROJECT REPORT

(EEE368)

SMART AGRICULTURE SYSTEM

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ABSTRACT

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The introduction of smart technology has transformed conventional agricultural techniques, opening the path for more efficient and sustainable farming methods. This final year project is to design a smart agriculture system that uses the capabilities of the ESP32 microcontroller to improve production, optimize resource utilization and promote environmental sustainability in modern farming. The ESP32 microcontroller serves as the system's primary control unit, seamlessly integrating a network of sensors, actuators, and communication modules. The system employs a varied variety of sensors, including soil moisture sensors, temperature sensors and humidity sensors. These sensors capture real-time data from the agricultural environment, allowing the system to work on its own whenever it needs it. The ESP32 uses wireless communication protocols such as Wi-Fi and Bluetooth to provide seamless interaction with a cloud-based platform. This connectivity enables farmers to remotely monitor and operate the whole system from a distance. The cloud platform saves and analyses the system's acquired data, providing significant insights into our farm. The ESP32 microcontroller, with its low cost, low power consumption and powerful processing capabilities, assures the system's dependability and energy economy. With the aid of ESP32, we can take proper care of our plants even when we are not present at our farm.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Agriculture is a very important system that supports our nation economics and become our main food supplier as we obtain most of our food resources from the agricultural site such as vegetables, wet food, herbs, medicine, etc. The most common method that used in agriculture is the old and traditional method that used by the farmers.

In these few centuries, the global agricultural landscape had tried to improve the method of farming by following nowadays modern technologies due to increasing demand for food production and supplier to sustain the world economic and rapid growing population. As these demands become a big burden to the farmers as their traditional method would not be able to fulfil it, they had to improvise their method by using modern technologies. This is where the Smart Agriculture System was introduced. Smart Agriculture System is a system that provide a more precise farming which gave a promising result. This is because this system provides more accurate technique and could ensure the quality of the production are stable.

The modern technologies such as Internet of Things (IoT), Artificial Intelligence (AI) and multiple sources from the internet has create a way for the farmers to create their own Smart Agriculture System by developing and implement the data that obtained on the internet. These systems have its own method for data collecting, processing and analysing for the agriculture system that they build. With the data obtained, the farmer able to decide the next step and think on how to enhance the production.

CHAPTER 2

LITERATURE REVIEW

1.1 INTRODUCTION

The Smart Agriculture System is a system that was invented to ease the method of gardening and farming by using modern technologies. With a microcontroller to control the whole system and sensors to help in data collecting and analyzing, agriculture section is way easier than it used to be. For this project, ESP-WROOM-32 was used as the microcontroller since it comes with Wi-Fi and Bluetooth features that useful in presenting data. Since we need to always monitor the condition of the plant wherever we are, ESP-WROOM-32 would be the best microcontroller as it comes with the Internet of Things (IoT) feature. This is also the reason we chose to use ESP-WROOM-32 instead of Arduino due to its ability to have the connection directly to an app called “Blynk”.

Next, this system used two type of sensors which are the soil moisture sensor as the most important component and a temperature and humidity sensor to make the system to work more efficiently. The Capacitive Soil Moisture Sensor V2.0 used in this project as the soil moisture sensor. This sensor is an analog capacitive soil moisture sensor which measures soil moisture levels by capacitive sensing which is the capacitance is varied based on water content present in the soil. The capacitance is converted into voltage level basically from 1.2V to 3.0V maximum. The advantage of Capacitive Soil Moisture Sensor is that they are made of a corrosion-resistant material, giving it a long service life.

Furthermore, another type of sensor that is used to collect the data of temperature and the humidity is the DHT11 sensor. DHT11 is a commonly used temperature and