PERFORMANCE INVESTIGATION ON A TEMPERATURE AND HUMIDITY SENSOR FOR SMART HOME IRRIGATION SYSTEM

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This report is submitted in partial fulfilment of the requirements for the degree of Bachelor of Electronic Engineering with Honours

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I declare that this report entitled “PERFORMANCE INVESTIGATION ON A TEMPERATURE AND HUMIDITY SENSOR FOR SMART HOME IRRIGATION SYSTEM” is the result of my own work except for quotes as cited in the references.

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DEDICATION

This work is the result of numerous and difficult sacrifices. This work is gladly and proudly dedicated to the people who serve as an inspiration thanks to the efforts of the researchers. From parents and guardians to classmates and circle of friends who stepped in to aid when challenges arose while working on this project. To the instructors and staff of Faculty of Electronic and Computer Engineering UTeM especially my supervisor, Dr Norizan Bin Ahmad for the teaching and guidance during the period of Projek Sarjana Muda (PSM). Above all, to our Almighty God, who has lavished His blessings on us in our daily lives, especially for the strength, courage, patience, wisdom, time, and guidance we have received in completing this project.

ABSTRACT

In the history of humanity, water plays a key role in sustaining life and building of social structure. As the water resources and quality is becoming unusual, conservation and quality monitoring of water has a high priority around the globe. This paper demonstrates the efficient use of Internet of Things for the traditional agriculture. The project describes the smart irrigation system using the concept of IoT. It shows the use of NodeMCU ESP32based monitored and controlled smart irrigation systems, which is also cost-effective and simple. The NodeMCU ESP32 has Wi-Fi module built-in which connects the system to internet. This smart irrigation system has DHT 11 sensor and DHT 22 that measure respectively and based on these NodeMCU ESP32 microcontroller drives the water pump. NodeMCU ESP32 received the information and transmitted wirelessly to the Blynk App through internet. This module controls two motor for supplying water to the field on the information obtained from two temperature and humidity sensor. This transmitted information is monitored by using IoT system. The Blynk App has been prepared which present the actual time values and reference values of various factors needed by crops. It is beneficial for users to irrigate their gardening conveniently by the application of automatic irrigation system. Moreover, a PV module is an assembly of photo-voltaic cells mounted in a framework

for installation. Photo- voltaic cells use sunlight as a source of energy and generate direct current electricity. A collection of PV modules is called a PV Panel, and a system of panels is an array of a photovoltaic system supply solar electricity to electrical equipment. This will save electricity when using the product

ABSTRAK

Dalam sejarah manusia, air memainkan peranan penting dalam mengekalkan kehidupan dan pembinaan struktur sosial. Memandangkan sumber dan kualiti air menjadi luar biasa, pemuliharaan dan pemantauan kualiti air mempunyai keutamaan yang tinggi di seluruh dunia. Kertas kerja ini menunjukkan penggunaan Internet Perkara yang cekap untuk pertanian tradisional. Projek ini menerangkan sistem pengairan pintar menggunakan konsep IoT. Ia menunjukkan penggunaan sistem pengairan pintar yang dipantau dan dikawal berasaskan NodeMCU ESP32, yang juga kos efektif dan mudah. NodeMCU ESP32 mempunyai modul Wi-Fi terbina dalam yang menghubungkan sistem ke internet. Sistem pengairan pintar ini mempunyai sensor DHT 11 dan DHT 22 yang mengukur masing-masing dan berdasarkan mikropengawal NodeMCU ESP32 ini memacu pam air. NodeMCU ESP32 menerima maklumat dan dihantar secara wayarles ke Apl Blynk melalui internet. Modul ini mengawal dua motor untuk membekalkan air ke medan pada maklumat yang diperoleh daripada dua sensor suhu dan kelembapan. Maklumat yang dihantar ini dipantau dengan menggunakan sistem IoT. Aplikasi Blynk telah disediakan yang membentangkan nilai masa sebenar dan nilai rujukan pelbagai faktor yang diperlukan oleh tanaman. Adalah berfaedah bagi pengguna untuk mengairi kebun

mereka dengan mudah dengan menggunakan sistem pengairan automatik. Selain itu, modul PV ialah himpunan sel foto-voltan yang dipasang dalam rangka kerja untuk pemasangan. Sel fotovoltaik menggunakan cahaya matahari sebagai sumber tenaga dan menjana elektrik arus terus. Koleksi modul PV dipanggil Panel PV, dan sistem panel ialah susunan sistem fotovoltaik yang membekalkan tenaga suria kepada peralatan elektrik. Ini akan menjimatkan elektrik apabila menggunakan produk

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LIST OF SYMBOLS AND ABBREVIATIONS

For examples:

V	:	Voltage
IDE	:	Integrate Development Environment
C	:	Celcius
W	:	Watt
PV	:	Photovoltaic
DC	:	Direct Current
AWD	:	Alternate Wetting Drying
IoT	:	Internet of Things
DHT	:	Digital Temperature And Humidity
NTC	:	Negative Temperature Coefficient

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CHAPTER 1

INTRODUCTION

Water is among the biggest problems in the world presently, and a lot of it is used in farming.Consequently, a water consumption system must be in place. So most of the irrigation systemsare now controlled by physically. The advancements in information technology have made a lot of things possible. In the last few years, "smart" technology has progressed the market andbecome a new standard in the business. Cell phones, tablets, cars, and other "smart" technologyhave all become more popular. The Internet of things makes it easier for devices, equipment, and services to communicate with each other in a specific way. This technology also makes iteasier for people to do their jobs more quickly. Smart irrigation is a new idea that many researchers are interested in, and it has been growing and developing for a long time. There isalso more pressure on the water distribution system, and the importance of water managementhas grown because irrigated farming or gardening is more sustainable.

Generally, the main goal of smart irrigation is to save time, money, and resources. Tensiometric and volumetric are both very simple ways to manage soil moisture-based irrigation, but the characteristic of temperature and humidity due to unpredictable weather changes. Sensors need to be checked on a regular basis to make sure they work properly.

Irrigation systems that are very smart work automatically and use a temperature and humidity sensor to water the plants in a very even way without any human supervision. So, the main goal of the work is to design an irrigation system that has all of the above qualities, as well as the traditional irrigation system features, like measuring the temperature and humidity level of the area to avoid crop damage. Smart Irrigation System is an overview of the ESP32 Wi-Fi module based smart irrigation system that uses IoT. It can be controlled from any place in the world that has Internet. Another good thing about this planned irrigation system is that it will keep track of crops and alert the user before bad things happen in their plants. It will quickly become important to control and keep an eye on the smart irrigation. For a plant to grow properly, it requires a consistent supply of water. People regularly forget to water his plant for a variety of reasons. Using a constant water dripping system is one solution to this problem. This project will focus on the design and development of a water drip irrigation system that can detect and monitor ambient temperature and humidity. The user could use smartphone to monitor these conditions. The system's power supply will be designed to use solar power to promote the use of green energy. The NodeMCU will be used to develop a communication system between the water irrigation system and the user via smartphone apps, among other things. Plants require sufficient water resources to be healthy and fertile. Excessive and insufficient water supply to the plant may cause it to wither and die. This home- based system is designed to assist humans

in watering plants without the use of any manpower. Different approaches of methods used in various fields were reviewed in order to develop a fully automated system that intelligently measures temperature and humidity.

1.1 Problem Statement

Often people forget to cultivate growing in their plants at home or farms especially when they are busy and not at home. Plants need to get enough water so that they maintain the surrounding temperature and humidity. When the plants get enough temperature and humidity, the plants will be fresh, healthy and will not be to the detriment of the gardeners instead they gain because the plants are not damaged and die. When gardeners or people are not at home, it will be difficult for plants to get water to maintain their temperature and humidity. Especially when there is a summer that will cause plants to die due to lack of constant water supply.

1.2 Objective

It is important to achieve the objective of this project as it the main purpose of this project. It will be also act as a guideline through this project to make sure the goal can be achieved. The first objective for this project is to develop a system that converts and store solar energy into a constant voltage. Second is to design a remote monitoring system for user using a smartphone to make plant watering system and also design a system for humans. The third is to develop transmission of wireless communication system using NodeMCU module. The last objective is to investigate the temperature and humidity that needed for a plants to become health.

1.3 Scope of Work

In this section there are some parts that need to be done for this project. In the first part which is the hardware part, this project requires a NodeMCU ESP32, which serves as a microcontroller for this project. The second hardware is the DHT11 Temperature and Humidity Sensor and DHT 22 Temperature and Humidity Sensor as input component where this sensor will sense the environment of plants. The third hardware is the Solar Panel 18V Monocell Polycrystalline allow little movement of electrons inside the cells. These solar panels absorb energy from the sun and convert it into electricity. The fourth hardware is the 12V DC Water Pump where this pump powered by solar dc power supply. The DC water pump will function when watering the plants. The fifth hardware is mobile phone, where this mobile phone use for Blynk application. The second part is the software part, in this project will use Arduino IDE software to do coding for the microcontroller that is Node MCU ESP32.

There are open source prototype board designs available for NodeMCU, an open source firmware. The term "NodeMCU" is a combination of the terms "node" and "microcontroller" (micro-controller unit). The term "NodeMCU" refers to the firmware rather than the development kits that go with it. The firmware and prototype board designs are both open source. The Lua programming language is used in the firmware. The firmware was developed using the Espressif Non-OS SDK for ESP32and is based on the Lua project. It uses open source projects such as lua-cjson and SPIFFS. Due to limited resources, users must select the components that are critical to their project and create a firmware that is tailored to their needs. Support for the 32- bit ESP32 is also included.