Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF DEMAND DRIVEN IRRIGATION SYSTEM USING IOT

MUHAMMAD MUADDIB BAKHTIAR BIN MUZAFAR

Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours

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A project report submitted
in partial fulfillment of the requirements for the degree of
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I declare that this project report entitled"Development Of Demand Driven Irrigation System Using IoT"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.

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I approve that this Bachelor Degree Project 2 (PSM2) report entitled “DEVELOPMENT OF DEMAND DRIVEN IRRIGATION SYSTEM USING IOT” is sufficient for submission.

Signature :

Supervisor Name : Mohamad Shazali Bin Syed Abdul Hamid

Date : 27/01/2023

APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology with Honours.

Signature :

Supervisor Name : Mohamad Shazali Bin Syed Abdul Hamid

Date : 27/01/2023

Signature :

Co-Supervisor :

Name (if any)

Date :

DEDICATION

To my beloved mother, Salemah Binti Salleh, and father, Muzafar Bin Maarof,

and

To brothers, Muhammad Mujahid Danial and Muhammad Murshid Anuar

and

My sister, Nurul Umairah

ABSTRACT

Good irrigation system has the potential to transform the agricultural sector from one that is manual and static to one that is intelligent and dynamic, resulting in improved productionwhile requiring less human supervision. A job that takes a lot of people can be turned into a job that requires very little manpower and imprecise data collecting can be turned into a very good, automated irrigation system with zero-error accurate reading. This research proposes thedevelopment of an IoT-based demand-driven irrigation system that autonomously checks and maintains the appropriate soil moisture content. The Arduino Uno microcontroller platform isused to build the control unit. Finding a way to calibrate the sensors so that an accurate readingmay be obtained will be a key breakthrough throughout the project. Soil moisture sensors are used in this configuration to determine the exact moisture content of the soil. This number allows the system to use the correct amount of water, preventing over- and under-irrigation. The Internet of Things (IoT) is utilized to keep farmers up to date on all data acquired during the irrigation process. All the data obtained by the sensors is sent to the cloud on a regular basis, allowing a farmer to verify whether the water pump watered the crop according to the pre-determined timetable. The sensor data is also sent to a Blynk application, where it is graphed for study.

ABSTRAK

Sistem pengairan yang baik berpotensi untuk mengubah sektor pertanian daripada yang manual dan statik kepada yang pintar dan dinamik, menghasilkan pengeluaran yang lebih baik di samping memerlukan pengawasan manusia yang kurang. Pekerjaan yang memerlukan ramai orang boleh ditukar menjadi pekerjaan yang memerlukan tenaga kerja yang sangat sedikit dan pengumpulan data yang tidak tepat boleh diubah menjadi sistem pengairan automatik yang sangat baik dengan bacaan tepat sifar ralat. Penyelidikan ini mencadangkan pembangunan sistem pengairan berasaskan permintaan berasaskan IoT yang secara autonomi memeriksa dan mengekalkan kandungan lembapan tanah yang sesuai. Platform mikropengawal Arduino Uno digunakan untuk membina unit kawalan. Mencari cara untuk menentukur penderia supaya bacaan yang tepat boleh diperolehi akan menjadi kejayaan utama sepanjang projek. Sensor kelembapan tanah digunakan dalam konfigurasi ini untuk menentukan kandungan lembapan tanah yang tepat. Nombor ini membolehkan sistem menggunakan jumlah air yang betul, mengelakkan pengairan berlebihan dan kurang. Internet of Things (IoT) digunakan untuk memastikan petani mendapat maklumat terkini tentang semua data yang diperoleh semasa proses pengairan. Semua data yang diperoleh oleh penderia dihantar ke cloud mengikut jadual yang ditetapkan, membolehkan pengguna mengesahkan sama ada pam air menyiram tanaman mengikut jadual waktu yang telah ditetapkan. Data sensor juga dihantar ke aplikasi Blynk, di mana ia digraf untuk kajian.

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CHAPTER 1

INTRODUCTION

1.1 Background

Since it comes to giving water to plants, an irrigation system is a must, especially when climate change is not on our side. Irrigation systems, also known as sprinkler systems, drip irrigation systems, landscape irrigation systems, and lawn drip irrigation systems, are artificial means of providing water directly to plants or indirectly via land or soil. They come in a variety of types, including sprinkler systems, drip irrigation systems, landscape irrigation systems, and lawn drip irrigation systems, to complement various geographical surfaces or regions. In dry places and during seasons of little rainfall, it is essential for growing crops, landscape upkeep, and the vegetation of disturbed soils.

A water source, a destination, and a conveyance system are all required components of an irrigation system. A pond, reservoir, or lake is a more popular choice for water confinement since it is easier to maintain and keep the proper amount of water than the other options. Streams, in particular, can be unpredictable in terms of volume throughout the rainy season as well as during periods of drought. If an appropriate irrigation system is not in place, this climatic inconsistency will have a severe influence on agricultural produce. The rainy season may result in agricultural or plant floods, in which case too much water will do more harm than benefit. During dry spells, on the other hand, evaporation is higher, therefore water is not adequately utilised unless a good irrigation system of water running straight to the root is in place. You end up spending more money watering the plant while potentially missing out on abundant harvests.

Agriculture was the important development of a country in this age of globalisation, providing the major source of food, money, and jobs for rural areas, but the global food system is beginning to sag as the world population is expected to reach 9.7 billion by 2050. In addition to population growth also increases the demand for food. Food demand is anticipated to rise between 59% to 98% by 2050 hence the planet's arable land is estimated to be half of what it was in the 1970s by that period. Land use change, as represented in land cover change, is the most significant component of global environmental change, influencing climate, biodiversity, and ecosystem services, as well as land use decisions.

The Internet of Things (IoT) is an emerging paradigm that is a crucial part of our lives. The terms " Internet Of Things " was coined by Kevin Ashton in 1999 when he included it in the title of a presentation he made at Procter & Gamble . It allows sensors and electronic devices to communicate with each other through the internet to facilitate maintenance management . For example, with the implementation of smart devices, it able to automate aquaponics maintenance system. This show that IoT became essential to our life.

The two important words in IoT are "Internet" and "Things". The internet is an electronic communications network that connected computers network and lets people share and receive information around the world. The definition of term "things" in the dictionary is an object that eminent from a living being. Simply to said, the IoT means that a system interlinks devices, mechanical and digital equipment, objects or people to transmit data across the network without the need for human- to-human transmission . Generally, IoT began with the best tools for communication. The devices can be monitored, operated by mobile phones or computers that connect through the Internet. Cloud serves as a great IoT partner as a forum for all sensors and it can store and access data.

NodeMCU is a free and open-source LUA-based firmware for the ESP8266 wifi chip. NodeMCU firmware comes with the ESP8266 Development board/kit, i.e. NodeMCU Development board, as a result of investigating capability with the ESP8266 chip.

Smartphones have become a highly frequent source and primary means of communication for everyone in the world to communicate or update most of the farming community as development of technology. A smart agriculture system with IoT based system helps to monitor and maintain the optimal condition for aquaponics system. IoT based smart agriculture able to help users to control the pH value, water level, water temperature, light and fish feeder through the internet with improve services. Users allow to manually control it by using smartphone and it also can be automated by controlling the aquaponics system to reduces the manpower in process of care and planting of fish and vegetables respectively. This will save them a lot of time.

The rate of growing vegetables is increasing proportionally to the good maintain of optimal condition. Smartphone development encourages users to prefer using mobile app. Growth of IoT allows the communication between the networking devices based on requirements. This mobile application developed to allow users check the current situation of irrigation system whenever they want

1.2 Problem Statement

Agriculture is the lifeblood of all industrialised nations. It consumes 85 percent of the world's fresh water resources, and due to population expansion and growing food demand, this percentage will continue to be dominating in water use. As a result, efficient water management is a key challenge in many arid and semi-arid farming systems. To maximise water utilisation for agricultural crops, an automated irrigation system is required. The goal of an automated irrigation system is to avoid overwatering and underwatering. Over irrigation happens as a result of inefficient waste water distribution or management, resulting in water contamination. To solve these issues and save manpower, a smart watering system is needed

1.3 Project Objective

The objectives for this project are:

a) To design and develop an IoT based irrigation system by using NodeMcu ESP8266.

b) Providing good soil moisture level to plant requirement for them to grow healthily.

c) Achieving accurate and error-free data during data collecting process and reduceman work.