Faculty of Electrical and Electronic Engineering Technology

DEVELOPMENT OF SMART WATER IRRIGATION SYSTEM WITH IOT CONTROLLING BASED

MOHD ASHRAF BIN ROSDIH

B081810118

Bachelor of Electronics Engineering Technology with Honours

2021

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A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electronics Engineering Technology 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 Smart Water Irrigation System with IoT Controlling Based

Sesi Pengajian : 1-2021/2022

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Alamat Tetap:
KAMPUNG KAWANG
89600 PAPAR
SABAH

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(COP DAN TANDATANGAN PENYELIA)

TS. DR SUZIANA AHMAD

TS. DR. SUZIANA AHMAD
JABATAN TEKNOLOGI KEJURUTERAAN ELEKTRIK
FAKULTI TEKNOLOGI KEJURUTERAAN ELEKTRIK
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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.

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Supervisor Name : TS. DR. SUZIANA AHMAD

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DEDICATION

To my beloved mother, Nirri binti Hj. Jalil, and father, Rosdih bin Miasin,

and

To my family.

ABSTRACT

Technology is one of the most effective ways to increase the quality of an agriculturally based product in this modernizing period. Agriculture may be done in housing areas without engaging large regions, according to the Malaysian government, and it can even be done in our own backyard. In administering this agricultural system, various issues have arisen. One of the issues is that it necessitates physical labor and wastes a significant amount of water. As a result, the project's goal is to create a smart irrigation system for agricultural. The goal of this project is to use NodeMCU to create a completely automated Smart Water Irrigation System, to monitor and operate thesystem using Blynk application, and to construct a system in agriculture that can comply with water conservation. This farm system utilizes an NodeMCU v2 ESP8266 WiFi model as the microcontroller to control the system's input and output, as well as Blynk application for monitoringand control. To detect soil condition, a moisture sensor is employed. This initiative is both environmentally benign and simple to implement, as it improved the agricultural system.

ABSTRAK

Pada era pemodenan ini, teknologi adalah salah satu inisiatif yang ideal untuk meningkatkan kualiti produk berasaskan pertanian. Kerajaan Malaysia mengesyorkan agar pertanian dapat dilakukan dikawasan perumahan tanpa melibatkan kawasan yang luas di mana ia dapat dilakukan di halaman belakang rumah kita sendiri. Terdapat beberapa masalah yang dihadapi dalam menguruskan sistem pertanian ini. Antara masalahnya ialah memerlukan tenaga kerja manual dan membuang banyak air semasa prosesnya. Oleh itu, tujuan projek ini adalah untuk mengembangkan sistem pengairan pintar untuk industri pertanian. Objektif projek ini adalah untuk mengembangkan Sistem Pengairan Air Pintar sepenuhnya automatik dengan menggunakan NodeMCU, untuk memantau dan mengendalikan sistem melalui aplikasi Blynk dan untuk mewujudkan sistem pertanian yang dapat memenuhi penjimatan air. Sistem pertanian ini menggunakan model NodeMCU v2 ESP8266 WiFi sebagai pengawal mikro untuk mengawal input dan output sistem dan penggunaan aplikasi Blynk juga dilaksanakan ke sistem ini untuk memantau dan mengendalikan sistem. Sensor kelembapan digunakan untuk mengesan keadaan tanah. Projek ini mesra alam dan mudah digunakan kerana memperkenalkan peningkatan yang baik terhadap sistem pertanian.

ACKNOWLEDGEMENTS

First and foremost, I would like to express my gratitude to my supervisor, Ts. Dr. Suziana binti Ahmad for their 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 which enables me to accomplish the project.

My highest appreciation goes to my parents and family members for their love and prayer during the period of my study.

Finally, I would like to thank all 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

TABLE	TITLE	PAGE

LIST OF FIGURES

LIST OF SYMBOLS

δ	-	Voltage angle
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	-	
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LIST OF ABBREVIATIONS

V	-	Voltage
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LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Background

Water is necessary for the human population, as well as other animals, plants, and bacteria around the world, to have a sufficient food supply and a productive environment. Global freshwater demand has been quickly increasingas human populations and economies have grown (Hinrichsen et al. 1998, Postel 1999, Rosegrant et al. 2002, Shiklomanov and Rodda 2003, UNEP 2003a, Gleick 2004). Irrigation is critical for raising crop yields and maintaining production stability. Irrigation is important for economically successful agriculture in arid and semi-arid regions, while it is frequentlyrequired as a supplement in semi-humid and humid locations (Oron et al., 1986). Irrigated agricultureis the world's largest user of diverted water, accounting for 70–80 percent of the total in dry and semi-arid regions. It's hardly surprising, however, that irrigated agriculture is seen as the principal supplierof water in those places, particularly during emergency droughts. Currently, irrigated agriculture is caught between two opposingviewpoints: some believe that agriculture is inefficient because it grows"water-guzzling crops" (Postel et al., 1996), while others believe that irrigation is necessary for the production of sufficient food in the future, given expected increases in food demand due to global population growth and climate change. The goal of this project is to aid individuals who work in agriculture in their own communities by reducing the strain of having to execute a task that can be readily completed with today's technology. The automatic irrigation system, for example, is utilised to eliminate human participation while also ensuring proper irrigation.

1.2 Problem Statement

Today, the agriculture industry is thriving, regardless of large scale or small scale agriculture. Also, agriculture industry contributes a lot in providing food and raw material to non-agriculture sectors. All of those related to the agricultural industry are needing sufficient amount of water resource to ensure the crops maintain its health. Nevertheless, there is also wastage of water during watering process to the crops. It occurs when the farmer only use dippers and buckets when watering their crops. In order to improve these problem, a water sprinkler was introduced and to some extent it helps on reducing water wastage. It only comes with a sprinkler and a roll of hose and the only thing the farmer will do is just turn on the tap and turn it off when the farmer desired. However, installing a water sprinkler to the crops also can lead to wastage of water since the farmer do not know when exactly the farmer should turn off the tap and to make sure the crops soil has the maximum amount of water needed. Consequently, an alternative irrigation system is design with an addition of moisture sensor to overcome the previous problem. It provides an efficient irrigation to the crops by using an overhead water sprinkler and the moisture sensor will play its part by identifying the crops soil was in dry condition or wet condition.

1.3 Project Objective

a) To develop an automated smart water irrigation system by using microcontroller based on IoT.

b) To implement the water irrigation system using soil moisture sensor, DC motor and water pump.

c) To analyze the smart water irrigation system by testing in organic soil.

1.4 Scope of Project

The scope of this project is made to inform the features and components usedin this project. Among the scope of the project is using NodeMCU microcontrolleras the brain of this project and its function to control all the components used in this project. And, the usage of Blynk application to monitor and control the system. Moreover, soil moisture sensor is used to detect the moisture in the soil. DC supply or battery is being used in this project to be connected to NodeMCU microcontroller and the circuit. In addition, this project utilized forward and reverse motor to move the irrigation bar and also a water pump to supply the water through hosethat attached tothe irrigation bar. Finally, this project is only dedicated to the domestic agriculture industry.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Literature review is a part of research branch where the connection between the past research and present research are found. Organizing a literature review is significant for advancing a research concept, for synthesizing what is already know about a subject and for searching any space in knowledge and how your exploration could provide further comprehension (Winchester and Salji, 2016).

This chapter is composed according on the past research, journal, thesis, article or any other form of published information that is related within the project title and scope.

2.2 History of irrigation system

The irrigation system innovation relocated similarly as the flow southwestern U.S, where the Hohokam, possessed in the Central Arizona fabricated nearly 700 miles of water system waterways to take care of their human progress, and deserted bafflingly there in the fourteenthcentury AC. Perhaps the most mind-boggling water system frameworks in history was found in antiquated Sri Lanka, where the most seasoned water works dating from around 300 BC, during the rule of King Pandukabhaya are realized. Verifiably, it has been of vital significance for the civilizations to have legitimate water system frameworks to have productive cultivating frameworks, which is the significant achievement for food security and the life spanof a civilization. On the off chance that we investigate the American mainland or the supposed ‘’New World’’, we see the most punctual

impressions of water system frameworks in the Zana Valley of the Andes Mountains in Peru, with dates as ahead of schedule as 4000 BC. In the event that the historical backdrop of the water system is dissected, the principal puts that should be inspected are Egypt and Mesopotamia, where the primary effective endeavors were made to control the water stream. Numerous historyspecialists and archeologists, alongside certain designers distributed articles and reports on the idea of old water works until the second 50% of the 20th century (Koç, 2018).

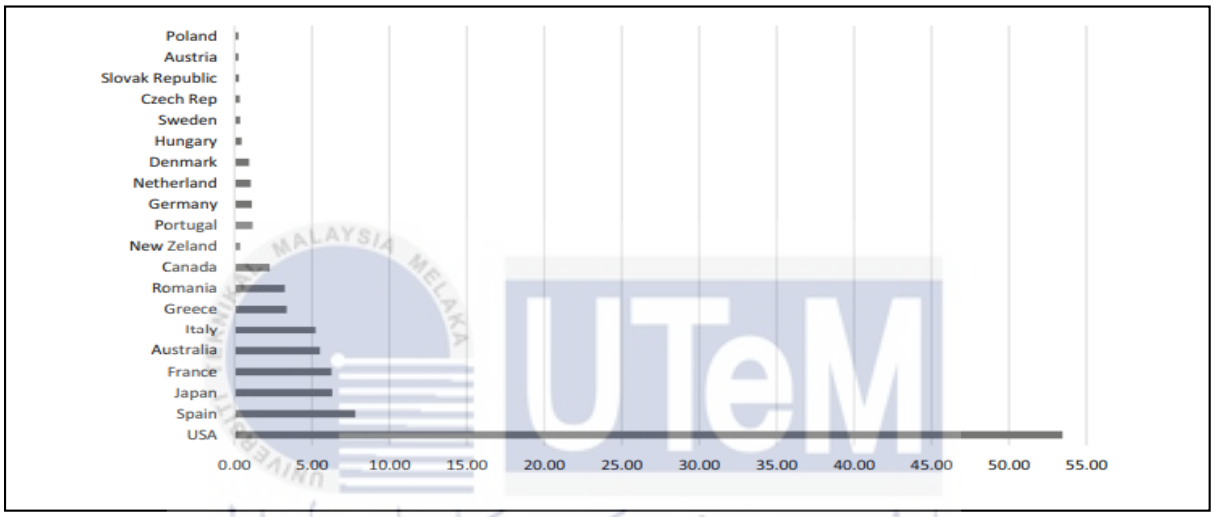

Figure 2.1: Percentage of irrigated areas in developed countries in the world (%)

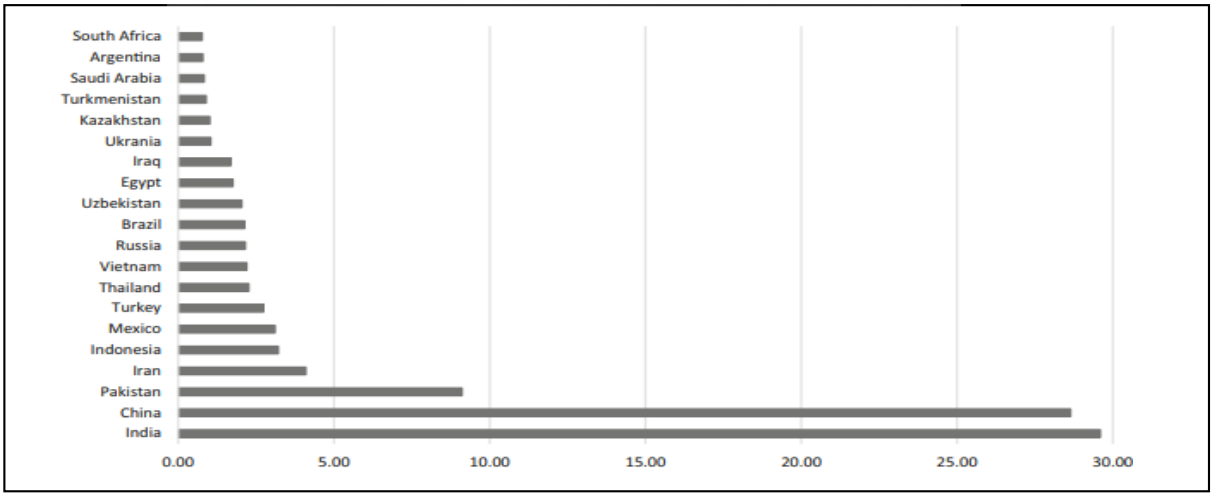

Figure 2.2: Percentage of irrigated areas in developing countries in the world (%)

Inside Mesopotamia and over Tigris reach, there are Ishaqi project, Nahrawan project, Middle Tigris projects, Dujailah project, Dalmaj venture, and Gharraf Canal projects.There are additionally numerous blasts on Tigris and Euphrates, a portion of these floods are some portion of Tharthar and Habbaniyah projects, while others serving the irrigation system projects in Mesopotamia. On Euphrates, there are a few irrigation projects, where the activities upstream Fallujah city are practically little or medium undertakings watered by siphoning. There are six huge dams inside Iraq, 5 are existing in Tigris bowl, and one in Euphrates bowl, these dams which were worked since 1950's are experiencing a few issues, similar to establishment liquefaction, seismic impacts, and others. On Tigris bowl, there are Jazeera project flooded by siphoning from Mosul Dam, Kirkuk project that is watered from Lesser Zab River, and Diyala are projects. Water system projects incorporate a few classifications, which are dams, blasts, channels, channels, siphoning stations, controllers, and supplies (Abdullah and Al-Ansari, 2020).

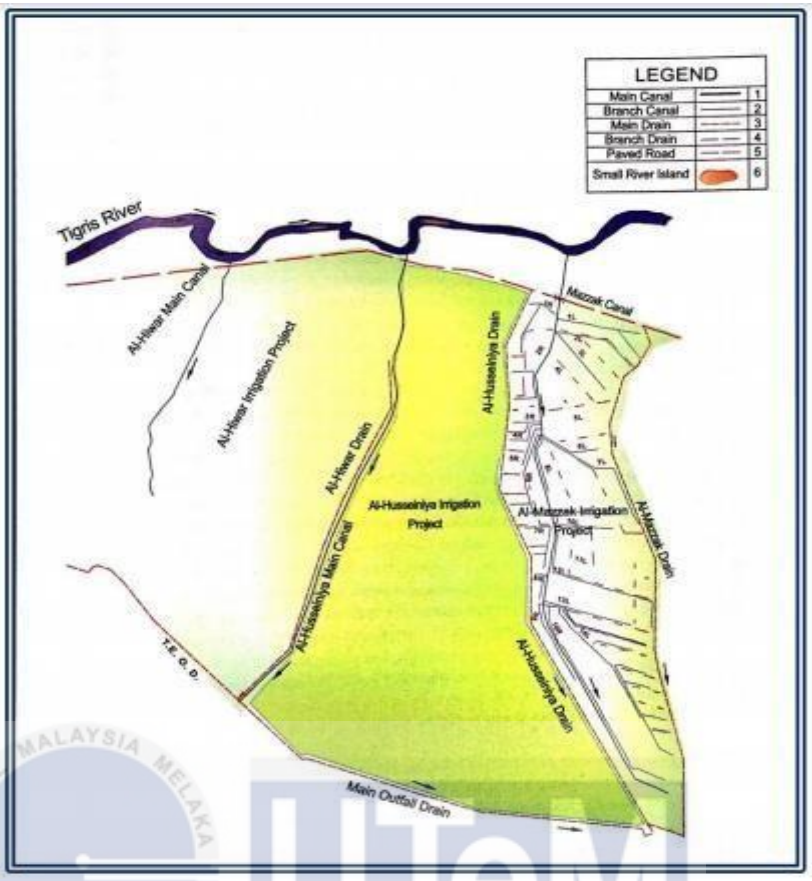

Figure 2.3: Map of Dalmaj Irrigation Project

2.3 Modern irrigation system

Biophysical parameters, family demographics, family economic resource situations, market access and distribution services, social capital, loan limits, and other factors are all shown to impact farmers' adoption of sophisticated irrigation equipment in this study. The importance of efficient water use in agriculture irrigation was reaffirmed in the central document No. 1 for 2020, which wasfurther emphasised by the policy of "acceleratingthe development of efficient water-savingirrigationtechnology and realising 100 million hectares of new and efficient farmland for irrigation water conservation." The promotion of modern irrigation technology and the development of water-efficientagricultural production in the arid and semi-arid regions of Northwest