

DEVELOPMENT OF IOT BASED CHILI FERTIGATION
SYSTEM BY USING MICROCONTROLLER



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021



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**DEVELOPMENT OF IOT BASED CHILI FERTIGATION
SYSTEM BY USING MICROCONTROLLER**

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Industrial Electronic) with Honours.



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2021

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Tajuk: DEVELOPMENT OF IOT BASED CHILI FERTIGATION SYSTEM BY
USING MICROCONTROLLER

Sesi Pengajian: 2021

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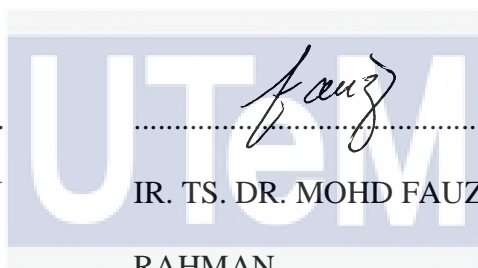
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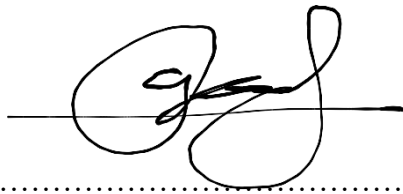
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I hereby, declared this report entitled DEVELOPMENT OF IOT BASED CHILI FERTIGATION SYSTEM BY USING MICROCONTROLLER is the results of my own research except as cited in references.



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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 Electronic Engineering Technology (Industrial Electronic) with Honours. The member of the supervisory is as follow:



ABSTRAK

Dalam projek untuk Projek Saujana Muda, saya telah memutuskan merekabentuk dan membangunkan Pembangunan Sistem Fertigasi Chili Berasaskan IoT Dengan Menggunakan Microcontroller. Sistem Fertigasi yang merupakan gabungan pengairan dan pembajaan dimana pengairan digunakan untuk memberi air ke tanaman makanakala pembajaan digunakan untuk membei baja ke tanaman. Sebab saya memilih cili kerana cili mempunyai potensi tanaman berpontensi dan bernilai tinggi. Cili adalah salah satu tanaman kegemaran petani di Malaysia terumata cuaca tropika dan cili adalah bahan makanan yang mesti ada dalam setiap keluarga. Tumbuhan cili mempunyai sifat yang sangat sesuai degan iklim, cuaca dan suhu. IoT pelaksana adalah aplikasi pintar yang membolehkan pelbagai fungsi seperti pencahayaan. Berdasarkan hasil pencarian, kajian cara pengembangan aplikasi bergerak dapat membantu petani memantau tanaman di lading. Projek ini dirancang untuk system fertigasi dengan menggunakan IoT automatik untuk memantau pengairan dan pembajaan. Hasilnya, projek ini akan mengurangkan tenaga pekerja, menjimatkan tenaga dan menjimatkan masa.

ABSTRACT

In this *Projek Saujan Muda*, I have decided to design and develop the Development of IoT Based Chili Fertigation System by Using Microcontroller. Fertigation System is a combination of irrigation and fertilization control, where irrigation is used to feed water to the plant, while fertilization is used to supply fertilizer to the plant. The reason I choose the chili because chili has potential and high-value cash crop. Chili is one of the favourite vegetables of many farmers in Malaysia, especially in tropical weather. Furthermore, chili is a food ingredient that must exist in every family. Chili plants have properties that are very tolerant of climate, weather and temperature. The implementing IoT based smart application enables a variety functions such as lighting. The development of this mobile application can help farmers monitor their plant. The IoT based chili fertigation system monitors the irrigation and fertilization that expected to reduce the labour workforce while saving energy and time.

DEDICATION

I would like to dedicate my beloved parents for providing all the support and assistance have made possible the fruition of our efforts. You have never given up and it will always be remembered in this heart.

Next, I would like to dedicate this project to my supervisor lecturer for supportive and give full cooperation during the whole *Projek Saujana Muda*.

Therefore, to all my friend's thanks for his or her cooperation, advices, motivation and support while conducting the *Projek Saujana Muda*.



ACKNOWLEDGEMENTS

Thank you Allah because His blessing, overflowing His award and permission for me to complete my *Projek Saujana Muda* in course of time, which is detrimental properly by Him. There is many research papers I have read during the time for me to complete my project goal, which is from last year's thesis using the internet and reasearch. I would like to impress on those here who have helped me a lot to complete my project for this semester. I could not complete this final year project alone without their guidance and support.

First, I would like to express our highest gratitude to Allah S.W.T for the opportunity and health provided to prepare this *Projek Saujana Muda* until it has been completed. Not to forget, our supervisor Ir. Ts. Dr. Mohd Fauzi bin Ab Rahman whose contribution in suggestion, guidance, encouragement and enthusiasm project. I also indebted to all people that involved in this project. Without their encouragement, support and guidance, in completing this project implantation. Their invaluable contribution have leded me to successfully complete this *Projek Saujana Muda*.

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LIST OF SYMBOLS

N	Nitrogen
P	Phosphorus
K	Potassium
V	Voltage
A	Ampere
mA	mili Ampere
KB	Kilobyte
MHz	Mega Hertz



LIST OF ABBREVIATIONS

IoT	Internet of Things
EC	Electrical Conductivity
ET	Evapotranspiration
pH	Hydrogen
SMS	Short Message Service
WUE	Water Use Efficiency
WSU	Wireless Sensor Unit
GSM	Global System Mobile
GPRS	General Packet Radio Service
LCD	Liquid Cristal Display
LED	Light Emitting Diode
WiFi	Wireless Fidelity

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CHAPTER 1

INTRODUCTION

1.1 Project Background

There are many types of agricultural activities that provide human their need for food like vegetables. One of the most used techniques for agriculture is fertigation system. Fertigation technology is a cultivation technique that has been proven to have beneficial effects on vegetable and fruit crops. Fertigation System that is a combination of irrigation and fertilization where irrigation is used to feed water to the plant, while fertilization is used to feed fertilizer to the plant. In this system, irrigation and fertilization are run simultaneously. Fertigation system is also an alternative planting method to prevent soil borne diseases such as Pythium, while increasing crop yields. Soil-borne diseases such as pituitary and fusarium can reduce and damage crop yield. Irrigation is an important part of agriculture that influence crop production. Fertigation system is also should have clean water sources such as pond water, lakes, river and other sources.

This project is focuses on developing an automated system for fertigation system of the chili plant. The output will be displayed on the Blynk app and two sensors that use is soil moisture sensor and pH sensor. The soil moisture sensor is used to measure humidity soil that is if the soil moisture detects dry, it will cause the water pump will starting pumping water to the chili plant. The amount of fertilizer inside the chili plant is measured by pH sensor where if no fertilizer then the fertilizer pump will starting pumping fertilizer to the chili plant.

1.2 Problem Statement

In fertigation farming, uncontrolled water supply causes waste and crops to absorb excess water from its needed. For example, the farmers need to open the water and let the water irrigate the crop until the farmer feels water has been sufficiently supplied on the crop. However, this causes wastage and water irrigation to be more systematically managed.

Furthermore, measuring water and irrigation systems is ineffective when using manual monitoring. For example, the farmer is difficult to measure air drainage rates as they only estimate water drainage. Consequently, it leads to poor performance on crop yield.

1.3 Project Objective

The objective of this project are listed as follows:

- 1) To develop a smart system of chili fertigation system on automated.
- 2) To evaluate the system performance in irrigation and fertilization to the chili plant.

1.4 Scope of the Project

The purpose of this project is to develop an automatic chili fertigation system. Arduino Uno is a mastermind of microcontroller that monitors all the components used for this project. This project has the scope of:

- IoT module is used to communicate between Microcontroller and mobile android application in real time when connected to Wi-Fi.
- The project is a collection of smart farming that enable a variety of functions in the fertigation system with mobile application controls to reduce labour workforce, save energy and save time.

