DEVELOPMENT OF IOT BASED CHILI FERTIGATION SYSTEM BY USING MICROCONTROLLER

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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.

by

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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:

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ABSTRAK

Dalam projek untuk Projek Saujana Muda, saya telah memutuskan merekabentulk dan membangunkan Pembangunan Sistem Fertigasi Chili Berasakan IoT Dengan Menggunakan Microcontroller. Sistem Fertigasi yang merupakan gabungan pegairaan dan pembajaan dimana pengairaan digunakan untuk memberi air ke tanaman makanakala pembajaan digunakan untuk membei baja ke tanaman. Sebab saya memilih cili kerana cili mempunya 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 meggunakan IoT automatik untuk memantau pengairaan 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.*

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TABLE OF CONTENTS

		PAGE
ABSTRAK		**vii**
ABSTRACT		**viii**
DEDICATION		**ix**
ACKNOWLEDGEMENTS		**x**
TABLE OF CONTENTS		**xi**
LIST OF TABLES		**xv**
LIST OF FIGURES		**xvi**
LIST OF APPENDICES		**xix**
LIST OF SYMBOLS		**xx**
LIST OF ABBREVIATIONS		**xxi**
CHAPTER 1	**INTRODUCTION**	**1**
1.1	Project Background	1
1.2	Problem Statement	2
1.3	Project Objective	2
1.4	Scope of the Project	3
CHAPTER 2	**LITERATURE REVIEW**	**4**
2.1	Introduction	4

2.2 Related Research of Project 4

2.2.1 Web-Based Monitoring of an Automated Fertigation System 4

2.2.2 Smart Irrigation: IOT-Based Irrigation Monitoring System 5

2.2.3 Field Monitoring and Automation using IOT in Agriculture 6

2.2.4 Irrigation Automation and Nutrient Recommendation System 7

2.2.5 A Model for Smart Agriculture Using IOT 9

2.2.6 IoT Crop-Field Monitoring and Irrigation Automation 9

2.2.7 Soil Monitoring, Feritgation and Irrigation System 10

2.2.8 A Design of an Automated Fertigation System Using IoT 11

2.2.9 Field Deployment in Automated Farming Operations 11

2.2.10 Agricultural Application along with Soil Monitoring 12

CHAPTER 3 METHOLODOLOGY 13

3.1 Introduction 13

3.2 Flowchart Process 14

3.3 Design of Study 15

3.4 Hardware Component 16

3.4.1 pH Sensor 16

3.4.2 Soil Moisture Sensor 18

3.4.3 Water Pump 19

3.4.4 Module Relay 20

3.4.5 NodeMCU ESP32 Wifi Module 21

3.4.6 Light-Emitting Diode 22

3.4.7 Microcontroller 23

3.5 Software Component 24

3.5.1 Arduino IDE 24

3.5.2 Blynk Application 25

CHAPTER 4 RESULT AND DISCUSSION 26

4.1 Introduction 26

4.2 Hardware Analysis 26

4.2.1 Project Implementation Stage 28

4.3 Software Analysis 29

4.3.1 Blynk Application Design 29

4.3.2 Arduino IDE Create Project Coding 32

4.3.3 Arduino IDE Serial Monitor for Soil Moisture Sensor 33

4.3.4 Arduino IDE Serial Monitor for pH Sensor 34

4.4 Result 37

4.5 Data Analysis 40

4.6 Discussion 41

4.7 Prototype of the Project 44

4.8 Limitation 44

CHAPTER 5 CONCLUSION AND FUTURE WORK 45

5.1 Introduction 45

5.2 Conclusion 45

5.3 Future Work 46

REFERENCES 47

APPENDICES 49

LIST OF TABLES

TABLE	TITLE	PAGE
Table 2. 1:	NPK Value for Different Crops	12
Table 3. 1:	pH Sensor Description	17
Table 3. 2:	Water Pump Specification	19
Table 3. 3:	Module Relay	20
Table 3. 4:	Microcontroller	23
Table 4. 1:	Pin Using in Arduino Uno	27
Table 4. 2:	Installation for Blynk Application	29
Table 4. 3:	Result	37
Table 4. 4:	Experimental to the Chili Plant	39
Table 4. 5:	Weather Information	40
Table 4. 6:	Soil Moisture and Soil pH Value Measurement	40

LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 2. 1:	Parts of Proposed Automatic Fertigation System	5
Figure 2. 2:	Architecture of e-Agriculture Monitoring Module	7
Figure 2. 3:	Proposed System Architecture	8
Figure 3. 1:	Project Planning Flow Diagram	13
Figure 3. 2:	Flowchart Process	14
Figure 3. 3:	Block Diagram of the System	15
Figure 3. 4:	pH Sensor	16
Figure 3. 5:	Soil Moisture Sensor	18
Figure 3. 6:	Water Pump	19
Figure 3. 7:	Module Relay	20
Figure 3. 8:	ESP32 WiFi Module	21
Figure 3. 9:	Light-Emitting Diode	22
Figure 3. 10:	Microcontroller	23
Figure 3. 11:	Arduino IDE Software	24
Figure 3. 12:	Blynk Application	25

Figure 4. 1: Connection of Chili Fertigation System in Fritzing Software 26

Figure 4. 2: Hardware Design on Breadboard 28

Figure 4. 3: Hardware Design on Donut Board Circuit 28

Figure 4. 4: Choosing Account for Login 29

Figure 4. 5: Choose the Device Name and Connection Hardware 30

Figure 4. 6: LCD Assign 30

Figure 4. 7: pH Value Assign 30

Figure 4. 8: Moisture Percentage Assign 30

Figure 4. 9: Update the Application in Blynk 31

Figure 4. 10: Declaration and Pinout 32

Figure 4. 11: Send Data to NodeMCU ESP8266 32

Figure 4. 12: Choose Pin Output 33

Figure 4. 13: Read for Soil Moisture Sensor 33

Figure 4. 14: Soil in Condition Dry 34

Figure 4. 15: Soil in Condition Moisture 34

Figure 4. 16: Read for pH Sensor 35

Figure 4. 17: Soil Less Acidic 35

Figure 4. 18: Normal 35

Figure 4. 19: Soil Excess Acidic 35

Figure 4. 20: Soil Moisture Sensor Code 36

Figure 4. 21: pH Sensor Code 36

Figure 4. 22: Soil Moisture Graph 42

Figure 4. 23: Soil pH Value Graph 42

Figure 4. 24: Prototype of the Project 44

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendix 1	Gantt Chart PSM1	49
Appendix 2	Gantt Chart PSM2	50
Appendix 3	Coding for NodeMCU ESP8266	51
Appendix 4	Coding for Arduino UNO	54

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

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.