

**UNIVERSITI TEKNOLOGI MARA**

**IOT BASED SYSTEM FOR FERTILIZATION  
APPLICATION**

**NUR SYAHIRAH BINTI ROSLI**

Thesis submitted in fulfillment  
of the requirements for the degree of  
**Diploma of Electrical Engineering**

**Centre for Electrical Engineering Studies, College of Engineering,  
Universiti Teknologi MARA, Johor Branch**

**Feb 2023**

## ABSTRACT

IoT Based System for Fertilization Application is a new system that combines several technologies from various fields. The aim of this project is to deploy and develop good agriculture and fertilizer modernization system to the farmers. Despite the views and experience that farmer had regarding traditional agricultural and fertilizing process, farmers may be thinking that is the best process for their plants. However, the reality is that today's fertilization industry is more precise, faster and smarter than the traditional fertilization. The rapid increases of Internet of Things (IoT) based technologies through the economy have redesigned almost all industry including agriculture industry. It moves the industry to the more effective approaches. Within this, it has changed a lot towards agriculture industry and many farmers are taking their opportunity to creating a good quality plant. IoT is a promising technology which provides efficient way of solving the agriculture and fertilizing problems. It can also automatically maintain the quality of process and monitor the process within minimal human involvement. This project will show the potential of variety of sensors and IoT in fertilization along with the challenges that will farmer faced when apply this technology with the traditional fertilization. IoT devices and communication techniques with the sensors that encountered in fertilizing applications are analysed in detail. All of the sensors that available for specific fertilizing application such as soil condition. It presents many aspects of technologies involved in the field of IoT in agriculture and fertilization. Other than that, the connection of IoT based fertilization systems with relevant technologies has been presented. Review by the farmers through some project IoT based system in fertilizing application has also been presented. Lastly, with this review, the current and future process of IoT in fertilization along with the potential research challenges has been analysed.

## **ACKNOWLEDGEMENT**

Firstly, I wish to thank Allah s.w.t for giving me the opportunity to embark on my diploma and for completing this long and challenging journey successfully, without god's willing, my project will never run smoothly. My gratitude and thanks go to my supervisor, Sir Rozi bin Rifin who always guide, assist and observe me to make sure that my project finish successfully.

Next, my appreciation again goes to Sir Rozi plus my friend who provided the facilities and assistance during sampling. Special thanks to my colleagues and friends for helping me with this project.

Finally, this thesis is dedicated to the loving memory of my very dear father and mother for the vision and determination to educate me. This piece of victory is dedicated to both of you. I also would like to express our gratitude for all the panels for FYP1 (EEE358) and FYP2 (EEE368) for their advices and kind words regarding my works and project. Alhamdulillah.

## TABLE OF CONTENT

<b>Content</b>	<b>Page no.</b>
<b>AUTHOR'S DECLARATION</b>	<b>ii</b>
<b>APPROVAL</b>	<b>iii</b>
<b>ABSTRACT</b>	<b>iv</b>
<b>ACKNOWLEDGEMENT</b>	<b>v</b>
<b>TABLE OF CONTENT</b>	<b>vi</b>
<b>LIST OF TABLES</b>	<b>viii</b>
<b>LIST OF FIGURES</b>	<b>ix</b>
<b>LIST OF SYMBOLS</b>	<b>xi</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xii</b>
<b>CHAPTER ONE: INTRODUCTION</b>	<b>1</b>
1.1 Research Background	1
1.2 Problem Statement	2
1.3 Objectives	3
1.4 Scope Of Work	3
1.5 Project Contribution	4
<b>CHAPTER TWO: LITERATURE REVIEW</b>	<b>5</b>
2.0 Introduction	5
2.1 Summary Of Research Projects	5
2.2 Table Of Related Research	11
<b>CHAPTER THREE: METHODOLOGY</b>	<b>14</b>
3.0 Introduction	14
3.1 Hardware Development	15
3.1.1 Block Diagram	15
3.1.2 Components	15
3.1.3 Experimental	22

# CHAPTER ONE

## INTRODUCTION

### 1.1 Research Background

Malaysia has decided to create smart agriculture using Internet of Things (IoT) technologies in order to achieve economies of scale and increase farmers income. IoT is a cutting-edge instrument that rural farmers may use to enhance their operations in numerous ways. It offers in-the-moment information that can assist farmers in lowering crop failure risks, improving crop yields, and reducing fertiliser and water use, all while reducing production costs and boosting profitability and sustainability. All people know how important soil is to the agricultural system, especially in terms of nutrients and soil moisture, which are essential elements for plants and crops. Monitoring soil moisture and nutrient levels is therefore essential in contemporary agriculture and horticulture. It might also be an amusing component of an Internet of Things (IoT)-based smart agricultural system. Water waste is a major issue in agriculture. Water waste in agriculture can be decreased or controlled in a number of ways. Crop yield is significantly impacted by fertiliser management, much like by water management. In the suggested system, individual tanks will be used to store various fertilisers and critical nutrients. Below that will be a sizable water tank that will be electronically connected to drip irrigation pipes already established in the field. An SMS will be sent to the farmer's phone by a soil moisture sensor that has been installed in the field. The controller will receive input from farmers in the form of specific alpha numerical values, which it will then transmit to the electrical valves together with a signal indicating the duration of valve opening. Because of this, the fertilisers will drop directly into the water tank, where they will be combined with water and drip-irrigated into the fields.