

**PLANT MANAGEMENT SYSTEM**

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**This report is submitted in partial fulfillment of the requirements for the award  
of Bachelor of Electronic Engineering (Computer Engineering) With Honours**

**Faculty of Electronic and Computer Engineering  
Universiti Teknikal Malaysia Melaka**

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# **SISTEM KENDALIAN TUMBUHAN**

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**Laporan ini dikemukakan untuk memenuhi sebahagian daripada syarat  
penganugerahan Ijazah Sarjana Muda Kejuruteraan Elektronik(Kejuruteraan  
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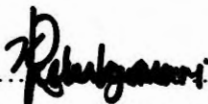
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Dedicating my thanks to my parents, supervisor (Mr.David Yap Fook Weng), lectures, friends and the FKEKK technicians for their supports and help.

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## ABSTRAK

“Plant Management System” ialah satu sistem automatik yang dapat mengawal suhu, kelembapan tanah dan sistem penyiraman dalam proses menyediakan satu keadaan yang kondensi untuk tumbuhan. Keadaan ini dapat diwujudkan melalui penyediaan sistem penyiraman tumbuhan yang sistematik, sistem penyejuk dan sistem bumbung. Sistem penyiraman automatik ini menyiram tumbuhan dua kali sehari menggunakan program pemasaan. Sementara itu, suhu dikawal dengan menggunakan kipas kawalan suhu. Bumbung bergerak digunakan untuk mengelakkan lebih air pada tumbuhan sewaktu musim tengkujuh. Pengesan air memicu pergerakan motor untuk menggerakkan bumbung pada kedudukan yang sesuai agar dapat menghalang air dari memasuki rumah tanaman. Sistem ini menggunakan pengawal PIC 16F877 dan program ini ditulis dengan menggunakan BASIC. Litar pengesan direka agar ia dapat menyediakan keluaran yang serasi dengan program yang ditulis agar ia dapat berinteraksi dengan keluaran daripada litar pengesan. Projek ini ditujukan kepada pengusaha ladang tanaman sayur sayuran dan tapak semaian.



## ABSTRACT

Plant Management System is an automatic system which able to control the temperature, composite's moisture and the soil saturation in order to provide a conditional environment for plant. This is done by providing a systematical plant irrigation, cooling and roofing system. The irrigation system is an automatic system that can water the plant twice daily by using the timing program. Meanwhile, temperatures are controlled by using temperature controlled fan which can on and controls the speeds linearly depending to the room temperature. Moving roof is used in order to prevent saturation which can harm the plant during the raining season. A rain detector triggers the motor rotation in order to move the roof in a proper location to block the rain water. The main controller for this system is PIC 16F877 microcontroller and the program is written by using C language. All the sensing and detector circuit is designed to provide the required output and the program is written accordingly to deal with the possible outputs of the sensing circuits. The intention of this project is to be used in the palm oil nurseries in order to ease the nurseries management system and reduce the overall cost.

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## LIST OF ABBREVIATIONS

ADC	-Analog to Digital convertor
CCW	-Counter Clock Wise
CMOS	-Complementary Metal Oxide Semiconductor
CW	-Clock Wise
DC	-Direct Current
IDE	-Integrated Development Equipment
LCD	-Liquid Crystal Display
MOSFET	-Metal Oxide Silicon Field Effect Transistor
NPN	-Negative Positive Negative
PCB	-Printed Circuit Board
PLC	-Programmable Logic Controller
PIC	-Programmable Intelligent Controller
PN	-Positive Negative
PSM	-‘Projek Sarjana Muda’

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Background**

Agriculture plays a major role in the growth of Malaysian economy nowadays. In order to reduce the food import and to diversify agricultural production, the government encourages growers to plant more food crops for both the local and international markets. Technology improvement plays an important role in the agricultural sector in order to producing vegetables and fruits in an efficient, safe and sustainable way. In order to increase the profit, modern agriculture technology is needed to be applied to these sectors in order to increase the profit. Research and Development (R&D) had improves a lot on the existing system; such as breeding, planting technologies and machineries in order to increase the productivity and as well to reduce the overall cost. Yet there are still some sectors that have the potential for an improvement. Nurseries and vegetable houses nowadays still use the manual management system whereas it has a potential to be managed automatically.

The disadvantages of the current nurseries system are the requirements of the man powers, improper irrigation system which wastes a lot of water and the dependency on the natural resources. Farms and plantation also requires its worker to work in a very uncomfortable environment, where the worker has to work without considering the hot

sun or rainy day. By improving these elements, nurseries and farms can increase its productivity.

Plant Management System is an automatic system which is able to control the temperature, composite's moisture and the soil saturation in order to provide a conditional environment for plant. This plant management system includes the systematical plant irrigation, cooling and roofing system. Irrigation system is an automatic system that can water the plant twice daily by using the timing program. Meanwhile, temperatures are controlled by using temperature controlled fan which can turn on and controls the speeds linearly depending to the room temperature. The third element, moving roof is used in order to prevent saturation which can harm the plant during the raining season. A rain detector triggers the motor rotation in order to move the roof in a proper location to block the rain water.

The main controller for this system is PIC 16F877 microcontroller and the program is written by using BASIC language. All the sensing and detector circuit is designed to provide the required output and the program is written accordingly to deal with the possible outputs of the sensing circuits.

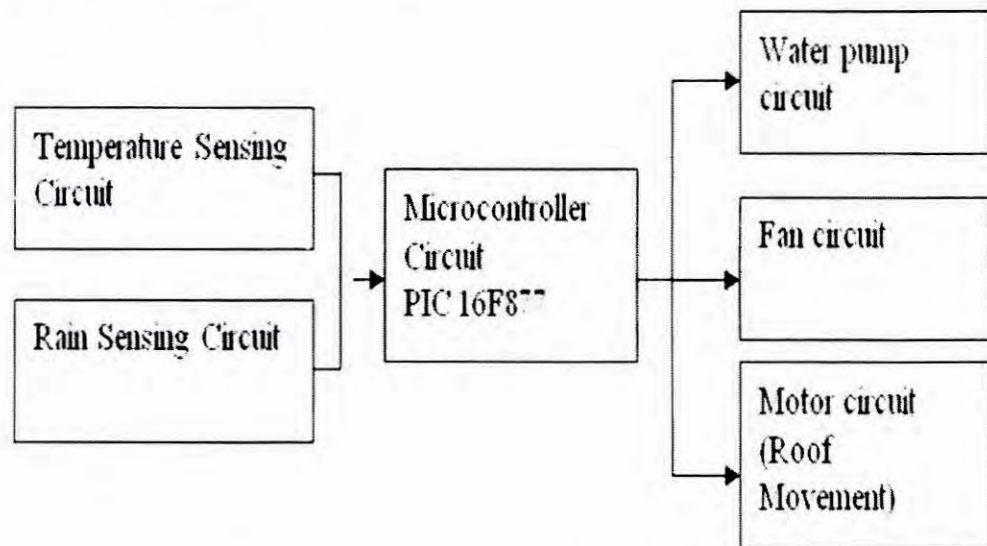


Figure 1.1.1: Block diagram of Plant Management System



## 1.2 Problem Statement

In nurseries and vegetable house should be maintained at the highest standard to ensure the production of healthy, vigorous and uniform palms. The disadvantages of the existing nurseries system are the requirements of the man powers, un-proper irrigation system which wastes a lot of water and the dependency on the natural resources. By using the plant management system, the irrigation system is been controlled automatically. Here, the pump will be on automatically twice a day and the temperature controlled fan will operates automatically according to the temperature of the nursery room. Through the moving roof the system can avoid soil saturation on seedling during the monsoon session.

## 1.3 Project Objectives

This Plant Management System is aimed to meet the following objectives.

- i. To introduce an automated oil palm nursery system which able to overcome certain imperfection in the current system in order to increase the productivity.
- ii. To minimize the usage of the man power.
- iii. To provide conditional environment for plant and worker as well
- iv. To produce the reliable, economical and commercial valued system.
- v. To learn the hardware and software design technique using the PIC16f877a microcontroller.
- vi. To gain realistic engineering knowledge and skills through the process of completing this project.

## 1.5 Report Structure

This report contains of five chapters that explain in detail about this project. This chapter contains the project introduction, project objectives, project scope, problem statement and research methodology.

First chapter will be the overall layout of the project. Here the project overall description, problem statement, scope of the project and the objective will be described clearly.

The second chapter the literature review. It explains about the components, circuits, microcontroller and program. This chapter gives the information that been used in order to understand the project well.

Chapter three is the methodology. It covers up the project methodology and the process of the project implementation. In this chapter the hardware design and the software design also will be explained in detail.

The following chapter is the result and discussion. Here the result of the Plant Management System is stated. All the process, design, problems faced on this project is been discussed in this chapter.

The final chapter is a conclusion and a recommendation. . Here, the suggestion on the project improvement is been high lighten.

## 1.6 Methodology

This project starts by searches for literature reviews from books and journals as a readability sources. Then the suitable circuits were identified. The circuits are The Microcontroller Circuit, The Temperature Sensing Circuit and The Rain Sensing Circuit is connected to the PIC as an input. Sensing circuit is been designed in order to drive the microcontroller for a desirable outputs. The liability of the circuits also been checked through the MULTISIM before it is been proceed for the PCB fabrication.

Secondly, the next activities are circuit design and programming. The circuits is been designed by using PROTEUS software in order to get the PCB layout. This layout

is been used for the PSB fabrication. For the software design part, the software is been constructed by guided by the program frame which combines all the function. The program is been written separately for each section and been combined to form a complete report.

The next stage is the simulation of the circuit. The entire program is been simulated separately for the confirmation of the output of the each part before combine it. For these, the MPLAB is been used.

Next, after the component which is been ordered is been received, the hardware construction is been done. First, before construct the circuit in the PCB, proto board is been used first and when only if the result is as the required one, it is been transferred into the PCB board. The PCB is been fabricated and soldering process is done. The functionality of each circuit is been checked separately again and retest is conducted after it is been assembled. Troubleshooting is needed to ensure the project functions well.

The last part is prototype. The prototype is been build to place the project and all the devices is connected to each other to ensure it form a simple nursery system.



### 1.6.1 Flow chart the Method

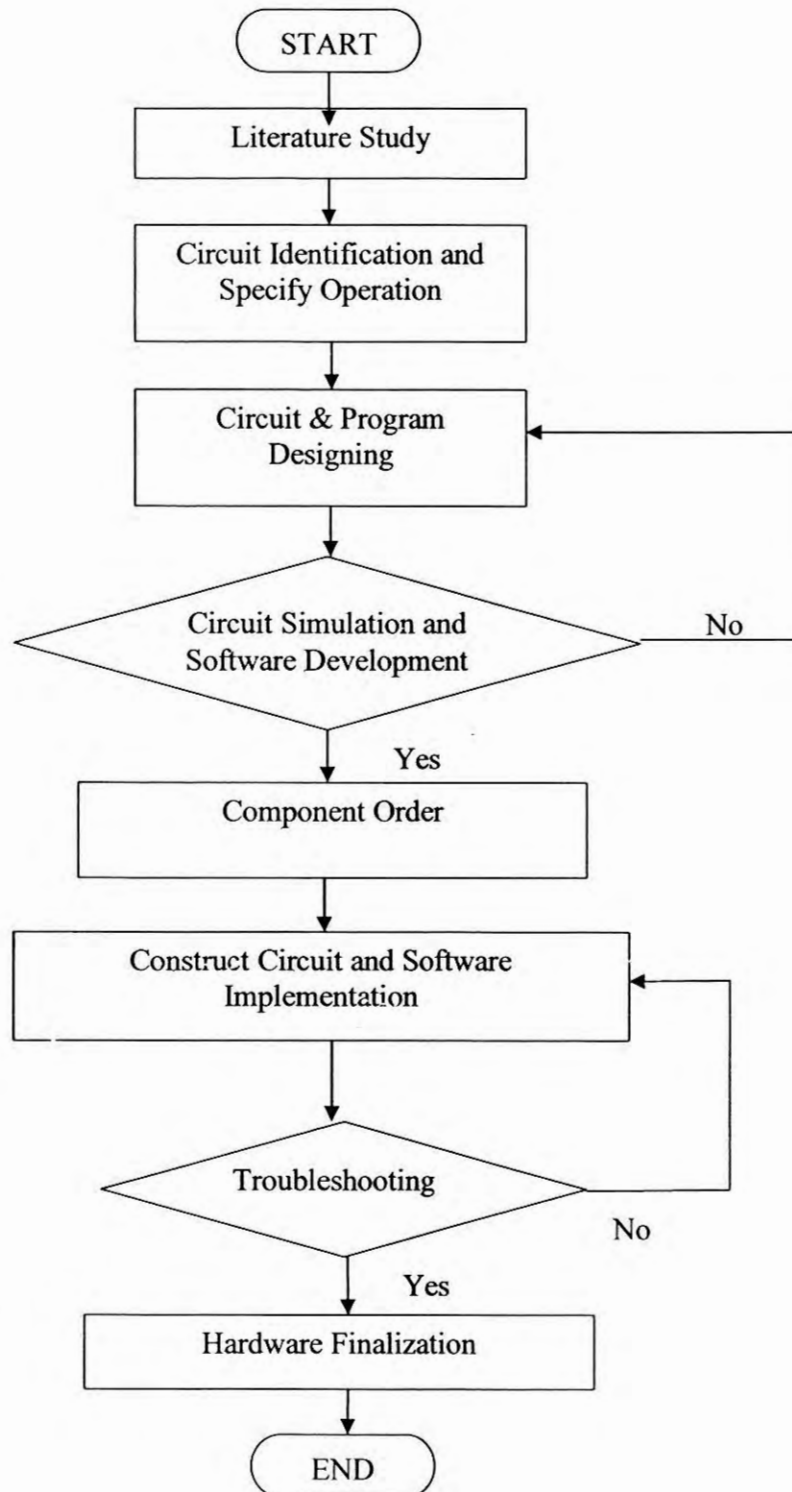


Figure 1.6.2: Flow Chart of Methodology

## CHAPTER 2

### LITERITURE REVIEW

This chapter will explain and discuss the theory of the components, equipments and programming languages that is used in the project. All these materials using for this project will be explain as well. The literature review must be done to understand the whole system especially the circuit and programming to decide the best part for inputs, outputs and devices. From literature review also, the information of equipment and part manuals will be discuss in detail such as the dimension, operation and specification. Each subsystem has its own defined design specifications in terms of its architectural overview, component description, and implementation.

#### **2.1 Microcontroller**

##### **2.1.1 Component Description**

The Microchip's PIC16F877A is a central control unit microprocessor, which comes in a 40-pin PDIP package. This microprocessor is chosen because of its power, versatility and ease in programmability. It has three kinds of timers, Analog Digital converter and Universal communication port. Flash memory is used in PIC16F877A. So,