AUTOMATED CONTROL SYSTEM FOR TOMATO PLANTATION

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Signature	: ……
Supervisor's Name	: Engr. Siti Fatimah bt Sulaiman
Date	: 23 May 2013

Dedicated to my father and mother

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ABSTRACT

The purpose of this project is to describe the ability of cold climate plants in Malaysia by using temperature and humidity control design. This project with the title Automated Control System for Tomato Plantation is aimed to facilitate the farmers or gardeners to involve in greenhouse system and improve agriculture technology. This project consists of three main scopes in the electronics which are the software development, hardware development and mechanical design. There are several parts which control the system. Temperature and humidity sensor is basically to control and maintains a sustainable temperature and humidity to the growth of cold climate plants. These sensors will detect the requirement and operate as the system designed. Photovoltaic (PV) solar panel is the power source for the project. The energy from the sun lights will be absorbed and converted to electrical energy, Light Emitting Diode (LED) flash siren alarm; LED flash siren alarm will determine and alert the error which occurs in the system. The colour of the LED flash siren alarm for this system is red and transparent roof; the transparent roof of the system uses Direct Current (DC) motor. The roof part of the system is almost done and still on progress. As the result, the user will be able to use the system manually and automatically. The program code for manual method is designed by using Programmable Integrated Circuit (PIC).

ABSTRAK

Tujuan projek ini adalah untuk menggalakkan penanaman tumbuhan iklim sejuk di Malaysia, dengan menggunakan reka bentuk kawalan suhu dan kelembapan. Projek bertajuk Sistem Kawalan Automatik untuk Penanaman Tomato ini adalah bertujuan untuk memudahkan petani atau tukang kebun untuk melibatkan diri dalam sistem rumah hijau dan meningkatkan teknologi pertanian. Projek ini terbahagi kepada tiga skop utama iaitu pembangunan perisian, pembangunan perkakasan dan reka bentuk mekanikal. Terdapat beberapa bahagian yang mengawal sistem ini. Sistem ini adalah pada dasarnya mengenai kawalan dan mengekalkan suhu yang mampan dan kelembapan untuk pertumbuhan tumbuhan iklim sejuk. Penderia akan mengesan keperluan dan beroperasi sebagai satu sistem yang direka. Tenaga dari matahari lampu akan diserap dan ditukar kepada tenaga elektrik. Siren penggera kilat akan menentukan dan memberitahu kesilapan yang berlaku dalam sistem. Hasilnya, pengguna akan dapat menggunakan sistem secara manual dan automatik. Kod program untuk kaedah manual direka dengan menggunakan perisian Litar Bersepadu Boleh Aturcara (PIC).

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A	
Amps	Ampere
AC	Alternative Current
C	
CdS	Cadmium-Sulphides
D	
DB	Data Bus
DC	Direct Current
E	
EN	Enable Signal
G	
GND	Ground
K	
K	Kilo
kHz	Kilo Hertz
L	
LED	Light Emitting Diode
LCD	Liquid Crystal Display
LVD	Low Voltage Disconnect
LDR	Light-Dependent Resistors
P	

PIC	Programmable Integrated Circuit
PCB	Printed Circuit Board
PV	Photovoltaic
PWM	Pulse Width Modulation
R	
R/W	Read/Write
RH	Relative Humidity
RPM	Revolutions per Minute
T	
Temp	Temperature
V	
Volt	Voltage
VSM	Virtual System Modelling
W	
Watts	Wattage
W hrs	Watt Hours

LIST OF APPENDIXS

CHAPTER I

INTRODUCTION

In this chapter, there will be discussion regarding the introduction, objectives, scope, and methodology of the project.

1.1 Introduction

In Malaysia, the climate is always hot, and humid throughout the year. The average temperature in Malaysia is 27°C while humidity is within the range of 60%-70%. The plants which grow in Malaysia are favourable to our climate. This project is about to encourage the growth of cold climate plants in this country. The plants which grow in cold climate needs differ from plants in Malaysia. The average temperature is 10-20°C.The humidity is 70-80%.

This project is a system whereby the temperature and humidity level is sustain for the cold climate plants. The concept of this project is based on the plantation in Cameron Highlands. This system can be built in any area because the temperature and humidity level would not be affected by the surrounding.

The system operates by using the electricity which generates by the photovoltaic (PV) solar panel. Solar energy is used when the sun shine, DC current will be used whereby solar power has stopped contributing the system to control the maintenance. DC supply will start to generate automatically when solar energy stopped producing solar power. The solar panel has a photovoltaic cell inside, which converts sunlight to an electrical current. A solar panel's effectiveness depends on the size and quality of the solar cell and the transparency of the protective cover.

Activities which being process in this system will be displayed on LCD. For example, when the system is running automatically to flush water to the plants, “watering” will display. Moreover, PIC programming is the main software for this project. Buzzer or LED will represent for any failure in this system. The buzzer or siren will alert the operator that the system has error at that time. The temperature and humidity sensors will detect the heat and humid of the system. The LCD is used to display the process which going on the system. The DC fan is used as the cooling device in the system. For example if the temperature increased in sudden within the system this DC fan will operate and decrease the temperature of the system. DC motor is used to operate the roof of the system.

1.2 Problem Statement

In Malaysia, the climatic conditions are favourable to the development of solar energy, with abundant sunshine throughout the year. The climate is also influence the types of plantation in an area. For example, the process of planting tomatoes in Malacca needs suitable climate and temperature. This project is to encourage plantation of cold climate under normal temperature with the control of automated climate system.

1.3 Project Objectives

a) To design an automated control system for tomato plantation.
b) To measure the humidity and temperature inside the plantation system.
c) To analyze the circuit to maintain the tomato plantation farm.

1.4 Scope of Project

The scope of this project is categorized into three parts such as software, hardware and mechanical design.

The software which will be used for this project is PIC software, and Proteus 7.2. Proteus 7.2 software is used to design the circuit to be produced on PCB. PIC software is used to install the program code regarding the process in the system of the project. Visual Basic software is used to control the system automatically by using laptop.

There is several hardware components used in this project. Photovoltaic (PV) solar panel characteristics are 21V, 10W, 30.4cm length and 35.2cm width. PIC

16F887A characteristics are 4.0-5.5V operating voltage and 20MHz operating speed. DC gear motor characteristics are 34rpm, 12V operating voltage and 25mm diameter. LM35 characteristics are 5V operating voltage, -40°C to 150°C temperature range and humidity sensor HR202 range is 20-95% RH. DC fan characteristics are 12V operating voltage, $80 \times 80 \times 25$ size and sleeve/ball bearing. The LCD characteristics are 5V (4.7-5.3V) operating voltage, 16 pins and 16×2 size. The LED characteristic is red colour.

The mechanical design is based on the system size. Mostly recycling stuff will be used for the project design.

1.5 Methodology

This project begins with the research of the proposed title. The result of the research is later discussed with the respective supervisor. Once the title of the project was approved, the background of study for this project was explored as stated in the literature review. There are two parts to be done in this project such as hardware and software. The project will be completed once the hardware and software part is completed successfully. This methodology flow chart as shown in the Figure 1.1 is the beginning of the project flow according to the project planning.

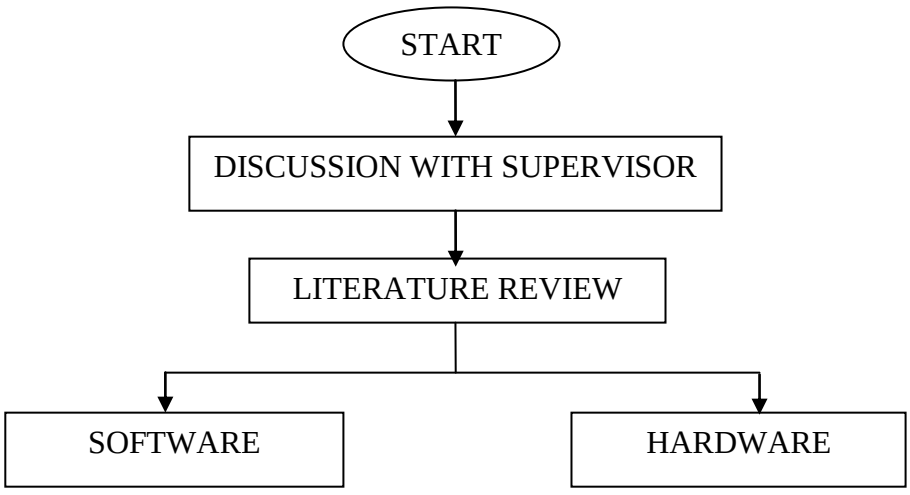

Figure 1.1: Flow Chart Methodology of Project

1.6 Thesis Outline

This final year project report consist five chapters to elaborate about Solar powered automated climate controlling system for plantation project which is starting with Introduction, Literature Review, Methodology, Project Requirement, Design, Analysis and Conclusion.

Chapter I consist an introduction of the project flow from the beginning to the end of the project. The early and basic explanations are mentioned in this chapter. Introduction is discussed about background of the project, problem statement and the purpose of developing this project. It also mentions the important of this project.

Chapter II consist the literature review which about the background study and research before developing this project. The content of the background studies such as PIC 16F877A, LED, LCD, DC motor, temperature, humidity sensor and etc.

Chapter III consist the methodology about the methods or approaches used in solving projects. Among the main content of this chapter are Initial Planning, Planning, Requirements, Analysis and Design, Implementation, Testing, Evaluation, and Deployment.

Chapter IV consist the result and discussion of this project is explained in detail. The main requirements are PIC 16F877A, LED, LCD, DC motor and just to list a few. The methods and result analysis proved with the design of flowcharts and function of this system.

Chapter V consist the conclusion of the project. After the project is done, recommendations are made for the betterment of this project or any expansions or upgrades that might be done in the future.

CHAPTER II

LITERATURE REVIEW

This chapter contains the literature review on theoretical concepts applied in this project. It contains the information gathering of the project in order to complete the whole project. There will be some discussion of the research background related to the project. The overall result in the concept literature framework shows that the link between research projects with the theory and concepts in the figure or an appropriate model.

2.1 Literature Review