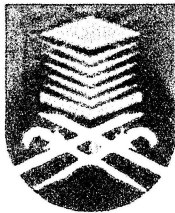


**DEVELOPMENT OF COOLING SYSTEM MECHANISM FOR
PHOTOVOLTAIC MODULE**

**This thesis represented in partial fulfillment of the requirement for the award of
The Bachelor of Electrical Engineering (Hons)**

UNIVERSITI TEKNOLOGI MARA MALAYSIA



MOHD SYAHRUL ASRI BIN ABDULLAH
Faculty of Electrical Engineering
UNIVERSITI TEKNOLOGI MARA
40450 Shah Alam, Malaysia
JULY 2014

ACKNOWLEDGEMENT

Alhamdulillah and all praises to Almighty Allah because of His guidance and grace, I'm able to complete my project within the deadline. The title of my project is development of cooling system mechanism for photovoltaic module.

I would like thank my parents for always supporting me from the start in terms of either moral or money for me to complete this project. Without them, I will not manage to finish this project in time. Next, I would like to thank and give my high appreciation to my supervisor Mrs. Rahmatul Hidayah Binti Salimin for her guidance, support and advices in completing this project.

I would like to give my deepest thank to Muhammad Hafiz Bin Mastro, Ahmad Aminulah Bin Shamsudin, Mustaqim bin Mustafa and Muhamad Hishamuddin Bin Idris for their guidances especially in completing my hardware and software part. I also would like to thank my friends and all the people who give their contribution, support and help to complete this project and for sharing their knowledge on how to solve the problems.

Also thank to the coordinator final year project Puan Wan Noraishah Wan Abdul Munim and the authority of UiTM for providing me with good informations, environments and facilities to complete this project. Lastly, I want to thanks to all friends electrical engineering batch 2010/2014 and the individual who have been involved in completing this project.

ABSTRACT

This thesis presents about the development of cooling system mechanism for photovoltaic module. Nowadays, solar energy is one of the most important sources among the renewable energies. One of the problems occur when using the photovoltaic is that low conversion efficiency of PV modules due to the heating of PV modules. This is because of the solar radiations that have been absorbed are not fully converting into electricity but parts of it are changed over into thermal energy. It is well known that the conversion efficiency decreases with the increase of PV modules surface temperature. Therefore, this project objective is to develop a workable prototype of cooling system mechanism that attached to the PV module. This system is designed by using Fritzing software. It is controlled by a microcontroller ATmega328p which it's programmed by using Arduino software. When the surface temperature of PV modules exceeds the reference temperature which is set to 38°C, the water pump will be activated and the water will flow above the PV modules surface so that its temperature can be reduced. Then, the electrical performance of the PV module that equipped with this system is compared with the conventional PV system. The results show that the prototype of cooling system mechanism is successfully developed. The temperature of PV module that equipped with this cooling system is reduced and it resulted to an increase of open circuit voltage produced by the PV module.

TABLE OF CONTENTS

ACKNOWLEDGEMENT	i
ABSTRACT	ii
TABLE OF CONTENTS	iii
LIST OF FIGURE	vi
LIST OF TABLES.....	viii
LIST OF SYMBOLS AND ABBREVIATIONS	ix
CHAPTER 1	1
INTRODUCTION	1
1.1 BACKGROUND STUDY	1
1.2 PROBLEM STATEMENT	3
1.3 OBJECTIVES	3
1.4 SIGNIFICANT OF THE STUDY	4
1.5 SCOPE OF WORK.....	4
CHAPTER 2	5
LITERATURE REVIEW	5
2.1 OVERVIEW	5
2.2 PREVIOUS RESEARCH	5
CHAPTER 3	10
METHODOLOGY	10

3.1	INTRODUCTION	10
3.2	FLOWCHART OF OVERALL PROGRESS OF THE PROJECT	10
3.3	FLOWCHART OF THE COOLING SYSTEM MECHANISM.....	13
3.4	BLOCK DIAGRAM OF COOLING SYSTEM MECHANISM.....	15
3.5	HARDWARE DESIGN	16
3.5.1	Overview of the Cooling System Mechanism	16
3.5.2	Hardware Components of Cooling System Mechanism.....	17
3.6	SOFTWARE DESIGN	26
3.6.1	Arduino Software.....	26
3.6.2	Fritzing Software	28
3.7	EXPERIMENTAL SETUP.....	30
CHAPTER 4.....		33
RESULT AND DISCUSSION		33
4.1	OVERVIEW	33
4.2	EXPERIMENTAL RESULTS.....	33
4.2.1	Irradiances of the Day.....	34
4.2.2	Temperature of Photovoltaic Modules	35
4.2.3	Open Circuit Voltage of Photovoltaic Modules	38
4.2.4	Short Circuit Current of PV Modules.....	40
CHAPTER 5.....		43
CONCLUSION		43
5.1	CONCLUSION.....	43