INTEGRATED PYRANOMETER FOR PHOTOVOLTAIC MODULE MEASUREMENT

This thesis is submitted in partial of fulfilment for the award of the

Bachelor of Engineering (Hons.) Electronic

UNIVERSITI TEKNOLOGI MARA (UiTM)

SHAH ALAM, MALAYSIA

MOHAMAD FAIZ SYAZWAN BIN ABDUL AZIZ
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM
SELANGOR DARUL EHSAN

ACKNOWLEDGMENT

Alhamdulillah, all the praise and thanks full to HIM, the load of the universe and peace be upon for messenger Muhammad S.A.W the last prophets and righteous follower. I am very gratitude to the almighty God for all strength, patience, and motivation and ability bestowed upon me to complete Final Year Project, "Integrated Pyranometer for Photovoltaic Module Measurement".

The author would like to thanks Dr Sharil Irwan b Sulaiman, project supervisor for his valuable advice, support, ideas and critical guidance during the period of this project. Also acknowledgement to Green Energy Research Centre (GERC), Universiti Teknologi MARA Shah Alam for providing the facilities required for the work.

Thank you very much to course mate and friends who has given me so many support and suggestion to improve my project from times to times until accomplish it. To my family thanks for all material support, motivation, money and full understanding in this projects.

ABSTRACT

This project presents the development of a handheld pyranometer which is integrated with temperature sensor modules using the application of Microcontroller PIC16F877A. The pyranometer employs a reference solar cell which is calibrated to measure the solar irradiance. Besides the pyranometer, two temperature sensor modules were introduced to measure ambient temperature and photovoltaic module temperature respectively. All measurements from the pyranometer and temperature modules were controlled by a Microprocessor PIC16F877A which provides programming strategy through basic C language. The algorithm was designed based on the calibrated solar cell and the temperature sensor modules and the measured values were displayed on an LCD display. The results show that the integrated pyranometer device has relatively similar measured values when compared to a commercial integrated pyranometer.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Nowadays, there is a global need for a renewable energy sources which can provide a green energy that is safe to the environment and will last forever. One of the renewable energy is solar energy and now has been used in our daily life [1]. This solar energy can be obtained directly from the sunlight that reaching the earth. Solar energy usually being associated with photovoltaic (PV) system modules due to the large amount of sunlight received during the year. In order to use the solar energy power, photovoltaic (PV) systems were used to obtain the power from the solar energy.

Photovoltaic (PV) system modules generally use solar panels to convert sunlight into electricity and an inverter to convert the direct current (DC) to alternating current (AC) so that it can use to supply energy to consumer [2]. The performance of photovoltaic (PV) systems is affected by several conditions such as solar irradiance, ambient temperature and module temperature [3, 4].