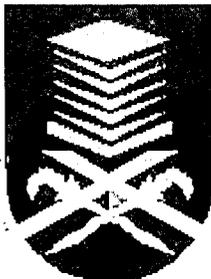


# **BATTERY MONITORING SYSTEM**

**This thesis is presented in partial fulfillment for the award of the  
Bachelor of Engineering (Hons.) in Electrical Engineering**

**UNIVERSITI TEKNOLOGI MARA (UiTM)**

**MALAYSIA**



**NOR SYAFIQAH SYAHIRAH BTE MOHAMED  
FACULTY OF ELECTRICAL ENGINEERING  
UNIVERSITI TEKNOLOGI MARA  
40450 SHAH ALAM, MALAYSIA**

**MAY 2011**

## **ACKNOWLEDGEMENT**

In the name of Allah, The Most Generous and The Most Merciful. With the deepest sense of gratitude to Allah the Almighty for giving me strength and ability to complete my final year project and thesis.

My deepest gratitude is expressed to my main project supervisor, Associate Prof Dr Ahmad Maliki Omar for his advice, guidance, suggestion and idea during the progress of this project. His profound academic background and insight into monitoring system gave me great help when I was confusing. My gratitude is also expressed to Research Assistance of PMVC for their assistance in providing me the experimental equipment.

Last but not least, I am also would like to express my appreciation to my beloved family, friends and anybody who are involved directly or indirectly for their support and devices during completing my final year project.

Thank you.

## **ABSTRACT**

This research deals with the design of a system to monitor the performance of solar battery. It will measure the several parameters such as voltage, current, ambient temperature, cell temperature and solar irradiance of battery and Photovoltaic (PV) module. All the parameters are display on the LCD (Liquid Crystal Display). This system using Peripheral Interface Controller (PIC) microcontroller as a control unit hence the results of measurement are stored in memory of the system and can be sent by Universal Asynchronous Receiver/Transmitter (UART) device to personal computer (PC). By installing Visual Basic Express software of battery monitoring system, the data can be sent to personal computer and save in database file that can be visualized in form of tables. Ampere hour and State of charge (SOC) batteries being obtain from the table. This will result the Battery Monitoring System.

# TABLE OF CONTENTS

CHAPTER	PAGE
DECLARATION	I
ACKNOWLEDGEMENT	II
ABSTRACT	III
TABLE OF CONTENTS	IV
LIST OF FIGURES	VI
LIST OF TABLES	VIII
LIST OF ABBREVIATIONS	IX
<b>CHAPTER 1</b>	
INTRODUCTION	1
1.1 INTRODUCTION	1
1.2 BACKGROUND	4
1.3 PROBLEM STATEMENT	5
1.4 OBJECTIVES	5
1.5 SCOPE OF WORK	6
1.6 THESIS OVERVIEW	7
<b>CHAPTER 2</b>	
LITERATURE REVIEW	8
2.0 INTRODUCTION	8
2.1 ANALYSIS FOR PREVIOUS WORK	8
2.2 COMPONENTS OF THE SYSTEM	10
2.2.1 SOLAR PANEL	10
2.2.2 CHARGE CONTROLLER	12
2.2.3 BATTERY PERFORMANCE CHARACTERISTIC	14
2.2.4 MICROCONTROLLER PIC 16F877	20
2.2.5 VOLTAGE REGULATOR	21

# CHAPTER 1

## INTRODUCTION

### 1.1 INTRODUCTION

As the Solar PV system technology grows rapidly and become more popular all over the world, engineers and scientists have carried out many researches, taken measurements and modeled for PV systems for various applications[1]. There are two types of photovoltaic systems, an On-grid and a standalone (Off-grid) system. Standalone PV systems are commonly used in rural areas, where there is no connection to the national electricity grid. Standalone PV systems are independent to grid electricity because they have their own energy storage system. Since PV technology is continuous growing and it will become competitive to conventional systems, standalone PV systems are more interesting to investigate. Figure 1.1 below shows a typical diagram of the components involved in a standalone PV system. An inverter need to be added if an AC load is utilized.

The battery is used to store the energy that generated by solar panel. Mostly, battery discharged energy at night when there is no energy supply by the solar panel. The most common type of batteries for a solar power system is regular 12 Volt sealed lead acid batteries[2]. These batteries are tough, can deliver a lot of power quickly and economically in term of price compared to other types of battery such as Gel, Lead acid and Absorbed glass mat (AGM) [3].