SOLAR PANEL TRACKER MODEL USING PIC16F877A

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ABSTRACT

The aim of this project is to develop a model of a solar panel tracker module using Peripheral Interface Controller (PIC). This paper presents an application of a solar panel tracker module that measures the output voltage of solar panel in Photovoltaic (PV) application and tracks the sun's movement in order to get optimum exposure of the sun's irradiance. The tracking method is based on comparing the output voltages of each solar cell in the solar panel. The solar panel tracker module will rotate the panel until both output voltages of solar cells are equal. In the experiment, PIC's Analogue to Digital conversion manages to convert the analogue input from solar cell into its digital form. However, the PIC controlled servomotor is not functional due to wrong choice of motor and mechanical design. Moreover, the Liquid Crystal Display (LCD) cannot display the value of output voltage from solar cell. It only manages to display "voltage" preset by program. This is due to look-up table's algorithm for Analog to Digital Conversion (ADC) to LCD conversion. All results obtained from this study would be beneficial to the PV application engineers for future planning and monitoring purposes.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, PV application is becoming an important application since people want to search for alternative source of electrical energy instead of using the current sources. Current installation practice for PV application used static solar panels that give a maximum energy when the sun approximately 15° to the solar panel and this energy will be decrease as the sun is moving. There are many solar panel trackers in PV application over the world such as TRAXLE tracker, Track Rack Passive tracker, TRACSTAR tracker and Universal Track Rack tracker. The TRAXLE tracker uses the dc motor to rotate the panel and a small PV module as the sensor. The Track Rack Passive tracker and Universal Track Rack use the sun's heat to moves liquid from side to side and these trackers do not use any motor or gear. TRACKSTAR tracker consists of a rack to hole the photovoltaic modules, a central hub to hold and move the rack and an electronic controller.

1.2 Project Overview

The tracking method is based on comparing the output voltages of each solar cell in the solar panel. The solar panel tracker module will rotate the panel until both output voltages of solar cells are equal. In the experiment, the sun is replaced by spotlight in order to imitate the sun exposure due to limited number of solar cell per panel. The analog output voltage from two solar cells will be converting into its digital form by PIC's built-in ADC. After that, PIC will compare the digital value and rotate the servomotor until the both value are match. Moreover, the LCD will display the voltage value of the solar cell.

The purpose of this module is to track the movement of the sun in order to get the maximum amount of irradiance or energy so that the solar cell will produce the maximum and constant output power. Based on the IV-curve, the output of the solar cell should remain at the maximum power level. However the scope of this project will be on the