Development of Hut Shaped Solar Photo Voltaic System with Rotating Convex Lens And Concave Mirror Mechanism

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A novel method has been proposed to design and develop a Triangular Hut-shaped photovoltaic panel with rotating mechanism using modified maximum power point tracking (MPPT). In this, irradiance for the Primary panel can be provided by the nature itself with the available Sun and Secondary panels are to be provided by reflection with the rotating convex lens and concave mirror rotating gear mechanism. Here that the rotation of the convex lens and concave mirror will be depending upon the position of the Sun. To locate the Sun an electro-optical sensor will be used. It consists of light-dependent resistor (LDR) sensors to track sun position. Modified MPPT based controller detects the difference of voltage signals sent by the LDRs. Based on the outcome of LDRs, signals will be transferred to the Optocoupler for the activation of the servo mechanism. The servo mechanism of the convex lens and concave mirror rotates either in clockwise or anticlockwise direction based on signals reached to the driver circuit. The inputs to this controller will be solar irradiation and temperature. The experimental results of Triangular Hut-shaped PV panels will be compared with the conventional PV system results.

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Contents

I. Introduction

The main theme of our project is to design and develop Triangular Hut Shape Photo Voltaic Solar Panel with a servo motor mechanism for maximum output. The main drawback of solar energy is with solar panels, it should be exhibited fully to the sunlight. As the solar panel is fixed in a single direction, then the sunlight potency varies between morning and evening. Rotating the solar panel w.r. t direction of the sun can escalate the solar energy generated. Our project consists of few sunlight sensors and a servo motor mechanism for a Microcontroller of control system that is responsible for sensing sunlight and controlling the convex lenses. This system works successively without any disturbance. The limit switch senses the solar panel when it rotates and then it stops the motorized mechanism. In this paper, a model is proposed, PV power output is still low, continuous efforts are taken to develop the PV converter and controller for maximum power extraction efficiency [1]. The incremental conductance method with optimized small iterative size was proposed to eliminate the power oscillation around maximum power receptacle [2]. Design and development of a photovoltaic system based on an improved P&O algorithm helps to improve the efficiency, stability and accuracy of solar energy systems [3]. The non-linearity and complexity of determining PV parameters caused the scalable and swarm optimizers to exhibit immaturity in the obtained solutions. In this study, an efficient metaheuristic algorithm based on swarm optimization (TSA) is proposed to determine the parameters of the PV model [4]. The P & O method is widely used because it is low cost and easy to implement. The P & O method oscillates near the maximum power point (MPP) when atmospheric conditions are constant or change slowly [5]. A solar cell simulation model according to the solar cell mathematical model is presented [6], Mathematical model of a single solar cell designed in MAT LAB / Simulink environment and I-V, P-V characteristics were studied and analyzed [7]. Simulation model of a solar power plant with an automatic biaxial solar tracker, developed using MA TLAB/Simulink. The development presented includes a random time generator (solar irradiance), automatic load redundancy, as well as the simultaneous use of two types of solar cells such as mono crystalline and polycrystalline [8]. The generated mathematical model of the solar cell and the solar cell model that is available in MAT LAB have their performance characteristics compared [9]. A survey of solar-panel mathematical models and the different uses is discussed [10]. The duty cycle, inductance value, maximum current, and capacitance values of the input and output capacitor are calculated for the DC-DC boost Converter of a solar charge controller with the maximum power point tracking system MPPT, and a diode and a MOS transistor are chosen for it [11].