

Experimental analysis of modified DC-P&O technique with arm controller for a stand-alone 40 W PV system

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Abstract

The world is moving towards the generation of electricity with renewable energy sources (RES) due to the deterioration of the green environment and trying to replace non-renewable energy resources. There is tremendous potential in solar energy to meet future electricity demands. Partial shading (PS) and drift are two major problems that must be addressed. Both of these factors contribute to the voltage drop due to heavy steady-state oscillation. The partial shading and drift problem are associated with severe rapid changes in the insolation. A modified drift-control perturbation and observation DC-(P&O) approach was investigated using a low-cost programmable hardware solution, i.e., the ARM Cortex M4 32-bit Microcontroller (MC) (STM32F407VGT6), with efficient embedded programming and waijung block sets for real-time solutions.

The experimental setup was accomplished on a 40-watt solar panel. It was found that the proposed method had a significant impact on drift control during abrupt changes in current and voltage caused by shading effects, with the controller conversion efficiency of 80.39% and 94.48% with percentage absolute errors of 7.3 and 7.2 for cases with and without PS and drift, respectively.

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Biography

Ashish Kumar Singhal the Head of Department of the Department of Biodiversity Conservation and Management at time of this research. He has specialized in biodiversity management and conservation with

particular interests in endogenous methodologies. He is also knowledgeable in climate change impacts and its dynamics.