ABSTRACT

This work presents a novel photovoltaic (PV) monitoring system based on the STM32F407VET6 microcontroller unit (MCU), which is designed solely using MATLAB/Simulink software. The proposed system features the functions of data acquisition (DAQ), monitoring, evaluation, and warning developed on a printed circuit board (PCB). Not only irradiance but the cell temperature, voltage, and current of PV devices are acquired through the DAQ of the MCU board. These measurement data are used for a simulation with the built-in PV model for performance evaluation. Both simulation and measurement results are displayed in two LCD modules. As the difference between measurement and simulation results reaches a preset 20% of simulation, a warning LED automatically works. The implemented system has sufficient accuracy and confidence through both theoretical and experimental validation. The novel MCU-based PV monitoring system features all monitoring, evaluation, and warning functions for PV performance.

Keywords: Microcontroller-Based; Photovoltaic Monitoring System; MATLAB/Simulink

REFERENCES