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| **Title:** | Design and Implementation of a Solar Radiation Meter Using PV Panel as a Sensor | | |
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| **Abstract:** |  |
| Abstract— Photovoltaic cells are characterized via a static relationship that describes their current-voltage relationship. This relationship is a complicated implicit algebraic equation that depends, in a nonlinear way, on two critical uncertain parameters: temperature and solar irradiance. The efficient operation of the panel relies on the knowledge of these key parameters. While it is technologically feasible to measure the former, a sensor for the latter is usually expensive and difficult to calibrate. This paper describes the implementation of low-cost solar radiation (W/m2) meter using a photovoltaic panel as a sensor. The meter is easy to use and can display instantaneous sun radiation by the constant monitoring of the open-circuit voltage, short circuit current, and temperature of the solar panel. This work pretends to avoid the use of classical solar irradiance sensors (e.g., pyranometer), which are expensive. The instrument consists of a solar panel, a simple sensing circuit, and a microcontroller-based control unit. The performance of the meter is validated through detailed computer simulations and experimental prototyping using real outdoor measurements at different atmospheric conditions. | |