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PERFORMANCE MONITORING AND POWER CONDITIONING OF ROOFTOP SOLAR PV SYSTEM USING AUXILIARY RESONANT CONVERTER

This work addresses the underutilization of solar energy, a vital renewable resource, in regions still heavily dependent on conventional energy sources. By focusing on the efficient installation and harvesting of solar photovoltaic (PV) power, this work aims to contribute to sustainable energy solutions aligned with the United Nations Sustainable Development Goals (SDGs) and enhance renewable power generation for societal well-being and environmental sustainability.

This work also envisions the creation of a functional solar PV system integrated with power electronic converters, enabling real-time testing and validation of designs to meet industry standards. Additionally, the facility will serve as a comprehensive data-logging center for Jakkasandra and its surrounding areas, recording annual solar insolation and atmospheric conditions. This dataset will act as a valuable reference for researchers and commercial entities interested in PV system deployment, while supporting ongoing academic studies in solar energy technologies.

To ensure successful implementation, the project involves a setup that includes two 500 W solar PV panels, configured in parallel to deliver a 1 kW output. The generated power will be routed through appropriately designed switchgear, wiring, and safety mechanisms to interface with an auxiliary resonant converter and a DC-DC converter, integrated with a control unit to regulate voltage for laboratory applications. Furthermore, the system incorporates instrumentation for monitoring solar irradiance, temperature, voltage, and current, with provisions for data storage to support research and analysis. By creating this dedicated infrastructure, this work contributes to the development of clean energy solutions that is expected to support India's transition toward a sustainable energy future.

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