Data Acquisition of Solar Panel

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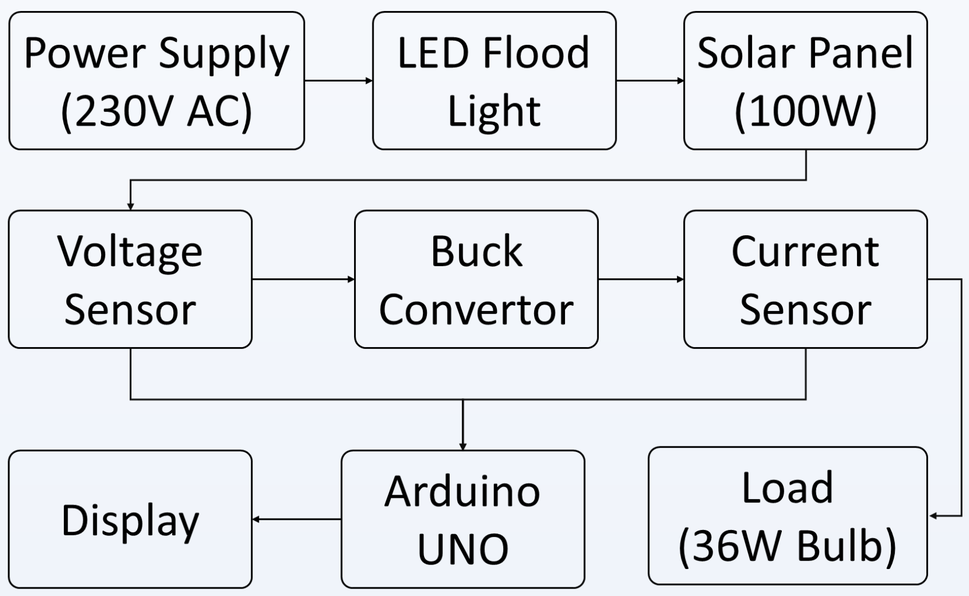
INTRODUCTION

Renewable energy, such as solar power, is increasingly in demand for household consumption, battery chargers, and public illumination. PV solar cells or modules harness solar energy and advancements in technology are making new markets more accessible for these systems. To accurately anticipate the solar PV energy potential under varied climatic circumstances, a simulation model having physical parameters such as solar irradiance and temperature is in much need. The study aims to model and simulate PV modules based on mathematical equations that govern the output depending on the input parameters. The simulations results are compared with the practical results.

AIMS & OBJECTIVES

- To simulate the solar panel system using MATLAB-Simulink.
- To implement the hardware system required for demonstrating the solar panel system.
- To measure the various parameters such as generated voltage, current, lux, and power.
- To compare the real-time data with simulated results.

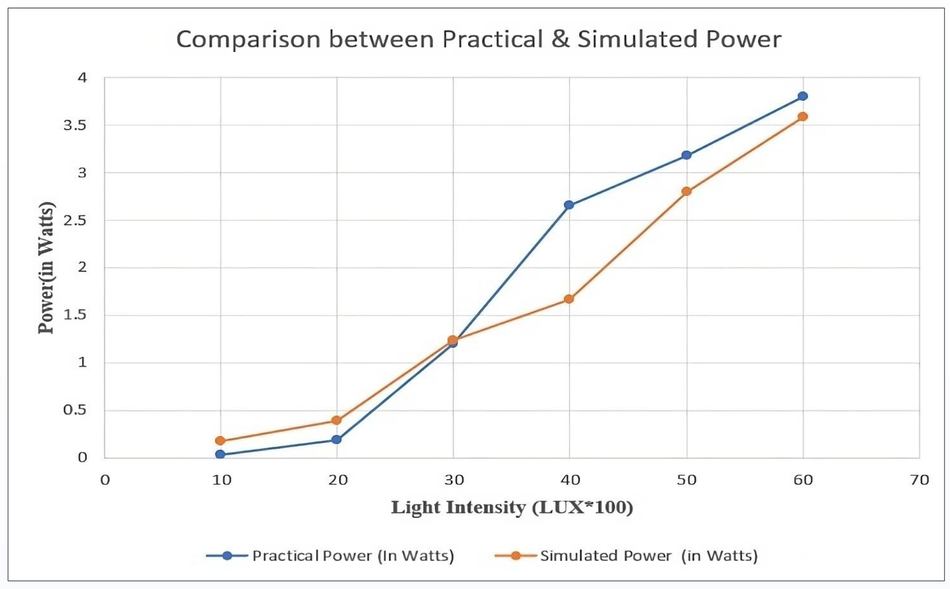
METHODOLOGY



The output power of the model is determined by the irradiance received by the solar panel. To provide light energy, a 100W floodlight is used. By varying the irradiance received by the panel the subsequent output power is varied. A range of sensors are interfaced with the system. These sensors include those for measuring Vo, Io and irradiance. Arduino UNO is employed to gather data from the sensor. The GUI serves as a visualization tool, presenting the Collected data in a user-friendly manner, facilitating analysis and interpretation of the system's Performance. Overall, this hardware testing setup enables comprehensive evaluation and characterization of the Solar panel module, and other system parameters. The integration of Sensors, Arduino uno, and the GUI contributes to efficient data acquisition, monitoring, and Analysis in the lab environment.

RESULTS

The simulation results and the practical results are noted and presented as a graph. The outputs are plotted as per the variation in the value of irradiance and compared. This is used to test and validate the model. It is evident from the graph that simulation values are in close proximity of practical values.



CONCLUSION

- It has been noticed that the output power generated by a solar panel is influenced by the irradiance received by the panel.
- The Simulink model built gives output that has close proximity to the power values measured practically.
- The GUI displays the real-time data for comparison with simulation output.

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