

Solar Wind Hybrid Microgrid System

Shahrukh H. Tanekhan, Hrushikesh Annaso Kavathekar, Sheyas Bhupal Lengare,

Prathmesh Yogesh Shinde, Siddhart Rahul Shinde

Lecturer, Dept. of Electrical Engineering

Student, Dept. of Electrical Engineering

Rajarambapu Institute of Technology, Rajaramnagar

Abstract: *The increasing demand for electricity and the environmental impact of conventional fossil-fuel-based power generation have led to the development of renewable energy systems. This project presents the design and analysis of a solar-wind hybrid microgrid system that integrates solar photovoltaic (PV) panels and wind turbines to generate sustainable electrical power. The main objective of the system is to provide a reliable and continuous power supply by utilizing multiple renewable energy sources.*

In this system, solar panels generate electricity during daytime using sunlight, while wind turbines produce power when sufficient wind energy is available. A hybrid controller and power conditioning unit manage the energy generated from both sources and regulate the power flow to the load and battery storage system. The battery bank stores excess energy and supplies power during periods of low solar radiation or insufficient wind speed.

The proposed hybrid microgrid improves system reliability, reduces dependency on fossil fuels, and minimizes greenhouse gas emissions. It is particularly suitable for remote or rural areas where grid connectivity is limited or unavailable. The system demonstrates an efficient and environmentally friendly solution for decentralized power generation.

Keywords: Solar energy, Wind energy, Hybrid microgrid, Renewable energy, Battery storage, Power generation

