

## Fuzzy Logic Optimization for Solar Systems with Integrated Hybrid Energy Storage

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**Abstract :** In this paper, a hybrid approach combining fuzzy logic-based Maximum Power Point Tracking (MPPT) with a battery-supercapacitor system is proposed to improve photovoltaic system performance. This method increases overall efficiency and extends the lifespan of the energy storage components. By optimizing energy capture and management, the system becomes more adaptive, reliable, and effective in harnessing solar power. The integration of fuzzy logic and hybrid storage represents a significant advancement in maximizing the potential of renewable energy technologies, providing a more sustainable and efficient solution for solar energy applications. This innovation enhances the effectiveness of solar power systems in real-world scenarios.

**Keywords :** Photovoltaic system, fuzzy logic control, energy management, hybrid storage

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