ICCEP 2025

9th International Conference on Clean Electrical Power

Special Session on
Artificial Intelligence solutions for efficient conversion, storage and harvesting of photovoltaic energy

The special session titled "Artificial Intelligence Solutions for Efficient Conversion, Storage, and Harvesting of Photovoltaic Energy" aims at exploring the transformative role of artificial intelligence (AI) in enhancing photovoltaic (PV) systems. This session will focus on innovative AI applications that optimize the conversion of solar energy, improve energy storage solutions, and enhance the overall efficiency of energy harvesting processes. The session welcomes applications for all scale of photovoltaic production, from large grid-scale energy production plants to indoor powering of wearable smart sensors.

The primary aim of this session is to gather researchers, engineers, and industry professionals to discuss and share insights on how AI technologies can be integrated into photovoltaic systems. This includes examining AI's capabilities in:

- Maximizing Power Output: Utilizing AI for Maximum Power Point Tracking (MPPT) to ensure that PV systems operate at their highest efficiency under varying environmental conditions.
- Predictive Maintenance: Implementing machine learning algorithms for real-time monitoring and fault detection to reduce downtime and maintenance costs.
- Energy Forecasting: Leveraging AI for accurate predictions of solar energy generation based on weather data, thereby improving grid management and energy distribution.

The scope of this session encompasses a wide range of topics related to AI in photovoltaic applications, including but not limited to:

- AI-driven Optimization Techniques: Exploring algorithms that enhance the design and configuration of PV systems for better performance;
- Deep learning model for Photovoltaic systems and apparatus;
- Optimization of BIPV system through AI models;
- Energy Storage Solutions: investigating how AI can improve battery management systems and energy storage efficiency to ensure reliable energy supply;
- Smart Energy Management Systems: discussing the development of intelligent systems that optimize energy distribution based on real-time demand and supply conditions;
- Scalable models for energy-sharing and rural energy communities, enabling access to affordable and sustainable energy through peer-to-peer trading, community-based microgrids;
- Cybersecurity in PV Systems: addressing the importance of securing AI-integrated PV systems against cyber threats as they become increasingly connected;

By bringing together diverse perspectives from academia and industry, this special session seeks to foster collaboration and innovation in the field of renewable energy, ultimately contributing to a more sustainable and efficient energy future.

This special session is organized by:
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