IECON 2026

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Call for Papers for the Special Session on

AI-2.0–DRIVEN STRATEGIES FOR CONDITION MONITORING AND PROGNOSIS IN POWER AND ENERGY SYSTEMS: FROM DIGITAL TWINS AND CYBERSECURE PREDICTIVE MAINTENANCE TO EMERGING FOUNDATION AND LLM-BASED MODELS

Organized and co-chaired by

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Technical Outline of the Session and Topics

The growing integration of renewable energy sources, power electronics, electrified transportation, and cyber-physical infrastructures has increased the complexity of power and energy systems, requiring advanced condition monitoring, fault diagnosis, prognosis, and predictive maintenance methods capable of operating under nonstationary conditions and limited fault data. Recent progress in data-driven and physics-guided hybrid models, together with digital twin technologies, has improved fault detection, remaining useful life estimation, and maintenance planning, while emerging AI-2.0 approaches enable scalable and interpretable system-level solutions. Building on successful editions at IECON 2022–2025, this special session focuses on AI-driven condition monitoring, prognosis, cybersecurity, and privacy in power and energy systems, including physics-guided models, digital twin-based architectures, and complementary use of foundation and large language models for decision support, with emphasis on validation, robustness, and industrial relevance.

Topics of the session include, but are not limited to:

- AI-based fault diagnosis, condition monitoring, and RUL estimation;
- Physics-guided and hybrid modeling for condition monitoring and prognosis;
- Digital twins for predictive maintenance and fleet-level monitoring;
- Condition monitoring of power and energy systems;
- Cyber-physical security, anomaly detection, and privacy-aware monitoring;
- Emerging AI-2.0 tools, including foundation models and LLM-assisted decision support.

Timeline for Authors

All the instructions for paper submission are available on the conference website. Please visit www.iecon2026.org or scan the QR code for the timeline.