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on

Smart Technologies for Power, Energy and Control (STPEC 2025)

December 10-13, 2025

Department of Electrical and Electronics Engineering,
National Institute of Technology Goa, Goa, India



Special Session 14 (SS14)

Integrating Digital Twins, Artificial Intelligence, and Blockchain for the Development of Sustainable and Resilient Smart Grids

Organized and co-chaired by:

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Call for Papers

• Technical Outline of the Session:

As the energy sector moves toward sustainability and decentralization, smart grids must evolve to be more adaptive, intelligent, and secure. This special session focuses on the intersection of digital twin technology and blockchain-enabled control systems as critical tools in modernizing power systems. Digital twins—virtual models of physical assets—enable real-time monitoring, simulation, and predictive decision-making. They enhance operational efficiency, fault management, and maintenance through real-time data replication and AI integration, allowing for forecasting, fault detection, and self-healing capabilities. When combined with blockchain, digital twins benefit from secure, transparent, and tamper-proof data handling. Blockchain supports decentralized energy systems by enabling trusted peer-to-peer transactions, smart contracts, and scalable integration across DERs, electric vehicles, and demand-side systems. Optimization methods—ranging from metaheuristics to AI-driven multi-objective approaches—are crucial in managing grid performance, resource use, and energy balancing.

• Topic of the Session includes, but are not limited to:

- Digital twin-based system modelling and real-time applications
- Block chain solutions for energy data security and decentralized control
- Predictive analytics and intelligent automation for grid operations
- Integration with electric vehicle systems and renewable energy sources
- Applications supporting smart cities and carbon-neutral energy targets
- Optimization Algorithms for Real-Time Control Enabled Smart Grids
- Multi-Objective and AI-Based Optimization Frameworks for Decentralized Energy Resource Management

• Important Dates:

- Special Session Paper Submission Due : June 15, 2025
- Notification of Paper Acceptance : July 31, 2025
- Camera Ready Paper Submission Due : August 31, 2025
- Regular Registration Due : October 30, 2025

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