INTERNATIONAL

INVITED SESSION SUMMARY

Title of Session:
AI-Driven Prediction, Optimization, and Automation in Digitalized Power Grids

Name, Title and Affiliation of Chair:
Dr. Imen Khamassi
University of Tunis, Tunisia

Details of Session (including aim and scope):

The digitalization of power systems is generating unprecedented volumes of data, placing AI and intelligent systems at the center of the next-generation energy transition. This invited session focuses on innovative AI-driven approaches that enhance prediction, optimization, automation, and decision-making in digitalized electrical power grids.

The session aims to bring together researchers and practitioners working at the intersection of artificial intelligence, power system digitalization, and cyber-physical infrastructures. Contributions are encouraged that explore how AI, machine learning, deep learning, and reinforcement learning can unlock new levels of efficiency, flexibility, reliability, and sustainability in modern energy systems.

Topics of interest include, but are not limited to:

- AI and machine learning for load, renewable generation, and electricity price forecasting
- Deep learning and reinforcement learning for real-time grid optimization
- Intelligent control, autonomous decision-making, and predictive automation
- Digital twins, simulations, and cyber-physical architectures for power systems
- AI for congestion management, stability prediction, and grid resilience
- Fault detection, predictive maintenance, and asset health monitoring
- Optimization of distributed energy resources, storage systems, and sector coupling
- AI-enabled virtual power plants and flexibility markets
- Grid-edge intelligence and consumer-centric automation systems
- Case studies and implementation experiences from utilities, smart grids, and national energy systems.

Main Contributing Researchers / Research Centres (tentative, if known at this stage):

These individuals regularly publish in smart grid digitalization, AI for energy, and cyber-physical systems

1. Moamar Sayed-Mouchaweh

King Abdullah Petroleum Studies and Research Center (KAPSARC), Saudi Arabia

2. W. Dong and Q. Yang

Machine learning-driven smart grid systems (Applied Energy 2020)

3. L. Cheng & T. Yu

AI for smart power systems (Int. Journal of Energy Research)

4. Lyu W. & Liu J.

AI and digital technologies in the energy sector (Applied Energy)

5. F.R.S. Sevilla et al.

Data analytics and sensing for transmission utilities

6. Abid K., Cornez L.

Predictive maintenance and AI for wind turbines

7. Boscán L. & Poudineh R.

Business models for grid flexibility and energy digitalization

B. Top International Researchers in AI for Smart Grids

1. E. Mocanu

AI & Deep Reinforcement Learning for Smart Grids
Netherlands

2. Henrik Madsen

Data-driven energy forecasting
Technical University of Denmark (DTU)

3. Pierluigi Siano

Smart grids, AI, optimization
Italy

4. Goran Strbac

Digitalization & flexibility markets
Imperial College London

5. Pedro Staudt / Johannes Staudt

Prediction of transmission congestion using ML
Germany

6. Ning Zhang & Chongqing Kang

AI for power systems
Tsinghua University, China

C. Strong Middle East & Africa Researchers

1. Majid Al-Gwaiz

Saudi Electricity Company – AI applications in grids

2. H. Karimipour

Cybersecurity + AI for smart grids
University of Calgary / Qatar collaborations

3. Mustapha Ouladsine

Smart energy systems, data-driven modeling
Saudi Arabia / France

4. Djamel Said

IoT and digital technologies for demand-side management

Website URL of Call for Papers (if any):

Not yet

Email & Contact Details:
Dr. Imen Khamassi
imen.khamassi@isg.rnu.tn