Special Session on
Artificial Intelligence and Digital Twin Applications for Energy Conversion Systems

The integration of Artificial Intelligence (AI) and Digital Twin (DT) technologies into energy conversion systems is revolutionizing the way energy is managed, optimized, and utilized, particularly in the context of renewable energy sources. These technologies offer unprecedented capabilities for real-time monitoring, predictive maintenance, and dynamic optimization, enabling more efficient and reliable energy conversion processes.
In renewable energy applications such as wind, solar, and hydrogen systems, AI-driven algorithms enhance the performance of power converters, which are critical for regulating and transforming electrical energy between various forms and ensuring seamless integration into the grid or standalone systems. Digital Twins, on the other hand, provide virtual replicas of energy systems, allowing for advanced diagnostics, virtual testing, and scenario-based optimization, thereby minimizing downtime and enhancing overall system performance.
This session aims to highlight the latest advancements and practical applications of AI and DT technologies in energy conversion systems, with a particular focus on their role in advancing renewable energy solutions. Contributions addressing innovative control strategies, simulation models, and experimental studies are particularly welcomed.

Topics of interest include, but are not limited to:

- AI-based optimization techniques for power converters
- Digital Twin applications for real-time monitoring and fault detection in energy systems
- Advanced control methods for renewable energy integration
- Predictive maintenance and reliability analysis of energy conversion systems
- Novel converter designs and topologies for renewable energy applications
- Energy management strategies leveraging AI and DT technologies
- Dynamic optimization of hybrid renewable energy systems
- Enhancing system stability and grid resilience through AI and DT applications
- Virtual commissioning and scenario testing using Digital Twin models
- Cybersecurity challenges in AI and DT-enabled energy systems

Organizer(s):

Pr. Dr. Hatim Ameziane
Electrical Engineering Department
Science and Technology for the Engineer Laboratory (LaSTI),
National School of Applied Sciences (ENSA), Khouribga.
Sultan Moulay Slimane University- Morocco.
E-mail: h.ameziane@usms.ma

Dr. Mourad Yessef
Engineering, modelling and system Analysis Laboratory (LIMAS).
Faculty of sciences dhar el mahraz,
Sidi Mohamed Ben Abdallah (SMBA) University- Morocco.
E-mail: mourad.yessef@usmba.ac.ma

Deadlines of the special session:

Full paper submission (maximum 6 pages):	**March 30, 2025**
Notification of acceptance:	**April 27, 2025**
Final submissions due:	**May 11, 2025**

All the instructions for paper submission are included at the conference website.
https://gpecom.org/2025/guidelines/