2025 IEEE 4th International Conference 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 16 (SS16)

Advancements in Autonomous Electric Vehicles: Leveraging Digital Twin Technology for Enhanced Power and Control

Organized and co-chaired by:

- Dr. A.S.S. Veerendra Babu , Manipal Inst. of Tech., Manipal, India — veerendra.babu@manipal.edu
- Dr. Kumaran Kadirgama, UMPSA, Pahang, Malaysia — kumaran@umpsa.edu.my
- Dr. Flah Aymen , Univ. of Gabes, Gabes, Tunisia — aymen.flah@enig.u-gabes.tn

Call for Papers

- **Technical Outline of the Session:**

The integration of Digital Twin (DT) technology into Autonomous Electric Vehicles (AEVs) represents a significant advancement in smart mobility. By creating real-time virtual replicas of vehicles and their environments, DT enables precise simulation, monitoring, and optimization of vehicle performance. In power and control systems, DT facilitates the development of advanced powertrains by simulating components like batteries, electric motors, and power electronics, allowing for performance prediction under various conditions and aiding in efficiency and reliability optimization. DT also enhances battery management systems by providing insights into thermal behavior and state-of-charge, leading to improved energy efficiency and extended battery life. Beyond individual vehicles, DT plays a crucial role in fleet management by offering real-time data on vehicle health and performance, supporting predictive maintenance, reducing downtime, and operational costs. Additionally, the fusion of DT with Vehicle-to-Everything (V2X) communication enables hybrid autonomous driving systems that combine local autonomy with remote guidance, enhancing safety and efficiency. This conference aims to explore the applications of DT in optimizing powertrain design, enhancing control systems, and fostering sustainable mobility solutions, charting the course for the next generation of intelligent, autonomous electric vehicles.

- **Topic of the Session includes, but are not limited to:**
  - Design principles and methodologies for digital twin systems in EV applications.
  - Integration of multi-physics and multi-scale simulations in Autonomous Electric Vehicles.
  - Health monitoring of energy storage systems using digital twin technologies.
  - Advancements in the manual and autonomous operation of EVs.
  - Lifecycle management and dynamic prediction models.
  - Battery Management Systems and Energy Management Systems in electric mobility using digital twin technology

IEEE Template

- **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

Author guidelines as per regular paper submission.

Submission Portal

https://nitgoa.ac.in/STPEC2025/specialsessions.html

For queries, email: ss_stpec2025@nitgoa.ac.in