

Title of the Special Session:

Green, Sustainable and Intelligent Systems: The Role of 5G/6G Communications, Embedded Technologies, AI and Machine Learning

Session Organizers:

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Abstract:

Recent advances in 5G/6G communication technologies, embedded systems, artificial intelligence (AI), machine learning (ML), deep learning, the Internet of Things (IoT), and edge–cloud computing are transforming the way intelligent systems are designed and deployed. High-speed, ultra-reliable, and low-latency 5G/6G networks serve as the communication backbone for next-generation smart applications by enabling seamless connectivity among billions of devices, real-time data acquisition, distributed intelligence, and autonomous decision-making. These technologies are driving sustainable innovations in healthcare, agriculture, transportation, smart cities, energy management, environmental monitoring, industrial automation, surveillance, and other critical sectors.

Despite these advances, large-scale deployment of AI-enabled connected systems significantly increases energy consumption, computational complexity, spectrum utilization, and carbon emissions. Future intelligent systems therefore require energy-efficient communication protocols, green 5G/6G network architectures, lightweight AI/ML models, optimized embedded platforms, edge intelligence, and sustainable computing frameworks. Developing environmentally responsible technologies while maintaining performance, reliability, security, and scalability has become a major research challenge.

This special session aims to bring together researchers, academicians, industry practitioners, and policymakers working on green and sustainable intelligent systems enabled by 5G/6G communications, embedded technologies, AI, ML, IoT, and edge/cloud computing. The session welcomes theoretical advances, algorithms, hardware and software innovations, prototypes, simulation studies, and real-world deployments that contribute to sustainable, energy-efficient, secure, and intelligent systems.

Rationale:

This special session is highly aligned with the core themes of PCEMS-2026 by addressing emerging communication technologies, intelligent computing, and sustainable engineering solutions. The convergence of 5G/6G communications, embedded systems, AI/ML, IoT, and edge computing is enabling next-generation cyber-physical systems capable of delivering ultra-reliable connectivity, real-time analytics, and energy-efficient operation. As industries transition towards smart manufacturing, intelligent transportation, precision agriculture, digital healthcare, smart grids, and sustainable cities, there is an urgent need for green communication networks, efficient embedded platforms, and

lightweight AI algorithms that reduce energy consumption and environmental impact. The session provides an interdisciplinary platform for researchers from academia and industry to present innovative methodologies, practical implementations, and future research directions that promote environmentally sustainable, intelligent, and connected systems.

List of Topics:

- Green 5G/6G communication networks for sustainable applications
- AI-enabled resource management in 5G/6G networks
- Green IoMT architectures for patient monitoring
- Energy-aware AI/ML models for disease prediction
- Sustainable edge-enabled fall detection frameworks
- Light weight human activity recognition using wearable IoT sensors
- Reliable and green AI models for real-time activity monitoring for Geriatric Care
- Sustainable IoT-based crop disease detection using lightweight vision models
- Green sensor networks for sustainable farming
- Energy-aware intelligent surveillance using edge AI
- Green data-driven climate monitoring systems
- AI-enabled cybersecurity for 5G/6G and IoT systems
- Lightweight and energy-efficient IDS for IoT/IoMT environments
- Embedded AI and TinyML for sustainable intelligent systems
- Edge intelligence and federated learning over 5G/6G
- Green V2X, UAV and smart transportation systems
- Energy-efficient embedded system design
- Sustainable indoor/outdoor seamless navigation systems