Title of the Special Issue: AI-Assisted Energy Harvesting Techniques and its Applications in Wireless Sensor Networks

Short description to be displayed on Special Issue page.

There has been a meteoric rise in the use of wireless devices across all industries in recent years. Increases in the number and sophistication of network nodes, including sensors, IoT gadgets, mobile phones, and other wireless electronic devices, have profoundly affected global communication's reliability in recent years. In the 1950s, the U.S. Navy created the sound surveillance system (SOSUS) to detect Soviet submarines, an early application of wireless sensor networks (WSNs). WSNs are currently being used in a wide variety of additional contexts, including but not limited to energy systems, air, and water quality monitoring systems, health monitoring systems, smart cities (traffic control, environmental monitoring, parking systems), and Industry 4.0. With WSNs, it is easier to conceive of a vast, realistic innovative system. Many different types of sensors are used in today's communication systems to facilitate data transfer between the real and virtual worlds.

Wireless sensor nodes must work together to efficiently employ their limited resources to manage the hostile circumstances and difficult-to-access working environments often experienced by these applications. As the life of each device and the network depends on the battery life of its components, energy management, control techniques, and infrastructure are crucial concerns for the deployment of wireless technologies. The cost of the electricity needed to run the modules in WSNs is still the biggest obstacle to their ability to operate autonomously and reliably. Research on the efficacy of energy control calculations for selected WSN applications is ongoing. Optimistic projections suggest that energy-harvesting WSNs will increase the feasible size of WSN deployments. Current conditions in a wireless environment have therefore prompted researchers to focus more on improving wireless devices' efficiency in terms of energy consumption. Energy efficiency in wireless devices is the primary focus of this special issue, which covers topics like communication protocols, energy harvesting, energy management, device scheduling, clustering protocols, fault tolerance, and more for a wide range of wireless sensor, underwater, and Internet of Things (IoT) applications.

The primary goal of this special issue is to address AI-based schemes to solve wireless communication problems in WSN. Furthermore, this special issue will cover the entire stack of the integration of artificial intelligence amd signal processing into wireless sensor networks (both above and below ground) and IoT. In addition, significant improvements in WSN performance are appreciated, and researchers are encouraged to submit unique works on any of the following areas of interest.

Give a short list of topics of interest:

- Distributed AI Techniques for Dynamic Energy Optimization in WSNs
- Predictive Maintenance Strategies using AI in WSNs:
- Energy-Aware Routing Protocols using Reinforcement Learning in WSNs
- Integration of Edge Computing and AI for Energy-Efficient Data Processing in WSNs.
- Self-Organizing WSNs using AI for Adaptive Network Management
- AI-Assisted energy management and storage techniques for wireless sensor networks.

- Intelligent Power Control and Scheduling Algorithms for Energy Harvesting Wireless Sensor Networks.
- Adaptive duty cycling and energy harvesting scheduling strategies for wireless sensor networks.
- AI-based data aggregation and processing techniques for wireless sensor networks.
- AI-assisted optimization techniques for energy-efficient wireless sensor network design and deployment.
- Intelligent routing protocols and algorithms for energy harvesting in wireless sensor networks.
- Hybrid energy harvesting and energy storage systems for wireless sensor networks.
- AI-assisted fault diagnosis and fault-tolerant techniques for energy harvesting wireless sensor networks.

Keywords: Energy efficiency; WSNs; energy harvesting; green IoT, Artificial Intelligence (AI)

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