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IEEE Internet of Things Journal

Special Issue on “Ambient Intelligence for AI-Native IoT: Invisible, Context-Aware, and Autonomous Experiences”

The Internet of Things (IoT) is rapidly evolving from a network of interconnected devices toward AI-native Intelligent ecosystems capable of autonomous perception, reasoning, decision-making, and adaptation. At the heart of this transformation is Ambient Intelligence (Aml), a paradigm in which computing becomes seamlessly embedded into everyday environments, enabling intelligent systems to understand user intentions, perceive contextual information, and proactively deliver personalized services with minimal human intervention. Recent advances in multimodal artificial intelligence, foundation models, edge intelligence, semantic communications, autonomous AI agents, ubiquitous sensing, digital twins, and distributed learning have significantly accelerated the realization of Ambient Intelligence. These technologies enable IoT systems to continuously learn from dynamic environment, coordinate heterogeneous devices, optimize resource utilization, and provide trustworthy, adaptive, and human-centric services across diverse application domains. Despite these advances, significant challenges remain in developing scalable, interoperable, secure, energy-efficient, and privacy-preserving Ambient Intelligence systems capable of supporting next-generation AI-native IoT. Addressing these challenges requires interdisciplinary innovations spanning artificial intelligence, wireless communications, networking, sensing, cybersecurity, distributed computing, embedded systems, and human-computer interaction. This Special Issue aims to provide a premier forum for researchers and practitioners from academia and industry to present the latest theoretical advances, enabling technologies, system architectures, and real-world applications of Ambient Intelligence for AI-native IoT. Original research articles, in-innovative system designs, experimental studies, and interdisciplinary contributions are highly encouraged.

Topics of interest include, but are not limited to:

- Aml architectures for AI-native IoT
- Context-aware sensing and intelligent perception
- Multimodal data fusion and semantic understanding
- Foundation models and multimodal AI for IoT
- Agentic AI and autonomous IoT systems
- Edge AI and distributed Aml
- Federated and collaborative intelligence for IoT
- Semantic communications for AI-native IoT
- Explainable and trustworthy Aml
- Privacy-preserving and secure ambient IoT systems

- Embodied AI and intelligent physical IoT environments
- Intent-driven and self-adaptive IoT networking
- Digital twins for ambient intelligent environments
- Energy-efficient AI-native IoT architectures
- Human-centric and personalized intelligent services
- Intelligent smart homes, buildings, and campuses
- Aml for smart healthcare and assisted living
- Aml for Industry 5.0 and smart manufacturing
- Low-altitude, vehicular, and mobile ambient IoT ecosystems
- Benchmarking, datasets, testbeds, and real-world deployments for Aml in AI-native IoT

Important Dates

- Submission Deadline: February 15th, 2027
- First Review Due: April 30th, 2027
- Revision Due: May 30th, 2027
- Second Reviews Due/Notification: July 15th, 2027
- Final Manuscript Due: August 15th, 2027
- Publication Date: October 2027

Submission

The original manuscripts to be submitted need to follow the guidelines at: <https://ieee-iotj.org/wp-content/uploads/2025/02/IEEE-IoTJ-Author-Guidelines.pdf>, which should not be concurrently submitted for publication in other venues. Authors should submit their manuscripts through the IEEE Author Portal at: <https://ieee.atyponrex.com/journal/iot>. The authors must select as "Aml for AI-Native IoT: Invisible, Context-Aware, and Autonomous Experiences" when they reach the "Article Type" step in the submission process.

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