

Call for Papers

IEEE Internet of Things Journal

Special Section on “Causal AI and Counterfactual Optimization for Autonomous IoT Systems”

The rapid evolution of autonomous Internet of Things (IoT) systems, edge intelligence, and AI-driven communication infrastructures is transforming modern cyber–physical environments. Emerging IoT systems increasingly rely on intelligent and autonomous decision-making for resource management, network optimization, adaptive control, and Quality of Service (QoS) assurance. However, most existing AI-driven IoT solutions remain predominantly correlation-based, limiting their robustness, interpretability, and adaptability in dynamic and non-stationary environments. Recent advances in causal AI, counterfactual reasoning, intervention-aware learning, and causal reinforcement learning provide new opportunities to enable more reliable, explainable, and trustworthy autonomous IoT systems. By identifying true cause–effect relationships, causality-aware approaches can significantly improve QoS optimization, adaptive decision-making, resilience, and autonomous system control under uncertain and adversarial conditions. Experimental validation, simulation platforms, and real-world IoT testbeds are particularly encouraged.

This Special Issue aims to bring together researchers and practitioners from academia and industry to advance theoretical foundations, system architectures, optimization frameworks, and experimental validation of causal AI and counterfactual optimization for autonomous IoT systems.

Topics of interest include, but are not limited to:

- Structural causal modeling for autonomous IoT systems
- Causal discovery and causal inference in IoT and edge-network environments
- Counterfactual reasoning for QoS optimization in autonomous IoT systems
- Causal reinforcement learning for adaptive IoT and edge intelligence
- Causal intervention-aware resource allocation and traffic optimization in IoT networks
- Explainable and robust causal decision-making for autonomous IoT systems
- Uncertainty-aware, robust, and resilient causal optimization techniques
- Safety verification and adversarial resilience in causal IoT systems
- Distributed causal learning and causal edge intelligence
- Causal representation learning for dynamic and heterogeneous IoT environments
- Energy-efficient and scalable causal optimization for large-scale IoT networks
- Benchmarks, datasets, and experimental testbeds for causal IoT research

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 " Causal AI and Counterfactual Optimization for Autonomous IoT Systems " when they reach the "Article Type" step in the submission process.

Important dates:

- Submission Deadline: January 15, 2027
- First Review Due: March 1, 2027
- Revision Due: April 10, 2027
- Second Reviews Due/Notification: May 25, 2027
- Final Manuscript Due: July 15, 2027
- Publication Date: September 2027

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