IEEE Journal of Selected Areas in Sensors

CALL FOR PAPERS

IEEE Journal of Selected Areas in Sensors Special Section on

Generative AI-Native Sensors: Toward Proactive, Adaptive, and Resilient Sensing Systems (Focus on Sensor Core Innovation, Cross-Scenario Application, and Hardware-Software Co-Design)

Justification of Theme

The paradigm of sensor technology is shifting from passive data collection to proactive, intelligent perception. This evolution is driven by Generative AI (GenAI), which offers the potential to create AI-Native Sensors, a new class of sensing systems where AI is not an external processor, but an intrinsic component of the sensor itself. Such systems can proactively anticipate sensing needs, adapt their own parameters in real-time, and exhibit resilience through self-diagnosis and data reconstruction. This special section will feature work that differentiates itself from existing research by focusing on GenAI's generative reasoning capabilities and the native co-design of GenAI architectures with sensor hardware characteristics.

It is intended that this Special Section of *IEEE Journal of Selected Areas in Sensors* (JSAS) will show the state-of-the-art in the deep integration of generative AI into sensor systems for proactive, adaptive, and resilient performance. Original research contributions, tutorials and review papers are sought in Generative AI-Native Sensors related areas including (but not limited to):

Topics of Interest

- Lightweight GenAI architectures for low-power sensor nodes, targeting significant reductions in inference energy consumption and latency.
- GenAI for predicting the lifecycle of novel sensing materials to reduce prediction error and optimize calibration cycles.
- AI-driven dynamic calibration and self-correction techniques embedded in sensor devices to enhance long-term accuracy.
- Generative fusion models for heterogeneous multi-sensor data, focused on reducing uncertainty and providing robust performance with missing data.
- Sensor-centric topology optimization using GenAI to minimize coverage blind spots based on the sensor's physical sensing range and data correlation.
- GenAI-driven adaptive sensing for extreme environments, including generative modeling of interference to compensate for sensing errors.
- Frameworks for sensor hardware-level security, such as GenAI for firmware tamper detection or generative watermarking for data integrity.
- Generative models for sensor fault self-diagnosis and predictive maintenance in Industrial IoT.

- GenAI for dynamic redundancy configuration of vehicular sensors for resilience against physical occlusion and interference.
- AI-driven adaptive sampling in wearable sensors based on GenAI-predicted physiological trends for energy-efficient health monitoring.

Solicited and invited papers shall undergo the standard JSAS peer review process. All manuscripts must be submitted on-line, via the IEEE Author Portal, see https://ieee.atyponrex.com/journal/jsas. When submitting, please indicate in the "Manuscript Type" roll down menu that the paper is intended for the "GenAI-Native-Sensors" Special Section. For manuscript preparation and submission, please follow the guidelines in the Information for Authors at JSAS web page, https://ieee-jsas.org/.

Deadlines:

- Manuscript Submission: March 1, 2026
- Notification of First Decision: April 15, 2026
- Revised Manuscript Submission: May 30, 2026
- Notification of Acceptance: June 1, 2026
- Final Manuscript published in IEEE Xplore: July 2026

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