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IEEE Journal of Selected Areas in Sensors Special Section on
Integrating Sensing and Communication for Intelligent Internet of Things

When the concept Internet-of-Things (IoT) first emerged, its additional sensing capabilities were identified as a critical paradigm shift from traditional computer networks. Since then, sensing and communications capabilities have been recognized as two basic components of IoT designs but typically implemented and developed independently in two layers (i.e., the sensing layer and the communications layer) in the IoT architecture. For traditional IoT applications, environmental information is sequentially collected by sensors, exchanged via communications, and fused by computation to support environment-aware and intelligent decision-making. However, the above communication-after-sensing procedure ignores the potential mutual cooperation between sensing and communication, as well as overlooks the inherent correlations of sensory and communication data in the computation procedure. On the other hand, modern IoT devices are expected to intelligently understand and interact with the users, which highlights a colossal desire for privacy-preserving and unobtrusive sensing solutions. These observations motivate the recent research theme of Integrated Sensing and Communications (ISAC), by which sensing and communication functionalities are possibly jointly designed, optimized, and allocated to share and assist each other, via the same hardware platform, common spectrum, joint signal processing strategy, and unified control framework. Hence, the new sensing and communication layers are envisioned as a novel paradigm shifting from separation to integration, with the advantages of low hardware cost, power consumption, signaling latency, reduced product size, and improved spectral efficiency. On the one hand, integrating radio sensing into wireless communications endows naive sensing capability to ubiquitous IoT devices in a fast and economical manner. On the other hand, the real word measurements, such as geographic relationship of communicating IoT devices, can be extracted and inferred from multimodal sensory data, which further improves the communication performance. On top of that, the in-device tradeoffs between sensing and communication performances are viewed as the enablers for learning and building intelligence for the future smart world.

The revolution of IoT architecture drives the need to re-think the designs of current IoT devices, in terms of fundamental limits and tradeoffs, hardware integration, information extraction, processing technologies and learning principles, as well as the new challenges to the public security and privacy. This special issue will provide a comprehensive overview of the state-of-the-art technology and theory for ISAC. It will provide a forum for the latest research, innovations, and applications of ISAC technologies, which will help to bridge the gap between theory and practice. We solicit high-quality original research papers on topics including, but not limited to:

- Fundamental limits for joint communications and sensing in IoT networks
- IoT Network architectures/transmission protocols/frame designs for ISAC
- Artificial Intelligence and data-driven Designs for ISAC-enabled IoT
- Cloud/edge computing and task/data/computation offloading for ISAC
- Waveform/receiver design for ISAC in IoT networks
- Security and privacy issues of ISAC for IoT applications
- Machine learning methods in ISAC for IoT connectivity
- Holographic/massive MIMO and reconfigurable intelligent surface (RIS) for ISAC / simultaneous communications and sensing metasurfaces
- ISAC for unmanned aerial vehicles (UAV) connected IoT
- Standardization progress of ISAC Wi-Fi sensing/positioning/detection in IoT networks
- Experimental demonstrations and prototypes of IoT application

Solicited and invited papers shall undergo the standard IEEE Journal of Selected Areas in Sensors (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 "Integrating Sensing and Communication for Intelligent Internet of Things" Special Section. Authors are particularly encouraged to suggest names of potential reviewers for their manuscripts in the space provided for these recommendations in *Manuscript Central*. For manuscript preparation and submission, please follow the guidelines in the *Information for Authors* at IEEE Journal of Selected Areas in Sensors web page,

https://ieee-jsas.org/.

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