Call for Papers

IEEE Journal of Selected Topics in Signal Processing

Special Issue on Near-Field Signal Processing: Algorithms, Implementations and Applications

Array signal processing technologies are moving toward to the employment of small and densely packed sensors yielding extremely large aperture arrays to provide higher angular resolution and beamforming gain. With the extended array aperture and small wavelength, the signal wavefront at the receiver is no longer plane-wave when the receiver is in near-field, i.e., it is closer to the transmitter than the Fraunhofer distance. In such a scenario, the spherical wavefront should be taken into consideration since the system performance depends on the propagation distance as well as the direction of the signal of interest. Lately, there has also been a significant paradigm shift in both radar and communication communities toward operating in higher frequencies, e.g., millimeter-wave and terahertz (THz) band which require employing massive antenna arrays to achieve enhanced communications data rate and high-resolution sensing. To this end, near-field signal processing becomes a key enabling technique to provide spatial multiplexing with increased degrees of freedom and high-resolution with range-dependent vary narrow beamwidth. Furthermore, while near-field signal processing is regarded as a new phenomenon in wireless communications and sensing, it has been a long-standing problem in other applications with short propagation distances, e.g., ultrasound, acoustics, microscopy, crystallography, spectroscopy, and optics. This special issue aims to bring together researchers from both academia and industry to introduce the original works on near-field signal processing, hitherto not made available. Topics of interest include but are not limited to:

- Signal processing for near-field localization, direction-of-arrival estimation, and sensing
- Spherical processing for reactive and radiative near-field, and measurements for massive MIMO communications
- Signal processing for short-range THz communications and spatial-wideband effect
- Active/passive near-field beamformer design for holographic-surface-assisted wireless systems
- Applications of near-field in integrated sensing and communications
- Novel sensor array/reflecting surface design for near-field beamforming and backscattering
- Theoretical performance analyses and fundamental limits in near-field signal processing
- Novel signal processing techniques to incorporate the electromagnetics and physics of near-field beamforming
- Recent advances in mid- and near-field optics via coded diffraction patterns
- Near-field synthetic aperture sounding and radar imaging
- Advanced near-field signal processing techniques for ultrasound, microphone arrays, sonar, and acoustics
- Near-field propagation modeling and hardware prototyping in microscopy, crystallography, and optics
- Near-field wireless power transfer for 5G and beyond IoT applications
- Real-world prototypes and testbeds for near-field signal processing systems

The Guest Editors also welcome creative papers outside the areas listed above but related to the overall scope of the special issue. Prospective authors may contact the Guest Editors to ascertain interest on topics that are not listed, should follow the instructions given on the IEEE JSTSP webpage: https://signalprocessingsociety.org/publications-resources/ieee-journal-selected-topics-signal-processing, and submit their manuscripts at http://mc.manuscriptcentral.com/jstsp-ieee. All submitted manuscripts will be peer-reviewed according to the standard IEEE process.

Important Dates

Manuscript Due: Nov 15, 2023
First Review Due: Jan 31, 2024
Revised Manuscript Due: Feb 29, 2024
Second Review Due: Mar 31, 2024
Final Manuscript Due: May 15, 2024
Publication Date: Third Quarter, 2024

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