CALL FOR PAPERS

IEEE Journal of Selected Topics in Signal Processing

Signal Processing for Digital Twin in 6G Multi-Tier Computing Systems

Digital Twin (DT) has become a game-changing technology in many intelligent applications of the next generation of wireless networks, i.e., 6G, by fully replicating the physical devices and produce real-time interactions to efficiently manage the entire system. DT in multi-tier computing systems enables signal processing and computing from the cloud-based twin object to the edge-based twin objects by distributing storage, control, and networking capabilities, thus extending the traditional cloud computing architecture to the edge of the network. The new computing model resulting from combining signal processing and multi-tier resources management with multi-tier computing will promote the rapid development of DT and enable efficient task offloading of computation-intensive tasks, so as to realize ultra-reliable and low latency of the interactions between physical and virtual objects. However, reaching the full potential of DT in practical multi-tier computing scenarios is challenging, and there are still many important open research problems, especially from the signal processing for communications' perspective. This special issue aims to provide a forum for the latest advances for DT in 6G multi-tier computing research, innovations, and applications to the signal processing and communications communities, in order to bridge the gap between theory and applications. We solicit high-quality original research papers on topics including, but not limited to:

- Distributed learning aided signal processing for DT in 6G multi-tier computing systems
- Twin signaling over wireless access channel for DT in 6G multi-tier computing systems
- Joint optimal design of signal processing, computing, communications for DT
- Channel coding schemes and modeling techniques for task offloading in 6G networks-based DT
- Signal decoupling and analytics for DT in 6G multi-tier computing systems
- Deep learning-aided signal processing for twin models and optimization in 6G
- Signal processing for mobility management in 6G networks-based DT
- Fundamental limits and performance analysis of resource allocation for DT in 6G multi-tier computing
- Ultra-reliable low-latency multi-tier computing for DT
- Federated learning aided signal processing for DT in multi-tier computing systems
- Distributed management of multi-tier computing resources in 6G networks-based DT
- Signal processing algorithms for security and privacy issues of DT in 6G

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 Submission: 15 July 2023

First Review Due: 30 September 2023

Revised Manuscript Due: 31 October 2023

Second Review Due: 30 November 2023

Final Decision Due: 31 December 2023

Final Manuscript Due: 15 January 2024

Publication Date: March 2024

Guest Editors:

Kunlun Wang (co-Lead Guest Editor), East China Normal University, China. (klwang@cee.ecnu.edu.cn)

Trung Q. Duong (co-Lead Guest Editor), Queen's University Belfast, Belfast, U.K. (trung.q.duong@qub.ac.uk)

Saeed R. Khosravirad, Nokia Bell Labs, Murray Hill, USA (saeed.khosravirad@nokia-bell-labs.com)

Octavia A. Dobre. Memorial University, Canada (odobre@mun.ca)

George K. Karagiannidis, Aristotle University of Thessaloniki, Greece (geokarag@auth.gr)