

# IEEE JOURNAL ON EMERGING AND SELECTED TOPICS IN CIRCUITS AND SYSTEMS

## CALL for PAPERS

### Artificial Intelligence for 5G and Beyond 5G: Implementations, Algorithms, and Optimizations

#### Guest editors

Chuan Zhang, Southeast University, China (chzhang@seu.edu.cn)

Yeong-Luh Ueng, National Tsing Hua University, Taiwan (ylueng@ee.nthu.edu.tw)

Christoph Studer, Cornell Tech, USA (studer@cornell.edu)

Andreas Burg, Ecole Polytechnique Federale de Lausanne, Switzerland (andreas.burg@epfl.ch)

#### Scope and purpose

In order to fulfil the ever-growing cultural and economic needs of human society, the information industry is expected to have unprecedented growth to boost innovation and productivity of other economic sectors. Thanks to information industry, the near future will bring us a variety of emerging technologies that will fundamentally change our everyday life and pose new challenges to researchers and engineers. Amongst these, the Internet of Things, vehicle-to-everything (V2X), machine translation, (enhanced) virtual (and augmented) reality, e-learning, and robotization have received the most attentions.

These disruptive technological trends, however, rely on wireless communications and pose extreme, partially contradictory requirements to the communications networks and the associated devices. As the present 3G/4G wireless networks cannot meet the future demands, intensive research has been initialized towards the 5G mobile communications era and beyond (B5G). The upcoming 5G and B5G mobile communication is aiming for the connection of tens of billions of wireless devices with some reaching several gigabit-per-second data rates and millisecond-level latency. Admittedly, emerging approaches such as cm/mmWave frequencies, cognitive radio (CR), device centric network architecture, cooperative network with joint processing, core network virtualization and reconsideration of the data, control and management planes could help to address these requirements. However, challenges still remain.

The aforementioned applications force wireless communications to meet the trends of mMTC, URLLC, and eMBB. Consequently, it should be of tremendously increased data rates, substantially reduced latencies, support for a massive number of simultaneous devices, increased energy efficiency, and various quality-of-service (QoS) guarantees. Therefore, the corresponding signal processing is required to take care of the massiveness with satisfactory performance, uniform approach, sufficient flexibility, and high efficiency, even when the apriori knowledge such as channel condition is varying, incomplete, or missing.

Witnessing its successful applications in fields including computer vision, speech recognition, natural language processing, audio recognition, social network filtering, machine translation, bioinformatics and drug design, researchers are considering use artificial intelligence (AI) techniques to wireless communications to address the above challenges. Preliminary results in channel estimation and baseband processing have been reported that the AI techniques can help to understand the wireless contents and produce results comparable to and in some cases superior to classic approaches.

Due to its undoubted significance, research combining “AI” and “5G and B5G” has drawn lots of attentions from both academia and industry. Although some initiatives related to “AI for 5G and B5G” have been named, their design, implementation, and optimization are unfortunately not complete and of course in infancy. Having lots of potential for AI’s new innovations, advances are required in network architectures, signal processing solutions, semiconductor technologies as well as in its optimization regarding the overall wireless system design. Much of the research has scattered on the design, implementation, and optimization of the corresponding circuits and systems.

This special issue would like to emphasize its uniqueness on “AI for 5G and B5G” related VLSI/IC designs and help readers to know the cutting-edge progresses from the perspective of circuits and systems. With a focus on bridging the gaps between theory and practical implementations, the goal of this special issue is to demonstrate the latest research progress on circuits and systems design for efficiently realizing machine learning in wireless communications. The special issue will bring together academic and industrial researchers to identify technical challenges and recent results related to this area. Original and unpublished research results with topics in any of the following areas or beyond are hereby solicited.

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## Topics of interest

- Signal and information processing for wireless communications based on deep learning
- Intelligent learning methods and their implementations for massiveness and scalability
- Cross-layer and end-to-end (E2E) deep learning optimization
- Learning for baseband processing
- Massive MIMO related deep learning, particularly signal processing and hardware challenges
- Hardware and real-time implementations (FPGA and VLSI) for wireless deep learning
- Algorithm-implementation optimization for wireless deep learning
- Heterogeneous deep learning implementations for base stations and user ends
- Advanced solutions for low-latency deep learning communications
- Design methodologies and tools for wireless deep learning
- Sensing and environmental intelligence from communications using machine learning
- Other (industrial) emerging applications of related signal and information processing.

## Submission procedure

Prospective authors are invited to submit their papers following the instructions provided on the JETCAS web-site: <https://mc.manuscriptcentral.com/jetcas>. The submitted manuscripts should not have been previously published nor should they be currently under consideration for publication elsewhere. Note that the relationship to screen content video technologies should be explained clearly in the submission.

## Important dates

1	Manuscript submissions due	<b>2019-12-30</b>
2	First round of reviews completed	<b>2020-02-29</b>
3	Revised manuscripts due	<b>2020-03-30</b>
4	Second round of reviews completed	<b>2020-04-14</b>
5	Final manuscripts due	<b>2020-05-01</b>
6	Target publication date	<b>2020-06-30</b>

## Request for information

chzhang@seu.edu.cn

<http://jetcas.polito.it>