IEEE IoT Journal Special Issue on
Advanced Communications, Control and Computing for Industrial Internet of Things

Industrial Internet of Things (IIoT) integrates advanced digital computing, communications and control technology. Within the Industry 4.0 framework, it aims to tackle a set of new technological challenges in industrial control, automation and intelligence. Since most of the IIoT applications, such as intelligent transportation, telesurgery, industry automation, power systems automation and power electronics control, are mission-critical and demand real-time communications and computation capabilities for successful closed-loop operation, IIoT requires the joint design and optimization of communications, control and computing (3C). However, most of the existing research in IIoT only focuses on one aspect of 3C, i.e., from the communications, control and computer science societies, respectively. Such an independent design approach ignoring the tight interaction between 3C has poor overall performance and low system efficiency, consuming substantial wireless and computation resources. Communications-control-computing co-design is a paradigm shift in IIoT, which introduces many new research challenges. Both fundamental research and applied research should be done to achieve low-latency, ultra-reliable and high-performance control in industrial environments. The emerging co-design approach has been expected to have a wide range of upcoming IIoT applications.

Despite the theoretical advancements over the past few years, the research of 3C codesign is still at an early stage as many technical challenges are yet to be addressed before we unlock its full potential for reliable and large-scale implementation in practice. The special issue is therefore focused on addressing the major challenges that pertain to this cutting-edge research topic. Topics of interest include, but are not limited to:

- Fundamental tradeoffs between communications, control and computing;
- Resource allocation for next-generation wireless sensing and control applications in IIoT;
- Wireless network protocol design for supporting multi-loop control applications;
- Designs for low-latency high-reliability control;
- Edge computing for low-latency control;
- Communications, control and computing for Smart Grid applications;
- Data-driven tools to support low-latency and high-reliable wireless autonomous applications, including reinforcement learning and statistical learning;
- Cyber-physical security in IIoT;
- Hardware Prototyping of codesign protocols.

Important Dates:

Manuscript submission: June 15, 2021

First Review Due: August 31, 2021

Revision Due: October 15, 2021

Second Review Notification: November 15, 2021

Final Manuscript Due: November 30, 2021

Publication Date: 2021

Submission Guidelines:

All submitted papers must be clearly written in excellent English and contain only original work, which has not been published by or is currently under review for any other journal or conference. Author guidelines and submission information can be found at http://iot.ieee.org/journal. All manuscripts and any supplementary material should be submitted through IEEE Manuscript Central, http://mc.manuscriptcentral.com/iot. The authors must select as "SI: Advanced Communications, Control and Computing for Industrial Internet of Things" when they reach the "Article Type" step in the submission process.

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