

**IEEE Internet of Things Journal Special Issue on
“Age of Information and Data Semantics for Sensing,
Communication and Control Co-Design in IoT”**

A typical Internet-of-Things (IoT) system consists of three major layers: sensing, communication and application (i.e., actuation and control) layers. Nowadays, with the emergence of more and more wireless-networked machine-type applications such as connected autonomous driving and factory automation, this co-design is more urgently desired than ever to meet the stringent quality of service requirement thereof. The 5G wireless network of today has mainly focused on the communication part and strive to reliably achieve low air-interface communication delay, i.e., ultra-Reliable and Low-Latency Communications (uRLLC). However, the current uRLLC design is insufficient to characterize the status update quality, therefore the performance of computing and control in IoT networks that rely highly on wireless communications, can hardly be guaranteed.

To deal with this challenge, a promising and powerful metric of Age of Information (AoI) has been proposed and studied in recent years. It directly measures the information latency as observed by the control layer, encompassing all factors resulting from the sensing, communication and computation process. Meanwhile, metrics derived from AoI, are being intensively studied recently in the literature in order to better understand and facilitate the convergence. These aspects strongly motivate interdisciplinary research across wireless communications, control theory, computing, vertical applications, and etc. This special issue is therefore focused on the AoI-inspired sensing, communication and control co-design in IoT systems. Topics of interest include, but are not limited to:

- ◆ Age of information performance analysis for IoT
- ◆ Data semantics beyond age of information for timely sensing, computing or control, and etc.
- ◆ Age of information and control theory for IoT
- ◆ Age of information and estimation theory for IoT
- ◆ Age of information and security and privacy for IoT
- ◆ AI-based information timeliness and data semantics-based optimization for IoT
- ◆ Age of information and data semantics inspired networking and scheduling for IoT
- ◆ Age of information and data semantics for vertical applications
- ◆ Proof-of-concepts and experiments for AoI-inspired sensing, communication and control co-design in IoT

Important Dates:

Submission Deadline: July 15, 2020

First Review Due: September 30, 2020

Revision Due: November 15, 2020

Second Review Notification: December 15, 2020

Final Manuscript Due: December 30, 2020

Publication Date: 2021

Submission Guidelines:

Authors need to follow the manuscript format and an allowable number of pages described at <http://ieeetj.org/guidelines-for-authors/>. To submit a manuscript for consideration for the special issue, please visit the journal submission website at <https://mc.manuscriptcentral.com/iot>.

Guest Editors:

Sheng Zhou, Tsinghua University, China, (sheng.zhou@tsinghua.edu.cn)

Zhiyuan Jiang, Shanghai University, China, (jiangzhiyuan@shu.edu.cn)

Anthony Ephremides, University of Maryland, USA, (etony@umd.edu)

Nikolaos Pappas, Linköping University, Sweden, (nikolaos.pappas@liu.se)

Luiz DaSilva, Trinity College Dublin, Ireland, (dasilval@tcd.ie)