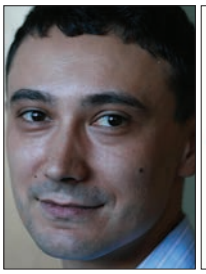
INTERNET OF THINGS AND SENSOR NETWORKS


Sergey Andreev


Ciprian Dobre


Prasant Misra

With the global spread of COVID-19 and the respective measures, the Internet of Things (IoT) is enabling frontline applications. Drones are being used for public surveillance to control the quarantine and the wearing of masks. Robots and digital assistants help us cope with indoor isolation more easily. With the aid of capable IoT devices, one can trace the origins of outbreaks and ensure patient compliance with vital medical recommendations. This motivates further investment in the IoT development.

Even though the underlying IoT technologies are ready to assist in fighting the disease, challenges do remain. Some IoT solutions are fragmented and not always best connected. Platforms may not be able to scale adequately and demonstrate their dependability. The present sixth appearance of the "Internet of Things and Sensor Networks" Series of *IEEE Communications Magazine* continues to follow the cornerstone IoT advancements that have the potential to transform our world.

In the first article, "Communication, Computation, and Caching Resource Sharing for Internet of Things", M. Tang *et al*. present a device-to-device resource sharing framework that enables mobile devices to form direct connections and share their generic resources. It supports cooperative task execution models, which address two problems: optimization of resource scheduling among the devices by considering economic implications, and incentivization of the participants to share their resources. This work opens new research directions toward a decentralized world where devices are able to collaborate efficiently and support the construction of new edge-based application models.

Continuing along these lines, the sharing of resources raises many security challenges. In the second article, "Energy- and Cost-Efficient Physical Layer Security in the Era of IoT: The Role of Interference", Z. Wei *et al*. examine the recent findings on energy- and cost-efficient physical layer (PHY) solutions for securing downlink IoT transmissions through interference exploitation. The work covers a range of research questions in downlink PHY security by concluding with a presentation of low hardware-cost constructive interference techniques. These can be used for interference management to secure the wireless connectivity of the emerging IoT applications.

Since wireless communications exist in many forms, in the third article, "A Software-Defined Opto-Acoustic Network Architecture for Internet of Underwater Things", A. Celik *et al*. envision a hybrid opto-acoustic network design for the Internet of Underwater Things (IoUT). Given that oceans cover most of our planet, the improved support for underwater nodes may lead to many new applications. Hence, this work proposes the development of software-defined underwater networking for IoUT, which becomes a powerful enabler by hybridizing the benefits of optic and acoustic systems as well as adapting the IoUT devices to the challenging and dynamically changing underwater environment.

In summary, these articles provide a range of answers to the essential questions on the continued evolution of the IoT and the supporting network infrastructures. To conclude, we are grateful to all the reviewers and the editorial team for their loyal support in the preparation of the present issue.

BIOGRAPHIES

SERGEY ANDREEV (sergey.andreev@tuni.fi) is an assistant professor of communications engineering and Academy Research Fellow at Tampere University, Finland. Since 2018, he has also been a Visiting Senior Research Fellow with the Centre for Telecommunications Research, King's College London, UK. He received his Ph.D. (2012) from TUT as well as his Specialist (2006) and Cand.Sc. (2009) degrees from SUAI. He serves as editor for IEEE Wireless Communications Letters (2016-) and as lead series editor of the IoT Series (2018-) for IEEE Communications Magazine. He (co-)authored more than 200 published research works on intelligent IoT, mobile communications, and heterogeneous networking.

CIPRIAN DOBRE (ciprian.dobre@cs.pub.ro) is a professor of computer science at University Politehnica of Bucharest, Romania, and director of MobyLab: Laboratory on Pervasive Products and Services. His research interests involve mobile wireless networks and computing applications, pervasive services, context awareness, and people-centric sensing. He is Director or PI for national and international research projects, and has received the IBM Faculty Award, CENIC Awards, and Best Paper Awards. He serves on the Steering and Organization Committees of major conferences.

PRASANT MISRA (prasant.misra@tcs.com) is a scientist at TCS Research and Innovation, Bangalore. He received his Ph.D. from UNSW Sydney (2012), and completed his postdoc from SICS Stockholm (2013). He performs research in computational sensing and optimization with a focus on intelligent cyber-physical systems. His felicitations include the MIT TR35 India (2017), the ERCIM Alain Bensoussan and Marie Curie Fellowship (2012), and the Australian Government's AusAID Australian Leadership Awards (2008). He is a senior member of IEEE and ACM, the Chair of the IMOBILE ACM Chapter, and a Series Editor (IoT and Sensor Networks) of IEEE Communications Magazine.