

# DESIGN AND IMPLEMENTATION OF DEVICES, CIRCUITS, AND SYSTEMS



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**T**he Design and implementation of Devices, Circuits, and Systems Series features original articles that cover a broad range of topics in technological advances of communication devices, circuits and systems. The Series continues to attract contributions from different industrial sectors including healthcare, automotive, energy, agriculture, smart manufacturing, consumer electronics, smart city, VR/AR/hologram, drone and consumer electronics. Following the appearance in January, May and August, this December issue marks the growth of the Series that has increased the frequency from two issues in 2019 to four in 2020. While we welcome articles in any ICT application areas, prospective authors are strongly encouraged to discuss their intended contribution with any one of the Series Editors prior to submitting an article in order to ensure that the article will be appropriate for the Series.

The Series features articles that provide practical knowledge to a broad range of audiences on the development and optimization of communication products and application solutions with an academically rigorous style and are also suitable for industry professionals. One of the key features of these articles is to conclude with the “Lessons learned,” which contains important lessons from the design and implementation process and the key takeaways.

In this December issue, three articles that cover timely topics across different areas of the design and implementation are featured.

The first article, entitled “Hardware Architecture Design and Implementation of Different Space Modulation Techniques,” provides a methodological review on the application of space modulation techniques in designing multiple-input multiple-output (MIMO) transmitters. One of the primary focuses is on the challenges faced in commercial deployment. Another key highlight of this article is addressing implementation and reliability issues in hardware development.

The second article, “Adaptable Switch: A Heterogeneous Switch Architecture for Network-Centric Computing,” highlights the design of a smart network interface card to relieve

the processing workload of network switches with an adaptable switch. The design is optimized for offloading hardware programmable processing while supporting processing throughput in the magnitude of Tb/s range.

This last article, “Integrated Millimeter-Wave Radars-On-Chip Enabling Next-Generation Cyber-Physical Infrastructures,” provides an insight into the implementation of millimeter-wave active sensing in a cyber-physical system environment. It focuses on the challenges in radar-on-chip design and proposes a system/block level solution for the implementation of 5G transmitters.

## BIOGRAPHIES

BERNARD FONG received his B.Sc. degree in electronics from the University of Manchester Institute of Science and Technology, and the Ph.D. degree in health information systems from the University of New South Wales in 1993 and 2005, respectively. He is a professor with Providence University and currently serves as a Series Editor for *IEEE Communications Magazine*, Executive Editor for *IEEE Consumer Electronics Magazine*, associate editor for the *Archives of Emergency Medicine and Critical Care*, *Anaesthesia*, *Critical Care and Pain Management*, *Cyber-Physical Systems*, *Journal of Advances in Information Technology*, and *IEEE Transactions on Consumer Electronics*. He is the Chair of the System Biology and Biomedical Systems Technical Committee under the IEEE Systems Council. He is an author of the book *Telemedicine Technologies 2/e* (Wiley, 2020).

HAESIK KIM is senior scientist on the 5G and beyond network team at the VTT Technical Research Centre of Finland. He was with the Samsung Advanced Institute of Technology (SAIT) from 2002 to 2006 and NEC, U.K. from 2008 to 2009. He received the Ph.D. degree from Lancaster University, U.K. in 2009. He is an author of the books *Wireless Communications Systems Design* (Wiley, 2015) and *Design and Optimization for 5G Wireless Communications* (Wiley-IEEE, 2020). He is a vice-chair of the 5G IA steering board. He is a series editor for the *IEEE Communications Magazine* series on Design and Implementation of Devices, Circuits and Systems, and also an associate technical editor for *IEEE Communications Magazine*. He has served as a conference co-chair, session chair, and TPC member of major international journals and conferences.

VYASA SAI currently works for the Visual Technologies Team at Intel, CA, USA. He received his Ph.D. from the RFID Center of Excellence, the Department of Electrical and Computer Engineering (ECE) at the University of Pittsburgh, Pittsburgh, PA, USA in 2013. He also holds M.S. and B.Tech. degrees in ECE from the U.S. and India, respectively. He is the lead series editor for the Design and Implementation of Devices, Circuits, and Systems Series for *IEEE Communication Magazine*. He currently also serves as an associate editor for *IEEE Communications Magazine*, Technical Committee member for the IEEE Communications Circuits and Systems, Editorial Board member for the *International Journal of RFID Technology & Applications*, associate editor for *IEEE Access*, *Elsevier International Journal of Computers and Electrical Engineering*, and *IEEE Communications Magazine*, and guest editor for *Elsevier Computer Communication*, among others.