As on-chip systems grow more complex, are increasingly heterogeneous, and design constraints are multifarious (low chip footprint, high performance, low power density, high reliability, security, and so on), it is virtually impossible to design fixed on-chip policies a priori. The term “self-awareness” implies that flexible run-time decisions should be taken with respect to the state of an on-chip system. Though we are only at the beginning of self-aware on-chip systems, I want to recall that the basic ideas and some of the principles date back to the early 2000s or even before. A major initiate was IBM’s Autonomic Computing initiative from around 2001 as well as some other international research programs around the same time on the very topic. What is new at this point, however, is that 1) now there is a real need for on-chip system to move towards this paradigm due to the aforementioned reasons and 2) the resources needed to achieve self-awareness are now available on-chip without taking too many resources away from the applications. In that sense, I am very grateful to our Guest Editors Axel Jantsch and Nikil Dutt for bringing us this exciting topic. Beside the five papers in this special issue, we will have a follow up since the special issue call attracted an unexpected high number of submissions. The authors also provide us a survey on the topic: “Self-Awareness in Systems on Chip—A Survey.”

An additional survey, “Trusted Analog/Mixed-Signal/RF ICs: A Survey and a Perspective,” in our survey section is provided by Angelos Antonopoulos, Christiana Kapatsori, and Yiorgos Makris. Since wherein the vast IP design and IC fabrication is performed by third-party design houses and foundries, trustworthiness has become a major concern. The semiconductor supply chain has vulnerable points that are now exposed. The authors provide a survey from the analog/mixed-signal (AMS) and radio frequency (RF) point of view.

Besides, we have in this issue three general-interest papers. In “Pre-bond Test of Silicon Interposer with Test Interposer,” the authors target the problem of a small number of test access ports. As a solution, they propose a set of interposers to obtain access to the nets under test.

In the second general interest paper, “Adaptive ECC for Tailored Protection of Nanoscale Memory,” Dongyeob Shin, Jangwon Park, Somnath Paul, and Swarup Bhunia describe the problem of run-time failure in nanoscale memory at low voltage levels. As a solution, the authors provide an ECC that dynamically adapts, and they report a significant improvement in reliability.

Finally, the third general interest paper, “Low-Power Sparse Hyperdimensional Encoder for Language Recognition” by Mohsen Imani, John Hwang, Tajana Rosing, Abbas Rahimi, and Jan M Rabaey, focusses on brain-inspired hyper-dimensional computing where patterns are represented as dense binary high-dimensional vectors. The authors propose a new sparse binary representation and design a low-power encoder.

In our departments, we have two highlights: The perspective from Lothar Thiele in “Internet of Things—The Quest for Trust” explores the challenges of IoT with respect to trust and dependability, key aspects on the path to wide-spread adoption. The perspective explains why this will be a complex endeavor. The second perspective from Patrick Mayor, Martin Rajman, and Giovanni De Micheli entitled “Nano-Tera.ch: Information Technology for Health,”
“Environment, and Energy” introduces the goals of NANO-TERA.CH program that intends to establish embedded/cyber-physical systems through the synergy of various disciplines like health, environment, and energy.

In addition, we have two conference reports, one from the European Test Symposium (ETS) that took place in Cyprus from 22–27 May authored by Maria K. Michael and Haralampos-G. Stratifopoulos and another from the International Symposium on Low Power Electronics and Design (ISLPED) held in Taiwan between 24–26 July authored by David Garret and Chia-Lin Yang. Special thanks to our report editors Yervant Zorian and Massimo Poncino who acquired the report articles.

The International Symposium on Low Power Electronics and Design (ISLPED) took place from 24–26 July in Taipei, Taiwan. Thanks to David Garrett and Chia-Lin Yang for the coverage of the event and thanks to departments editor Massimo Poncino.

Last but not least, many thanks to Scott Davidson for the LastByte.

Many thanks to all who have contributed to this issue of IEEE Design&Test. If you have any questions or ideas, please contact me at henkel@kit.edu.

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