

Guest Editorial: Special Issue On Emerging Technologies in Computer Design

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IEEE International Conference on Computer Design (ICCD) invited the highest ranked papers to be included in this special issue of *IEEE Transactions on Emerging Technologies in Computing (TETC)* in 2017. These papers describe original work on practical and theoretical work covering system and computer architecture, test, verification and security, design and technology, and tools and methodologies. Papers were submitted and reviewed under five tracks in ICCD 2017:

1. Computer Systems and Applications: Advanced architectures for general and application-specific enhancement; Software design for embedded, mobile, general-purpose, cloud, and high-performance platforms; IP and platform-based designs; HW/SW co-design; Modeling and performance analysis; Support for security, languages and operating systems; Hardware/software techniques for embedded systems; Application-specific and embedded software optimization; Compiler support for multithreaded and multi-core designs; Memory system and network system optimization; On-chip and system-area networks; Support for communication and synchronization.
2. Processor Architecture: Microarchitecture design techniques for uni- and multi-core processors: instruction-level parallelism, pipelining, caching, branch prediction, multithreading; Techniques for low-power, secure, and reliable processors; Embedded, network, graphic, system-on-chip, application-specific and digital signal processor design; Hardware support for processor virtualization; Real-life design challenges: case studies, tradeoffs, post-mortems.
3. Logic and Circuit Design: Circuits and design techniques for digital, memory, analog and mixed-signal systems; Circuits and design techniques for high performance and low power; Circuits and design techniques for robustness under process variability and radiation; Design techniques for emerging process technologies (MEMs, spintronics, nano, quantum, etc.); Asynchronous circuits; Signal processing, graphic processor and arithmetic circuits.
4. Electronic Design Automation: High-level, logic and physical synthesis; Physical planning, design and early estimation for large circuits; Automatic analysis and

optimization of timing, power and noise; Tools for multiple-clock domains, asynchronous and mixed timing methodologies; CAD support for FPGAs, ASSPs, structured ASICs, platform-based design and NOC; DFM and OPC methodologies; System-level design and synthesis; Tools and design methods for emerging technologies (MEMs, spintronics, nano, quantum).

5. Test, Verification and Security: Design error debug and diagnosis; Fault modeling; Fault simulation and ATPG; Analog/RF Testing; Statistical Test Methods; Large volume yield Analysis and Learning; Fault tolerance; DFT and BIST; Functional, transaction-level, RTL, and gate-level modeling and verification of hardware designs; Equivalence checking, property checking, and theorem proving; Constrained-random test generation; High-level design and SoC validation. Hardware security primitives; Side channel analysis; Logic and micro-architectural countermeasures; Hardware security for IoT; Interaction between VLSI test and trust.

Upon the completion of the paper reviews by the conference technical program committee, the highest ranked papers from the regular submissions were invited to “IEEE Transactions on Emerging Topics in Computing: Special Issue on Emerging Technologies in Computer Design” for publication; these selected papers replaced publication in the ICCD proceedings. The authors presented their paper at the conference, and improved their paper based on the feedback they obtained from the paper review process and the conference audience.

It is our great pleasure to publish this special issue on the highest ranked papers of ICCD 2017. This special issue contains 12 high-quality papers on diverse topics relevant to the five tracks of ICCD. The following six articles will be published in this issue of *TETC* (October-December 2020):

- Madiha Gul, Muhamed Chouikha and Mamadou Wade, Joint Crosstalk Aware and Burst Error Fault Tolerance Mechanism for Reliable On-Chip Communication
- Mohammad Khavari Tavana, Yunsi Fei and David Kaeli, Nacre: Durable, Secure and Energy-efficient Non-Volatile Memory Utilizing Data Versioning
- Kamran Rahmani and Prabhat Mishra, Feature-based Signal Selection for Post-silicon Debug using Machine Learning

- Hao Liu, Linpeng Huang, Yanmin Zhu and Yanyan Shen, LibreKV: A Persistent In-Memory Key-Value Store
- Kashif Naveed and Hui Wu, Aster: Multi-bit Soft Error Recovery Using Idempotent Processing
- Thomas Fehmel, Dominik Stoffel and Wolfgang Kunz, Generation of Abstract Driver Models for IP Integration Verification

The following six articles will be published in the next issue of *TETC* (January-March 2021):

- Lorenzo Ferretti, Giovanni Ansaloni and Laura Pozzi, Cluster-Based Heuristic for High Level Synthesis Design Space Exploration
- Alireza Khodamoradi and Ryan Kastner, O(N)-Space Spatiotemporal Filters for Reducing Noise in Neuro-morphic Vision Sensors
- M. Hassan Najafi and David Lilja, High Quality Down-Sampling For Deterministic Approaches to Stochastic Computing
- Weiwen Jiang, Edwin H.-M. Sha, Qingfeng Zhuge, Lei Yang, Hailiang Dong and Xianzhang Chen, On the Design of Minimal-Cost Pipeline Systems Satisfying Hard/Soft Real-Time Constraints

- Pai Chen, Jianhui Yue, Xiaofei Liao and Hai Jin, Simultaneously Optimizing DRAM Cache Latency and Hit Rate
- Tiago Alves, Leandro A. J. Marzulo, Felipe M. G. Franca and Sandip Kundu, Concurrency Analysis in Dynamic Dataflow Graphs

We sincerely hope that you enjoy reading this special issue, and would like to thank all authors and ICCD reviewers for their tremendous efforts and contributions in producing these high-quality articles. We also take this opportunity to thank the IEEE Transactions on Emerging Topics in Computing (*TETC*) Editor-in-Chief (EIC) Prof. Cecilia Metra, past Associate Editor Ramesh Karri, the editorial board, and the entire editorial staff for their guidance, encouragement, and assistance in delivering this special issue.

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