

Special issue on Languages, Compilers, Tools, and Applied Theory for Embedded Systems

Embedded system design faces many challenges both with respect to functional requirements and extra-functional requirements, many of which are conflicting. These requirements are found in areas such as design and developer productivity, verification, validation, maintainability, and meeting performance goals and resource constraints. Novel design-time and run-time approaches are needed to meet the demand of emerging applications and to exploit new hardware paradigms, and in particular to scale up to multicores (including GPUs and FPGAs) and distributed systems built from multicores.

A specific aspect in advancing the state-of-the-art of designing embedded systems are programming languages, compilers, tools, theory, and architectures that help in overcoming these challenges.

This special section of the ACM TECS is related to the ACM SIGPLAN/SIGBED Conference on Languages, Compilers, Tools and Theory for Embedded Systems. In addition, this special issue is also inviting submissions that were not part of the related event. All submissions will go through the same review process and will be treated equally in their consideration for publication in the special issue.

Topics of interest include:

- Programming language challenges, including:
 - Domain-specific languages
 - Features to exploit multicore, reconfigurable, and other emerging architectures
 - Features for distributed, adaptive, and real-time control embedded systems
 - Language capabilities for specification, composition, and construction of embedded systems
 - Language features and techniques to enhance reliability, verifiability, and security
 - Virtual machines, concurrency, inter-processor synchronization, and memory management
- Compiler challenges, including:
 - Interaction between embedded architectures, operating systems, and compiler
 - Interpreters, binary translation, just-in-time compilation, and split compilation
 - Support for enhanced programmer productivity
 - Support for enhanced debugging, profiling, and exception/interrupt handling
 - Optimization for low power/energy, code and data size, and best-effort and real-time performance
 - Parameterized and structural compiler design space exploration and auto-tuning
- Tools for analysis, specification, design, and implementation, including:
 - Hardware, system software, application software, and their interfaces
 - Distributed real-time control, media players, and reconfigurable architectures
 - System integration and testing
 - Performance estimation, monitoring, and tuning
 - Run-time system support for embedded systems
 - Design space exploration tools
 - Support for system security and system-level reliability

- Approaches for cross-layer system optimization
- Theory and foundations of embedded systems, including:
 - Predictability of resource behaviour: energy, space, time
 - Validation and verification, in particular of concurrent and distributed systems
 - Formal foundations of model-based design as basis for code generation, analysis, and verification
 - Mathematical foundations for embedded systems
 - Models of computations for embedded applications
 - Novel embedded architectures, including:
 - Design and implementation of novel architectures
 - Workload analysis and performance evaluation
 - Architecture support for new language features, virtualization, compiler techniques, debugging tools
- Empirical studies and their reproduction, and confirmation

Conference papers may only be submitted if the paper was completely re-written or substantially extended (30%). The extension requirement by 30% is not in textual volume but in novelty. This is very important to remember. The paper should be submitted via the Manuscript Central website and should adhere to standard ACM TECS formatting requirements. The page count limit is 25.

Guest Editor:

Sebastian Fischmesiter, University of Waterloo, Canada, [sfischme@uwaterloo.ca]

Jason Xue, City University of Hong Kong, China, [jasonxue@cityu.edu.hk]

Authors should submit their journal version at Manuscript Central adhering to the formatting instructions on the TECS Web page and indicate that you are submitting to the Special issue on Languages, Compilers, Tools, and Applied Theory for Embedded Systems on the first page and in the field "Author's Cover Letter:" in Manuscript Central. Any questions on this special issue should be addressed to Jason Xue at jasonxue@cityu.edu.hk.

Submission Deadline 31 Aug 2015

Preliminary notification 1 Dec, 2015

Final paper due 31 Jan, 2016