Editorial: Special Issue on Real-Time and Embedded Technology and Applications

The 2012 edition of the IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) was a significant event in the history of the real-time and embedded systems community. As part of the Cyber-Physical Systems Week, it was located in Beijing, China, coming back to Asia after 11 years and benefitting from the growing interest of the Chinese and Asian research communities.

RTAS has always been a premier conference on applications, case studies, methodologies, tools, and applied algorithms that contribute to the state of practice in the broad field of embedded and real-time systems. In 2012, the identity of the conference was defined in very clear terms as an applications and systems conference, requesting that all submissions provide convincing proof of strong application motivation, applicability, and experiments or case studies applied to real-world examples.

The emphasis on applications and systems was not only needed to restore a clear identity to the conference, but also to provide a better match for the growing needs of the embedded and real-time industry and foster an exchange of ideas, models, algorithms, and case studies between academia and the industry.

Embedded systems are pervasive in today's society, and everyone can witness the increasing number of intelligent functions in everyday devices. What is less evident is the number of problems faced by the industry in coping with the increasing complexity of embedded functionality. The need for more content and new intelligent functions is openly a mismatch with the request for a reduced time-to-market, more robustness, and future extensibility.

Embedded systems are required to perform tasks that are mission- or safety-critical. The use of models and analysis methods to specify the functional contents of the system, its execution platform, and the timing, energy, and reliability constraints on the implementation is needed to reduce the productivity gap and improve the quality, correctness, and modularity of embedded subsystems and systems.

Research work tries to define the range of properties that can be analyzed and demonstrated as correct, providing methods and tools to this purpose. Time properties are an important subset, since they apply to the majority of complex and distributed systems in the automotive, avionics, and controls domains.

This special issue collects contributions on different topics, including the analysis of the worst-case execution time of embedded code on single and multicore platforms, scheduling and analysis techniques targeted to thermal-resilient systems, innovative architectures (including OS and resource managers), system optimization, and real-time networks with a special focus on wireless sensor networks.

The intended audience includes, of course, the general community of embedded systems researchers, but we believe several topics should also be of interest for developers, tool vendors, and development process experts. The applicability of all the provided results is demonstrated by use cases and/or project experiences.

We would like to acknowledge all of the authors for their hard work and the reviewers for their constructive feedback and interesting discussion, which eventually paved the way for improved and new content. We hope that this special issue will serve as an interesting source of inspiration for new researches and applications and help many readers to enter the domain of real-time and embedded systems.

The following articles appear in this special issue.

- Whitham et al. *Explicit Reservation of Cache Memory in a Predictable, Preemptive Multitasking Real-Time System*
- Nirjon et al. *MultiNets: A System for Real-Time Switching between Multiple Network Interfaces on Mobile Devices*
- Kumar and Thiele *Worst-Case Guarantees on a Processor with Temperature-Based Feedback Control of Speed*
- Guan et al. *WCET Analysis with MRU Cache: Challenging LRU for Predictability*
- Chattopadhyay et al. *A Unified WCET Analysis Framework for Multicore Platforms*
- Zhu et al. *ColLoc: A Collaborative Location and Tracking System on WirelessHART*
- Huang et al. *Implementation and Evaluation of Mixed-Criticality Scheduling Approaches for Sporadic Tasks*
- Pajic et al. *Safety-Critical Medical Device Development Using the UPP2SF Model Translation Tool*
- Saifullah et al. *Near Optimal Rate Selection for Wireless Control Systems*

Marco Di Natale
Scuola Superiore S. Anna, Italy

Rich West
Boston University, USA

Jian-Jia Chen
Karlsruhe Institute of Technology, Germany

Rahul Mangharam
University of Pennsylvania, USA

Guest Editors