8th International Workshop on Model-Based Architecting of Cyber-physical and Embedded Systems (ACES-MB 2015)

Co-located with MoDELS 2015, Ottawa, Canada

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http://www.irit.fr/ACES-MB/

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Objectives

The design of embedded and cyber-physical systems with real-time and critical constraints raises distinctive problems throughout the development process, from high-level specifications to verification, implementation, testing and maintenance. This workshop focuses on innovative techniques and methods allowing to specify, construct and bridge the gap between high-level and low-level designs for such safety-critical systems.

Undeniably, on the high-level engineering side, the complexity of embedded and cyber-physical systems has greatly increased during the past few years, while their usage as parts of large systems-of-systems has accelerated. Therefore, architecting cyber-physical and embedded systems has now to take into account complex collaboration patterns and integration of constraints of computational elements and physical parts, which makes it a compelling task.

From the system engineering perspective, many actors in the industry working on complex distributed embedded systems identified the software crisis to be often rooted in a system crisis such that model-based system engineering is becoming the norm in the industry. The formalization of system engineering models and approaches is considered to be one of the major factors for further gains in productivity, quality and time-to-market such complex systems. Although a mature discipline, system engineering is currently renewing at high speed, driven forward by the progress of model-driven approaches and by standards such as SysML or Modelica.

On the low-level design side, there are specific architectural choices that have to be made as early as possible in the process to streamline production. Key non-functional constraints related to, for instance, real-time deadlines and to platform parameters like energy consumption or memory footprint, have to be handled. In lower-level design, the last few years have seen an increased interest in using model-based engineering techniques for two main reasons: (1) they provides means to capture architectural and non-functional information using precise (and often formal) domain-specific models, and (2) they separate functional aspects (platform independent) from architectural and non-functional aspects (platform specific). These aspects are combined later (more or less automatically) via semantic-preserving model transformations to obtain the final system.

This workshop, at its 8th edition, is an opportunity to bring together researchers and practitioners interested in model-based engineering to explore innovative ideas and experiences on architecting and construction of cyber-physical and embedded systems.

Topics

We are seeking contributions at all levels of the construction of cyber-physical and embedded systems, from high-level modeling languages and semantics to concrete application experiments, from model analysis techniques to model-based implementation and deployment. Given the criticality of the application domain, we particularly focus on model-based approaches yielding efficient and provably correct designs. Authors are invited to submit papers on the following non-exclusive list of topics:

- **Model-based embedded and cyber-physical systems engineering**: system design techniques (compositionality, synthesis, etc.); semantics of system models, refinement of system designs into hardware/software implementations (e.g. scheduling, code generation, compilation, i.e.), integration and interaction of system and software design models; validation of systems.
- **Architecture description**: position of architecture description languages (ADLs) in an MBE approach, techniques for deriving architecture models from requirements, deriving high-level design models from architecture models; verification and validation using architecture models.
- **Capturing and exploitation of non-functional aspects, interactions among functional and non-functional aspects of the design**, including but not limited to performance, quality of service, hard real-time constraints, power and resource management, security, etc.
- **Domain specific design and implementation languages**. **Computation and composition models** - synchronous languages and paradigms (Lustre/SCADE, Simulink, Signal/Polychrony, TTA, Giotto, etc.), scheduling-oriented models (HRT-UML, Ada Ravenscar) -, **component languages** (BIP, FRACTAL, Ptolemy, etc.).
- **Model-based analysis, verification and validation techniques**. Exploit above-mentioned models for formal analysis, verification and validation.

Submissions

Submissions should be previously unpublished, written in English, no longer than 8 pages (including the illustrations and bibliography) and using the IEEE style (http://www.ieee.org/conferences_events/conferences/publishing/templates.html). Papers must be submitted online in electronic PDF format via EasyChair: https://easychair.org/conferences/?conf=acesmb15.

Submissions in the following categories are solicited:

- Full papers describing original, unpublished results (max. 8 pages in IEEE style);
- Short papers, describing work in progress (max. 6 pages in IEEE style).

Accepted papers must be presented at ACES-MB'15 by one of the authors. Papers accepted and presented at ACES-MB'15 will be published in a pre-event proceedings edition of CEUR, which is indexed by DBLP and Google Scholar.

Workshop format

1. An introduction by the organizers.
2. An invited presentation (name to be confirmed).
3. Presentations of accepted papers organized in sessions according to subjects emerging from the submissions.
4. A discussion forum about research directions and challenges in model-based design for embedded and cyber-physical systems, as well as controversial questions regarding the state of the art and the state of practice in this domain.

Dates

Paper submission deadline:	July 17, 2015
Notification of acceptance:	August 21, 2015
Pre-event version deadline:	TBA
Workshop:	September 28, 2015