Editorial

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Formal methods emerged as discipline area of computer science and software engineering half a century ago. Formal methods provide foundations for software development through research on mathematical models, composition and adaptation, and rigorous approaches to verification, deployment, testing, and certification. Whilst those areas still need further exploration, emerging technologies and systems, such as Cyber-Physical Systems, Networks of Things and Cloud-Based Systems, demand for techniques to tackle the challenges caused by the multi-dimensional complexities and high requirements of trustworthiness of these ubiquitous systems.

SETTA 2015 is the first edition of the annual *Symposium on Dependable Software Engineering: Theories, Tools and Applications* for researchers and practitioners interested in how to make formal methods fit for the new architectures of today and the systems that are now pervading the socio-economic world. The first conference was held in Nanjing, China, between November the 4th and the 6th, 2015, and attracted 60 submissions, of which 22 were accepted for presentation.

This special issue includes six of the seven articles that the programme committee selected for further revision and significant extension to a journal version. Each revised paper underwent a thorough three-round review process, with at least three referees. The six papers are briefly summarised below:

- *Synthesizing and verifying controllers for multi-lane traffic maneuvers* by Gregor v. Bochmann, *et al*, models the dynamic behaviour of a car by a hybrid system and describes the control of safe (collision free) lane change maneuvers in multi-lane traffic on highways by finite state machines extended with continuous variables coming from the environment. It then shows how standard theory for controller synthesis is used to derive the dynamic behaviour of a lane-change controller. Compositional verification is addressed by using an assumption-guarantee paradigm.
- *Improving design decomposition (extended version)* by D. Faitelson and S. Tyszbrowicz presents an analytical approach that enables reasoning about early exploration of alternatives of system decomposition. A visual notation is used for diagramming the composition of subsystems, and an automatic technique is given for suggesting good decompositions.
- *Cost vs. time in stochastic games and Markov automata* by H. Hatefi, *et al*, studies the computation of Markov automata and stochastic games against cost-bounded reward objectives. The main contributions are a fixed point characterisation for the optimal expected cost-bounded reward, and an efficient measure-preserving transformation from cost-bounded to time-bounded objectives.
- *Fault trees on a diet: automated reduction by graph rewriting* by S. Junges, *et al*, presents a novel and fully automated reduction technique for dynamic fault trees (DFTs). The key idea is to interpret DFTs as directed graphs and exploit graph rewriting to simplify them. A collection of rewrite rules are presented, with a simple heuristic to determine the order of rewriting.

- *An application of temporal projection to interleaving concurrency* by B. Moszkowski and D. P. Guelev revisits properties of the known temporal projection operator in discrete-time Propositional Interval Temporal Logic (PITL) and how it is used to formalise interleaving concurrency. It finds similarities between the expressiveness of this projection operator and the standard LTL operator (‘until’), and shows that properties expressed in LTL combined with the projection operator help to reveal and analyse important differing viewpoints involving global time and the local projected time seen by each individual process.
- *A compositional modelling and verification framework for stochastic hybrid systems* by S. Wang, *et al*, proposes an extension to Hybrid CSP (HCSP), a formal modelling language for hybrid systems, by introducing probability and stochasticity to model stochastic hybrid systems, which we call stochastic HCSP (SHCSP). The Hybrid Hoare Logic for specification and reasoning about processes in HCSP is also extended to specify and reason about SHCSP processes.

We are grateful to *Formal Aspects of Computing* for allowing us to publish this collection of papers, and in particular Cliff Jones and John Cooke for their help throughout the process and Priyanka Ganesh for her editorial work on this special issue. We are also grateful to all Programme Committee members of SETTA 2015 and reviewers involved in selecting the papers included in this special issue.

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