Preface

This volume of the *Lecture Notes in Computer Science* contains the papers presented at FORMATS 2016, the 14th edition of the International Conference on Formal Modeling and Analysis of Timed Systems, held during August 24–26, 2016, in Quebec City, Canada.

Control and analysis of the timing of computations are crucial to many domains of system engineering, be it, e.g., for ensuring a timely response to stimuli originating in an uncooperative environment or for synchronizing components in VLSI. Reflecting this broad scope, timing aspects of systems from a variety of domains have been treated independently by different communities in computer science and control. Researchers interested in semantics, verification, and performance analysis study models such as timed automata and timed Petri nets, the digital design community focuses on propagation and switching delays, while designers of embedded controllers have to take account of the time taken by controllers to compute their responses after sampling the environment, as well as of the dynamics of the controlled process during this span.

Timing-related questions in these separate disciplines have their particularities. However, there is growing awareness that there are basic problems that are common to all of them. In particular, all these subdisciplines treat systems whose behavior depends upon combinations of logical and temporal constraints; namely, constraints on the temporal distances between occurrences of events. Often, these constraints cannot be separated, as intrinsic dynamics of processes couples them, necessitating models, methods, and tools facilitating their combined analysis.

Reflecting this fact, the aim of FORMATS is to promote the study of fundamental and practical aspects of timed systems, and to bring together researchers from different disciplines that share interests in modeling and analysis of timed systems and, as a generalization, hybrid systems. Typical topics include (but are not limited to):

- Foundations and Semantics: Theoretical foundations of timed systems and languages; comparison between different models (such as timed automata, timed Petri nets, hybrid automata, timed process algebra, max-plus algebra, probabilistic models)
- Methods and Tools: Techniques, algorithms, data structures, and software tools for analyzing or synthesizing timed or hybrid systems and for resolving temporal constraints (e.g., scheduling, worst-case execution time analysis, optimization, model checking, testing, constraint solving)
- Applications: Adaptation and specialization of timing technology in application domains in which timing plays an important role (real-time software, embedded control, hardware circuits, and problems of scheduling in manufacturing and telecommunication, etc.)

FORMATS 2016 continued the tradition of the events previously held in Madrid (2015), Florence (2014), Buenos Aires (2013), London (2012), Aalborg (2011), Klosterneuburg (2010), Budapest (2009), St. Malo (2008), Salzburg (2007), Paris (2006), Uppsala (2005),

Grenoble (2004), and Marseille (2003). It was co-located with the 27th International Conference on Concurrency Theory (CONCUR 2016) and the 13th International Conference on Quantitative Evaluation of Systems (QEST 2016), sharing invited speakers and social events among these conferences, and with the workshops EXPRESS/SOS and TRENDS.

This year FORMATS received 32 full submissions by authors coming from 26 different countries. Each submission had full reviews from three Program Committee (PC) members and their sub-reviewers, plus additional comments from further PC members during an intense discussion phase. The committee finally selected 14 submissions for publication and presentation at the conference, which amounts to a 44 % acceptance rate. In addition, the conference included invited talks by:

- Scott A. Smolka, State University of New York, Stony Brook: "V-Formation as Optimal Control" (joint with Concur and QEST; abstract presented in the proceedings of CONCUR)
- Ufuk Topcu, University of Texas at Austin: "Adaptable yet Provably Correct Autonomous Systems" (joint with QEST, which also includes the abstract in its proceedings)
- Oleg Sokolsky, University of Pennsylvania: "Platform-Specific Code Generation from Platform-Independent Timed Models"

We sincerely thank the invited speakers for accepting our invitation and for providing abstracts of their talks for inclusion in the different proceedings volumes. We are grateful to the 27 PC members and their 33 associated reviewers for their competent and timely reviews of submissions, which were instrumental in securing the scientific standards of FORMATS. The EasyChair conference management system again provided reliable support in the submission phase, during the selection process, and while preparing this volume. We would also like to thank the Steering Committee of FORMATS for giving us the opportunity to put together this exciting event and for their support throughout this process, and Josée Desharnais of the University of Laval, Canada, for the competent and reliable local organization.

Last but not least, we are deeply grateful to all the authors for entrusting us with their papers. Thanks to their contributions we were able to put together the inspiring program reflected in these proceedings.

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