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Editorial

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Formal methods for engineering software-intensive systems continue to attract the interest not only of academic researchers but also of practitioners that apply them to different domains in industry. The International Conference on Formal Engineering Methods (ICFEM) is a well-established forum for the presentation of research in all topics related to formal engineering methods, including verification and validation, software engineering, formal specification and modeling, software security and reliability. Contributions that advance the state of the art of applying formal methods in practice are particularly encouraged. The 16th edition of ICFEM took place in Luxembourg in November 2014.

After the conference, an open call was issued in early 2015 to all researchers in the field, including authors of papers accepted at ICFEM 2014, for submitting articles presenting their results in the domain of formal engineering methods. The objective was to have a competitive process and select the best submissions for publication in the journal. Submissions based on papers previously published at conferences, including ICFEM, were required to contain significant novel content. We received 28 submissions in reply to this call. A stringent peer review process resulted in eleven articles accepted for publication. These articles address a broad range of aspects of formal engineering methods, including theoretical and practical perspectives on the topic. The first six accepted papers appeared in volume 28(3) of Formal Aspects of Computing. The present volume contains the five remaining articles.

Modelling Timed Reactive Systems from Natural-Language Requirements by Gustavo Carvalho, Ana Cavalcanti, and Augusto Sampaio describes algorithms for generating state machine representations from requirements of timed reactive systems expressed in controlled natural language. The resulting formal representations are mainly intended for generating test cases so that an implementation can be validated against the original requirements. The approach has been validated with the help of several case studies, including some from the automotive and aeronautic domains.

Formal Modeling and Verification of GALS Systems Using GRL and CADP by Fatma Jebali, Frédéric Lang, and Radu Mateescu introduces a domain-specific language for modeling globally asynchronous, locally synchronous (GALS) systems. The language combines elements from synchronous programming languages and from process algebras for asynchronous systems. It is supported by a translation to the input language of the CADP model checker, enabling formal verification of GALS designs. The techniques are illustrated using the design of part of a flight control system as a running example.

Formalising Concurrent UML State Machines Using Coloured Petri Nets by Étienne André, Mohamed Mahdi Benmoussa, and Christine Choppy contributes a faithful encoding of UML state machines into Coloured Petri Nets (CPNs) that supports the formal analysis of UML designs using existing CPN tools. The authors use the control of a CD player as their running example for describing their approach.

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On the Diversity of Asynchronous Communication by Florent Chevrou, Aurélie Hurault, and Philippe Quéinnec studies models of asynchronous communication in distributed systems that provide different ordering guarantees. The authors are particularly interested in the compatibility of different models, and a formalization in TLA$^+$ enables the use of formal verification techniques and helps designers identify which assumptions are necessary for ensuring certain correctness properties.

On the Formal Analysis of Gaussian Optical Systems in HOL by Umair Siddique and Sofiène Tahar presents a formalization of the fundamental concepts of Gaussian optics in the interactive proof assistant HOL Light. This formal representation can be applied for analysing the performance of actual optical systems, as is exemplified by the receiver module of the Atacama Pathfinder Experiment telescope.

We are very grateful to Formal Aspects of Computing for enabling us to publish both of these special issues, and in particular to the managing editor John Cooke for his unfailing support during the preparation of this issue. We would like to thank the many authors who responded to our call for papers. The reviewers did a wonderful job in providing timely, in-depth reports, which have contributed significantly to improving the quality of the articles.

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