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Leveraging Applications of Formal Methods, Verification and Validation

10th International Symposium
on Leveraging Applications of Formal Methods, ISoLA 2021
Rhodes, Greece, October 17–29, 2021
Proceedings

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Introduction

As Symposium and Program Chairs we would like to welcome you to the proceedings of ISoLA 2021, the 10th International Symposium on Leveraging Applications of Formal Methods, Verification and Validation which was planned to take place in Rhodes (Greece) during October 17–29, 2021, and endorsed by EASST, the European Association of Software Science and Technology.

This year's event was very special due to the very special circumstances. It comprised most of the contributions that were submitted to ISoLA 2020, only a few of which were presented last year in a remote fashion. ISoLA was planned to take place in October 2021 in a hybrid fashion, now comprising also the contributions contained in this volume. Only one track was postponed for yet another year, and we hoped very much to experience the other tracks in Rhodes.

As in the previous editions, ISoLA 2021 provided a forum for developers, users, and researchers to discuss issues related to the adoption and use of rigorous tools and methods for the specification, analysis, verification, certification, construction, testing, and maintenance of systems from the point of view of their different application domains. Thus, since 2004 the ISoLA series of events has served the purpose of bridging the gap between designers and developers of rigorous tools on one side and users in engineering and in other disciplines on the other side. It fosters and exploits synergetic relationships among scientists, engineers, software developers, decision makers, and other critical thinkers in companies and organizations. By providing a specific, dialogue-oriented venue for the discussion of common problems, requirements, algorithms, methodologies, and practices, ISoLA aims in particular at supporting researchers in their quest to improve the usefulness, reliability, flexibility, and efficiency of tools for building systems and users in their search for adequate solutions to their problems.

The program of ISoLA 2021 consisted of a collection of special tracks devoted to the following hot and emerging topics:

- Engineering of Digital Twins for Cyber-Physical Systems
  (Organizers: John Fitzgerald, Pieter Gorm Larsen, Tiziana Margaria, Jim Woodcock)
- Verification and Validation of Concurrent and Distributed Systems
  (Organizers: Cristina Seceleanu, Marieke Huisman)
- Modularity and (De-)composition in Verification
  (Organizers: Reiner Hähnle, Eduard Kamburjan, Dilian Gurov)
- Software Verification Tools
  (Organizers: Markus Schordan, Dirk Beyer, Irena Boyanova)
- X-by-Construction: Correctness meets Probability
  (Organizers: Maurice H. ter Beek, Loek Cleophas, Axel Legay, Ina Schaefer, Bruce W. Watson)
- Rigorous Engineering of Collective Adaptive Systems

(Organizers: Rocco De Nicola, Stefan Jähnichen, Martin Wirsing)
- Automating Software Re-engineering
(Organizers: Serge Demeyer, Reiner Hähnle, Heiko Mantel)
- 30 years of Statistical Model Checking!
(Organizers: Kim G. Larsen, Axel Legay)
- From Verification to Explanation
(Organizers: Holger Hermanns, Christel Baier)
- Formal methods for DIStributed COmputing in future RAILway systems (DisCoRail 2020)
(Organizers: Alessandro Fantechi, Stefania Gnesi, Anne Haxthausen)
- Programming: What is Next?
(Organizers: Klaus Havelund, Bernhard Steffen)

It also included two embedded events:

- Doctoral Symposium and Poster Session (A.-L. Lamprecht)
- Industrial Day (Falk Howar, Johannes Neubauer, Andreas Rausch)

Co-located with ISoLA 2021 was:

- STRESS 2021 – 5th International School on Tool-based Rigorous Engineering of Software Systems (J. Hatcliff, T. Margaria, Robby, B. Steffen)

Altogether ISoLA 2021 comprised contributions from the proceedings originally foreseen for ISoLA 2020 collected in four volumes, Part 1: Verification Principles, Part 2: Engineering Principles, Part 3: Applications, and Part 4: Tools and Trends, and the content of these proceedings which also cover contributions of the associated events.

We thank the track organizers, the members of the Program Committee and their referees for their effort in selecting the papers to be presented, the local Organization Chair, Petros Stratis, and the Easy Conferences team for their continuous precious support during the entire two-year period preceding the events, and Springer-Verlag for being, as usual, a very reliable partner for the proceedings production. Finally, we are grateful to Christos Therapontos for his continuous support for the Web site and the program, and to Markus Frohme and Julia Rehder for their help with the editorial system Equinocs.

Special thanks are due to the following organizations for their endorsement: EASST (European Association of Software Science and Technology) and Lero – The Irish Software Research Centre, and our own institutions—TU Dortmund and the University of Limerick.

We hope that you, as an ISoLA participant, had a wonderful experience at this edition, and that those of you reading the proceedings at a later date gain valuable new insights that hopefully contribute to your research and its uptake.

Tiziana Margaria
Bernhard Steffen

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