

# Report about FormaliSE 2019: 7th International Conference on Formal Methods in Software Engineering

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**Abstract:** FormaliSE 2019 was a fruitful conference, co-located with the 41st International conference on Software Engineering (ICSE). This event brought together formal methods researchers and practitioners from diverse laboratories, countries and fields, which efficiently triggered great discussions. The conference blended thirteen presentations and a keynote by Dr. Jeffrey Joyce on the effective role that formal methods play in the certification of safety-critical systems, such as airborne software. The takeaway of this conference is mainly new and original contributions, but also ideas and connections between participants which may lead to future works.



Figure 1: Photo of the participants to the FormaliSE 2019 conference

Formal Methods (FM) provide means to improve the software quality but they are still not widely used in industrial software development. The FormaliSE conference aims at bringing a closer integration of formal methods in Software Engineering (SE). Therefore, it gathers various researchers and practitioners who can explain the significant benefits of formal methods, especially by increasing the quality of various software systems.

The conference kicked off with a speech by *Stefania Gnesi*, the general co-chair. Stefania welcomed the participants to the conference and thanked the Formal Methods Europe (FME) organization for their funding and support. She also invited the attendees to join the FME community and to subscribe to their mailing list. Later on, she presented the agenda of the day, which contained fourteen talks distributed in four sessions. The talks included eleven full papers presentations, two short papers presentations and one keynote.

The talks of this conference ranged from formal methods for IoT and machine learning to certification of airborne software. This range shows the large applicability of FM to SE.

- *Omar Al-Bataineh* from *Nanyang Technological University* talked about a methodology to verify the shortest and longest execution time of a distributed protocol.
- *Ajay Krishna* from *Inria* presented a formal approach to ensure a correct composition of

objects and a reliable deployment of an IoT application.

- *Dmitry Ivanov* from the *Hamburg University of Technology* presented an approach on analyzing the battery utilization for programs and identifying its worst case.
- *Ebru Aydin Gol* from the *Middle East Technical University* proposed a new method to reduce the number of clocks of timed automata, in order to improve their performance.
- *Jeffrey Joyce*, who is the co-founder and managing director of a Vancouver-based engineering consultancy, *Critical System Labs Inc. (CSL)*, gave a keynote entitled “The Benefits of (having doubts about) Formal Methods”. He talked about several ways and domains for using formal methods. Also, the keynote session was interactive, as the audience got to propose ways of answering the doubts about formal methods.
- *Daniel Ratiu* from *Siemens Corporate Technology* talked about FASTEN, their extensible environment that integrates several formal languages, to help users efficiently specify and verify systems.
- *Taylor Johnson* from *Vanderbilt University* discussed their algorithms for computing the reachable set of a trained feed-forward neural network, in order to verify different safety requirements.
- *Maxime Cordy* from the *University of Luxembourg* explained how they apply sampling and statistical methods to check non-functional requirements of variability-intensive systems.
- *Matt Pedersen* from *UNLV* discussed how they translate a process-oriented language into Java code, then into CSP, and how they verify the behaviour of the Java code using FDR model checker.
- *Cláudio Belo Lourenço* from *LRI, Université Paris-Sud & Inria* presented a formalization of bounded model checking tools, to verify the soundness and completeness of their workflow.
- *Dirk Pattinson* from the *Australian National University*, presented a formal approach to design trustworthy and well-founded voting systems.
- Then, *Erick Raelijohn* from the *University of Montreal*, presented a vision for assisting developers by recommending temporal API usage patterns as part of an IDE.
- *Andreas Lööw* from *Chalmers University of Technology*, presented their proof-producing translator from the HOL theorem prover to Verilog.
- Last but not least, *Waqar Ahmad* from *Concordia University*, made a talk about the formalization of the importance measures using HOL.

Almost each paper was accompanied by a GitHub repository or a website which provide tools and datasets for further research, and promote open science. The presentations were clear, deep in details and also followed by relevant and interesting questions. Overall, the conference was very fruitful and brought new and original contributions. Moreover, it was a favorable environment for discussions and potential collaborations, during the sessions and the two coffee breaks.

Finally, *Nico Plat*, the general co-chair, closed the day with a stimulating discussion about the next steps for formal methods in SE. This discussion focused on two main questions:

- How to increase the impact of FM?
- What are the barriers of FM for SE?

A lot of ideas were proposed and discussed by the participants, namely:

- *Nancy Day* highlighted the problem of standardization and certification which remains unresolved in the domain.

- Since formal tools are still a barrier, *Matt Pedersen* proposed to stop using automated verification tools - where one button does everything - and adopt instead more of assistant tools.
- *Jeffrey Joyce* proposed the “cookbook” notion of readily usable formal methods for different problem domains. This cookbook aims to explain which formal tool and approach are appropriate for each kind of problem.

Before farewell, the general chairs invited the participants to submit their work to the next edition of FormaliSE and hoped they will see them next year at ICSE in Seoul, Korea.



Figure 2: Photo of the members of FormaliSE 2019 conference organizing and program committees

*Stéphanie Challita,  
Communications Officer at FormaliSE 2019*

**About the author** *Stéphanie Challita* is a postdoctoral researcher at Inria Sophia Antipolis - Méditerranée within the Kairos research team. She obtained her PhD degree in computer science from the University of Lille in 2018. She prepared her thesis at Inria Lille - Nord Europe within the Spirals research team. Her thesis focused on automatically inferring models from Cloud APIs and reasoning over them. Her research is about Cloud Computing, Internet of Things, Model Driven Engineering and Formal Methods. For more information, see <http://researchers.lille.inria.fr/schallit/>.

