# ATVA 2021 Program

Welcome to the 19th International Symposium on Automated Technology for Verification and Analysis (ATVA 2021)!

ATVA 2021 was planned to be hosted on the Gold Coast, Australia, in late October 2021. However, due to the pandemic and travel restrictions, the Steering Committee decided to host the conference virtually. ATVA 2021 received 75 submissions covering theory and applications in automated verification and analysis techniques. Each paper was reviewed by at least three reviewers, and the programme committee accepted 19 Regular Papers and 4 Tool Papers, leading to a competitive and attractive scientific programme.

## Keynote Speakers

Sir Tony Hoare

Prof Andrew Yao

Prof Moshe Vardi

Prof Somesh Jha

This edition of ATVA is blessed by the presence of four prestigious keynote speakers. The first keynote will be given by Sir Tony Hoare, a Turing Award and Kyoto Prize laureate. He will discuss the link between geometry and programming testing. The second keynote speaker, Prof Andrew Chi-Chih Yao of Tsinghua University, is also a Turing Award and Kyoto Prize laureate. His expertise is in complexity theory and cryptography, and he will present novel ideas about probabilistic reasoning in machine learning. Prof Moshe Vardi of Rice University is another widely recognised top computer scientist and a Godel Prize

winner. He will talk about linear temporal logic and its applications in analysis and synthesis. Last but not least, Prof Somesh Jha of the University of Wisconsin will present insightful views of security and trustworthy machine learning. The four talks cover current hot research topics and many new interesting research directions.

After the success of the workshops of the previous edition, we decided to co-host the conference with three workshops in related research areas: Security and reliability of Machine Learning (SRML) 2021, organised by Shiqi Wang, Huan Zhang, Kaidi Xu and Suman Jana; the Workshop on Hyperproperties: Advances in Theory and Practice (HYPER) 2021, organised by Daniel Fremont and Hazem Torfah; and the Workshop on Open Problems in Learning and Verification of Neural Networks 2021, organised by Anna Lukina, Guy Avni, Mirco Giacobbe and Christian Schilling. All three workshops will be hosted virtually on the 18th of October 2021. We thank all the workshop organisers for their hard work.

ATVA 2021 would not have been successful without the contribution and involvement of the Programme Committee members and the external reviewers who contributed to the review process (with more than 225 reviews) and the selection of the best contributions. This event would not exist if authors and contributors did not submit their proposals. We address our thanks to every person, reviewer, author, programme committee member and organizing committee member involved in the success of ATVA 2021.

The EasyChair system was set up for the management of ATVA 2021 supporting submission, review and volume preparation processes. It proved to be a powerful framework.

## Sponsors

Griffith UNIVERSITY Queensland, Australia

Lecture Notes in Computer Science LNCS LNAI LNBI

FORMAL METHODS EUROPE

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Although ATVA 2021 will be hosted virtually, the local host and sponsor Griffith University has provided tremendous help with registration and online facilities. The other sponsors, Formal Methods Europe, Springer LNCS, and the National University of Singapore, have contributed in different forms to help run the conference smoothly. Many thanks to all the local organisers and sponsors.

We wish to express our special thanks to the General Chair and steering committee members, particularly Jing Sun, Farn Wang, Jie-Hong Roland Jiang and Yu-Fang Chen, for their valuable support.

# Day 1

18/10/2021

Workshops have their own schedules.

Security and Reliability of Machine Learning (SRML) 2021

Workshop on Hyperproperties: Advances in Theory and Practice (HYPER) 2021

Workshop on Open Problems in Learning and Verification of Neural Networks 2021

## Day 2

19/10/2021
N.B. The schedule is in Brisbane time.

10:00 – 10:30 **Opening**

### Session 1 (Chair: Guangdong Bai)

10:30 – 11:00 Edi Muškardin, Bernhard K. Aichernig, Ingo Pill, Martin Tappler and Andrea Pferscher
**AALpy: An Active Automata Learning Library**

11:00 – 11:30 Jean-Raphaël Gaglione, Daniel Neider, Rajarshi Roy, Ufuk Topcu and Zhe Xu
**Learning Linear Temporal Properties from Noisy Data: A MaxSAT-based Approach**

11:30 – 12:00 Sara Mohammadinejad, Jyotirmoy V. Deshmukh and Laura Nenzi
**Mining Interpretable Spatio-temporal Logic Properties for Spatially Distributed Systems**

12:00 – 15:30 Day Break

### Session 2 (Chair: Yan Xiao)

15:30 – 16:00 Tobias John, Simon Jantsch, Christel Baier and Sascha Klüppelholz
**Determinization and Limit-determinization of Emerson-Lei automata**

16:00 – 16:30 Alessandro Cimatti, Alberto Griggio and Enrico Magnago
**Automatic discovery of fair paths in infinite-state transition systems**

16:30 – 17:00 Orna Kupferman, Nir Lavee and Salomon Sickert
**Certifying DFA Bounds for Recognition and Separation**

17:00 – 17:30 Afternoon Break (Announcement)

17:30 – 18:30 **Keynote**: Sir Tony Hoare (Chair: Zhe Hou)
**A Geometric Theory for Program Testing**

## Day 3

20/10/2021
N.B. The schedule is in Brisbane time.

### Session 3 (Chair: Zhe Hou)

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| 10:30 – 11:00 | Lukas Stevens and Tobias Nipkow<br>**A Verified Decision Procedure for Orders in Isabelle/HOL** |
| 11:00 – 11:30 | Dirk Beyer, Karlheinz Friedberger and Stephan Holzner<br>**PJBDD: A BDD Library for Java and Multi-Threading** |
| 11:30 – 12:00 | Brae Webb, Mark Utting and Ian Hayes<br>**A Formal Semantics of the GraalVM Intermediate Representation** |
| 12:00 – 15: 30 | Day Break |

### Session 4 (Chair: Yun Lin)

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| 15:30 – 16:00 | Igor Khmelnitsky, Daniel Neider, Rajarshi Roy, Xuan Xie, Benoît Barbot, Benedikt Bollig, Alain Finkel, Serge Haddad, Martin Leucker and Lina Ye<br>**Property-Directed Verification and Robustness Certification of Recurrent Neural Networks** |
| 16:00 – 16:30 | Peter Gjøl Jensen, Stefan Schmid, Morten Konggaard Schou, Jiri Srba, Juan Vanerio and Ingo van Duijn<br>**Faster Pushdown Reachability Analysis with Applications in Network Verification** |
| 16:30 – 17:00 | Bernd Finkbeiner, Felix Klein, and Niklas Metzger<br>**Live Synthesis** |
| 17:00 – 17:30 | Afternoon Break |
| 17:30 – 18:30 | **Keynote**: Prof Andrew Yao (Chair: Jin Song Dong)<br>**Probabilistic Reasoning in Machine Learning** |

## Day 4

21/10/2021
N.B. The schedule is in Brisbane time.

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| 9:00 – 10:00 | **Keynote**: Prof Moshe Vardi (Chair: Jun Sun)<br>**Linear Temporal Logic: From Infinite to Finite Horizon** |

### Session 5 (Chair: Rajeev Gore)

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| 10:30 – 11:00 | Christel Baier, Florian Funke, Simon Jantsch, Jakob Piribauer and Robin Ziemek<br>**Probabilistic causes in Markov Chains** |
| 11:00 – 11:30 | Stefan Pranger, Bettina Könighofer, Lukas Posch and Roderick Bloem<br>**TEMPEST - Synthesis Tool for Reactive Systems and Shields in Probabilistic Environments** |
| 11:30 – 12:00 | Zixin Huang, Saikat Dutta and Sasa Misailovic<br>**AQUA: Automated Quantized Inference for Probabilistic Programs** |
| 12:00 – 15: 30 | Day Break |

### Session 6 (Chair: Tobias Nipkow)

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| 15:30 – 16:00 | **This session starts at 16:00.** |
| 16:00 – 16:30 | Vedad Hadžić, Robert Primas and Roderick Bloem<br>**Proving SIFA Protection of Masked Redundant Circuits** |
| 16:30 – 17:00 | Norine Coenen, Bernd Finkbeiner, Christopher Hahn, Jana Hofmann and Yannick Schillo<br>**Runtime Enforcement of Hyperproperties** |

## Day 5

22/10/2021
N.B. The schedule is in Brisbane time.

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| 9:00 – 10:00 | **Keynote**: Prof Somesh Jha (Chair: Vijay Ganesh)<br>**Trustworthy Machine Learning and the Security Mindset** |

### Session 7 (Chair: Jing Sun)

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| 10:30 – 11:00 | Dario Guidotti, Luca Pulina and Armando Tacchella<br>**pyNever: a Framework for Learning and Verification of Neural Networks** |
| 11:00 – 11:30 | Siddharth Priya, Xiang Zhou, Yusen Su, Yakir Vizel, Yuyan Bao and Arie Gurfinkel<br>**Verifying Verified Code** |
| 11:30 – 12:00 | Murad Akhundov, Federico Mora, Nick Feng, Vincent Hui and Marsha Chechik<br>**Verification by Gambling on Program Slices** |
| 12:00 – 15: 30 | Day Break |

### Session 8 (Chair: Zhilin Wu)

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| 15:30 – 16:00 | Shaun Azzopardi, Nir Piterman and Gerardo Schneider<br>**Incorporating Monitors in Reactive Synthesis without Paying the Price** |
| 16:00 – 16:30 | Guillaume Dupont, Yamine Ait Ameur, Marc Pantel and Neeraj Singh<br>**Event-B Refinement for Continuous Behaviours Approximation** |
| 16:30 – 17:00 | Bernd Finkbeiner and Noemi Passing<br>**Compositional Synthesis of Modular Systems** |

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