

DJORDJE ZIKELIC (ĐORĐE ŽIKELIĆ)

PERSONAL INFORMATION

Email: dzikelic@smu.edu.sg

Website: <https://djordjezikelic.github.io/>

CURRENT POSITION

Singapore Management University
School of Computing and Information Systems (SCIS)
Assistant Professor of Computer Science

Jan 2024 - Present

EDUCATION

Institute of Science and Technology Austria (ISTA)
Ph.D. in Computer Science
Advisors: Krishnendu Chatterjee, Petr Novotný
Thesis: *Automated Verification and Control of Infinite State Stochastic Systems*
Outstanding PhD Thesis 2024 and **Outstanding Scientific Achievement 2023** awards

2018 - 2023

University of Cambridge, UK
Mathematical Tripos, Gonville & Caius College
Bachelor of Arts (BA) and Master of Mathematics (MMath)
Part III essay: *Lagrangians of Hypergraphs*

2014 - 2018

Mathematical Grammar School, Belgrade, Serbia

2010 - 2014

PRIOR EMPLOYMENT

Amazon, UK
Applied Scientist Intern
Team: Prime Video Automated Reasoning
Project: On-line Automated Threshold Analysis for Time-series Anomaly Detection

Aug 2022 - Oct 2022

Amazon, UK (virtual)
Applied Scientist Intern
Team: Prime Video Automated Reasoning
Project: Differential Cost Analysis in Programs
Results featured in the **Amazon Science blog**, invited for presentation at the **Infer Practitioners Workshop 2021** organized by Meta and published at **PLDI 2022**, the premier venue in programming languages research.

Oct 2020 - Jan 2021

PUBLICATIONS

* equal contribution, † authors ordered alphabetically

Conference proceedings

(26 in total, 18 A*, 6 A, 1 B according to CORE conference rankings)

1. *Sound and Complete Witnesses for Template-based Verification of LTL Properties on Polynomial Programs.*
Krishnendu Chatterjee, Amir Kafshdar Goharshady, Ehsan Kafshdar Goharshady, Mehrdad Karrabi, Đorđe Žikelić†.
27th International Symposium on Formal Methods (**FM 2024**)
2. *Certified Policy Verification and Synthesis for MDPs under Distributional Reach-Avoidance Properties.*
S. Akshay, Krishnendu Chatterjee, Tobias Meggendorfer, Đorđe Žikelić†.
33rd International Joint Conference on Artificial Intelligence (**IJCAI 2024**)
3. *Solving Long-run Average Reward Robust MDPs via Stochastic Games.*
Krishnendu Chatterjee, Ehsan Kafshdar Goharshady, Mehrdad Karrabi, Petr Novotný, Đorđe Žikelić†.
33rd International Joint Conference on Artificial Intelligence (**IJCAI 2024**)
4. *Equivalence and Similarity Refutation for Probabilistic Programs.*
Krishnendu Chatterjee, Ehsan Kafshdar Goharshady, Petr Novotný, Đorđe Žikelić†.
46th ACM SIGPLAN Conference on Programming Language Design and Implementation (**PLDI 2024**)

5. *Fully Automated Selfish Mining Analysis in Efficient Proof Systems Blockchains.*
Krishnendu Chatterjee, Amirali Ebrahim-Zadeh, Mehrdad Karrabi, Krzysztof Pietrzak, Michelle Yeo, Đorđe Žikelić[†].
43rd ACM Symposium on Principles of Distributed Computing (**PODC 2024**)
6. *Quantitative Bounds on Resource Usage of Probabilistic Programs.*
Krishnendu Chatterjee, Amir Kafshdar Goharshady, Tobias Meggendorfer, Đorđe Žikelić[†].
ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (**OOPSLA 2024**)
7. *Compositional Policy Learning in Stochastic Control Systems with Formal Guarantees.*
Đorđe Žikelić*, Mathias Lechner*, Abhinav Verma, Krishnendu Chatterjee, Thomas A. Henzinger.
37th Conference on Neural Information Processing Systems (**NeurIPS 2023**)
8. *Learning Provably Stabilizing Neural Controllers for Discrete-Time Stochastic Systems.*
Matin Ansari Pour, Krishnendu Chatterjee, Thomas A. Henzinger, Mathias Lechner, Đorđe Žikelić[†].
21st International Symposium on Automated Technology for Verification and Analysis (**ATVA 2023**)
9. *Reachability Poorman Discrete-Bidding Games.*
Guy Avni, Tobias Meggendorfer, Suman Sadhukhan, Josef Tkadlec, Đorđe Žikelić[†].
26th European Conference on Artificial Intelligence (**ECAI 2023**)
10. *MDPs as Distribution Transformers: Affine Invariant Synthesis for Safety Objectives.*
S. Akshay, Krishnendu Chatterjee, Tobias Meggendorfer, Đorđe Žikelić[†].
35th International Conference on Computer Aided Verification (**CAV 2023**)
11. *A Learner-Verifier Framework for Neural Network Controllers and Certificates of Stochastic Systems.* (invited)
Krishnendu Chatterjee, Thomas A. Henzinger, Mathias Lechner, Đorđe Žikelić[†].
29th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (**TACAS 2023**)
12. *Learning Control Policies for Stochastic Systems with Reach-avoid Guarantees.*
Đorđe Žikelić*, Mathias Lechner*, Krishnendu Chatterjee, Thomas A. Henzinger.
37th AAAI Conference on Artificial Intelligence (**AAAI 2023**), **oral presentation**
13. *Quantization-aware Interval Bound Propagation for Training Certifiably Robust Quantized Neural Networks.*
Mathias Lechner, Đorđe Žikelić, Krishnendu Chatterjee, Thomas A. Henzinger, Daniela Rus.
37th AAAI Conference on Artificial Intelligence (**AAAI 2023**), **oral presentation**
14. *Bidding Graph Games with Partially-Observable Budgets.*
Guy Avni, Ismaël Jecker, Đorđe Žikelić[†].
37th AAAI Conference on Artificial Intelligence (**AAAI 2023**), **oral presentation**
15. *Algorithms and Hardness Results for Computing Cores of Markov Chains.*
Ali Ahmadi, Krishnendu Chatterjee, Amir Kafshdar Goharshady, Tobias Meggendorfer, Roodabeh Safavi, Đorđe Žikelić[†].
42nd IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (**FSTTCS 2022**)
16. *Sound and Complete Certificates for Quantitative Termination Analysis of Probabilistic Programs.*
Krishnendu Chatterjee, Amir Kafshdar Goharshady, Tobias Meggendorfer, Đorđe Žikelić[†].
34th International Conference on Computer Aided Verification (**CAV 2022**)
17. *Differential Cost Analysis with Simultaneous Potentials and Anti-potentials.*
Đorđe Žikelić, Bor-Yuh Evan Chang, Pauline Bolignano, Franco Raimondi.
44th ACM SIGPLAN Conference on Programming Language Design and Implementation (**PLDI 2022**)
Featured in the Amazon Science blog
18. *Stability Verification in Stochastic Control Systems via Neural Network Supermartingales.*
Mathias Lechner*, Đorđe Žikelić*, Krishnendu Chatterjee, Thomas A. Henzinger.
36th AAAI Conference on Artificial Intelligence (**AAAI 2022**), **oral presentation**
19. *Infinite Time Horizon Safety of Bayesian Neural Networks.*
Mathias Lechner*, Đorđe Žikelić*, Krishnendu Chatterjee, Thomas A. Henzinger.
35th Conference on Neural Information Processing Systems (**NeurIPS 2021**)
20. *On Lexicographic Proof Rules for Probabilistic Termination.*
Krishnendu Chatterjee, Ehsan Kafshdar Goharshady, Petr Novotný, Jiří Závěručky, Đorđe Žikelić[†].
24th International Symposium on Formal Methods (**FM 2021**)
Invited to the Special Collection from FM 2021, dedicated to best papers

21. *Proving Non-termination by Program Reversal*.
Krishnendu Chatterjee, Ehsan Kafshdar Goharshady, Petr Novotný, Đorđe Žikelić[†].
43rd ACM SIGPLAN Conference on Programming Language Design and Implementation (**PLDI 2021**)
22. *Scalable Verification of Quantized Neural Networks*.
Thomas A. Henzinger, Mathias Lechner, Đorđe Žikelić[†].
35th AAAI Conference on Artificial Intelligence (**AAAI 2021**)
23. *Infinite-Duration All-Pay Bidding Games*.
Guy Avni, Ismaël Jecker, Đorđe Žikelić[†].
ACM-SIAM Symposium on Discrete Algorithms (**SODA 2021**)
24. *Bidding Mechanisms in Graph Games*.
Guy Avni, Thomas A. Henzinger, Đorđe Žikelić[†].
44th International Symposium on Mathematical Foundations of Computer Science (**MFCS, 2019**)
25. *Optimizing Expectation with Guarantees in POMDPs*.
Krishnendu Chatterjee, Petr Novotný, Guillermo A. Perez, Jean-Francois Raskin, Đorđe Žikelić[†].
31st AAAI Conference on Artificial Intelligence (**AAAI, 2017**)
26. *Stochastic invariants for probabilistic termination*.
Krishnendu Chatterjee, Petr Novotný, Đorđe Žikelić[†].
44th ACM SIGPLAN Symposium on Principles of Programming Languages (**POPL, 2017**)

Journal publications

1. *On Lexicographic Proof Rules for Probabilistic Termination*.
Krishnendu Chatterjee, Ehsan Kafshdar Goharshady, Petr Novotný, Jiří Závěručky, Đorđe Žikelić[†].
Formal Aspects of Computing, Vol. 35, Issue 2 (**FAC 2023**)
2. *Social balance on networks: Local minima and best-edge dynamics*.
Krishnendu Chatterjee, Jakub Svoboda, Đorđe Žikelić, Andreas Pavlogiannis, Josef Tkadlec.
Physical Review E, Vol. 106, No. 3 (**PRE 2022**)
3. *Bidding Mechanisms in Graph Games*.
Guy Avni, Thomas A. Henzinger, Đorđe Žikelić[†].
Journal of Computer and System Sciences, Vol. 119 (**JCSS, 2021**)
4. *Theorems about quadrilaterals and conics*.
Đorđe Baralić, Branko Grbić, Đorđe Žikelić[†].
International Journal of Computer Mathematics 91 (7) (**Int. J. Comput. Math., 2014**)

Workshop publications

1. *Learning Stabilizing Policies in Stochastic Control Systems*.
Đorđe Žikelić*, Mathias Lechner*, Krishnendu Chatterjee, Thomas A. Henzinger.
ICLR 2022 Workshop on Socially Responsible Machine Learning (**SRML@ICLR 2022**)

HONOURS AND AWARDS

Outstanding PhD Thesis	2024
Awarded annually for best PhD theses by the Institute of Science at Technology Austria.	
Outstanding Scientific Achievement	2023
Together with Mathias Lechner, for our work on developing a framework for learning and verifying neural controllers in stochastic dynamical systems. Awarded annually by the Institute of Science at Technology Austria.	
Meta PhD Research Fellowship - finalist	2022
Shortlisted as one of the 4 finalists for the programming languages category.	
Gonville & Caius College Scholarship and Cambridge Trust Scholarship	2014-2018
Full university fees, tuition fees, and maintenance costs.	
Stephen Hawking Fund Award	2017
Awarded by Gonville & Caius College, Cambridge to mathematics students proceeding to Part III.	
Scholar of the Gonville & Caius College, Cambridge	2015, 2016
High performance in the examinations of the Mathematical Tripos.	

International High School Olympiads

2010-2014

Participated in international high school olympiads in mathematics, physics, and astronomy. Most notable results:

- International Olympiad in Astronomy and Astrophysics (IOAA) 2014 (bronze medal)
- International Mathematical Competition Arhimede 2013 (gold medal), 2012 (silver medal)
- International Junior Science Olympiad (IJSO) 2010 (bronze medal)
- International Astronomy Olympiad (IAO) 2010 (bronze medal)
- International Mathematical Olympiad (IMO) 2014 (first reserve for the Serbian team)

National High School Competitions

2010-2014

- Serbian Mathematical Olympiad: second prize in 2014, third prize in 2013, 2012
- Mathematics (national): **first overall** in my year in 2014, 2012, 2010, **second overall** in 2013
- Physics (national): first prize in 2013, second prize in 2012, 2011, third prize in 2014
- Astronomy (national): second prize in 2014, 2012

GRANTS

- *Formal Methods for Safe and Trustworthy Probabilistic Systems*

2023

SMU Internal Grant, Ministry of Education (MOE) Tier 1, PI (Project Level): S\$90,244

TEACHING

Teaching at SMU

- CS423: Heuristic Search and Optimisation

Term 2, 2024

Overall course rating: **6.6/7**

Overall instructor rating: **6.8/7** (highest student rating across all non-compulsory courses in the School)

Teaching at ISTA

- Computer Science Track Core Course, TA

Spring, 2021

- Formal Methods, TA

Spring, 2020

- Computer Science Track Core Course, TA

Spring, 2020

- Mathematics Track Core Course, 4 lectures on Brownian motion and aspects of probability

Spring, 2019

SUPERVISION

Supervision of visiting students and interns at SMU

- Pouya Sadeghi, University of Tehran

Aug 2024 - Feb 2024

Learning-based Control with Guarantees

- Ouldouz Neysari, University of Tehran

Jul 2024 - Jan 2025

Policy Verification and Synthesis in MDPs for Distributional Properties

- Maaruni Pandithurai, SMU

May 2024 - Jul 2024

Safe Reinforcement Learning under Probabilistic Constraints

- Sarah Ann Hogan, SMU

May 2024 - Jul 2024

Safe Reinforcement Learning under Probabilistic Constraints

Supervision of interns at ISTA

- Amirali Ebrahim-zadeh, Sharif University

Summer 2022

Analyzing Selfish Mining in Proof of Space-based Blockchain Protocols (PODC 2024)

- Matin Ansaripour, Sharif University

Spring 2022

Learning Control Policies for Region Stabilization in Stochastic Systems (ATVA 2023)

- Roodabeh Safavi, Sharif University

Spring 2022

Algorithms and Hardness Results for Computing Cores of Markov Chains (FSTTCS 2022)

- Ehsan Kafshdar Goharshady, Ferdowsi University of Mashhad

Summer 2020

Proving Non-termination by Program Reversal (PLDI 2021)

On Lexicographic Proof Rules for Probabilistic Termination (FM 2021)

SERVICE

- Program Committee:

2025: AAAI 2025, VMCAI 2025

2024: AAAI 2024, IJCAI 2024, ECAI 2024, ATVA 2024, SETTA 2024

2023: AAAI 2023, ECAI 2023, CAV AEC 2023

2022: CAV AEC 2022

- Reviewer/Subreviewer/External Reviewer: LICS 2024, TACAS 2024, POPL 2024, ISSAC 2024, FSTTCS 2023, CONCUR 2023, CDC 2023, ATVA 2023, LPAR 2023, FoSSaCS 2022, AAMAS 2022, ICML 2022

INVITED TALKS

-
- Hong Kong University of Science and Technology, Hong Kong, China July 2024
Neural Controller Synthesis and Verification with Guarantees
 - East China Normal University, Shanghai, China July 2024
Trustworthy AI through Neural Certificates, Runtime Monitoring, and Multi-Agent Reasoning
(invited lecture) 20th International Summer School on Trustworthy Software, together with Tom Henzinger
 - IIT Bombay, Mumbai, India May 2024
A Learner-verifier Framework for Certifying Neural Controllers in Stochastic Systems
 - National University of Singapore, Singapore, Singapore May 2024
A Learner-verifier Framework for Certifying Neural Controllers in Stochastic Systems
 - Mathematical Institute of the Serbian Academy of Science and Arts, Belgrade, Serbia Dec 2023
A Learner-verifier Framework for Learning and Certifying Neural Controllers (in Serbian)
 - École Normale Supérieure, Paris, France Jul 2023
A Learner-verifier Framework for Learning and Certifying Neural Controllers in Stochastic Systems
 - (keynote) The Workshop on Verification of Probabilistic Programs (VeriProP), Paris, France Jul 2023
A Learner-verifier Framework for Learning and Certifying Neural Controllers in Stochastic Systems
 - Nissan Research, virtual Jun 2023
A Learner-verifier Framework for Learning and Certifying Neural Controllers in Stochastic Systems
 - TU Delft, Delft, Netherlands Jun 2023
Formal Verification and Learning-based Control of Infinite State Stochastic Systems
 - Masaryk University, Brno, Czech Republic Jun 2023
Formal Verification and Learning-based Control of Infinite State Stochastic Systems
 - ETH Zürich, Zürich, Switzerland Apr 2023
Formal Verification and Learning-based Control of Infinite State Stochastic Systems
 - INSAIT, Sofia, Bulgaria (virtual) Apr 2023
Formal Verification and Learning-based Control of Infinite State Stochastic Systems
 - Singapore Management University, Singapore, Singapore Feb 2023
Formal Verification and Learning-based Control of Infinite State Stochastic Systems
 - National University of Singapore, Singapore, Singapore Feb 2023
Formal Verification and Learning-based Control of Infinite State Stochastic Systems
 - EPFL, Lausanne, Switzerland Jul 2022
Martingale-based Methods for Formal Verification and Certified Control of Stochastic Systems
 - Masaryk University, Brno, Czech Republic Apr 2022
Proving Non-termination by Program Reversal
 - Infer Practitioners Workshop, virtual Jun 2021
Differential Cost Analysis with Infer and Possible Extensions for Concrete Cost Analysis
 - Mathematical Institute of the Serbian Academy of Science and Arts, Belgrade, Serbia Dec 2019
Static Analysis of Probabilistic Programs with Martingales (in Serbian)

CONFERENCE PRESENTATIONS

-
- IJCAI 2024, Jeju, South Korea Aug 2024
Certified Policy Verification and Synthesis for MDPs under Distributional Reach-Avoidance Properties
 - Konferencija Veštačka Inteligencija, Belgrade, Serbia Dec 2023
A Learner-verifier Framework for Learning and Certifying Neural Controllers (in Serbian)
 - ATVA 2023, Singapore, Singapore Oct 2023
Learning Provably Stabilizing Neural Controllers for Discrete-Time Stochastic Systems
 - Highlights 2023, Kassel, Germany Jul 2023
MDPs as Distribution Transformers: Affine Invariant Synthesis for Safety Objectives
 - CAV 2023, Paris, France Jul 2023
MDPs as Distribution Transformers: Affine Invariant Synthesis for Safety Objectives
 - AAI 2023, Washington, D.C., US Feb 2023
Learning Control Policies for Stochastic Systems with Reach-Avoid Guarantees
Bidding Graph Games with Partially-Observable Budgets
 - Formal Reasoning Enthusiasts (FReE) Workshop at Amazon, Boston, US Oct 2022
Differential cost analysis with simultaneous potentials and anti-potentials

- CAV 2022, Haifa, Israel Aug 2022
Sound and Complete Certificates for Quantitative Termination Analysis of Probabilistic Programs
- PLDI 2022, San Diego, US Jun 2022
Differential Cost Analysis with Simultaneous Potentials and Anti-potentials
- AAAI 2022, virtual Feb 2022
Stability Verification in Stochastic Control Systems via Neural Network Supermartingales
- NeurIPS 2021, virtual Dec 2021
Infinite Time Horizon Safety of Bayesian Neural Networks
- FM 2021, virtual Nov 2021
On Lexicographic Proof Rules for Probabilistic Termination
- PLDI 2021, virtual Jun 2021
Proving Non-termination by Program Reversal
- MFCS 2019, Aachen, Germany Aug 2019
Infinite-duration All-pay Bidding Games

ORGANIZATION

- Co-organized **Young Scientist Symposium 2019** at ISTA May, 2019
- President of the **Cambridge University Serbian Society** 2017-2018