Mirco Giacobbe

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Zeroth Research
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Areas of Specialization

Automated Verification of Software and Cyber-physical Systems, Formal Methods for Safe Artificial Intelligence, Machine Learning for Formal Verification and Control

Education

2019 PhD in Computer Science, Institute of Science and Technology Austria (ISTA)
2012 MSc in Embedded Systems, University of Trento
2012 MSc in Software Systems Engineering, RWTH Aachen University
2010 BSc in Computer Science, University of Trento

Employment

Jun 2025–current Co-founder & CEO, Zeroth Research
Feb 2025–current Associate Professor, School of Computer Science, University of Birmingham
Sep 2021–Jan 2025 Assistant Professor, School of Computer Science, University of Birmingham
Oct 2019–Aug 2021 Research Associate, Department of Computer Science, University of Oxford
Sep 2013–Sep 2019 PhD Student, Tom Henzinger Group, ISTA
Feb 2013–Aug 2013 Research Assistant, Embedded Systems Unit, FBK

Grants & Awards

2025 Grant, *Formal Certification Technologies for AI Safety Verification*, AISTOF
2025 Grant, *Automated Reasoning Technologies for AI Safety Verification*, ARIA
2025 Grant, *Hardware-level AI Safety Verification*, ARIA
2025 Amazon Research Award, *Neural Software Verification*, Amazon
2025 Grant, *Privacy-preserving AI Safety Verification* ARIA
2025 Grant, *Safeguarded AI-enabled Biopharmaceutical Manufacturing*, ARIA
2024 Grant, *Supermartingale Certificates for Temporal Logic Verification and Control*, ARIA
2015 Best Paper Award, ETAPS EASST

2013 Merit Award, University of Trento
2011 Erasmus Mundus Scholarship, European Master in Informatics

Research Group

Doctoral Students

Jacob Swales (co-supervised with Pascal Berrang)
Daniel Eduardo Contro
Sam Robbins (co-supervised with Leonardo Stella)
Abhinandan Pal

Postdoctoral Researchers

Edwin Hamel-de le Court
Grigory Neustroev
Adam Szekely
Gokhan Tut
Xiao Yang
Diptarko Roy

Alumni

Amrita Suresh, now at CDMA
Ayberk Tosun, now at Zeroth Research

Research Projects

Autumn 2025 PI, *Neural Software Verification*, funded by Amazon
Sep 2025–current Co-PI, *Hardware-level AI Safety Verification*, joint project with Edoardo Manino (University of Manchester), funded by ARIA
Jul 2025–current PI, *Automated Reasoning Technologies for AI Safety Verification*, joint project with Luca Arnaboldi and Pascal Berrang (Zeroth Research) and FBK, funded by ARIA
May 2025–current Co-PI, *Privacy-preserving AI Safety Verification*, joint project with Pascal Berrang (University of Birmingham), funded by ARIA
Feb 2025–current Co-PI, *Safeguarded AI-Enabled Biopharmaceutical Manufacturing*, joint project with Leonardo Stella (University of Birmingham) and AstraZeneca, funded by ARIA
Sep 2024–current PI, *Supermartingale certificates for temporal logic verification and control*, funded by ARIA
Sep 2024–Sep 2025 Co-I, *Hyper-optimised tensor network contraction for neural network verification*, joint project with Stefano Gogioso (Hashberg), funded by ARIA
Oct 2019–Aug 2021 Researcher, *High-Integrity, Complex, Large, Software and Electronic Systems* (HICLASS), funded by Innovate UK

Publications

Refereed Conference Papers

[c1] A. Abate, M. Giacobbe, C. Micheletti, and Y. Schnitzer, "Branching bisimulation learning," in *CAV*, 2025.

[c2] A. Abate, M. Giacobbe, and D. Roy, "Quantitative supermartingale certificates," in *CAV*, 2025.

[c3] M. Giacobbe, D. Kroening, A. Pal, and M. Tautschnig, "Let a neural network be your invariant," in *NeurIPS*, 2025.

[c4] G. Neustroev, M. Giacobbe, and A. Lukina, "Neural continuous-time supermartingale certificates," in *AAAI*, AAAI Press, 2025.

[c5] S. Robbins, M. Giacobbe, and L. Stella, "Feedback-evolving mean-field games," in *CDC*, IEEE, 2025.

[c6] A. Abate, M. Giacobbe, and D. Roy, "Stochastic omega-regular verification and control with supermartingales," in *CAV*, 2024.

[c7] A. Abate, M. Giacobbe, and Y. Schnitzer, "Bisimulation learning," in *CAV*, 2024.

[c8] M. Giacobbe, D. Kroening, A. Pal, and M. Tautschnig, "Neural model checking," in *NeurIPS*, 2024.

[c9] A. Abate, A. Edwards, M. Giacobbe, H. Punchihewa, and D. Roy, "Quantitative verification with neural networks," in *CONCUR*, Schloss Dagstuhl, 2023.

[c10] A. Edwards, M. Giacobbe, and A. Abate, "On the trade-off between efficiency and precision of neural abstraction," in *QEST*, Springer, 2023.

[c11] A. Abate, A. Edwards, and M. Giacobbe, "Neural abstractions," in *NeurIPS*, 2022.

[c12] M. Giacobbe, D. Kroening, and J. Parsert, "Neural termination analysis," in *ESEC/SIGSOFT FSE*, ACM, 2022.

[c13] A. Abate, D. Ahmed, A. Edwards, M. Giacobbe, and A. Peruffo, "FOSSIL: a software tool for the formal synthesis of Lyapunov functions and barrier certificates using neural networks," in *HSCC*, ACM, 2021.

[c14] A. Abate, M. Giacobbe, and D. Roy, "Learning probabilistic termination proofs," in *CAV (2)*, Springer, 2021.

[c15] E. Bacci, M. Giacobbe, and D. Parker, "Verifying reinforcement learning up to infinity," in *IJCAI*, ijcai.org, 2021.

[c16] M. Giacobbe, M. Hasanbeig, D. Kroening, and H. Wijk, "Shielding Atari games with bounded prescience," in *AAMAS*, ACM, 2021.

[c17] M. Giacobbe, T. A. Henzinger, and M. Lechner, "How many bits does it take to quantize your neural network?" In *TACAS (2)*, Springer, 2020.

[c18] G. Frehse, M. Giacobbe, and T. A. Henzinger, "Space-time interpolants," in *CAV (1)*, Springer, 2018.

[c19] S. Bogomolov, G. Frehse, M. Giacobbe, and T. A. Henzinger, "Counterexample-guided refinement of template polyhedra," in *TACAS (1)*, 2017.

[c20] S. Bogomolov, M. Giacobbe, T. A. Henzinger, and H. Kong, "Conic abstractions for hybrid systems," in *FORMATS*, Springer, 2017.

[c21] M. Giacobbe, C. C. Guet, A. Gupta, T. A. Henzinger, T. Paixão, and T. Petrov, "Model checking gene regulatory networks," in *TACAS*, Springer, 2015, ETAPS EASST Best Paper Award.

[c22] S. Biallas, M. Giacobbe, and S. Kowalewski, "Predicate abstraction for programmable logic controllers," in *FMICS*, Springer, 2013.

Refereed Journal Papers

[j1] Y. Gao, A. Abate, F. J. Jiang, M. Giacobbe, L. Xie, and K. H. Johansson, "Temporal logic trees for model checking and control synthesis of uncertain discrete-time systems," *IEEE Trans. Autom. Control.*, 2022.

[j2] A. Abate, D. Ahmed, M. Giacobbe, and A. Peruffo, "Formal synthesis of Lyapunov Neural Networks," *IEEE Control. Syst. Lett.*, 2021.

Invited Papers & Special Issues

[j3] A. Abate, M. Giacobbe, D. Roy, and Y. Schnitzer, "Model checking and strategy synthesis with abstractions and certificates," in *Principles of Verification (2)*, Springer, 2025.

[j4] G. Frehse, M. Giacobbe, and E. Zaffanella, "Symbolic analysis of linear hybrid automata - 25 years later," in *Principles of Systems Design*, Springer, 2022.

[j5] R. Alur, M. Giacobbe, T. A. Henzinger, K. G. Larsen, and M. Mikucionis, "Continuous-time models for system design and analysis," in *Computing and Software Science*, Springer, 2019.

[j6] M. Giacobbe, C. C. Guet, A. Gupta, T. A. Henzinger, T. Paixão, and T. Petrov, "Model checking the evolution of gene regulatory networks," *Acta Inf.*, 2017.

Software

FOSSIL: a neuro-symbolic synthesiser for Lyapunov functions and barrier certificates.
nuXmv: a symbolic model checker for finite- and infinite-state models.
Arcade.PLC: a verification platform for programmable logic controllers.

Teaching

Spring 2024 Lecturer, Data Structures, Algorithms & Databases, University of Birmingham
Fall 2023 Module lead, Computer-aided Verification, University of Birmingham
Spring 2023 Lecturer, Data Structures, Algorithms & Databases, University of Birmingham
Fall 2022 Module lead, Computer-aided Verification, University of Birmingham
Spring 2022 Lecturer, Data Structures, Algorithms & Databases, University of Birmingham
Fall 2021 Lecturer, Systems Programming, University of Birmingham

Fall 2020 Tutor, Probabilistic Model Checking, University of Oxford
Spring 2015 Teaching assistant, Advanced Topics in Formal Methods, ISTA

Advising

BSc project supervisor at the University of Birmingham for David Butler (2021), Omar Lamrani (2021), Joseph Tebbett (2021), Xuanwei Xu (2021), Stephen Holmes (2022), Haibin Wang (2022), Abdul Mirza (2023), Matthew Shaw (2023), Christopher Upton (2023), Holly Packer (2024), Ryan Bendall (2024), Muhammmad Aqil Bin (2024), Haotian Sun (2024)

MSc project supervisor at the University of Birmingham for Haoran Wang (2022), Yicong Li (2022), Kiran Ramani (2022), Honghao Zheng (2022), Ziqi Li (2023), Haozhe Xuan (2023), Oscar Guarnizo Cabezas (2024), Anbumathi Chinnasamy (2024), Jian Jiao (2024), Krithika Sadhasivan (2024), Abhiroop Sarkar (2024), Sazwan Ahamad Sheik (2024)

MSc project co-supervisor at the University of Oxford for Vlad-Stefan Bercovici (jointly with Alessandro Abate, 2023), Yannik Schnitzer (jointly with Alessandro Abate, 2023), Hashan Punchihewa (jointly with Alessandro Abate, 2022), Diptako Roy (jointly with Alessandro Abate, 2020), Hjalmar Wijk (jointly with Daniel Kroening, 2020)

Doctoral co-advisor at the University of Oxford for Diptarko Roy (jointly with Alessandro Abate), Alec Edwards (jointly with Alessandro Abate), Julian Parsert (jointly with Daniel Kroening)

MSc project co-supervisor at the University of Padua for Daniel Eduardo Contro (jointly with Alessandro Abate, 2024), Christian Micheletti (jointly with Alessandro Abate, 2024)

Professional Service

Conference Organization

2026 Logic Lounge Host, Federated Logic Conferences (FLoC)
2025 Program Chair, International Symposium on AI Verification (SAIV)
2024 Program Chair, International Symposium on AI Verification (SAIV)
2024 Artifact Evaluation Chair, International Conference on Computer-aided Verification (CAV)
2021–2023 Program Chair, International Workshop on Open Problems in Learning and Verification of Neural Networks (WOLVERINE)
2016 Registration & Travel Grants Officer, Cyber-physical Systems Week (CPSWeek)

Steering Committees

2024–current International Symposium of AI Verification (SAIV), Co-Founder
2021–2023 International Workshop on Open Problems in Learning and Verification of Neural Networks (WOLVERINE), Co-Founder

Program Committees

2026 International Conference on Computer-aided Verification (CAV)
2026 AAAI Conference on Artificial Intelligence (AAAI)
2026 Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)
2025 Artificial Intelligence and Formal Verification, Logic, Automata, and Synthesis (OVERLAY)
2025 Conference on Neural Information Processing (NeurIPS)
2025 International Joint Conference on Artificial Intelligence (IJCAI)
2025 International Conference on Computer-aided Verification (CAV)
2025 AAAI Conference on Artificial Intelligence (AAAI)
2024 European Conference on Artificial Intelligence (ECAI)
2024 International Conference on Computer-aided Verification (CAV)
2024 International Joint Conference on Artificial Intelligence (IJCAI)
2024 IFAC Conference on Analysis and Design of Hybrid Systems (ADHS)
2024 ACM International Conference on Hybrid Systems: Computation and Control (HSCC)
2024 AAAI Conference on Artificial Intelligence (AAAI)
2023 International Joint Conference on Artificial Intelligence (IJCAI)
2023 AAAI Conference on Artificial Intelligence (AAAI)
2023 Internation Symposium on Model Checking Software (SPIN)
2022 International Joint Conference on Artificial Intelligence (IJCAI)
2022 Conference on Formal Modeling and Analysis of Real Time Systems (FORMATS)
2021 Repeatability Evaluation of Conference on Quantitative Evaluation of Systems (QEST)
2021 Workshop on Numerical Software Verification (NSV)
2017 Repeatability Evaluation of Conf. on Hybrid Systems: Computation and Control (HSCC)
2016 Workshop on Numerical Software Verification (NSV)

Other Review Activity

Conference on Decision and Control (CDC) 2020; Conference on Hybrid Systems: Computation and Control (HSCC) 2020, 2021; Conference on Formal Modelling and Analysis of Timed Systems (FORMATS) 2017; Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS) 2016, 2017, 2020; Conference on Cyber-Physical Systems, Networks, and Applications (CPSNA) 2016; Conference of Computational Methods for Systems Biology (CMSB) 2015; International Conference on Computer-Aided Verification (CAV) 2015, 2021; European Conference on Artificial Intelligence (ECAI) 2020; Information and Computation (Journal) 2019, 2021, 2025; Workshop on Numerical Software Verification (NSV) 2015; Workshop on Quantitative Aspects of Programming Languages and Systems (QAPL) 2015;

Administrative Service

2023-2024 Director of PGR Admission, School of Computer Science, University of Birmingham
2022-2024 Founder *&* coordinator, *Facts and Snacks* series of interdisciplinary research seminars, School of Computer Science, University of Birmingham
2022-2024 Apprenticeship Tutor, School of Computer Science, University of Birmingham

2021-2023 MSc Admissions Officer, School of Computer Science, University of Birmingham
2015-2018 Treasurer, Graduate School Association, ISTA