Curriculum Vitae

Kaushik Mallik

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Address:	ISTA, Am Campus 1, 3400 Klosterneuburg, Austria.	**Emails:**	kaushik.mallik@ist.ac.at kmallik314@gmail.com
Web:	`https://kmallik.github.io/`	**Skype ID:**	kaushik_mallik

Areas of Research

Formal verification and control of cyber-physical systems

Reactive synthesis, games on graphs

Algorithmic fairness in AI

Employment

July 2022–present	Postdoctoral researcher, Institute of Science and Technology Austria (ISTA), Austria. Advisor: Thomas A. Henzinger.

Education

June 2022	PhD in Computer Science (with *summa cum laude*), Max Planck Institute for Software Systems (MPI-SWS), Germany. Advisor: Rupak Majumdar. (Degree granted by: TU Kaiserslatuern, Germany.)
June 2015	M. Tech in System and Control (with distinction), Indian Institute of Technology Roorkee, India.
July 2012	B. Tech in Electrical Engineering, Meghnad Saha Institute of Technology, India.

Academic Internships

Sep 2019–Nov 2019	University of California, Berkeley, USA. Advisor: Claire Tomlin.
Oct 2015–Dec 2015	MPI-SWS, Germany. Advisors: Rupak Majumdar and Anne-Kathrin Schmuck.
Sep 2014–Mar 2015	TU-Berlin, Germany. Advisors: Jörg Raisch and Anne-Kathrin Schmuck.

Awards and Fellowships

ETAPS Association	2023 ETAPS Best Dissertation Award.
IIT Roorkee	Late Smt. Uma Goyal W/O Sri Uday Shankar Goyal Memorial Cash Prize, *merit-based*.
DAAD Germany	IIT Master Sandwich Scholarship.
MHRD India	Master's fellowship, *merit-based*.
MHRD India	Bachelor's fellowship, *merit-based*.

Invited Talks

April 2022	*A Direct Symbolic Algorithm for Solving Stochastic Rabin Games* (remote), Host: Sadegh Soudjani, Newcastly University, UK.
May 2021	*A Negotiation Framework for Distributed Reactive Synthesis*, Workshop: Games and Equilibria in System Design and Analysis, Simons Institute for the Theory of Computing, Berkeley, USA.
August 2019	*Lazy Multi-Layered Controller Synthesis for Safety Specification*, Host: Sanjit Seshia, UC Berkeley, USA.

Tool Development

Genie	Abstract solver for Rabin games.
Fairsyn	Solver for ω-regular fair-adversarial games on finite graphs.
Mascot-SDS	Verified control of stochastic dynamical systems.
Mascot	Lazy abstraction-based controller design.
Agnes	Modular synthesis using negotiation.

Mentored Bachelor's/Master's Students

5. Mahyar Karimi, ISTA, 2022.
4. Mateusz Rychlicki, MPI-SWS, 2021.
3. Tamajit Banerjee, MPI-SWS, 2021.
2. Mehrdad Zareian, MPI-SWS, 2020.
1. Kyle Hsu, MPI-SWS, 2017.

Mentored Phd Students

3. Mahyar Karimi, ISTA, 2023–present.
2. Ehsan Goharshady, ISTA, 2023.
1. Konstantin Kueffner, ISTA, 2022–present.

Teaching

Summer 2019 (TA)	Logic and Verification Seminar (master's level).
Winter 2017-18 (TA)	Complexity Theory (master's level).

Other Professional Roles

Conference committee	HSCC Posters/Demos 2021, TACAS Artefact Evaluation Committee 2024.
Journal review	Automatica (2023), Elsevier NAHS (2020-21, 2023×2), IEEE L-CSS (2020, 2023×2), Wiley RNC (2023), IEEE OJ-CSYS (2022), IEEE TAC (2018), SIAM SICON (2018), Springer DEDS (2018).
Conference review	ECC 2022, CDC 2017-20, ACC 2019, ECC 2019.
Conference sub-review	FoSSaCS 2024, FSTTCS 2020, HSCC 2018-19, ATVA 2019, CAV 2019.

Journal Publications:

[1] Rupak Majumdar, Kaushik Mallik, Anne-Kathrin Schmuck, and Sadegh Soudjani. "Symbolic control for stochastic systems via finite parity games". In: *Nonlinear Analysis: Hybrid Systems* 51 (2024), p. 101430.

[2] Tamajit Banerjee, Rupak Majumdar, Kaushik Mallik, Anne-Kathrin Schmuck, and Sadegh Soudjani. "Fast Symbolic Algorithms for Omega-Regular Games under Strong Transition Fairness". In: *TheoretiCS* 2 (2023).

[3] Rupak Majumdar, Kaushik Mallik, Anne-Kathrin Schmuck, and Damien Zufferey. "Assume-Guarantee Distributed Synthesis". In: *IEEE Trans. Comput. Aided Des. Integr. Circuits Syst.* 39.11 (2020), pp. 3215–3226.

[4] Kaushik Mallik, Anne-Kathrin Schmuck, Sadegh Soudjani, and Rupak Majumdar. "Compositional Synthesis of Finite-State Abstractions". In: *IEEE Trans. Autom. Control.* 64.6 (2019), pp. 2629–2636.

[5] Srikumar Mallik, Kaushik Mallik, Amal Barman, Dipten Maiti, Sujit K. Biswas, Nirmal K. Deb, and Sujay Basu. "Efficiency and Cost Optimized Design of an Induction Motor Using Genetic Algorithm". In: *IEEE Trans. Ind. Electron.* 64.12 (2017), pp. 9854–9863.

Conference Publications:

[6] Ashwani Anand, Kaushik Mallik, Satya Prakash Nayak, and Anne-Kathrin Schmuck. "Computing Adequately Permissive Assumptions for Synthesis". In: *TACAS (2)*. Vol. 13994. Lecture Notes in Computer Science. Springer, 2023, pp. 211–228.

[7] Thomas A. Henzinger, Mahyar Karimi, Konstantin Kueffner, and Kaushik Mallik. "Monitoring Algorithmic Fairness". In: *CAV (2)*. Vol. 13965. Lecture Notes in Computer Science. Springer, 2023, pp. 358–382.

[8] Thomas A. Henzinger, Mahyar Karimi, Konstantin Kueffner, and Kaushik Mallik. "Runtime Monitoring of Dynamic Fairness Properties". In: *FAccT*. ACM, 2023, pp. 604–614.

[9] Thomas A. Henzinger, Konstantin Kueffner, and Kaushik Mallik. "Monitoring Algorithmic Fairness Under Partial Observations". In: *RV*. Vol. 14245. Lecture Notes in Computer Science. Springer, 2023, pp. 291–311.

[10] Rupak Majumdar, Kaushik Mallik, Mateusz Rychlicki, Anne-Kathrin Schmuck, and Sadegh Soudjani. "A Flexible Toolchain for Symbolic Rabin Games under Fair and Stochastic Uncertainties". In: *CAV (3)*. Vol. 13966. Lecture Notes in Computer Science. Springer, 2023, pp. 3–15.

[11] Rupak Majumdar, Kaushik Mallik, Mateusz Rychlicki, Anne-Kathrin Schmuck, and Sadegh Soudjani. "Poster Abstract: A Toolchain for Accelerated Symbolic Control". In: *HSCC*. ACM, 2023, 28:1–28:2.

[12] Tamajit Banerjee, Rupak Majumdar, Kaushik Mallik, Anne-Kathrin Schmuck, and Sadegh Soudjani. "A Direct Symbolic Algorithm for Solving Stochastic Rabin Games". In: *TACAS (2)*. Vol. 13244. Lecture Notes in Computer Science. Springer, 2022, pp. 81–98.

[13] Bernd Finkbeiner, Kaushik Mallik, Noemi Passing, Malte Schledjewski, and Anne-Kathrin Schmuck. "BOCoSy: Small but Powerful Symbolic Output-Feedback Control". In: *HSCC*. ACM, 2022, 24:1–24:11.

[14] Alessandro Abate, Henk A. P. Blom, Marc Bouissou, Nathalie Cauchi, Hassane Chraibi, Joanna Delicaris, Sofie Haesaert, Arnd Hartmanns, Mahmoud Khaled, Abolfazl Lavaei, Hao Ma, Kaushik Mallik, Mathis Niehage, Anne Remke, Stefan Schupp, Fedor Shmarov, Sadegh Soudjani, Adam Thorpe, Vlad Turcuman, and Paolo Zuliani. "ARCH-COMP21 Category Report: Stochastic Models". In: *ARCH@ADHS*. Vol. 80. EPiC Series in Computing. EasyChair, 2021, pp. 55–89.

[15] Rupak Majumdar, Kaushik Mallik, Mahmoud Salamati, Sadegh Soudjani, and Mehrdad Zareian. "Symbolic reach-avoid control of multi-agent systems". In: *ICCPS*. ACM, 2021, pp. 209–220.

[16] Rupak Majumdar, Kaushik Mallik, Anne-Kathrin Schmuck, and Sadegh Soudjani. "Symbolic Qualitative Control for Stochastic Systems via Finite Parity Games". In: *ADHS*. Vol. 54. IFAC-PapersOnLine 5. Elsevier, 2021, pp. 127–132.

[17] Yunjun Bai and Kaushik Mallik. "Accurate Abstractions for Controller Synthesis with Non-uniform Disturbances". In: *ICFEM*. Vol. 12531. Lecture Notes in Computer Science. Springer, 2020, pp. 297–307.

[18] Rupak Majumdar, Kaushik Mallik, and Sadegh Soudjani. "Symbolic controller synthesis for Büchi specifications on stochastic systems". In: *HSCC*. ACM, 2020, 14:1–14:11.

[19] Stanly Samuel, Kaushik Mallik, Anne-Kathrin Schmuck, and Daniel Neider. "Resilient Abstraction-Based Controller Design". In: *CDC*. IEEE, 2020, pp. 2123–2129.

[20] Stanly Samuel, Kaushik Mallik, Anne-Kathrin Schmuck, and Daniel Neider. "Resilient abstraction-based controller design". In: *HSCC*. ACM, 2020, 33:1–33:2.

[21] Yunjun Bai, Kaushik Mallik, Anne-Kathrin Schmuck, Damien Zufferey, and Rupak Majumdar. "Incremental Abstraction Computation for Symbolic Controller Synthesis in a Changing Environment". In: *CDC*. IEEE, 2019, pp. 6261–6268.

[22] Kyle Hsu, Rupak Majumdar, Kaushik Mallik, and Anne-Kathrin Schmuck. "Lazy Abstraction-Based Controller Synthesis". In: *ATVA*. Vol. 11781. Lecture Notes in Computer Science. Springer, 2019, pp. 23–47.

[23] Kyle Hsu, Rupak Majumdar, Kaushik Mallik, and Anne-Kathrin Schmuck. "Lazy Abstraction-Based Control for Safety Specifications". In: *CDC*. IEEE, 2018, pp. 4902–4907.

[24] Kyle Hsu, Rupak Majumdar, Kaushik Mallik, and Anne-Kathrin Schmuck. "Multi-Layered Abstraction-Based Controller Synthesis for Continuous-Time Systems". In: *HSCC*. ACM, 2018, pp. 120–129.

[25] Kaushik Mallik, Sadegh Esmaeil Zadeh Soudjani, Anne-Kathrin Schmuck, and Rupak Majumdar. "Compositional construction of finite state abstractions for stochastic control systems". In: *CDC*. IEEE, 2017, pp. 550–557.

[26] Kaushik Mallik and Anne-Kathrin Schmuck. "Supervisory controller synthesis for decomposable deterministic context free specification languages". In: *WODES*. IEEE, 2016, pp. 22–27.