

# Curriculum Vitae

Kaushik Mallik

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## Area of Research

Formal verification and control of continuous/discrete, stochastic/non-stochastic dynamical systems.

## Education

July 2016- present	Doctoral student (Computer Science), Max Planck Institute for Software Systems, Germany. Advisor: Rupak Majumdar.	
June 2015	M.Tech in System and Control, (first division with distinction, ranked first in the dept.), Department of Electrical Engineering, IIT Roorkee, India.	CGPA: 9.69/10.
July 2012	B.Tech in Electrical Engineering, Meghnad Saha Institute of Technology, India.	CGPA: 8.62/10.

## Academic Internships

Sep 2019–Nov 2019	University of California, Berkeley, USA. Advisor: Claire Tomlin. Topic: <i>Abstraction-based controller synthesis for black-box systems.</i>
Oct 2015–Dec 2015	MPI-SWS, Germany. Advisors: Rupak Majumdar and Anne-Kathrin Schmuck. Topic: <i>Compositional controller synthesis using finite abstractions.</i>
Sep 2014–Mar 2015	TU-Berlin, Germany. Advisors: Jörg Raisch and Anne-Kathrin Schmuck. Topic: <i>Compositional controller synthesis for discrete-event systems.</i>

## Awards and Scholarships

1. IIT Roorkee, Late Smt. Uma Goyal W/O Sri Uday Shankar Goyal Memorial cash prize for obtaining highest CGPA in M.Tech. in Electrical Engineering Department, 2015.
2. Deutscher Akademischer Austausch Dienst (DAAD) Germany, IIT Master Sandwich Scholarships for carrying out M.Tech dissertation in TU-Berlin, September 2014-March 2015.
3. Ministry of Human Resource Development (MHRD) India, for pursuing M.Tech, 2013-2015.
4. Ministry of Human Resource Development (MHRD) India, for outstanding result in Higher Secondary Examination, 2008.

## Invited Talk

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.

## List of Tools:

1. *Mascot-SDS*: Controller synthesis for discrete-time continuous-state stochastic dynamical systems.
2. *Mascot*: Lazy abstraction-based controller synthesis for continuous dynamical systems.
3. *Agnes*: Assume-guarantee distributed synthesis for interacting reactive systems.

## Highlights of Recent Publications:

(Complete list follows in the next page.)

1. *Fast Symbolic Algorithms for Omega-Regular Games under Strong Transition Fairness*, with T. Banerjee, R. Majumdar, A.-K. Schmuck, and S. Soudjani (available as technical report).
2. *Symbolic Control for Stochastic Systems via Finite Parity Games*, with R. Majumdar, A.-K. Schmuck, and S. Soudjani, ADHS '21 (extended version submitted to IEEE TAC and is available online).
3. *Assume-Guarantee Distributed Synthesis*, with R. Majumdar, A.-K. Schmuck, and D. Zufferey, EMSOFT '20.

## Teaching Experience:

Assisted in teaching the following courses:

- **Logic and Verification Seminar**, TU-Kaiserslautern, Summer 2019.
- **Complexity Theory**, TU-Kaiserslautern, Winter 2017-18.

## Supervised Bachelor's/Master's Students:

- Kyle Hsu, now at Stanford University, USA.
- Mehrdad Zareian, TU-Kaiserslautern, Germany.
- Tamajit Banerjee, IIT Delhi, India.
- Mateusz Rychlicki, University of Warsaw, Poland.

## Other Professional Roles:

- **PC member**: Posters/Demos in HSCC '21.
- **Conference reviewer**: CDC {2020, 2019, 2018, 2017}, ACC 2019, ECC 2019.
- **Conference sub-reviewer**: FSTTCS 2020, HSCC {2019, 2018}, ATVA 2019, CAV 2019.
- **Journal reviewer**: IEEE TAC (2018), IEEE L-CSS (2020), SIAM SICON (2018), Springer DECS (2018), Elsevier NAHS (2020, 2021).

**References:** available upon request.

## Complete List of Publications:

### Preprints:

1. *Fast Symbolic Algorithms for Omega-Regular Games under Strong Transition Fairness*, with T. Banerjee, R. Majumdar, A.-K. Schmuck, and S. Soudjani (available as technical report).
2. *Symbolic Control for Stochastic Systems via Finite Parity Games*, with R. Majumdar, A.-K. Schmuck, and S. Soudjani, ADHS '21 (extended version submitted to IEEE TAC and is available online).

### Journals and Book Chapters:

1. *Abstraction-Based Control Design (Lecture Notes)* with R. Majumdar and A.-K. Schmuck, Engineering Secure and Dependable Software Systems 53 (2019): 117.
2. *Compositional Synthesis of Finite-State Abstractions* with R. Majumdar, A.-K. Schmuck, and S. Soudjani, IEEE Transactions on Automatic Control, 2018.
3. *Efficiency and cost optimized design of an induction motor using genetic algorithm* with S. Mallik, A. Barman, D. Maiti, S. K. Biswas, N. K. Deb, and S. Basu, IEEE Transactions on Industrial Electronics, 2017.

### Invited Papers:

1. *Lazy Abstraction-Based Controller Synthesis* with K. Hsu, R. Majumdar, and A.-K. Schmuck, ATVA '19.

### Peer-reviewed Conferences and Workshops:

1. *Symbolic reach-avoid control of multi-agent systems* with R. Majumdar, M. Salamati, S. Soudjani, and M. Zareian, ICCPS '21.
2. *Assume-Guarantee Distributed Synthesis* with R. Majumdar, A.-K. Schmuck, and D. Zufferey, EMSOFT '20.
3. *Resilient Abstraction-Based Controller Design* with S. Samuel, A.-K. Schmuck, and D. Neider, CDC '20.
4. *Accurate Abstractions for Controller Synthesis with Non-uniform Disturbances* with Y. Bai, ICFEM '20.
5. *Symbolic Controller Synthesis for Büchi Specifications on Stochastic Systems* with R. Majumdar and S. Soudjani, HSCC '20 (was **nominated for the ACM SIGBED Best Paper Award**).
6. *Incremental Abstraction Computation for Symbolic Controller Synthesis in a Changing Environment* with Y. Bai, A.-K. Schmuck, D. Zufferey, and R. Majumdar, CDC '19.
7. *Lazy Abstraction-Based Control for Safety Specifications* with K. Hsu, R. Majumdar, and A.-K. Schmuck, CDC '18.
8. *Lazy Abstraction-Based Control for Reachability* with K. Hsu, R. Majumdar, and A.-K. Schmuck.
9. *Multi-Layered Abstraction-Based Controller Synthesis for Continuous-Time Systems* with K. Hsu, R. Majumdar and A.-K. Schmuck, HSCC '18.
10. *Compositional Construction of Finite State Abstractions for Stochastic Control Systems* with R. Majumdar, S. Soudjani, and A.-K. Schmuck, CDC '17.
11. *Supervisory controller synthesis for decomposable deterministic context free specification languages* with A.-K. Schmuck, WODES '16.