

EDUCATION

Max Planck Institute for Software Systems

Ph.D. in Computer Science

Advisor: Anne-Kathrin Schmuck

Kaiserslautern, Germany

2021–Current

Chennai Mathematical Institute

M.Sc. in Computer Science

CGPA: 9.94/10.00

Chennai, India

2019–2021

Chennai Mathematical Institute

B.Sc. in Mathematics and Computer Science

CGPA: 8.48/10.00

Chennai, India

2016–2019

AREA OF RESEARCH

Formal verification and synthesis of cyber-physical systems

Temporal Logics, Controller Synthesis, Game Theory

RESERACH INTERNSHIPS/VISITS

Carnegie Mellon University

with Eunsuk Kang

- Robustness for Software Systems

Pittsburgh, USA

May 2025

Max Planck Institute for Software Systems / University of Liverpool

with Daniel Neider and Martin Zimmermann

- Adaptive Strategies for rLTL Games

Remote

July - Dec 2020

Aix-Marseille University

with Jean-Marc Talbot

- Minimization of Visibly Pushdown Automata

Marseille, France

May - July 2019

READING PROJECTS

Chennai Mathematical Institute

with Prajakta Nimbhorkar

- Metric Embeddings and their Algorithmic Applications

Chennai, India

Aug - Nov 2020

Chennai Mathematical Institute

with Balaguru Srivathsan

- Games on Graphs

Chennai, India

Aug - Nov 2019

HONOURS

- Recipient the INSPIRE scholarship for my Bachelor's and Master's degrees by the Dept. of Science and Tech, India.
- Was among the top 30 students in India selected to attend the International Mathematics Olympiad Training Camp (IMOTC) 2015 and 2016
- Was among the top 30 students in my state in the Zonal Informatics Olympiad 2015
- Recipient of the Gold Medal in the Regional Mathematics Olympiad 2014

INVITED TALKS

Assume-Guarantee Distributed Synthesis via Permissive Templates Software Design and Analysis Group at Carnegie Mellon University	Pittsburgh, USA May 2025
Towards Seamless Reactivity of Hybrid Control ELLIIT Focus Period on Security and Fault Tolerance of Cyber-Physical Systems	Lund, Sweden Apr 2024
Strategy Templates for Graph Games Formal Methods and Verification Seminar at Université libre de Bruxelles	Brussels, Belgium Dec 2023
Adaptive Strategies for rLTL Games Formal Methods and Verification Seminar at Université libre de Bruxelles	Remote Dec 2020

SKILLS

- **Programming Languages:** C++, Python, Haskell

TOOLS DEVELOPED

- **rpg-STeLA:** reactive **p**rogram (infinite-state) **g**ame solver using **S**trategy **T**emplate-based **L**ocalized **A**cceleration
- **CoSMo:** **C**ontracted **S**trategy **M**ask **N**egotiation in two-objective parity games
- **PeSTel:** **P**ermissive **S**trategy **T**emplate for generalized parity games
- **SImPA:** **S**ufficient **I**mplementable **P**ermissive **A**ssumption for synthesis

TEACHING EXPERIENCE

- **Teaching Assistant** at Technical University of Kaiserslautern
Advanced Automata Theory 2024
Advanced Automata Theory 2023
- **Teaching Assistant** at Chennai Mathematical Institute
Discrete Mathematics 2021
Design and Analysis of Algorithms 2020
Data Mining and Machine Learning 2019
- **Guest Teacher** at Rtapalli Vidyapitha
Calculus 2017-2018
Elementary Number Theory 2025-Current

MENTORING OF MASTER'S STUDENTS

- Kilian Schweppe (Universität Lübeck, Germany)
- Oz Gitelson (Yale University, USA)
- Ali Mirzaeisaghezchi (Sharif University of Technology, Iran)

OTHER PROFESSIONAL ACTIVITIES

- **PC Member:** HSCC RE 2024-2025
- **Journal Reviewer:** FAC 2024
- **Conference Reviewer:** ISoLA 2022
- **Conference Sub-reviewer:** CAV 2025, IJCAI 2025, AAMAS 2025, TACAS 2024-2025, ICALP 2025, VMCAI 2024, ICSE 2023, NFM 2022

REFERENCES

- **Anne-Kathrin Schmuck**
Faculty member at the Max Planck Institute for Software Systems, Germany
email: akschmuck@mpi-sws.org
- **Bernd Finkbeiner**
Faculty member at the CISPA Helmholtz Center for Information Security, Germany
Professor at Saarland University, Germany
email: finkbeiner@cispa.de
- **Eunsuk Kang**
Associate Professor of Computer Science in the Software and Societal Systems Department
at Carnegie Mellon University, Pittsburgh, USA
email: eskang@cmu.edu
- **Martin Zimmermann**
Associate professor at Aalborg University, Denmark
email: mzi@cs.aau.dk

JOURNAL PUBLICATIONS (@. alphabetical/randomized order of authors)

- [1] @. S. P. Nayak, D. Neider, R. Roy, and M. Zimmermann, “Robust computation tree logic”, *Innovations in Systems and Software Engineering*, 2024.
- [2] S. P. Nayak, L. N. Egidio, M. Della Rossa, A.-K. Schmuck, and R. M. Jungers, “Context-triggered abstraction-based control design”, *IEEE Open Journal of Control Systems*, vol. 2, 2023.

CONFERENCE PUBLICATIONS (@. alphabetical/randomized order of authors)

- [3] @. B. Finkbeiner, N. Metzger, S. P. Nayak, and A.-K. Schmuck, “Synthesis of universal safety controllers”, in *Tools and Algorithms for the Construction and Analysis of Systems - 31st International Conference, TACAS 2025*.
- [4] @. A. Anand, S. P. Nayak, R. Raha, I. Saglam, and A.-K. Schmuck, “Fair quantitative games”, in *Foundations of Software Science and Computation Structures - 28th International Conference, FoSSaCS 2025*.
- [5] @. A. Anand, A. Schmuck, and S. P. Nayak, “Strategy templates - robust certified interfaces for interactive systems”, in *Automated Technology for Verification and Analysis - 22nd International Symposium, ATVA 2024*.

- [6] @. A. Schmuck, P. Heim, R. Dimitrova, and S. P. Nayak, “Localized attractor computations for infinite-state games”, in *Computer Aided Verification - 36th International Conference, CAV 2024*.
- [7] @. A. Anand, A. Schmuck, and S. P. Nayak, “Contract-based distributed logical controller synthesis”, in *Proceedings of the 27th ACM International Conference on Hybrid Systems: Computation and Control, HSCC 2024*.
- [8] A. Nejati, S. P. Nayak, and A. Schmuck, “Context-triggered games for reactive synthesis over stochastic systems via control barrier certificates”, in *Proceedings of the 27th ACM International Conference on Hybrid Systems: Computation and Control, HSCC 2024*.
- [9] @. S. P. Nayak and A. Schmuck, “Most general winning secure equilibria synthesis in graph games”, in *Tools and Algorithms for the Construction and Analysis of Systems - 30th International Conference, TACAS 2024*.
- [10] @. A. Schmuck, K. S. Thejaswini, I. Saglam, and S. P. Nayak, “Solving two-player games under progress assumptions”, in *Verification, Model Checking, and Abstract Interpretation - 25th International Conference, VMCAI 2024*.
- [11] @. A. Anand, S. P. Nayak, and A. Schmuck, “Synthesizing permissive winning strategy templates for parity games”, in *Computer Aided Verification - 35th International Conference, CAV 2023*.
- [12] @. A. Anand, K. Mallik, S. P. Nayak, and A. Schmuck, “Computing adequately permissive assumptions for synthesis”, in *Tools and Algorithms for the Construction and Analysis of Systems - 29th International Conference, TACAS 2023*.
- [13] @. S. P. Nayak, D. Neider, and M. Zimmermann, “Robustness-by-construction synthesis: Adapting to the environment at runtime”, in *Leveraging Applications of Formal Methods, Verification and Validation. Verification Principles - 11th International Symposium, ISoLA 2022*.
- [14] @. S. P. Nayak, D. Neider, R. Roy, and M. Zimmermann, “Robust computation tree logic”, in *NASA Formal Methods - 14th International Symposium, NFM 2022*.