

## EDUCATION

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### 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

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Formal verification and synthesis of cyber-physical systems

Temporal Logics, Controller Synthesis, Game Theory

## RESERACH INTERNSHIPS/VISITS

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### 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

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### 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

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- Recipient of 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

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

## SKILLS

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

## TOOLS DEVELOPED

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- **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

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- **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

## MENTORED MASTER'S STUDENTS

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

## OTHER PROFESSIONAL ACTIVITIES

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- **PC Member:** HSCC RE 2024-2025
- **Journal Reviewer:** Formal Methods in System Design (2025), Formal Aspects of Computing (2024)
- **Conference Reviewer/Sub-reviewer:** AAAI 2026, CAV 2025, TACAS 2024-2025, IJCAI 2025, AAMAS 2025, ICALP 2025, VMCAI 2024, ICSE 2023, ISoLA 2022 NFM 2022

## REFERENCES

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- **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)

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- [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)

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- [3] @. A. Anand, S. P. Nayak, R. Raha, I. Saglam, and A.-K. Schmuck, “Quantitative strategy templates”, in *Automated Technology for Verification and Analysis - 23rd International Symposium, ATVA 2025*.
- [4] @. 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*.
- [5] @. 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*.

- [6] @. 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*.
- [7] @. 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*.
- [8] @. 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*.
- [9] 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*.
- [10] @. 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*.
- [11] @. 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*.
- [12] @. 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*.
- [13] @. 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*.
- [14] @. 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*.
- [15] @. S. P. Nayak, D. Neider, R. Roy, and M. Zimmermann, “Robust computation tree logic”, in *NASA Formal Methods - 14th International Symposium, NFM 2022*.