Satya Prakash Nayak

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EDUCATION

Max Planck Institute for Software Systems　Kaiserslautern, Germany
Ph.D. in Computer Science　2021–Current
Advisor: Anne-Kathrin Schmuck

Chennai Mathematical Institute　Chennai, India
M.Sc. in Computer Science　2019–2021
CGPA: 9.94/10.00

Chennai Mathematical Institute　Chennai, India
B.Sc. in Mathematics and Computer Science　2016–2019
CGPA: 8.48/10.00

AREA OF RESEARCH

Formal verification and synthesis of cyber-physical systems
Temporal Logics, Controller Synthesis, Game Theory

RESERACH INTERNSHIPS/VISITS

Carnegie Mellon University　Pittsburgh, USA
with Eunsuk Kang　May 2025

− Robustness for Software Systems

Max Planck Institute for Software Systems / University of Liverpool　Remote
with Daniel Neider and Martin Zimmermann　July - Dec 2020

− Adaptive Strategies for rLTL Games

Aix-Marseille University　Marseille, France
with Jean-Marc Talbot　May - July 2019

− Minimization of Visibly Pushdown Automata

READING PROJECTS

Chennai Mathematical Institute　Chennai, India
with Prajakta Nimbhorkar　Aug - Nov 2020

− Metric Embeddings and their Algorithmic Applications

Chennai Mathematical Institute　Chennai, India
with Balaguru Srivathsan　Aug - Nov 2019

− Games on Graphs

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 Pittsburgh, USA
Software Design and Analysis Group at Carnegie Mellon University May 2025

Towards Seamless Reactivity of Hybrid Control Lund, Sweden
ELLIIT Focus Period on Security and Fault Tolerance of Cyber-Physical Systems Apr 2024

Strategy Templates for Graph Games Brussels, Belgium
Formal Methods and Verification Seminar at Université libre de Bruxelles Dec 2023

Adaptive Strategies for rLTL Games Remote
Formal Methods and Verification Seminar at Université libre de Bruxelles Dec 2020

Skills

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

Tools Developed

- **rpg-STeLA: r**eactive **p**rogram (infinite-state) **g**ame solver using **S**trategy **Te**mplate-based **L**ocalized **A**cceleration
- **CoSMo: Co**ntracted **S**trategy **M**ask Neg**o**tiation in two-objective parity games
- **PeSTel: Pe**rmissive **S**trategy **Te**mplate for generalized parity games
- **SImPA: S**ufficient **Im**plementable **P**ermissive **A**ssumption for synthesis

Mentoring of Master's Students

Kilian Schweppe

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*

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*.