Rajiv Sambharya

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Academic Positions

- **Postdoctoral Researcher, University of Pennsylvania** — Sept 2024-
  Electrical and Systems Engineering
  Supervision: George Pappas

Education

- **Ph.D., Princeton University** — Sept 2019-Sept 2024
  Operations Research and Financial Engineering
  Thesis: Learning to Accelerate Optimization Algorithms with Guarantees
  Supervision: Bartolomeo Stellato
- **M.Sc. University of California - Berkeley** — Sept 2017-Sept 2018
  Electrical Engineering and Computer Science
  Supervision: Laurent El Ghaoui
- **B.Sc. University of California - Berkeley** — Sept 2013-Sept 2017
  Electrical Engineering and Computer Science

Research Interests

- **Data-driven computational tools for decision-making**
  Theory: optimization, machine learning, control theory.
  Methodology: machine learning for optimization, real-time optimization, optimization-based control, learning for control, statistical learning theory, computer-assisted optimization analysis.
  Applications: autonomous systems, signal processing, robotics, power systems, data science, operations research, finance.

Publications

Journal Articles

J1 R. Sambharya and B. Stellato, "Learning Algorithm Hyperparameters for Fast Parametric Convex Optimization," *SIAM Journal on Mathematics of Data Science (pending minor revision)*, 2025.

J2 R. Sambharya and B. Stellato, "Data-Driven Performance Guarantees for Classical and Learned Optimizers," *Journal of Machine Learning Research*, vol. 26, no. 171, pp. 1–49, 2025.

J3 R. Sambharya, G. Hall, B. Amos, and B. Stellato, "Learning to Warm-Start Fixed-Point Optimization Algorithms," *Journal of Machine Learning Research*, vol. 25, no. 166, pp. 1–46, 2024.

Conference Proceedings

C1 R. Sambharya, G. Hall, B. Amos, and B. Stellato, "End-to-End Learning to Warm-Start for Real-Time Quadratic Optimization," in *Proceedings of The 5th Annual Learning for Dynamics and Control Conference*, ser. Proceedings of Machine Learning Research, vol. 211, PMLR, 2023, pp. 220–234.

Preprints

P1 R. Sambharya, J. Bok, N. Matni, and G. Pappas, "Learning Acceleration Algorithms for Fast Parametric Convex Optimization with Certified Robustness," 2025.

P2 A. Askari, G. Negiar, R. Sambharya, and L. E. Ghaoui, "Lifted Neural Networks," 2018.

Thesis

T 1 R. Sambharya, "Learning to accelerate optimization algorithms with guarantees," Ph.D. dissertation, Princeton University, 2024.

Working Papers

W 1 R. Sambharya, N. Matni, and G. Pappas, *Verification of Sequential Convex Programming for Parametric Non-convex Optimization*.

W 2 T. Fujinami, R. Sambharya, N. Matni, and G. Pappas, *Finite-step verification of the iterative linear quadratic regulator*.

Honors and Awards

- **Princeton Excellence in Teaching Award**: Top award winner in engineering 2021
- **Princeton McGraw Teaching Fellow**: Led orientation for new teaching assistants 2022-2023
- **Princeton SEAS Travel Grant Award**: (INFORMS) 2023

Talks

Learning Algorithm Hyperparameters for Fast Parametric Convex Optimization with Certified Robustness

- INFORMS Optimization Society — Atlanta, Georgia, March 2026
- INFORMS Annual Meeting — Atlanta, Georgia, October 2025
- International Conference on Continuous Optimization — Univ. of Southern California, July 2025

Data-Driven Performance Guarantees for Classical and Learned Optimizers

- Neurips — San Diego, California, December 2025
- International Symposium on Mathematical Programming — Montreal, Canada, July 2024
- Optimization Learning and Control Workshop (Poster) — Princeton University, June 2024
- INFORMS Optimization Society — Rice University, March 2024
- Conference on Information Sciences and Systems — Princeton University, March 2024

Learning to Accelerate Optimizers with Guarantees

- Thesis defense — Princeton University, September 2024
- **George Pappas's group** — University of Pennsylvania, May 2024
- **REALM lab** — MIT, March 2024
- **Computational Robotics Group** — Harvard University, March 2024

Learning to Warm-Start Fixed-Point Optimization Algorithms

- Yale Robotics Seminar — Yale University, December 2023
- INFORMS Annual Meeting — Phoenix, AZ, October 2023
- Modeling and Optimization: Theory and Applications — Lehigh University, August 2023

End-to-End Learning to Warm-Start for Real-Time Quadratic Optimization

- Learning for Dynamics and Control (Poster) — University of Pennsylvania, June 2023
- NYC Operations day (Poster) — Columbia University, May 2023
- INFORMS Annual Meeting — Indianapolis, IN, October 2022

Accelerating Non-Convex Optimization via Learned Sequential Convexifications

- International Conference on Continuous Optimization — Lehigh University, July 2022

Learning for Real-Time Semidefinite Optimization

- INFORMS Annual Meeting — Anaheim, CA (hybrid), October 2021

Teaching

- ORF499: Senior Thesis — Spring 2024
- ORF498: Senior Thesis — Fall 2023
- ORF363: Computing and Optimization for the Physical and Social Sciences — Spring 2023
- ORF387: Networks — Fall 2022
- ORF522: Linear and Nonlinear Optimization (Graduate-level) — Fall 2021
- ORF307: Optimization — Spring 2021 (Head TA), 2022
- ORF455: Energy and Commodities Markets — Fall 2020

Mentoring

- **Research supervision**: Guided multiple graduate students in their research (Penn) — 2025-
- **Research group leader**: Led weekly research group of 11 senior thesis students (Princeton) — 2023-2024
- **Teaching assistant orientation leader**: Led yearly new TA orientation (Princeton) — 2022-2023

Software

- Learning Acceleration Algorithms for Fast Parametric Convex Optimization with Certified Robustness
  https://github.com/rajivsambharya/learn_algo_steps_robust
- Learning Algorithm Hyperparameters for Fast Parametric Convex Optimization
  https://github.com/stellatogrp/learning_algorithm_hyperparameters
- Data-Driven Performance Guarantees for Classical and Learned Optimizers
  https://github.com/stellatogrp/data_driven_optimizer_guarantees
- Learning to Warm-Start Fixed-Point Optimization Algorithms
  https://github.com/stellatogrp/l2ws
- End-to-End Learning to Warm-Start for Real-Time Quadratic Optimization
  https://github.com/stellatogrp/l2ws_qp

Industry Experience

- Machine Learning Engineer at Linc Global — Sunnyvale, CA, July 2018 - July 2019
- Software Engineering Intern at Amazon — Seattle, WA, June 2016 - August 2016

Service

- INFORMS Optimization Society Session Organizer: AI for Optimization — 2026
- Group Meeting Organizer for the weekly Pappas Group Meeting — 2025-
- Program Committee Member for the **ScaleOpt workshop** at Neurips — 2025
- INFORMS Optimization Society Session Organizer: Machine Learning for Optimization — 2024
- Princeton Optimization Seminar Organizer — 2022-2023

Peer Review

- Neurips (x2)
- Conference on Learning Theory (x2)
- Learning for Dynamics and Control (x2)
- Integer Programming and Combinatorial Optimization (x1)

Technical Skills

- **Programming languages**: Python, Matlab, Julia, R, C, Java, SQL, HTML
- **Tools**: Git, LaTeX, Slurm, GPU, JAX, PyTorch, Tensorflow