Christopher Watson

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Citizenship: USA

EDUCATION

University of Pennsylvania Fall 2021 - Present
Ph.D. Student in Computer and Information Science
Advisors: Rajeev Alur and Dinesh Jayaraman

Cornell University Fall 2017 - Spring 2021
B.A. in Computer Science (*summa cum laude*) and Archaeology

RESEARCH STATEMENT

I work at the intersection of robot learning and formal methods. Recent advances in large AI models have brought us closer than ever to realizing the dream of general-purpose robots that adapt quickly and reliably to new tasks and environments. However, approaches that focus entirely on scaling data lack safety guarantees and may not fully exploit task structure to make the most of (often scarce) robot training data. My research takes inspiration from formal methods and symbolic reasoning to improve the reliability and efficiency of robot learning. Recently, I've been focusing on ways to combine human-specified and autonomously-discovered task structure to scaffold effective learning.

PUBLICATIONS AND PREPRINTS

Christopher Watson, Arjun Krishna, Dinesh Jayaraman, and Rajeev Alur. 2026. Let it Cook: Learning to Wait in Sequential Decision Making. *In submission.*

William Shen, Nishanth Kumar, Sahit Chintalapudi, Jie Wang, **Christopher Watson,** Edward Hu, Jing Cao, Dinesh Jayaraman, Leslie Pack Kaelbling, Tomás Lozano-Pérez. 2026. TiPToP: A Modular Open-Vocabulary Planning System for Robotic Manipulation. *ArXiv preprint.*

Andy Yang, **Christopher Watson,** Anton Xue, Satwik Bhattamishra, Jose Llarena, William Merrill, Emile Dos Santos Ferreira, Anej Svete, and David Chiang. 2026. The Transformer Cookbook. *Transactions on Machine Learning Research (TMLR).*

Ethan Decker, **Christopher Watson,** Junyu Zhou, Yuhao Liu, Chenxu Liu, Ang Li, Gushu Li, and Samuel Stein. 2025. F2: Offline Reinforcement Learning for Hamiltonian Simulation via Free-Fermionic Subroutine Compilation. *ArXiv preprint.*

Christopher Watson, Rajeev Alur, Divya Gopinath, Ravi Mangal, and Corina S. Pasareanu. 2025. Scenario-based Compositional Verification of Autonomous Systems with Perception. *International Symposium on AI Verification (SAIV).*

Christopher Watson, Arjun Krishna, Rajeev Alur, and Dinesh Jayaraman. 2025. Illustrated Landmark Graphs for Long-horizon Policy Learning. *Transactions on Machine Learning Research (TMLR).*

Sayan Mitra, Corina Pasareanu, Pavithra Prabhakar, Sanjit A. Seshia, Ravi Mangal, Yangge Li, **Christopher Watson,** Divya Gopinath, and Huafeng Yu. 2024. Formal Verification Techniques for Vision-Based Autonomous Systems - A Survey. *Principles of Verification: Cycling the Probabilistic Landscape - Essays Dedicated to Joost-Pieter Katoen on the Occasion of his 60th Birthday.*

Joseph W. Cutler, **Christopher Watson,** Emekah Nkurumeh, Phillip Hilliard, Harrison Goldstein, Caleb Stanford, and Benjamin C. Pierce. 2024. Stream Types. *Programming Language Design and Implementation (PLDI).*

Rajeev Alur, Caleb Stanford, and **Christopher Watson.** 2023. A Robust Theory of Series Parallel Graphs *Principles of Programming Languages (POPL).* (Authors in alphabetical order).

RESEARCH INTERNSHIP EXPERIENCE

NASA Ames Research Center Summer 2024
Software Development Intern

- Worked with Corina S. Pasareanu on probabilistic verification of autonomous systems with perception.
- Published original work at SAIV 2025 and contributed to a survey paper.

TEACHING

University of Pennsylvania
Teaching Assistant

- CIS 6730: Computer Aided Verification Spring 2023
  Instructor: Rajeev Alur
  Lectures taught: "Introduction to Dafny" and "Introduction to SPIN"
- CIS 5110: Theory of Computation Fall 2022
  Intructor: Anindya De

Cornell University
Teaching Assistant

- CS 4810: Introduction to the Theory of Computing Fall 2019
  Instructor: John Hopcroft

SERVICE

Co-chair of CIS Doctoral Student Association Fall 2022 - Fall 2024
University of Pennsylvania

Student Volunteer
POPL 2022, CCC 2022, OPLSS 2022 *2022*

CONFERENCE PRESENTATIONS

Scenario-based Compositional Verification of Autonomous Systems with Perception. July 2025. Zagreb, Croatia. Oral presentation at *International Symposium on AI Verification (SAIV).*

Illustrated Landmark Graphs for Long-horizon Policy Learning. November 2024. Munich, Germany. Poster presentation at *Learning Effective Abstractions for Planning* workshop at *Conference on Robot Learning.*

A Robust Theory of Series Parallel Graphs. January 2023. Boston, USA. Oral presentation at *Principles of Programming Languages (POPL).*

TECHNICAL SKILLS

Deep Learning and RL	PyTorch, JAX, Gymnasium, LLM-in-the-loop systems.
Robot Learning	Vision-Language-Action models, DROID platform.
Formal Methods	PRISM, Rocq, SPIN, Dafny.