# Alaia Solko-Breslin

alaia@seas.upenn.edu ◇ alaiasolkobreslin.github.io
Levine 575, 3330 Walnut St ◇ Philadelphia, PA 19104

## EDUCATION

**University of Pennsylvania** Fall 2022 - Present
Ph.D. in Computer and Information Science
Advisors: Rajeev Alur and Mayur Naik

**Cornell University** Fall 2021 - Spring 2022
M.Eng. in Computer Science
GPA: 4.08

**Cornell University** Fall 2018 - Spring 2021
B.S. in Computer Science
Minor in Applied Mathematics
GPA: 3.81

## RESEARCH INTERESTS

My research interests involve machine learning, programming languages, and formal methods. I am currently interested in neurosymbolic learning, a paradigm that combines neural and symbolic approaches to improve the accuracy and interpretability of machine learning models. I am currently working on the problem of approximating gradients of black-box functions with the goal of making neurosymbolic learning possible with non-differentiable programs.

## RESEARCH EXPERIENCE

**Neurosymbolic Learning with Black-Box Programs** Fall 2022 - Present
*University of Pennsylvania*

- Designing and implementing an algorithm for neurosymbolic learning with non-differentiable programs.
- Testing our algorithm on an extensive benchmark suite, which includes synthetic and real-world tasks.
- Working under Rajeev Alur and Mayur Naik.

**L* + Blanks ($L^*_\square$) and Petr4** Spring 2020 - Spring 2022
*Cornell University*

- Contributed to the development of the $L^*_\square$ algorithm, inspired by the Maler-Pnueli version of L*, that learns finite automata from a set of example strings. Worked under Nate Foster and Alexandra Silva.
- Developed a framework for testing the semantics of the Petr4 interpreter. Worked under Nate Foster.

## PUBLICATIONS

- *Beyond Differentiability: Neurosymbolic Learning with Black-Box Programs* Under Review
  **Alaia Solko-Breslin**, Ziyang Li, Neelay Velingker, Rajeev Alur, Mayur Naik
- *Automata Learning with an Incomplete Teacher* [paper] ECOOP 2023
  Mark Moeller, Thomas Wiener, **Alaia Solko-Breslin**, Caleb Koch, Nate Foster, Alexandra Silva.
- *Petr4: Formal Foundations for P4 Data Planes* [paper] POPL 2021
  Ryan Doenges, Mina Tahmasbi Arashloo, Santiago Bautista, Alexander Chang, Newton Ni, Samwise Parkinson, Rudy Peterson, **Alaia Solko-Breslin**, Amanda Xu, Nate Foster.

## WORK EXPERIENCE

**Amazon Web Services** Summer 2021
*Software Development Engineer Intern*

- Implemented an API that performs a deep health check of our authentication service.
- Implemented canaries that would continuously make requests to this health check and our service and report metrics.

**Amazon Web Services** Summer 2020
*Software Development Engineer Intern*

- Designed and implemented an API that allows test fleets to obtain the posture that is necessary for them to reach services in Native AWS.

## TEACHING

**University of Pennsylvania**
*Teaching Assistant*

- CIS 7000: Special Topics: Trustworthy Machine Learning — Spring 2024
  Instructors: Rajeev Alur and Osbert Bastani
- CIS 5000: Software Foundations — Fall 2023
  Instructor: Benjamin Pierce
  Lectures taught: "Induction and data structures"

**Cornell University**
*Teaching Assistant*

- CS 4160/5160: Formal Verification — Spring 2022
  Instructor: Michael Clarkson
- CS 3110: Data Structures and Functional Programming — Fall 2021
  Instructor: Michael Clarkson
- CS 4820: Introduction to Analysis of Algorithms — Spring 2021
  Instructor: Robert Kleinberg
- CS 4820: Introduction to Analysis of Algorithms — Fall 2020
  Instructor: Dexter Kozen
- CS 3110: Data Structures and Functional Programming — Spring 2020
  Instructor: Nate Foster
- CS 3110: Data Structures and Functional Programming — Fall 2019
  Instructor: Michael Clarkson

## SERVICE

**CIS TGIF Event Coordinator** June 2023 - Present
Organize weekly social dinners for CIS Ph.D. students, postdocs, and faculty.

**CIS Office Committee Member** May 2023 - Present
Coordinate office assignments for CIS Ph.D. students and postdocs.

**PLDI Student Volunteer** June 2023
Assisted with conference sessions to address technical difficulties and keep talks running on schedule.

## AWARDS

**Summer School on Formal Techniques Funding** 2023
Received funding to travel to and attend the SSFT summer school.

**Programming Languages Mentoring Workshop at PLDI Funding** 2022
Received funding to travel to and attend PLMW at PLDI.

**John Grist Brainerd Doctoral Fellowship (UPenn)** 2022
Donor-named fellowships like these provide a one-time $3,000 award. This honor and award is in recognition of outstanding academic accomplishments and research potential.

## TECHNICAL SKILLS

| | |
|---|---|
| **Programming Languages** | Python, Java, OCaml, Rust, Coq, Ruby, Racket, Dafny, C |
| **Tools** | Pytorch, Git, LaTeX |

## REFERENCES

**Mayur Naik**
Professor
University of Pennsylvania, Department of Computer and Information Science
mhnaik@seas.upenn.edu

**Rajeev Alur**
Professor
University of Pennsylvania, Department of Computer and Information Science
alur@seas.upenn.edu