

# Alaia Solko-Breslin

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## EDUCATION

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### 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

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My research interests involve machine learning, programming languages, and formal methods. My research focuses on 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

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### 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](#).

### $L^* + \text{Blanks } (L^*_\square)$ 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

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### Under Review

- *Beyond Differentiability: Neurosymbolic Learning with Black-Box Programs*  
**Alaia Solko-Breslin**, Ziyang Li, Neelay Velingker, Rajeev Alur, Mayur Naik
- *Understanding the Effectiveness of Large Language Models in Detecting Security Vulnerabilities* [[paper](#)]  
Avishree Khare\*, Saikat Dutta\*, Ziyang Li, **Alaia Solko-Breslin**, Rajeev Alur, Mayur Naik

### Refereed Publications

- *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

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### 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

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### 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**

## AWARDS

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### AWS-AI ASSET Fellow

2024

Funding to support research on safe, explainable and trustworthy AI-enabled systems.

### John Grist Brainerd Doctoral Fellowship (UPenn)

2022

## SERVICE

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<b>CIS Mentorship Program Mentor</b>	August 2023 - Present
<b>CIS Mentorship Program Volunteer</b> Organize social events for CIS Ph.D. students participating in our mentorship program.	August 2023 - Present
<b>CIS TGIF Event Coordinator</b> Organize weekly social dinners for CIS Ph.D. students, postdocs, and faculty.	June 2023 - Present
<b>CIS Office Committee Member</b> Coordinate office assignments for CIS Ph.D. students and postdocs.	May 2023 - Present
<b>PLDI Student Volunteer</b> Assisted with conference sessions to address technical difficulties and keep talks running on schedule.	June 2023

## TRAVEL FUNDING

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<b>Summer School on Formal Techniques Funding</b>	2023
<b>Programming Languages Mentoring Workshop at PLDI Funding</b>	2022

## TECHNICAL SKILLS

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<b>Programming Languages</b>	Python, Java, OCaml, Rust, Coq, Ruby, Racket, Dafny, C
<b>Tools</b>	Pytorch, Git, L <sup>A</sup> T <sub>E</sub> X

## REFERENCES

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**Mayur Naik**  
Professor  
University of Pennsylvania, Department of Computer and Information Science  
[mhnaik@seas.upenn.edu](mailto:mhnaik@seas.upenn.edu)

**Rajeev Alur**  
Professor  
University of Pennsylvania, Department of Computer and Information Science  
[alur@seas.upenn.edu](mailto:alur@seas.upenn.edu)