

## Talia Lily Ringer

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### ACADEMIA

**University of Illinois Urbana-Champaign** 2021 – Present  
**Assistant Professor (2 YOE)**

**University of Washington** 2015 – 2021  
*Ph.D. in Computer Science (advised by Dan Grossman).*  
*Ph.D. Thesis: [Proof Repair](#). [Defense video](#).*

**University of Maryland, College Park** 2008 – 2012  
*B.S. in Mathematics and Computer Science. (advised by Larry Washington).*  
*Honors Thesis: [An Elliptic Curve Threshold Key Establishment Scheme](#)*

### INDUSTRY

**Industrial Research (1 YOE)**  
*Visiting Researcher, Google (N2Formal)* Summer 2022 – Winter 2023  
*Research Scientist Intern, Amazon (Automated Reasoning Group)* Summer 2016

- Worked on machine learning tools for proof assistants at Google.
- Developed a solver-aided language for automated test input generation at Amazon.

**Software Engineering (4 YOE)**  
*Software Development Engineer II, Amazon* 2015  
*Software Development Engineer I, Amazon* 2012 – 2014  
*Software Development Engineer Intern, Amazon* Summer 2011  
*Software Intern, Carr Astronautics* 2010 – 2011

- Helped launch [Amazon Business](#).
- Wrote customer-facing code used company-wide at Amazon.
- Deleted more lines of code during my time as an engineer at Amazon than I added. :)

### INTERNATIONAL PROGRAMS FOUNDED

I am the **founder and president** of the [Computing Connections Fellowship](#), which provides institution-independent transitional funding and research visits for computer science Ph.D. students seeking healthier environments. Our two year pilot is in programming languages.

I am also the **founder and previous chair** of [SIGPLAN-M](#), a cross-institutional long-term mentoring program for the programming languages research community. It currently reaches more than **200 mentors** and **300 mentees** across more than **41 countries**, and has been described by mentees as “**life changing**” and “**a career saver.**”

### RESEARCH IMPACT

My work introduced [proof repair](#), which has since been implemented and adapted at [Amazon](#) and [NASA](#), and is the subject of a [DARPA AI Exploration](#), a grant for which I am primary PI.

## RESEARCH VISION

How can we build a world in which programmers of **all skill levels** across **all domains** can prove the absence of costly or dangerous bugs in software systems---that is, **formally verify** them? I lead a group that builds **proof engineering** technologies to make that world a reality. My group loves to use the whole toolbox---everything from **dependent type theory** to **program transformations** to **neural proof synthesis**---all in service of **real humans**.

## CURRENT ADVISING

Dependent Type Theory and Proof Repair:

**Cosmo Viola** (Ph.D., 2021 – Present)

**Max Fan** (undergraduate, 2022 – Present)

Proof Compilation:

[Chris Lam](#) (Ph.D., 2021 – Present)

Verified Secure Computer Architectures (with Christopher Fletcher):

[Hannah Leung](#) (Ph.D., 2022 – Present)

**Eeshan Zele** (undergraduate, 2022 – Present)

**Sankar Gopalkrishna** (undergraduate, 2022 – Present)

Learning Semantic Relations (with Maxim Raginsky):

**Dylan Zhang** (Ph.D., 2022 – Present)

Machine Learning for Proofs:

**Arpan Agrawal** (visiting research programmer, 2022 – Present)

**Thomas Reichel** (masters student, 2022 – Present)

[Timothy Zhou](#) (undergraduate, 2021 – Present)

## STUDENTS ADVISED

Taylor Blau (undergraduate, coadvised with Dan Grossman, 2019 – 2020)

[Verifying Strong Eventual Consistency in  \$\delta\$ -CRDTs](#) (senior thesis)

Jasper Hugunin (undergraduate, coadvised with Dan Grossman, 2018 – 2019)

[Constructing Inductive-Inductive Types in Cubical Type Theory](#) (FOSSACS 2019)

## GRANTS AWARDED

**PLATO: Enriched Tactic Prediction Models for Proof Synthesis & Repair.** DARPA

[PEARLS](#) AI Exploration. PI: **Talia Ringer** (UIUC). Co-PIs: Yuriy Brun (UMass Amherst) and Alex Sanchez-Stern (UMass Amherst). Budget: \$1,000,000.

**POLYMORPH: Promotion to Optimal Languages Yielding Modular Operator-driven**

**Replacements and Programmatic Hooks.** DARPA [V-SPILLS](#). Primary PIs: Galois. Co-PIs: Northeastern, UW, UIUC, Alabama, and Syracuse. Budget: \$11,342,650.

**Neurosymbolic Proof Synthesis & Repair.** [Amazon Research Awards](#) 2022. PI: **Talia Ringer** (UIUC). Budget: \$40,000.

## INVITED TALKS

- [Concrete Problems in Proof Automation](#)** 2022  
[AI for Theorem Proving](#) (AITP), [EuroProofNet Large Libraries of Proofs](#)
- You and Your Environment** 2022  
Programming Languages Mentoring Workshop (PLMW) at POPL
- Proof Engineering Tools for a New Era** 2021  
Caltech, UCLA, UMass Amherst, Aarhus, Vermont, Illinois, Virginia, Tufts
- Proof Repair Across Type Equivalences** 2020 – 2021  
Cornell, CMU, NUS
- [Proof Transformation](#)** 2020  
[Logic Supergroup](#) Seminar Series
- Proof Engineering Tools for a New Era** 2019  
Rising Stars in CS Lecture Series at UMass Amherst

## INVITED SEMINARS AND WORKSHOPS

- Dagstuhl Seminar** *Fall 2023*  
Automated Mathematics: Integrating Proofs, Algorithms, and Data
- Career Path Panel** *Summer 2023*  
Programming Languages Mentoring Workshop (PLMW) at PLDI.
- NeurIPS Queer in AI Workshop: Queerness and Faculty Panel** *Winter 2022*  
Invited Panel
- NeurIPS Workshop on MATH-AI: Toward Human-Level Math Reasoning** *Winter 2022*  
Invited Panel
- ICML Workshop on Human-Machine Collaboration and Teaming** *Summer 2022*  
Invited Panel: Human-Machine Teams for Mathematicians
- Dagstuhl Seminar** *Canceled (COVID-19)*  
Static Methods for Correctness of Model and Program Transformations
- Coq Users and Developers Workshop** *Summer 2018, 2019*  
An Event for Understanding, Improving, and Extending Coq
- Rising Stars** *Fall 2019*  
An Academic Career Workshop for Women in EECS

## REFEREED CONFERENCE & JOURNAL PUBLICATIONS

Emily First, Markus Rabe, Talia Ringer, Yuriy Brun.

[Baldur: Whole-Proof Generation and Repair with Large Language Models.](#)

To appear in ESEC/FSE 2023.

Alex Sanchez-Stern\*, Emily First\*, Timothy Zhou, Zhanna Kaufman, Yuriy Brun, Talia Ringer.

[Passport: Improving Automated Formal Verification Using Identifiers.](#)

To appear in TOPLAS. 2023.

Arpan Agrawal, Emily First, Zhanna Kaufman, Tom Reichel, Shizhuo Zhang, Timothy Zhou, Alex Sanchez-Stern, Talia Ringer, Yuriy Brun.

[Proofster: Automated Formal Verification.](#)

To appear in ICSE 2023 (Demo Track). [Demo video](#), [tool website](#).

Emily Ruppel\*, Sihang Liu\*, Elba Garza, Sukyoung Ryu, Alexandra Silva, Talia Ringer.

[Long-Term Mentoring for Computer Science Researchers.](#)

Communications of the ACM (CACM): Volume 66: No. 5, pp 33-35. May 2023.

Talia Ringer, RanDair Porter, Nathaniel Yazdani, John Leo, Dan Grossman.

[Proof Repair Across Type Equivalences.](#)

PLDI 2021. [Talk video](#), PUMPKIN Pi [tool repository](#).

Talia Ringer, Alex Sanchez-Stern, Dan Grossman, Sorin Lerner.

[REPLICA: REPL Instrumentation for Coq Analysis.](#)

CPP 2020. [Talk video](#).

Talia Ringer, Karl Palmskog, Ilya Sergey, Milos Gligoric, Zachary Tatlock.

[QED at Large: A Survey of Engineering of Formally Verified Software.](#)

Foundations and Trends® in Programming Languages: Vol. 5: No. 2-3, pp 102-281. 2019.

[Project website](#).

Talia Ringer, Nathaniel Yazdani, John Leo, Dan Grossman.

[Ornaments for Proof Reuse in Coq.](#)

ITP 2019. [Talk video](#), DEVOID [tool repository](#).

Talia Ringer, Nathaniel Yazdani, John Leo, Dan Grossman.

[Adapting Proof Automation to Adapt Proofs.](#)

CPP 2018. [Talk video](#), PUMPKIN PATCH [tool repository](#).

Talia Ringer, Dan Grossman, Daniel Schwartz-Narbonne, Serdar Tasiran.

[A Solver-Aided Language for Test Input Generation.](#)

OOPSLA 2017. [Talk video](#).

Talia Ringer, Dan Grossman, Franziska Roesner.

[AUDACIOUS: User-Driven Access Control with Unmodified Operating Systems.](#)

CCS 2016. [Talk video](#).

## WORKSHOP PUBLICATIONS

Hannah Leung, Talia Ringer, and Christopher Fletcher.  
[Towards Formally Verified Path ORAM in Coq.](#)  
CoqPL 2023.

Seth Poulsen, Matthew West, Talia Ringer.  
[Autogenerating Natural Language Proofs for Proof Education.](#)  
The Coq Workshop 2022.

## PUBLICATION DRAFTS

Audrey Seo\*, Chris Lam\*, Dan Grossman, Talia Ringer.  
[Correct Compilation of Proofs about Embedded Programs.](#)  
Under Submission.

Tom Reichel, R. Wesley Henderson, Andrew Touchet, Andrew Gardner\*, Talia Ringer\*.  
[Proof Repair Infrastructure for Supervised Models: Building a Large Proof Repair Dataset.](#)  
Under Submission.

## LEADERSHIP, DIVERSITY, & SERVICE

### International Programs:

- [Computing Connections Fellowship](#), Founder & President 2022 – Present
- [SIGPLAN-M](#) (long-term mentoring), Founder & Previous Chair 2021 – Present

### Conferences & Workshops:

- Beyond Bayes Workshop Co-Chair 2022
- Coq Workshop Co-Chair 2022
- SPLASH Hybridization Committee ([first major hybrid conference in my field](#)) 2021
- ICFP Programming Languages Mentoring Workshop (PLMW) Co-Chair 2020
- ICFP Mentoring Chair 2020
- [POPLmark 15 Year Retrospective Panel](#) Lead Organizer 2020
- Shut Down PL Co-Organizer (anti-racist workshop) 2020
- DeepSpec Summer School Student Talks Organizer 2017

### Departmental & University Service:

- Grainger [IDEA Institute](#) Core Faculty Member 2022 – Present
- UW CSE Academic Jobs Panel 2022
- Illinois CS BPC Committee 2022 – Present
- Illinois Mental Health Ambassador 2021 – Present
- Illinois [CS CARES](#) Committee 2021 – Present
- UW CSE Care Committee Founder & Organizer (support network) 2019 – 2021
- UW CSE Graduate Admissions Committee 2018

### National Service & Policy:

- [C3E Workshop](#) Planning Committee 2023

## Reviewing & Program Committees (PCs):

- **Panels:** NSF (2023).
- **Conference PCs:** POPL (2024), ICFP (2023), ITP (2022), PLDI (2022), CAV (2021).
- **Journal Reviewing:** [JAR](#) (2022), Mathematical Structures in Computer Science (2020).
- **Workshop PCs:** TYPES (2022), AIPLANS (2021), HATRA (2020), CoqPL (2019).
- **Artifact Evaluation Committees:** CAV (2019), POPL (2018, 2019).

## Mentoring:

- Mentor for [SIGPLAN-M](#), the program that I founded and chair. *2021 – Present*
- Mentor for undergraduate and graduate women in CS at UW. *2015 – 2020*
- Mentor for LGBT students through the UW Queer Mentoring Program. *2016 – 2019*
- Technical and career mentor for software engineers at Amazon. *2012 – 2015*

## Community:

- Creator and administrator of the Neurodivergent at UIUC Slack (2022 – Present).
- Creator and administrator of the Neurodivergent in CS Slack (2021 – Present).
- Creator and administrator of the Midwest PL Slack (2021 – Present).
- Packer and food delivery driver for food banks in Seattle (2020 – 2021).
- ESL tutor & friendly visitor for an elderly refugee with JFS (2017 – 2021).
- Author of a [blog interview series](#) about LGBT CS researchers (2016 – 2018).

## HONORS & AWARDS

Amazon Research Awards Recipient, PEO Scholar, NSF GRFP Fellow

## TEACHING

### [CS 598 TLR: Proof Automation](#)

*Spring 2022, Fall 2022*

A new graduate seminar on proof automation.

A lot of thought went into its design. Check it out!

## MEDIA

### [Ringer Seeks to Expand Upon the Impact of Being a Mentor](#)

Article about my international service work.

### [Proof Repair](#)

Thesis Review podcast about my thesis work and how it has informed my work since.

### [Tenure, Sexism, and ADHD](#)

Type Theory Forall podcast about my work and my experiences.

### [How Will Proof Engineering Affect the Future of Software Development?](#)

A podcast interview about my work and future vision. From DevDiscuss Season 6, Episode 4.

### [Proof Repair & Code Generation](#)

A Galois blog post by Valentin Robert about using my tools for industrial applications.

### [Proof Engineering for the People](#)

A podcast interview about my work and future vision. From Building Better Systems.

### [AMA on Mentoring](#)

Invited Ask Me Anything (AMA) session at ICFP 2021 about SIGPLAN-M.

### [GAP Interview](#)

Interview about the academic job search.

## JUST FOR FUN

I enjoy **distance running**. I used to compete for **Club Northwest**, a top distance running club in Seattle. I served on the board of Club Northwest from 2015 to 2016. I ran **NCAA Division I Cross-Country** in 2009. These days, though, I'm getting more into **judo**.

I also enjoy **solving logic and number puzzles, writing poetry, singing, studying languages, making bagels, playing Dance Dance Revolution, foraging edible mushrooms, and composing music for the piano.**