Talia Lily Ringer

https://dependenttyp.es

ACADEMIA

University of Illinois at Urbana-Champaign *2021 – Present*
Assistant Professor

University of Washington *2015 – 2021*
Ph.D. in Computer Science
Advisor: Dan Grossman
Ph.D. Thesis: Proof Repair. Defense video.

University of Maryland, College Park *2008 – 2012*
B.S. in Mathematics and Computer Science
Advisor: Lawrence Washington
Honors Thesis: An Elliptic Curve Threshold Key Establishment Scheme

DRAFTS

Alex Sanchez-Stern, Emily First, Timothy Zhou, Zhanna Kaufman, Yuriy Brun, Talia Ringer.
Passport: Improving Automated Formal Verification Using Identifiers.
Under Submission.

PUBLICATIONS

Talia Ringer, RanDair Porter, Nathaniel Yazdani, John Leo, Dan Grossman.
Proof Repair Across Type Equivalences.
PLDI 2021. 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.

RESEARCH VISION

My research makes **program verification** using proof assistants more accessible through better **proof engineering** technologies that make it easier to develop and maintain verified systems. To that end, I develop foundational results in **dependent type theory**, and use those results to drive the development of tools informed by the needs of real proof engineers. My vision is a future of verification with the help of these tools that is accessible to all programmers.

CURRENT ADVISING

Cosmo Viola (Ph.D.)
Extending proof repair to handle more more general relations.

Chris Lam (Ph.D.)
Compiling proofs alongside programs.

Timothy Zhou (undergraduate)
Improving neural tactic prediction models for proof synthesis and repair.

Thomas Reichel (undergraduate)
Developing a neural proof repair model.

UNDERGRADUATE STUDENTS ADVISED

Taylor Blau.
Verifying Strong Eventual Consistency in δ-CRDTs (senior thesis)

Jasper Hugunin.
Constructing Inductive-Inductive Types in Cubical Type Theory (FOSSACS 2019)

INDUSTRY

Visiting Researcher at Google Research (Google Brain) *Summer 2022*
Will work on machine learning tools for proof assistants.

Research Scientist Intern at Amazon (Automated Reasoning Group) *Summer 2016*
Developed a solver-aided domain-specific language to generate test inputs.

Software Development Engineer at Amazon (Amazon Business) *2012 – 2015*
Helped launch Amazon Business. Wrote code used company-wide.

GRANTS AWARDED

PLATO: Enriched Tactic Prediction Models for Proof Synthesis & Repair. UIUC and UMass Amherst. DARPA PEARLS AI Exploration. $1,000,000.

POLYMORPH: Promotion to Optimal Languages Yielding Modular Operator-driven Replacements and Programmatic Hooks. Galois, Northeastern, University of Washington, UIUC, University of Alabama, and Syracuse University. DARPA V-SPELLS. $11,342,650.

Neurosymbolic Proof Synthesis & Repair. Amazon Research Awards. $40,000.

LEADERSHIP & SERVICE

Beyond Bayes Workshop Co-Chair *2022*
Coq Workshop Co-Chair *2022*
Illinois Mental Health Ambassador *2021 – Present*
Illinois CS CARES Committee *2021 – Present*
SPLASH Hybridization Committee *2021*
SIGPLAN Long-Term Mentoring Committee (SIGPLAN-M) Founder & Chair *2021*
ICFP Mentoring Chair *2020*
ICFP Programming Languages Mentoring Workshop (PLMW) Co-Chair *2020*
POPLmark 15 Year Retrospective Panel Lead Organizer *2020*
University of Washington Graduate Admissions Committee *2018*
DeepSpec Summer School Student Talks Organizer *2017*

PROGRAM COMMITTEES

TYPES (2022), ITP (2022), PLDI (2022), AIPLANS (2021), CAV (2021), HATRA (2020), MSCS (2020), CoqPL (2019), CAV AEC (2019), POPL AEC (2018, 2019)

MENTORSHIP, DIVERSITY, & OUTREACH

Transitional Funding (Work in Progress) *2022*
Designer of a program to help Ph.D. students flee unsafe environments.

SIGPLAN Long-Term Mentoring Committee *2020 – Present*
Mentor for the mentorship program listed under leadership & service above.

Shut Down PL *2020*
Coorganizer of an anti-racist workshop for programming languages researchers.

Neighbors Feeding Neighbors Seattle & Ballard Food Bank *2020 – 2021*
Packer & delivery driver of food & masks for the hungry during the pandemic.

UW CSE Care Committee *2019 – 2021*
Founder & organizer of a support network for graduate students in times of need.

Jewish Family Services *2017 – 2021*
ESL tutor and friendly visitor for an elderly refugee.

UW CSE & TUNE House *2015 – 2020*
Mentor for undergraduate women and graduate students in computer science.

UW Queer Mentoring Program *2016 – 2019*
Mentor for LGBT students from any major.

The Identity Function *2016 – 2018*
Author of a blog interview series about LGBT computer science researchers.

Amazon *2012 – 2015*
Technical and career mentor for software engineers.

INVITED TALKS

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 *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

MEDIA

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.

HONORS & AWARDS

College of Engineering Quarterly Fellow *University of Washington*
P.E.O. Scholar *University of Washington*
NSF GRFP Fellow *University of Washington*

TEACHING

CS 598 TLR: Proof Automation *Spring 2022*

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.

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