Kenny Foner

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Location:	**Philadelphia, PA**	*Pronouns*:	**they/them/their**

★ Who am I?

I'm a **software engineer** with a deep background in **programming languages research and development**. I love building languages, compilers, and tools for testing and verification—but I'm equally excited to learn new domains and tackle their new challenges! I take pride in collaboratively creating software that is intuitive, well-documented, and actively helpful, to delight developers and users with polished, thoughtful engineering work. I seek to apply meaningful theory towards real problems, using my craft as a computer scientist to make a positive difference for programmers and for the world.

★ Education

University of Pennsylvania *(Philadelphia, PA)* May 2018
Master of Science in Engineering in Computer and Information Science

Advised by Dr. Stephanie C. Weirich
Teaching: *Advanced Programming (Haskell)*, *Software Foundations (Coq)*

Brandeis University *(Waltham, MA)* May 2015
Bachelor of Science in Computer Science *summa cum laude* with highest departmental honors (inducted $\Phi\mathrm{BK}$)

Advised by Dr. Harry G. Mairson
Thesis: *Getting a Quick Fix on Comonads* (later published in *Haskell Symposium '15*)
Teaching: *Functional Programming (Haskell)*, *Structure & Interpretation of Computer Programs (Scheme)*

★ Work Experience

Galois *(Remote)* 2018 – present
Software Engineer/Researcher

I've worked on the ElectionGuard verification API for tamper-resistant end-to-end encrypted elections, a redesigned RPC server for the SAW/Cryptol suite of open-source program analysis tools, a novel interface to the Crux verification tool for C/LLVM program analysis, and several other projects. Along the way I've authored and contributed to a number of open source projects (listed in a separate section).

Microsoft Research *(Redmond, WA)* Summer 2016
Research Intern

I formalized the metatheory of several small programming languages as a stress test for the experimental Dafny language/proof assistant, and designed an intermediate language to verify a multi-part compilation pipeline. I contributed to Dafny's development, implementing bug fixes and feature improvements.

Galois *(Portland, OR)* Summer 2015
Research Intern

I implemented a user-friendly interactive code generation utility for the open-source SAW suite of program analysis tools, designed to help cryptography domain experts get started more easily with automated formal verification. In a separate project, I worked on the design of a prototype graph query language.

Galois *(Portland, OR)* Summer 2014
Research Intern

I created an embedded domain-specific language for secure distributed computations, implemented using oblivious secret-sharing protocols. I developed an optimizing compiler, and an efficient bytecode interpreter which was several times faster than the previous best results on a series of established benchmarks.

MIT Lincoln Laboratory *(Lexington, MA)* Summer 2013
Research Intern

I prototyped applications and protocols to evaluate experimental frameworks for dynamic information flow control (IFC). Within one of these, I implemented a secure distributed multi-player game of *Battleship*, and contributed to a comparative analysis of IFC frameworks published in PLAS '14.

★ Programming Background

Expert Knowledge: Haskell – I've been programming in Haskell for more than seven years, and currently use it in my day-to-day work. I've authored libraries using advanced type-system extensions, implemented compiler plugins, and published novel research at top-tier academic conferences about high-performance immutable data structures, strictness analysis, and generic programming.

Strong Professional Background: Rust – I've been programming in Rust for several years, and currently use it in my day-to-day work. I've contributed several open source packages to the ecosystem, including the Myxine server for rapid language-agnostic GUI prototyping and the Hopscotch data structure for fast tagged skip-queues. I'm familiar with the async ecosystem and HTTP stack, having built multiple applications atop them.

Assorted Professional Experience: Python, JavaScript – I've used Python to implement a number of projects: notably, bindings to the Myxine server and an idiomatic front-end to the SAW verification tool. I'm also conversant in JavaScript, though not yet expert: Myxine's front-end is written in vanilla JavaScript, making use of a number of newer web technologies.

Academic Experience: OCaml, Coq, Scheme – I've used these languages in my academic career to collaborate on research, create course materials, and teach university classes.

Other Experience: Clojure, C, Java – I've used these languages in less-recent work, in university courses, or in hobby projects. I can read them, and I'm comfortable working in them with the aid of reference materials.

★ Open Source Contributions

I'm the primary author and maintainer of the **Myxine** server for rapid language-agnostic GUI prototyping, the **StrictCheck** library in Haskell for randomized dynamic demand analysis, the **Hopscotch** data structure in Rust for efficient tagged skip-queues. I'm also a co-author and co-maintainer of the **Urn** data structure in Haskell for updateable discrete probabilistic sampling. I'm a current contributor to the **Cryptol** specification language and the **Software Analysis Workbench**. I've also contributed to the **Glasgow Haskell Compiler** and the **Dafny** language.

★ Publications & Talks

PL Mentoring Workshop at SPLASH '19, POPL '20, ICFP '20 (upcoming): "How Can I Academia When My Brain Can't Even? Mental Health in Grad School and Beyond" (non-technical talk)

C○mp○se '19: "Functors of the World, Unite!" (talk)

ICFP '18: Keep Your Laziness in Check. K. Foner, H. Zhang, and L. Lampropoulos. In *Proceedings of the 2018 ACM SIGPLAN International Conference on Functional Programming*.

ICFP '18: "Keep Your Laziness in Check" (talk)

ICFP '18: What's the Difference? A Functional Pearl on Subtracting Bijections. B. Yorgey and K. Foner. In *Proceedings of the 2018 ACM SIGPLAN International Conference on Functional Programming*.

Haskell '17: Ode on a Random Urn (Functional Pearl). L. Lampropoulos, A. Spector-Zabusky, and K. Foner. In *Proceedings of the 2017 ACM SIGPLAN Symposium on Haskell*.

C○mp○se '17: "Choose Your Own Derivative" (talk)

TyDe '16: Choose Your Own Derivative (Extended Abstract). J. Paykin, A. Spector-Zabusky, and K. Foner. In *Proceedings of the 2016 ACM SIGPLAN Workshop on Type-Driven Development*.

C○mp○se '16: *"There and Back Again* and What Happened After" (talk)

Haskell '15: Functional Pearl: Getting a Quick Fix on Comonads. K. Foner. In *Proceedings of the 2015 ACM SIGPLAN Symposium on Haskell*.

Haskell '15: "Functional Pearl: Getting a Quick Fix on Comonads" (talk)

PLAS '14: You Sank My Battleship!: A Case Study in Secure Programming. A. Stoughton, A. Johnson, S. Beller, K. Chadha, D. Chen, K. Foner, and M. Zhivich. In *Proceedings of the 2014 ACM Workshop on Programming Languages and Analysis for Security*.

★ Service

#ShutdownPL '20: I co-chaired this virtual day of action against racism in the programming languages research community (a part of the larger #ShutdownSTEM day of action). Organized in less than 48 hours, the event drew 165 faculty, industry researchers, and students, and consisted of 6 parallel 5-hour discussion tracks focusing on building lasting commitments to substantive change. Subjects discussed ranged from building actively anti-racist mentoring structures to founding a group to increase the transparency of police and military spending on PL research. I am presently involved in efforts to replicate and grow this anti-racist work as an official component of academic conferences on programming languages.

Mental health advocacy: I've given recurring invited talks about mental illness within academia and industry. I am outspoken in public about my own experience of bipolar disorder and ADHD and regularly speak with people across my field who experience mental illness and need someone to talk to. I am determined to use my own privileges to work against the stigma attached to these and all other mental illnesses and neurodivergent identities.