Kenneth William Foner

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Education

University of Pennsylvania, Philadelphia, PA — Expected 2021

Doctor of Philosophy in Computer & Information Science
Advised by Dr. Stephanie C. Weirich

University of Pennsylvania, Philadelphia, PA — Expected May 2018

Master of Science in Engineering in Computer & Information Science
Advised by Dr. Stephanie C. Weirich

Brandeis University, Waltham, MA — May 2015

Bachelor of Science *summa cum laude* in Computer Science (with highest honors); Minor in Philosophy
Thesis: *Getting a Quick Fix on Comonads*, advised by Dr. Harry G. Mairson
GPA: 3.87/4.0; Phi Beta Kappa (inducted May 2015)

Publications

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

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

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

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

Presentations

C∘mp∘se Conference NYC, 2017: Choose Your Own Derivative.

Hendrix College, Seminar Series: Getting a Quick Fix on Comonads (the reprise).

Hendrix College, Intro Functional Programming: Pure Functional Data Structures (invited lecture).

C∘mp∘se Conference, 2016: "There and Back Again" and What Happened After.

Haskell Symposium, 2015: Functional Pearl: Getting a Quick Fix on Comonads.

Boston Haskell, 2015: Ice, Ice, Data: Freezing Mutable Data Structures with Midas.

Boston Haskell, 2014: Getting a Quick Fix on Comonads.

Galois Tech Talk, 2014: Comonadic Spreadsheets and Löb's Theorem.

Industry Experience

Microsoft Research, Redmond, WA Summer 2016
Research Intern advised by Dr. K. Rustan M. Leino

The summer of 2016, I used the verified programming language Dafny to formalize the metatheory of several programming languages, as astress test for Dafny *qua* proof-assistant. I subsequently designed a "two-dimensional" intermediate language specifically crafted to enable verification of a staged compilation pipeline more succinct and comprehensible. Along the way, I contributed to Dafny's development, including bug fixes and feature improvements.

Galois Inc., Portland, OR Summer 2015
Research Intern advised by Dr. Aaron Tomb

The summer of 2015, I designed and implemented a semi-interactive heuristics-based code generation tool which presents a user-friendly interface to the construction and evaluation of formal proofs of equivalence between heterogeneous codebases. At the same time, I collaborated on another project, creating a preliminary design for a novel streaming graph query language and evaluating distributed graph database technologies for high-throughput provenance queries.

Galois Inc., Portland, OR Summer 2014
Research Intern advised by Dr. David Archer

The summer of 2014, I designed embedded domain-specific languages in Haskell for expressing secure distributed computations with cryptographically enforced static security guarantees. I created an optimization-friendly compiler for a new deep embedding of a language for linear secret sharing, using features of Haskell's type system to ensure that the compiler pipeline was correct. I then implemented an efficient bytecode virtual machine as the final target of the new compiler which improved upon the previous best results on several key cryptographic benchmarks for secure multi-party computation.

MIT Lincoln Laboratory, Lexington, MA Summer 2013
Research Intern advised by Dr. Alley Stoughton

The summer of 2013, I prototyped secure applications and protocols to evaluate experimental frameworks for dynamically enforced monadic information flow control in Haskell, culminating in a secure-by-construction distributed game of online *Battleship*, as described in "You Sank My Battleship!" (PLAS '14).

Teaching Experience

University of Pennsylvania Department of Computer Science, Philadelphia, PA Spring 2017
Teaching Assistant for *CIS 552: Advanced Programming*

I was a teaching assistant at University of Pennsylvania for CIS 552 (an advanced programming course in and about the Haskell programming language), taught by my advisor Stephanie Weirich. My responsibilities included contributing to the core course material, grading, and occasional lecturing.

University of Pennsylvania Department of Computer Science, Philadelphia, PA Fall 2016
Teaching Assistant for *CIS 500: Software Foundations*

I was a teaching assistant at University of Pennsylvania for CIS 500, the course constructed from the book *Software Foundations*, taught by Benjamin Pierce. My responsibilities included contributing to the core course material, examination design, grading, course infrastructure development, and occasional lecturing.

Brandeis University Department of Computer Science, Waltham, MA Spring 2015
Course Instructor for *COSI 98: Introduction to Haskell*

I designed and taught a full-credit introductory course on the Haskell programming language at Brandeis University to a group of interested students and faculty.

Brandeis University Department of Computer Science, Waltham, MA Spring 2013, Spring 2014
Teaching Assistant for *COSI 21B: Structure and Interpretation of Computer Programs*

I was a frequent teaching assistant and guest lecturer for COSI 21b, a course based upon the book *Structure and Interpretation of Computer Programs* (Abelson and Sussman, 1996), taught by my undergraduate advisor Harry Mairson.

Awards & Honors

2015: Highest Departmental Honors in Computer Science for senior thesis (later published in *Haskell'15*)

2015: Phi Beta Kappa Academic Honor Society

2015: Michtom Prize for Academic Excellence in Computer Science

2014: Jerome A. Schiff Undergraduate Research Fellowship for work on computational literary analysis

2014: Dr. Jacques and Diana Cohen Endowed Award in Interdisciplinary Studies

2011–2015: Dean's List for all semesters at Brandeis University

Service

Since 2016, I co-organize the University of Pennsylvania's annual Haskell exchange, Hac φ: a gathering of academics, professionals, and hobbyists to share, collaborate, and hack together.

I served as a student volunteer at the International Conference on Functional Programming (ICFP) 2016.

I organized a reading group on the fundamentals of SMT solvers and their applications to programming languages and verification during the spring of 2016.