# Kavon Farvardin

🏠 kavon.farvard.in , ✉ kavon@farvard.in

## Research Interests

Implementation of functional and concurrent programming languages; adaptive program optimization; scalable concurrent data structures.

## Education

**University of Chicago**

Ph.D. in Computer Science — **2014 – present**
M.S. in Computer Science — **2018**

**Pennsylvania State University**

B.S. in Computer Science — **2009 – 2014**
B.S. in Mathematics

## Experience

**HALO: Wholly Adaptive LLVM Optimizer** — **Sep 2018 – present**

For my dissertation, I am developing an adaptive optimization system called HALO. Details are available on GitHub.

**The Manticore Project** — **Sep 2014 – present**

I developed a new LLVM backend for the compiler while investigating various implementations of continuations and lightweight call stacks. I also explored techniques for garbage collection to reduce thread communication overhead in the split-heap runtime system. Paper is currently in submission.

**Argonne National Laboratory**

*Research Aide* — **June 2019 – Sep 2019**
*Research Aide* — **June 2018 – Aug 2018**

Under the mentorship of Hal Finkel, I first started the atJIT project, which is an LLVM-powered system that provides the ability to automatically performance-tune annotated C++ programs during execution through the use of machine learning and other optimization techniques. Taking what worked and learning what did not from atJIT, the second-time around I worked on the HALO project for my dissertation while at Argonne.

**Microsoft Research**

*Research Intern* — **Apr 2017 – June 2017**

Under the mentorship of Simon Peyton Jones, I worked on improving the interface between the Glasgow Haskell Compiler (GHC) and LLVM. Specifically, I added a new intrinsic to LLVM that can be used by many functional-language compilers, which typically manage the call stack themselves, to alleviate the process targeting LLVM effectively.

### Penn State Applied Research Laboratory

*Research Staff* **May 2014 – Aug 2014**
*Distinguished Undergrad Researcher* **May 2012 – May 2013 ∪ Jan 2014 – May 2014**
Lead developer researching new features for an immersive 3D data visualization program.

### Intel Corporation

*Software Engineering Intern* **June 2013 – Dec 2013**
Worked with a team developing a DSL and compiler based on LLVM for hardware validation. My primary task was to develop hardware tests according to a specification, analyze the compiler's output, and run tests on known-good CPUs to identify compiler bugs.

### Pennsylvania State University

*Undergraduate Researcher* **Aug 2009 – Aug 2011**
Built educational software, for pedagogical research with a professor, that employs an interactive, graphical tracing method to teach fundamentals of programming.

## Papers

**Weighing Continuations for Concurrency** **Mar 2017**
Kavon Farvardin
*Master's Thesis*

**Compiling with Continuations and LLVM** **Sep 2016**
Kavon Farvardin and John Reppy
*ML Workshop*

**Spread-Spectrum Organization for Concurrent Pools** **Feb 2016**
Kavon Farvardin and John Reppy
*Unpublished*

## Talks

**atJIT: an online, feedback-directed optimizer for C++** **Oct 2018**
*LLVM Developers' Meeting*

**Comparing strategies for lightweight threading based on continuations** **Sep 2018**
*Workshop on Functional High-Performance Computing*

**Native Support for Explicit Stacks in LLVM** **Sep 2017**
*Haskell Implementors' Workshop*

**Practical Conversion from CPS to Direct Style** **Dec 2016**
*Midwest PL Summit*

## SERVICE

**PLDI 2019** — Artifact Evaluation Committee Member
**PPoPP 2016** — Shadow Reviewer

## TEACHING

**Artifice**
*Chief Technical Officer* **Sep 2016 – present**
*After-school Instructor* **Sep 2015 – Sep 2016**
Artifice is a non-profit, volunteer-run organization in Chicago that teaches youths valuable STEM skills. We run after-school classes for 4th–6th graders that provides a fun, hands-on experience with electronics and Arduino programming. As CTO, I led the switch to a visual language (Scratch) for Adriuno programming in the after-school classes.

**Computer Science with Applications 2 — CAPP 30122**
*Teaching Assistant* UChicago, **Winter 2019**

**Compilers — MPCS 51300**
*Teaching Assistant* UChicago, **Autumn 2018**

**Compilers — MPCS 51300**
*Teaching Assistant* UChicago, **Winter 2018**

**Computer Science with Applications 1 — CMSC 12100**
*Teaching Assistant* UChicago, **Autumn 2017**

**Computer Science with Applications 2 — CMSC 12200**
*Teaching Assistant* UChicago, **Winter 2017**

**Compilers for Computer Languages — CMSC 22600**
*Teaching Assistant* UChicago, **Autumn 2016**

**Functional Programming — CMSC 22300**
*Teaching Assistant* UChicago, **Winter 2016**

**Computer Science with Applications 1 — CMSC 12100**
*Teaching Assistant* UChicago, **Autumn 2015**

**Concurrent Scientific Programming — CMPSC 451**
*Teaching Assistant* Penn State, **Spring 2014**

**Programming Language Concepts — CMPSC 461**
*Teaching Intern* Penn State, **Spring 2013**
Prepared and delivered the class's lectures on compilers, context-free and regular languages, memory management, garbage collection, and Prolog.

**Introduction to Programming Techniques — CMPSC 121**
*Teaching Intern* Penn State, **Fall 2012**

Prepared and delivered the class's lectures on Boolean algebra, sorting and searching algorithms, and basic data structures.

LANGUAGE FAMILIARITY

Assembly, C, C++, Haskell, Java, LLVM, Prolog, Python, Scheme, Standard ML, *etc.*