Caleb A. Helbling

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EDUCATION

Doctor of Philosophy, Computer Science
Purdue University, Lafayette, IN
Began Fall 2021
Advisor: Roopsha Samanta

Bachelor of Science, Computer Science, Minor in Mathematics
Tufts University, Medford, MA
GPA: 3.63, Graduated Spring 2016
Tau Beta Pi engineering honor society member

SKILLS

Expertise: Programming Language Theory, Computer Graphics, Embedded Systems Programming, Machine Learning, Concurrent Systems, Simulation and Game Development, Front End Web Development, and Mathematics.
Languages: C++, C#, C, Python, Java, JavaScript, F#, Erlang, Haskell, Coq, Clojure, HCS12 Microcontroller Assembly, SML, PHP, HTML, CSS

EXPERIENCE

Software Engineer III November 2019 - July 2021
Holos, Inc, Madison, WI

- Worked as a software developer on Holos' virtual reality platform experience. Implemented the multiplayer functionality of Holos, which includes user state synchronization, file sharing, voice chat and encryption. Prototyped several other interaction based features for the Holos system.
- Holos makes VR software for K-12 education and other educational projects such as training software for F-35 fighter jet mechanics.

Assistant Staff August 2016 - February 2019
MIT Lincoln Laboratory, Lexington, MA

- Worked as a software developer researcher at MIT Lincoln Laboratory. MIT Lincoln Laboratory is US Department of Defense research and development center which applies advanced technology to problems of national security.
- Worked in a variety of areas relating to cyber-physical systems research. Lead developer on embedded systems project working with VXWorks based systems, delivered this project successfully to sponsoring agencies.

Intern Developer Summer 2014
AIR Worldwide, Boston, MA

- Worked as an intern on a research and development team at AIR Worldwide. Researched and implemented solutions for computational geometry problems on elliptic geometry, for use in geospatial analysis.
- AIR Worldwide creates risk modeling software which simulate natural and man-made catastrophes for use by insurance and government organizations.

Intern Developer Summer 2013
International Business Machines Corporation (IBM), Rochester, MN

- Worked as a software development intern on the z/OS print development team. I developed an analysis program to detect the location and magnitude of differences in print documents outputted by the z/OS Infoprint server transforms for testing purposes.
- The program that I wrote is now in use for transform testing at Crawford Technologies and Ricoh. IBM works closely with Crawford and Ricoh to develop the z/OS Infoprint server.

Independent Game Developer Summer 2011 - Fall 2012
Jagex Game Studios, Cambridge, United Kingdom

- Developed the Ace of Spades computer game in collaboration with other international developers prior to acquisition by Jagex Ltd. Jagex is the largest game development studio in Europe. Prior to acquisition, Ace of Spades was downloaded 2.5 million times and had a peak concurrent player count of 3500.

Intern Developer Fall 2012 - Spring 2013

Bolder Thinking, Fargo, ND

- Developed system visualization software for Bolder Thinking as an intern at the North Dakota State University Research and Technology Incubator.
- Bolder Thinking develops cloud based VOIP (Voice Over Internet Protocol) software for enterprise customers.

ACADEMIA

Purdue University September 1-3, 2021

Solving the Funarg Problem with Static Types, Online Conference

- Published "Solving the Funarg Problem with Static Types" at the 33rd Symposium on Implementation and Application of Functional Languages.
- Presented novel method to solve the funarg problem (a type of memory management problem) using static types. Worked with coauthors to create a type theory model and successfully implemented the system in the Juniper programming language.
- Helbling, Caleb, and Fırat Aksoy. "Solving the Funarg Problem with Static Types." *33rd Symposium on Implementation and Application of Functional Languages*. ACM, 2021.

Independent Researcher March 9-13, 2020

Directed Graph Hashing, Boca Raton, Florida

- Published "Directed Graph Hashing" at the 51st Southeastern International Conference on Combinatorics, Graph Theory & Computing.
- Invented an algorithm for hashing directed graphs, paper includes an analysis of strengths and weaknesses, computation complexity, and applications.
- Helbling, Caleb. "Directed Graph Hashing." *51st Southeastern International Conference on Combinatorics, Graph Theory & Computing*. 2020.

Tufts University September 24, 2016

Juniper: A Functional Reactive Programming Language for the Arduino, Nara, Japan

- Published "Juniper: A Functional Reactive Programming Language for the Arduino" at the International Workshop on Functional Art, Music, Modelling, and Design (FARM).
- Invented and implemented a programming language and compiler for use in programming Arduino microcontrollers. Juniper offers a number of high level features previously inaccessible to microcontroller programmers.
- Held a demonstration of the Juniper programming language at the FARM Conference in Nara, Japan.
- Helbling, Caleb, and Samuel Z. Guyer. "Juniper: a functional reactive programming language for the Arduino." *Proceedings of the 4th International Workshop on Functional Art, Music, Modelling, and Design*. ACM, 2016.

Tufts University Fall 2014 - Spring 2016

Teaching Assistant, Medford, MA

- Assisted for COMP 50 Concurrent Programming course for two years. Duties included creating student exercises, holding office hours, grading assignments and answering student questions via online forum.
- COMP 50 was a small, special topic course with only one undergraduate teaching assistant.
- Assisted for COMP 105 Programming Languages course. COMP 105 provides an introduction to the study of programming languages as an intellectual discipline.

MISC

Bug Bounty Program August 2021

Microsoft, Microsoft Windows Vulnerability

- Reported vulnerability (VULN-049373) in Microsoft Windows that allows malicious code execution in certain circumstances. Awaiting notification from Microsoft that the issue has been fixed before full disclosure.
- Awarded bug bounty for this report by Microsoft.

PERSONAL

Blog: Where I write thoughts on technical topics and more `https://helbli.ng/blog/`

Global Game Jam Projects:

- Cell Tower Tycoon (2018): `https://globalgamejam.org/2018/games/cell-tower-tycoon`
- Wave Rider (2017): `https://globalgamejam.org/2017/games/wave-rider-3`

GitHub: `https://github.com/calebh/`