

Education

- October 2020 **Doctor of Philosophy in Computer Science**
– Present *The University of California, Los Angeles*
Advisor: Jens Palsberg
Quantum Computing, Optimization, Programming Languages, Verification
- August 2018 **Master of Science in Computer Science**
– May 2020 *The University of Illinois, Urbana-Champaign* GPA – 4.0
Thesis: "Closing the Gap in the LLVM Backend of \mathbb{K} ". Advisor: Grigore Rosu
Formal Methods and Verification, Rewriting Logic, Programming Languages
Phi Kappa Phi
- August 2014 **Bachelor of Science in Computer Engineering, Mathematics minor**
– May 2018 *The University of Illinois, Urbana-Champaign* GPA – 3.67
Thesis: "Raincoat and DNP3 on POX". Advisor: Zbigniew Kalbarczyk
James Scholar

Research

- October 2020 **Quantum Superoptimization** *Prof. Jens Palsberg*
– Present
 - Developed an optimization tool for quantum programs that reduces CNOT and rotation gate counts using phase polynomials.
 - Created a rich and modular interface for optimization passes in the optimization tool.
 - Wrote and tested various optimization passes and heuristics to reduce problem instances and increase overall optimization.
 - Designed and tested various backend optimization algorithms to construct optimized circuits from phase polynomials.
- November 2019 **IMPL** *Prof. Jose Meseguer*
– July 2020
 - Designed the IMPL programming language, an imperative programming language with loops, conditionals, and variables, incorporating booleans, natural numbers, and lists over natural numbers.
 - Implemented the continuation-style semantics of IMPL using the Maude system for formally correct execution of IMPL programs, as well as reachability logic proofs of IMPL program properties.
 - Wrote a technical report presenting the semantics of IMPL, as well as the proof methodology for carrying out reachability logic proofs of IMPL program properties and loop invariants.
- October 2018 **The \mathbb{K} Framework** *Prof. Grigore Rosu*
– May 2020
 - Implemented and tested new heuristics to optimize the pattern matching engine in the LLVM backend.
 - Developed file and system input/output capabilities in the LLVM backend to further enrich languages defined in \mathbb{K} .
 - Constructed a module in the \mathbb{K} frontend and implemented hooks in the LLVM backend to bring the power of a foreign function interface to \mathbb{K} based languages.
 - Assisted in the ongoing effort to formalize the semantics of C++ using \mathbb{K} by implementing the semantics of aliases.
 - Worked with different teams to help migrate existing \mathbb{K} based projects to the LLVM backend.
- January 2017 **Software-Defined Networking for Power Grids** *Prof. Zbigniew Kalbarczyk*
– May 2018
 - Implemented a secure data obfuscation algorithm for DNP3 based smart power grids using Mininet and the POX controller.
 - Created a DNP3 packet parsing library in Python to fill the gap in current open source projects.

Industry Experience

- June 2017 **Software Engineering Intern** UBER, San Francisco, CA
– August 2017
 - Integrated Google Calendar into the iOS Rider app in Swift through the Uber cross-platform RIB architecture.
 - Utilized SnapKit to programmatically create and modify UI elements within the iOS app.
 - Used ReactiveX technology through RxSwift for asynchronous process communication and network connectivity.
 - Worked closely with backend engineers and designers to deliver a consistent experience across devices.
- June 2016 **System Support Engineering Intern** U.S. CELLULAR, Schaumburg, IL
– August 2016
 - Used perl and bash utilities to verify internal system configurations and validate data integrity to discover unused production machines.
 - Modified patching automation for virtual machines using VMWare's vSphere Perl SDK.
 - Installed network switches and Hadoop clusters in production data center and gained experience working inside a production data center.

Teaching

- Fall 2021 **Compiler Construction CS 132** Teaching Assistant
Summer 2021 **IPAM RIPS Quantum Group** Academic Mentor
Spring 2020 **Program Verification CS 476** Teaching Assistant
Fall 2018 **Artificial Intelligence CS 440** Teaching Assistant
Fall 2017 **Engineering Orientation ENG 100** Lead Engineering Learning Assistant
Outstanding ICES ranking (Top 10% of instructors)
Fall 2016 **Engineering Orientation ENG 100** Engineering Learning Assistant
Outstanding ICES ranking (Top 10% of instructors)
Spring 2016 **Computer Systems Engineering ECE 391** Undergraduate Course Assistant
– Spring 2017 Top course assistant

Technology

Python, C, C++, Maude, Swift, JavaScript, Git, SVN, Linux, MacOS, Windows

Service

Reviewer SEFM 2019, COLA 2019, GuttmanFest 2021