# Micky Abir

## Education

September 2020 – Present
**Doctor of Philosophy in Computer Science**
*The University of California*, Los Angeles
Advisor: Jens Palsberg
*Programming Languages, Type Theory, Verification, Quantum Computing*

August 2018 – May 2020
**Master of Science in Computer Science**
*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 – May 2018
**Bachelor of Science in Computer Engineering, Mathematics minor**
*The University of Illinois*, Urbana-Champaign — GPA – 3.67
Thesis: "Raincoat and DNP3 on POX". Advisor: Zbigniew Kalbarczyk
*James Scholar*

## Research

November 2019 – Present
**IMPL** — *Prof. Jose Meseguer*
- 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 about the IMPL semantics, as well as the proof methodology for carrying out reachability logic proofs of IMPL program properties and loop invariants.

October 2018 – May 2020
**The $\mathbb{K}$ Framework** — *Prof. Grigore Rosu*
- 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 – May 2018
**Software-Defined Networking for Power Grids** — *Prof. Zbigniew Kalbarczyk*
- 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 – August 2017
**Software Engineering Intern** — Uber, San Francisco, CA
- 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 – August 2016
**System Support Engineering Intern** — U.S. Cellular, Schaumburg, IL
- 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.

(224) 848 1810 • micky.abir@gmail.com
https://www.linkedin.com/in/mickyabir

## Teaching

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| Spring 2020 | **Program Verification** *CS 476* | Teaching Assistant |
| Fall 2018 | **Artificial Intelligence** *CS 440* | Teaching Assistant |
| Fall 2017 | **Engineering Orientation** *ENG 100*<br>Outstanding ICES ranking (Top 10% of instructors) | Lead Engineering Learning Assistant |
| Fall 2016 | **Engineering Orientation** *ENG 100*<br>Outstanding ICES ranking (Top 10% of instructors) | Engineering Learning Assistant |
| Spring 2016 – Spring 2017 | **Computer Systems Engineering** *ECE 391*<br>Top course assistant | Undergraduate Course Assistant |

## Technology

*C*, *C++*, *Python*, *JavaScript (React*, *D3*, *Node)*, *Maude*, *Swift*, *Git*, *SVN*, *Linux*, *MacOS*, *Windows*