Keara L. Hill

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EDUCATION

State University of New York at Binghamton — **Binghamton, NY**
Doctorate of Philosophy in Computer Science — expected May 2027
Masters of Science in Computer Science — May 2022
Bachelor of Science in Computer Science — May 2016

RESEARCH INTERESTS

Formal probabilistic methods for software security, vulnerability analysis, exploitability analysis

RESEARCH EXPERIENCE

Binghamton University — **Binghamton, NY**
Graduate Assistant — *August 2024–Present*
Student Assistant — *May 2024–August 2024*

- Investigated formal methods for analyzing timing side channel vulnerabilities
- Developed tool implementing abstract interpretation-based side channel analysis technique on LLVM IR
- Applied tool to real-world cryptographic algorithms to quantify timing leakage
- Supported other students on systems security projects which used introspective hypervisor technology

TEACHING EXPERIENCE

Binghamton University — **Binghamton, NY**
Teaching Assistant — *August 2024–May 2024*

- Helped new professors design curricula for graduate-level Programming Languages and Compiler Design courses
- Developed automatic grading software that built and tested student projects written in C, Java, and Haskell
- Provided grading assistance in graduate level Programming Languages, Compiler Design, Design Patterns, and Information Security courses
- Supported students that struggled with material or projects

PROFESSIONAL EXPERIENCE

Grammatech — **Ithaca, NY**
Software Engineer — *October 2019–February 2023*

- Developed feature selection and results analysis techniques for a machine learning-based analysis of binary rewriting tools
- Architected a production-quality refactor of a prototype embedded library matcher
- Responsible for maintenance, improvements, and testing for the primary component of the CodeSentry library matching backend
- Contributed to productization of CodeSentry library detector from its original research project
- Continuously evaluated and improved on a suite of string-based library detectors for COTS binaries

Assured Information Security — **Rome, NY**
Software Engineer — *September 2015–September 2019*

- Led a multi-institution research team through design and development of a prototype assured hardware compiler
- Reviewed literature to determine the state of the art for assured hardware generation
- Designed a language for dynamic function call pattern matching
- Developed custom software suite for cyber warfare exercises
- Mentored a research team investigating formal software verification for mission-critical systems
- Supported a full-scale cyber warfare exercise with over twenty participants
- Contributed to development lifecycle of large, multi-language projects

- Ensured software compatibility with a variety of current and legacy systems

Co-op *May 2015–August 2015*

- Reviewed litereature to support research into cyber deception techniques
- Developed prototype cyber deception tools using the IntroVirt introspective virtual machine

PUBLICATIONS

The 7th Annual Symposium on Machine Programming (MAPS) **December 2023**
Predicting the Success of x86-64 Binary Rewriters

- Used machine learning techniques to predict whether a binary was transformable for a suite of binary rewriting tools
- Discovered, investigated, and extracted features likely to predict transformation success

Master's Thesis **Spring 2022**
A Formal Role-Based Access Control Model for a Microservice-Based Malware Analysis Platform

- Designed access control model for platform with known malicious and untrustworthy actors
- Proved security properties of model

PRESENTATIONS

Upstate Programming Languages Seminar **August 2025**
Probabilistic Abstract Interpretation for Quantifying Side Channel Leakage *Cornell University*

- Presented ongoing side channel analysis research and preliminary results

TECHNICAL SKILLS

Programming Languages: C, C++, Go, Python, C♯, PowerShell, Haskell, x86 assembly, Prolog, AWK, bash, Java, SML, BLISS
Operating Systems: Linux, Solaris, OpenBSD, Microsoft Windows, OpenVMS, RSTS/e
Tools: Frama-C, Intel Pin, Antlr 4, Wireshark, Cobalt Strike, HOL4, LaTeX, MongoDB