

KIRBY LINVILL



kirby.linivill.net



github.com/klinivill

EDUCATION

PhD: Computer Science, University of Colorado Boulder

August 2020 to Present

MS: Computer Science, University of Colorado Boulder

December 2023

Advisor: Gowtham Kaki, **Areas: Formal Methods and Security,**

GPA: 4.00, Honors: Dean's Fellowship, Outstanding Service Award, Outstanding TA Award

BS: Computer Science and Engineering, Santa Clara University

September 2011 to June 2015

GPA: 3.87, Honors: Magna Cum Laude, TΠ Engineering Honor Society, UPE Computing Honor Society

PEER-REVIEWED PUBLICATIONS

Verifying Indistinguishability of Privacy-Preserving Protocols

Kirby Linvill, Gowtham Kaki, and Eric Wustrow

Proceedings of the ACM on Programming Languages 7, OOPSLA2, Article 273 (October 2023)

DOI: 10.1145/3622849 (36% Acceptance Rate)

A Quantum-Inspired Method for Three-Dimensional Ligand-Based Virtual Screening

Maritza Hernandez, Guo Liang Gan, Kirby Linvill, Carl Dukatz, Jun Feng, and Govinda Bhisetti

Journal of Chemical Information and Modeling 2019 59 (10), 4475-4485

DOI: 10.1021/acs.jcim.9b00195 (5.79 Impact Score)

SELECT INDUSTRY EXPERIENCE

Microsoft Research, Research Intern (Research in Software Engineering) **May 2023 to August 2023**

- Helped create a Domain Specific Language (DSL) for optimizing distributed programs
- Created a transpiler to automatically extract TLA+ models from programs and optimizations written in the DSL so they could be model-checked for correctness and refinement
- Worked on extending the transpiler to extract F* models from programs so they could be formally verified

Curative Inc., Software Engineer Consultant

August 2020 to August 2020

- Built features, fixed bugs, and provided support for new web-based in-house lab management software used to track >30 million COVID-19 diagnostic tests

Accenture Labs, Systems & Platforms Researcher

August 2017 to August 2020

- Led quantum computing and heterogeneous computing work within Accenture Labs
- Managed 3 teams of 3 developers across projects
- Designed and architected 2 different offerings: a system to track files throughout an enterprise and a system to automate intelligent data cleaning and validation
- Developed 4 demo applications of quantum computing and 1 of secure multi-party computing
- Evaluated 4 leading quantum development kits (QDKs), resulting in redesigns and improvements

Teradata, Big Data Consultant

June 2015 to August 2017

- Developed a near real-time system to ingest and process 20 million customers' call detail records
- Stabilized a high-profile runaway project by prioritizing features and setting transparent timelines
- Presented design patterns and best practices to prospective clients and 150+ senior architects

SKILLS

Technologies (proficient): F*, Rust, OCaml, TLA+, Python, C, JavaScript, Linux, Spark, Hadoop, SQL

Technologies (experience with): Z3, Coq, PlusCal, Scala, Java

Techniques: Formal Methods, Programming Language Design, Application Security, Application Development

Foundational Knowledge: Static Analysis, Dynamic Analysis, Machine Learning

KIRBY LINVILL



PATENTS

- Utilizing machine learning to prevent intellectual property issues for content during different stages of a project lifecycle (US Patent 11,657,466)
- Quantum formulation independent solver (US Patent 11,568,293)
- Systems and methods for distributed control of manufacturing processes (US Patent 11,513,507)
- Quantum computation for optimization in exchange systems (US Patent 10,592,816)

SELECT PROJECTS

Abstract Interpreter Static Analysis Library for Rust

August 2022 to Present

- Personal project to build an abstract interpreter in and for Rust (working on the MIR layer)
- Currently supports interval and boolean abstract domains

ELU support for ETH Robustness Analyzer for Neural Networks (ERAN)

April 2022

- Created a sound relaxation for the ELU activation function in the DeepPoly abstract domain
- Enabled the static analysis tool ERAN to verify robustness of neural networks with ELU activation functions

Web Skimmer Detection

August 2020 to January 2021

- Adapted a Chromium-based forensics engine (JSGraph) to detect client-side web credit card skimmers
- Investigated use of taint tracking on webpages to detect client-side web skimmers
- Hooks into the Blink rendering engine to record DOM manipulations and interactions with V8

AWARDS & FELLOWSHIPS

- CU Boulder Publication Recognition Award - "Verifying Indistinguishability of Privacy-Preserving Protocols"
- CU Boulder Outstanding Teaching Assistant Award (2024)
- CU Boulder Outstanding Service Award (2023)
- CU Boulder Dean's Fellowship (2020-2021)
- CU Boulder Conference Support Fellowship - OOPSLA 2023
- ACM Special Interest Group in Programming Languages (SIGPLAN) Travel Grant - OOPSLA 2023
- Oregon Programming Languages Summer School (OPLSS) Fellowship (2022)
- Programming Languages Mentoring Workshop (PLMW) Scholarship - POPL 2022
- Magna Cum Laude - Santa Clara University
- TBP Engineering Honor Society (2013-2015)
- UPE Computing Honor Society (2014-2015)

+1 CURRENT EXTRACURRICULAR ACTIVITIES

ex-President, ex-Vice President, Member: CU Boulder Cybersecurity Club

SERVICE

Participated in reviews and committees at the following venues:

- OOPSLA 2024 - Artifact Evaluation Committee
- CAV 2023 - Artifact Evaluation Committee
- PLDI 2023 - Artifact Evaluation Committee
- CAV 2022 - Artifact Evaluation Committee
- USENIX Security 2021 - Sub-reviewer