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EDUCATION

- CURRENT** PHD IN COMPUTER SCIENCE, *University of Pennsylvania*, Philadelphia, PA
Research: “*Programming languages for formally verified cryptographic proof systems*” in PLClub, DSL.
Advised by Sebastian ANGEL & Steve ZDANCEWIC. Graduation in summer 2025.
- 2015, 2019 BSC, MENG IN COMPUTER SCIENCE, *Massachusetts Institute of Technology*, Cambridge, MA
Research: “*Extracting and optimizing low-level bytecode from high-level verified Coq*” in PDOS.

EMPLOYMENT

- SUMMER '22 Research Scientist Intern, AMAZON, Automated Reasoning Group, Arlington, VA
– Contributed in the type system formalization of the Cedar authorization language.
– Implemented a novel type inference algorithm for Cedar including singleton and capability types.
- 2018 - 2019 Investment Engineer, BRIDGEWATER Associates, Westport, CT
– Created Programming languages for big-data analysis and visualization used by Quantitative Research.
– Implemented risk-controls and hedging algorithms used daily by Trade Generation.
– Taught the Scala programming language to more than 100 traders and engineers.
- 2016 - 2018 Principal Software Engineer, UNIFYID (acquired by PROVE), San Francisco, CA
– Designed and implemented the core back-end with more than 30 microservices.
– Implemented a Machine Learning (ML) service for high-throughput inference (3000 req/sec).
– Implemented certificate management and PKI systems for End-to-end encryption.
- 2015 - 2016 Software Security Engineer, APPLE, Cupertino, CA
– Contributor to the LLVM compiler and the Swift programming language.
– Implemented cryptographic protocols for DRM.

TECHNOLOGIES AND LANGUAGES

- Computing: Compilers, Language design, Performance engineering, Formal verification, Cryptography, Smart Contracts, Zero-knowledge proofs, Distributed systems, Cloud security, Microservices.
- Languages: Rust, Scala, Haskell, OCaml, Coq, C, C++, Python, Go, Java, Javascript, Elm, SQL.

PATENTS & PUBLICATIONS

- Oct. 2024.** “Cedar: A New Language for Expressive, Fast, Safe, and Analyzable Authorization”. In: *Proceedings of the ACM on Programming Languages* OOPSLA.
- Dec. 2024.** “Choice Trees: Representing and reasoning about nondeterministic, recursive, and impure Programs in Coq”. In: *Journal of Functional Programming, Special POPL 2025 edition*.
- June 2024.** “Reef: Fast Succinct Non-Interactive Zero-Knowledge Regex Proofs”. In: *33rd USENIX Security Symposium*.
- Dec. 2024.** “Structural temporal logic for mechanized program verification”. In: under submission.
- June 2022.** “Efficient representation of numerical optimization problems for SNARKs”. In: *31st USENIX Security Symposium*.
- Mar. 2020.** “Privacy-preserving system for machine-learning training data”. US Patent 10,601,786.
- Nov. 2019.** “Extracting and optimizing formally verified code for systems programming”. In: *NASA Formal Methods: 11th International Symposium*.