Alex Kisil

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WORK EXPERIENCE

Agita Labs **Ann Arbor, MI**

Lead Computer Engineer *April 2022 - Present*

- Manage and mentor a team of 3 engineers in the continued agile development of TrustForge, an FPGA-powered secure hardware enclave, custom ISA, and software programming framework enabling general-purpose encrypted computation
- Design and iterate on the TrustForge SDK and emulator, enabling clients without FPGA access to trial our tech
- Maintain and document a 100,000+ line codebase (C++, SystemVerilog, Assembly, Node.js, Python) in AWS and Azure
- Architect cloud-based FPGA workflow in Azure & AWS, automating dependency installs, maintaining VM availability, and on-boarding new team members with living documentation
- Implemented performance-critical interfaces between hardware and C++ libraries to facilitate practical user adoption
- Built hardware performance monitor and ciphertext cache to identify and reduce >70% of our latency at FPGA interfaces
- Presented roadmaps, technical specs, and challenges to investors to help secure $4 million in seed funding

Computer Engineer *January 2019 - April 2022*

- Co-invented and implemented Sequestered Encryption to serve as the foundation of TrustForge
- Created hardware-accelerated encryption and data integrity modules, achieving secure computation with 120,000x speedup over leading software-based fully homomorphic encryption solutions
- Architected and built novel data hashing, IEEE754 floating point, and exception handling approaches under bit-granularity memory constraints leveraging open source library HardFloat
- Led backend development of a privacy-preserving health tracking demo, converting an open-source application to use TrustForge for encrypted data processing

Qualcomm **San Diego, CA**

Software Engineering Intern *May 2018 - August 2018*

- Implemented OpenVX/OpenCV interface to enable efficient data flow between the Computer Vision and VR teams
- Optimized legacy computer vision functions for a 2.5x average speedup to meet Qualcomm's Snapdragon XR chip specs

University of Michigan **Ann Arbor, MI**

Undergraduate Research Assistant (Computer Security Lab) *December 2017 - May 2018*

- Assessed security profile of novel encryption accelerators via power analysis to identify vulnerabilities before tape-out
- Programmed data tagging for the RocketChip open-source processor to allow for finer-grained encryption

University of Michigan **Ann Arbor, MI**

Student Instructor (EECS 280: Object-Oriented Programming and Data Structures) *December 2016 - December 2017*

- Instructed labs on OOP, performed code review in office hours, and designed exam problems for 1000+ students
- Implemented cheat-checking software to analyze students' C++ code to provide an equitable learning environment

SKILLS

Languages: C/C++, C#, Python, SystemVerilog, Bash, Assembly (RISC-V, ARM, x86)
Hardware Development: FPGA Development (Xilinx, Altera), Custom ISA Design, Hardware Security
Cloud & DevOps: CI/CD, AWS, Azure, Git, Jenkins
Development Tools: VS Code, GDB, Make

PUBLICATIONS & PATENTS

- *Morpheus II: A RISC-V Security Extension for Protecting Vulnerable Software and Hardware, 2021 IEEE HotChips 33*
- Patent US11748521: *Privacy-Enhanced Computation via Sequestered Encryption*
- Patent US12105855: *Safe Disclosures in Sequestered Encryption Systems*

EDUCATION

University of Michigan **Ann Arbor, MI**

B.S.E Computer Engineering, cum laude *September 2015 - December 2018*