

Friedrich Doku

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Education University of Pittsburgh.
Major Computer Science

Pittsburgh, PA
Graduating Fall 2023

Technical Skills

Programming Languages: Python, Java, C, Go, Assembly (Arm and x64)

Software Tools: GDB, Vim, Linux, Bash, TensorFlow, PyTorch, Docker, AWS, Kubernetes, Oracle Cloud, Buildroot, Yocto, Busybox, U-boot, Linux System Administrator

Relevant Coursework: Algorithms and Data Structures, Object Oriented Programming Using Java, System Programming, Computer Organization & Assembly Language

Experience

Software Engineering Intern @ Carnegie Robotics

Pittsburgh, PA

Carnegie Robotics (CRL)

May 2023-Present

- Working with embedded systems software and PCBs
- Developing testing software for camera sensors
- Working on automation software
- Writing kernel level code for ARM devices

R&D @ [Privacy Backplane](#)

Pittsburgh, PA

University of Pittsburgh, Northwestern University, University of Michigan

Sep 2022-Present

- Developed and contributed to the "Privacy Backplane," a legal-technical framework enabling individuals to control policies governing access, usage, and storage of their personal data in IoT environments.
- Designed and implemented a video pipeline for ARM devices in the Linux kernel, optimizing video processing and enhancing the performance of multimedia applications
- Collaborated with a team to design and implement the technical aspects of the Privacy Backplane

TITANS Cybersecurity R&D Intern @ Sandia National Laboratories

Albuquerque, NM

Sandia National Laboratories

May 2022-April 2023

- Working with operating systems kernels and hypervisors
- Writing kernel level code for ARM devices

Research with Professors Adam Lee & Jack Lange

Pittsburgh, PA

University of Pittsburgh

September 2020-Present

- Developing a secure image processing system for embedded devices.
- Wrote device drivers for operating system kernels.
- Implemented an IPC mechanism for communication between virtual machines.
- Configured operating systems to run on hafnium hypervisor.
- Done in C.

Software Engineer Contractor @ [Whonix](#)

Remote

Whonix

August 2021-September 2022

- Worked on a secure operating system. That protects the identity and personal data of its users.
- Developed application to automatically sign kernel modules.
- Wrote code to allow existing Linux distributions to be booted into live mode.

Software Engineer Intern @ Oracle

Austin, TX

Oracle Corporation

May 2021-August 2021

- I developed a secure data store for IoT applications using the Oracle Cloud <https://github.com/friedrich12/redsgx>.
- Developed a cloud platform for secure data storage using trusted hardware
- Worked with embedded Linux, busybox, and U-boot
- Used Docker to deploy applications.
- Done in C and Java

Developed an exokernel for embedded ARM devices

Pittsburgh, PA

[Mutex Unlocked](#)

Fall 2021-Present

- Developing an exokernel for the raspberry pi.
- Wrote device drivers for operating system kernel.
- Implemented core OS components, such as, timer. scheduler, virtual memory, heap, user-space, locking mechanisms, and interrupts.

Developed a Secure Contact Tracing System Named Khopesh

Pittsburgh, PA

University of Pittsburgh

Summer 2020

- I published a research paper on the project titled “Khopesh – Contact Tracing Without Sacrificing Privacy”. See for details: https://link.springer.com/chapter/10.1007/978-3-030-63095-9_30
- I implemented the system in C++ and C <https://github.com/MutexUnlocked/khopesh>
- I used Docker, DigitalOcean, and R to test the system and evaluate performance results.
- Khopesh effectively hides the location data and contacts of users from attackers.
- Wrote cryptographic protocols, such as, Identity Based Encryption.

Research with Professor Paul Cohen, Dean of Computing

Pittsburgh, PA

University of Pittsburgh

Summer 2020-Fall 2020

- I'm an engineer for a machine learning project, currently spearheading its 1st web service, allowing the research to be disseminated to the broader research community.
- <https://github.com/momacs/sim-server> allows users to easily configure and run probabilistic relational agent-based models. These models can be used to run simulations on Covid-19.
- I implemented the webservice using Python.

Software Engineering Internship w/ Professor Juergen Konczak

Minneapolis, MN

University of Minnesota - Twin Cities

Winter 2019-Present

- Developed a cloud storage application that backs up patient data.
- I designed a robot that improves hand function for patients with somatosensory deficits.

- Added support for a Trusted Execution Environment that guarantees code and data with integrity and confidentiality.
- This work was done in C, C++, Rust, and Python.
- Developed designs for the system's architecture.

Awards

Chancellor's Undergraduate Research Fellowship

University of Pittsburgh

Pittsburgh, PA
November 2020

- Received funding to work on my own research project.
- The goal of my project is to remove sensitive information from camera feed.

**Leadership
Experience**

Irondale Computer Science Club

President/Founder

New Brighton, MN
November 2018-Spring 2020

- Taught computer science fundamentals to students in Java. For loops, inheritance, derived classes, user input, basic data structures, binary search, linear search, merge sort, etc.
- Organized team projects such as creating a 2D platformer game.