

# Friedrich Doku

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**Education** University of Pittsburgh.

**Major** Computer Science

Pittsburgh, PA

Graduating Fall 2023 (Expected)

## 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**

*Carnegie Robotics (CRL)*

Pittsburgh, PA

May 2023-Present

- Working with embedded systems software and PCBs
- Developing testing software for hardware/software
- Writing kernel level code for ARM devices

**TITANS Cybersecurity R&D Intern @ Sandia National Laboratories**

*Sandia National Laboratories*

Albuquerque, NM

May 2022-April 2023

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

**Software Engineer Contractor @ [Whonix](#)**

*Whonix*

Remote

August 2021-September 2022

- I'm working 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**

*Oracle Corporation*

Austin, TX

May 2021-August 2021

- I'm the lead engineer for a cloud computing project. I am developing 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

**Research with Professors Adam Lee & Jack Lange**

*University of Pittsburgh*

Pittsburgh, PA

Fall 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.

### **Developed an exokernel for embedded ARM devices**

Pittsburgh, PA  
Fall 2021-Present

#### [Mutex Unlocked](#)

- 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  
Summer 2020

#### *University of Pittsburgh*

- 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](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  
Summer 2020-Fall 2020

#### *University of Pittsburgh*

- 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  
Winter 2019-Present

#### *University of Minnesota - Twin Cities*

- 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**

Pittsburgh, PA  
November 2020

#### *University of Pittsburgh*

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

<b>Leadership</b>	<b>Irondale Computer Science Club</b>	New Brighton, MN
<b>Experience</b>	<i>President/Founder</i>	November 2018-Spring 2020
	<ul style="list-style-type: none"> <li>● 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.</li> <li>● Organized team projects such as creating a 2D platformer game.</li> </ul>	