ISAAC AHLGREN

https://isaac-ahlgren.github.io/
(218)-731-5990
iahlgren@luc.edu

RESEARCH INTERESTS

Security & Privacy, Embedded Systems, Cyber-Physical Systems, and Computer Architecture.

EDUCATION

Loyola University Chicago — ***January 2023 - Present***
MS in Computer Science — ***GPA: 3.945/4.0***
Advisor: Neil Klingensmith

Loyola University Chicago — ***August 2019 - January 2023***
BS in Computer Science — ***GPA: 3.96/4.0***

PUBLICATIONS

Isaac Ahlgren, Jack West, Kyuin Lee, George K. Thiruvathukal, and Neil Klingensmith. SyncBleed: A Realistic Threat Model and Mitigation Strategy for Zero-Involvement Pairing and Authentication (ZIPA). [Currently Under Submission]

A Signal Injection Attack Against Zero Involvement Pairing and Authentication for the Internet of Things . Isaac Ahlgren, Jack West, Kyuin Lee, George Thiruvathukal, and Neil Klingensmith. Workshop On Design Automation For CPS and IoT (DESTION 2024). 2024.

Isaac Ahlgren, Victor Rakotondranoro, Yasin N. Silva, Eric Chan-Tin, George K. Thiruvathukal, and Neil Klingensmith. 2023. Poster: Userland Containers for Mobile Systems. In Proceedings of the 24th International Workshop on Mobile Computing Systems and Applications (HotMobile '23).

Isaac Ahlgren, Jack West, George K. Thiruvathukal, and Neil Klingensmith. 2022. Poster: A universally composable bit generation scheme for zero involvement authentication. In Proceedings of the 23rd Annual International Workshop on Mobile Computing Systems and Applications (HotMobile '22).

J. Veselsky, J West, Isaac Ahlgren, et al., "Establishing Trust in Vehicle-to-Vehicle Coordination: A Sensor Fusion Approach," 2022 2nd Workshop on Data-Driven and Intelligent Cyber-Physical Systems for Smart Cities Workshop (DI-CPS)

AWARDS AND HONORS

Graduate Research Mentorship Award, Loyola University Chicago, May 2023

Dijkstra Award, Loyola University Chicago, May 2023

Departmental Honors, Loyola University Chicago, May 2023

Summa Cum Laude, Loyola University Chicago, May 2023

PROFESSIONAL SERVICE

Artifact Evaluation Committee Member for MobiSys 2023

TALKS

Zero Involvement Pairing and Authentication and Its Vulnerabilities, Loyola CS Seminar

WORK EXPERIENCE

Loyola University of Chicago — **Chicago, IL**
Department of Computer Science — *January 2019 – Present*

- Lead graduate student in the Software and Systems Laboratory who lead and mentored four students on a large scale project. The mentorship was awarded with the Graduate Research Mentorship Award.
- Developed novel authentication protocol for IoT devices.
- Developed a cluster of research IoT authentication systems using custom PCBs and Raspberry Pis connected to a variety of sensors. Software was written in Python and C where each system uses Avahi, OpenVPN, and Ansible to automatically set up communication between devices.
- Worked within the Linux kernel to research virtualization techniques for mitigating container escape security vulnerabilities in technologies like Docker.
- Worked with ESP32 and NORA-B1 microcontrollers to modify or implement wireless communication protocols like WiFi or Bluetooth.
- Helped instruct Computer Systems and Operating Systems classes.

Motorola Solutions — **Schaumburg, IL**
Embedded Software Engineer Intern — *May 2021 – August 2021*

- Researched and modeled an radio frequency anomaly detection algorithm in Python.
- Developed anomaly detection system with a software-defined radio.
- Thoroughly documented approaches to the algorithm as well as future possible approaches to the algorithm.

PROJECTS

Custom OS for the Raspberry Pi: Custom operating system of the Raspberry Pi 4 board with working page table, memory management unit, FAT filesystem driver, UART driver, and ELF loader. https://github.com/isaac-ahlgren/pios.git

RISC-V CPU: RISC-V single cycle CPU created in verilog that is able to execute a merge sort algorithm. https://github.com/isaac-ahlgren/riscv-processor.git

TECHNICAL SKILLS

Programming Languages: C/C++ , Python , MATLAB, Java, Verilog, ARM32/64 Assembly, RISC-V Assembly

Technologies Git, GDB, Wireshark, QEMU, VMWare, Docker, Pytorch, Tensorflow