



Alexander C. Sutula

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Summary

I am an ambitious Computer Systems Engineering and Computer Science student with a strong background in cybersecurity and low-level programming, currently working on my Master's Thesis and contributing to storage research. I am passionate about solving complex technical challenges and eager to apply my knowledge in real-world applications. I am seeking to leverage my skills in either an industry development or research role and I aspire to contribute to cutting-edge projects that involve system optimization, kernel-level development, and hardware integration.

Education

B.S.E, Computer Systems Engineering (Cybersecurity)

Fall 2019 - Spring 2023

- Arizona State University, Tempe, AZ
- Relevant Coursework: Data Structures, Algorithms, Digital Hardware Design, Embedded Systems, Circuit Analysis, Operating Systems, Data Forensics, Networks and Security, Computer Architecture, Software Security.

4.00 GPA, Summa Cum Laude

M.S, Computer Science (Cybersecurity)

Fall 2023 - Present

- Arizona State University, Tempe, AZ
- Relevant Coursework: Real-Time Embedded Systems, Applied Cryptography, Software Security.

4.00 GPA

Technical Skills

Programming Languages: Proficient with Python, C, C++, Assembly; Experienced with Rust, Java, Nix.

Programming Libraries: Standard Template Library, Boost, Pydantic, Pandas, Numpy, Flask, FastAPI, Boto3, Pwntools.

Software Applications: LTSpice, Xilinx Vivado, Volatility, AccessData FTK Imager, IDA Interactive Disassembler, Valgrind, GDB and extensions.

Hardware Applications: Arduino/Raspberry-pi/KL46Z Microcontroller boards, Nexys A7 FPGA board.

Compilers and Utilities: GNU Compiler Collection, Cargo/Rustc, Git/GitHub, Jupyter, Docker.

Professional Experience

Virtualized Infrastructure, Systems, and Applications: Researcher

June 2022 - Present

Optimizing the garbage collection performance/lifespan trade off in Zoned Namespace SSD-based caching strategies.

- The work of our team was submitted to multiple storage research conferences:
 - USENIX Conference on File and Storage Technologies (FAST '23):** Accepted as a WIP
 - Massive Storage Systems and Technology Conference (MSST 2024):** Accepted poster submission
- Gained experience with kernel debugging and Linux kernel module development using the device mapper framework.
- Implemented a host-side flash translation layer designed specifically to work with the constraints of the ZNS-SSD
- Developed a userspace simulator to replay real-world workloads and evaluate garbage collection efficiency.

Academic/Personal Projects

Audio Recorder Implemented on FPGA-based Hardware

Academic Project

- Designed audio serialization and deserialization modules leveraging combinational and sequential logic.
- Integrated custom modules with existing IP memory modules for audio recording and playback.
- Final solution enabled recording and playback of two seconds of audio to one of multiple selectable memory blocks.

IaaS and Faas Cloud-based Autoscaling and Machine Learning Pipelines

Academic Projects

- Designed multiple scalable cloud-based projects using various AWS features including S3, SQS, EC2, Lambda.
- Implemented a horizontally-scaling infrastructure to dynamically start and stop EC2 instances based on workload size.
- Leveraged Lambda to implement a pipeline to perform facial recognition on videos submitted via a web tier.

Low Level Embedded Systems Programming

Academic Projects

- Interacted with various sensors and actuators including motors, screens, accelerometers, gyroscopes, distance encoders.
- Implemented various modal models on the Pololu 3pi+ 2040 Robot to navigate up and down sloped terrain and follow pre-determined paths drawn on the ground.
- Implemented a game on an arm-based microcontroller using an LCD and accelerometer to direct a ball through a series of randomly generated mazes using tilt.

Interpretive Emulators and Debugging Tools for Old Game Consoles

Personal Project

- Implemented low-level emulators for the DMG-GameBoy and Nintendo Entertainment System in C/C++ from scratch using the SDL2 and Win32 libraries.
- Implemented software replicas for various components and instruction sets to mimic hardware functionality and quirks using publicly available reverse engineering information.
- Enabled step-by-step instruction tracing and memory analysis for debugging. Verified emulator accuracy using community-developed test ROMs to assess mimicry of console functionality and hardware bugs.

Other Work Experience

CSE330 - Operating Systems: Graduate Services Assistant

Summer 2024 Semester

- Wrote required course project specification, expected implementation, grading rubrics, and grading scripts.

CSE340 - Principles of Programming Languages: Graduate Teaching Assistant

Spring 2024 Semester

- Held office hours to assist student's with project implementation and completion of course assignments.
- Held in-person recitations consisting of working relevant problems live to review lecture material.

CSE330 - Operating Systems: Graduate Teaching Assistant

Fall 2024 Semester

- Wrote required course project specification, expected implementation, grading rubrics, and grading scripts.
- Contributed to the development of an automated grading infrastructure built from scratch to assess kernelspace course projects and exams.

Activities

PWN.College - Capture the flag platform

January 2022 - May 2024

- Participated in a publicly available capture the flag platform run by Arizona State University.
- Practiced a wide variety of software exploitation methods across both userspace and kernelspace.
- Practiced known stack and heap corruption methods, exploitation of race conditions, reverse engineering of x86_64 binaries, known micro-architectural exploits such as Meltdown and Spectre, and intercepting network communication.
- Earned physical blue and yellow belts as a reward for the full completion of the corresponding sets of challenges.

PicoCTF

March 2023

- Participated in a publicly hosted Carnegie Mellon University (CMU) cybersecurity competition.
- Competed in a group of five Arizona State University students finishing in the top 1% of the global rankings.
- Practiced binary exploitation, cryptography, data forensics, reverse engineering, etc.