



Alexander C. Sutla

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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 4.00 GPA, Summa Cum Laude
- Relevant Coursework: Data Structures, Algorithms, Digital Hardware Design, Embedded Systems, Circuit Analysis, Operating Systems, Data Forensics, Networks and Security, Computer Architecture, Software Security.

M.S, Computer Science (Cybersecurity)

Fall 2023 - Present

- Arizona State University, Tempe, AZ 4.00 GPA
- Relevant Coursework: Real-Time Embedded Systems, Applied Cryptography, Software Security.

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.