Ammar Ratnani

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Education

Georgia Institute of Technology, B.S. in Computer Science — May 2023 (Expected)

- *Concentrations:* Systems & Architecture and Theory
- *GPA:* 4.0

Skills

Proficient: C, Linux
Intermediate: C++, Rust, Verilog, Java, Python, Git
Beginner: Go, CUDA, Chisel, Kotlin, Scala, NumPy, SQL
Coursework: Computer Architecture, Operating Systems, Processor Design, Algorithms

Experience

Student Researcher | *Embedded System Cyber Security VIP* — Aug. 2021 - Present

- Won first place in CSAW's Embedded System Cybersecurity competition on voltage glitching and power side-channel analysis
- Analyzed `malloc` implementations, fuzzing them for vulnerabilities and using those found to gain shell access on the target system
- Investigated modifying AFL++'s compiler runtime to circumvent infinite recursion when instrumenting standard library functions

Teaching Assistant | *Intro. Computer Architecture* — Aug. 2020 - May 2022

- Instructed students in this challenging major-specific course, guiding them through circuit building, Assembly, C, and some C++
- Interacted with students in both one-on-one office hours and group recitations
- Created instructional material for recitations, as well as student assignments: homeworks, quizzes, and the final exam
- Attained a deeper understanding of how computer systems work

Software Engineering Intern | *L3Harris* — May 2021 - Aug. 2021

- Administered three platforms running C++ applications on embedded Linux
- Refactored firewall setup scripts to reduce duplicate code while ensuring no regressions were introduced in the process
- Initiated a move to multi-user systems, configuring authentication to integrate with both open-source and hand-written PAM modules

Projects

Sudo in UserSpace — Oct. 2021 - Dec. 2021

- Experimented with running most of `sudo`'s logic as an unprivileged user
- Configured Linux permissions to ensure isolation between the user and root access
- Achieved feature-completeness, utilizing Rust and its build tools

Gameboy Advance Cross-Compilation — Apr. 2020 - May 2021

- Compiled a GCC-based toolchain to target the GBA with Assembly, C, and some C++
- Packaged the toolchain into Docker containers for end-users and for testing in CI/CD
- Became familiar with program initialization on bare-metal targets and used that knowledge to write a C runtime from scratch

Open Source Contributions

cmocka: gitlab.com/cmocka/cmocka/-/merge_requests/36 — Mar. 2021
Propagated failure messages to test output instead of dumping them to standard-out

Gentoo Linux: forums.gentoo.org/viewtopic-p-8341586.html — Jun. 2019
Resolved compile-time errors that prevented some users from installing Blender