

# AUSTIN J. HEATH

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Clearance: TS/SCI with CI Poly

## EXPERIENCE

### Senior Security Researcher

June 2021 – Present

*U.S. Army Cyber Command - Cyber Solutions Development*

*Fort Gordon, GA*

- Managed a team of 12 security researchers using tools like IDAPro, BinDiff, LLVM, and QEMU, to research, discover, and exploit vulnerabilities in embedded devices and Windows applications, saving the organization over \$1mil in expected costs when compared to similar vendor solutions.
- Developed a shellcode library using C, Python, and CMake, enabling developers to cross-compile ubiquitous shellcodes for Intel, ARM, MIPS, and PowerPC processor architectures, eliminating duplicate shellcodes across the organization's codebase.
- Triaged public vulnerability disclosures and rapidly reverse-engineered, modified, and released bespoke exploit tools, providing initial access to computer networks of interest for operations teams across multiple organizations and uniformed services.
- Instructed operations teams on the effective use of exploit tools, increasing stakeholder interaction and influencing organizational policy to emphasize consistent stakeholder engagement.
- Hosted monthly training events covering reverse-engineering and exploit development techniques, increasing the organization's number of trained security researchers by 25%.
- Overhauled the organization's technical documentation process using Markdown, LaTeX, Pandoc, CMake, and Python, enabling developers to better detect documentation errors prior to release.

### Junior Security Researcher

January 2019 – May 2021

*U.S. Army Cyber Command - Cyber Solutions Development*

*Fort Gordon, GA*

- Redesigned the organization's binary obfuscation methods using LLVM, rendering obfuscated artifacts unrecognizable compared to the original, inhibiting effective reverse-engineering efforts and increasing the operational longevity of cyber capabilities.
- Implemented modules for a Python exploit framework, automating common operator tasks and reducing human interaction, increasing mission efficiency for all operations teams.
- Automated the organization's compilation, testing, release, and deployment process by integrating existing projects into GitLab CI, expediting tool development and release for all developer teams.
- Obfuscated web-based malware written in PHP using open source software and designed command, control, and configuration mechanisms using Python.

## EDUCATION

### Georgia Institute of Technology

Atlanta, GA

*Master of Science, Computer Science (Specialization: Computing Systems), 4.0 GPA*

*December 2022*

### U.S. Army Cyber Center of Excellence

Augusta, GA

*Cyber Basic Officer Leader Course, Distinguished Honor Graduate*

*December 2018*

### Mississippi State University

Starkville, MS

*Bachelor of Science, Computer Engineering, 3.61 GPA*

*December 2017*

## CERTIFICATIONS

Offensive Security Certified Professional (OSCP)  
Certified Information Systems Security Professional (CISSP)  
GIAC Reverse Engineering Malware (GREM)

CompTIA Security+ (Sec+)  
Certified Ethical Hacker (CEH)  
Cisco Certified Network Associate (CCNA)

## PROJECTS

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- Splinter Shell** | <https://github.com/one2blame/splinter-shell> | *C, Python, NumPy, amd64* April 2021 - Present  
Employed unsupervised learning techniques to train a machine learning model on a corpus of packet captures, classifying normal and malicious network traffic and encoding shellcodes to bypass intrusion prevention systems.
- The Dark Arts** | <https://one2bla.me/the-dark-arts/> | *C, Python, Ghidra, pwntools, angr* July 2020 - Present  
Composed a blog to catalogue my adventures in reverse-engineering and binary exploitation, serving as a training resource for junior security researchers.
- Constraint-based Variable Analyzer** | <https://github.com/one2blame/cs6340> | *C++, LLVM, Z3* October 2021  
Transformed programs into LLVM intermediate representation (IR), derived Datalog facts from the instructions, and designed a reaching definition and live variables analysis using Z3.
- Data Dependency Tracker** | <https://github.com/one2blame/cs6747> | *Python, Ghidra* July 2021  
Wrote Python scripts to parse Ghidra disassembly, generating control flow graphs and data dependency tracking for functions in malware specimens.
- Stock Trading Robot** | <https://github.com/one2blame/cs7646> | *Python, NumPy, pandas* April 2022  
Employed reinforcement learning to train a model on historical stock metrics, assessing the trading robot's performance on out-of-sample data, outperforming a manual trading strategy by 30%.
- Multi-class Random Forest** | <https://github.com/one2blame/cs6601> | *Python, NumPy* July 2022  
Improved upon existing multi-class classification tree and random forest implementations, achieving a classification accuracy of 84% on out-of-sample data.
- Extensible MapReduce Framework** | <https://github.com/one2blame/cs6210> | *C++, gRPC, Protobuf* April 2020  
Designed an extensible, distributed system to MapReduce a large corpus of data, applying data sharding and load balancing to enhance performance.
- Distributed File System** | <https://github.com/one2blame/cs6200> | *C++, gRPC, Protobuf* November 2019  
Engineered a concurrent server capable of handling clients initiating asynchronous gRPC requests to upload and download files.
- SDN Firewall** | <https://github.com/one2blame/cs6250> | *Python, Mininet, OpenFlow, POX* March 2021  
Constructed an emulated network to test software-defined network firewall rules, programming real-time traffic inspection to enforce access controls.

## TECHNICAL SKILLS

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**Languages:** Python, C/C++, x86, amd64, MIPS, ARM, PowerPC, TileGX, Java, PHP, JavaScript  
**Libraries:** gRPC, OpenMP/MPI, libvirt, libcurl, POX, Mininet, OpenFlow, LLVM, Z3, NumPy, SciPy, pandas, pwntools  
**Developer Tools:** Git, GitLab CI, Atlassian Bamboo, Jupyter, Docker, QEMU, GDB, WinDbg, angr, AFL, KLEE  
**Applications:** VMware, VirtualBox, Vagrant, Ghidra, IDAPro, BinaryNinja, BinDiff  
**Frameworks:** Metasploit, WordPress

## VOLUNTEERING AND COMMUNITY SERVICE

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- Mentor** February 2022 – May 2022  
*Grovetown High-school Robotics Club* *Grovetown, GA*  
Mentored high-school students on robotics mechanical engineering, setup of electrical components, and development of Arduino code for controller logic. Lead the Grovetown High-school Robotics Club to take 1st place in the Central Savannah River Area (CSRA) Fully Wired high-school robotics competition.
- Volunteer** May 2021 - July 2021  
*Air Force Association CyberPatriot* *Augusta, GA*  
Moderated a Virtual CyberPatriot Summer Camp via Zoom and provided instruction to high-school students on techniques to harden the security posture of various Linux distributions.
- Volunteer** August 2019 – March 2020  
*Girls Who Code* *Augusta, GA*  
Facilitated club meetings and taught 6th - 12th grade girls Python game development.

## ACHIEVEMENTS AND AWARDS

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CISA President's Cup Cybersecurity Competition - 3rd Place

3 x Army Achievement Medals