Haoda Wang

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Education

Columbia University **New York, NY**
PhD, Computer Science *Aug 2022 – Present*
MS, Computer Science *Dec 2023*
Advisors: Asaf Cidon and Junfeng Yang

University of Southern California **Los Angeles, CA**
BS, Computer Engineering and Computer Science *May 2022*
Advisor: Jelena Mirkovic
Thesis: Towards Secure and Reliable Networked Systems
Magna Cum Laude, Engineering Honors, Discovery Scholar Distinction, USC Presidential Scholar

Experience

Research

NASA Jet Propulsion Laboratory **Pasadena, CA**
Engineering Graduate Student, Robotics and Mobility Systems *Jan 2023 – Present*
Building computer systems approaches to address computing issues in the space domain
- Developing software-based radiation hardening methods for commercial off-the-shelf hardware on Mars 2020

Columbia University **New York, NY**
Graduate Research Assistant, Computer Science Department *Aug 2022 – Present*
Working as a graduate research assistant advised by Asaf Cidon and Junfeng Yang
- Developing software-based radiation hardening methods for commercial off-the-shelf hardware on space missions
- Implementing a single-event latchup detection tool for commodity single-board computers

Sandia National Laboratories **Livermore, CA**
R&D Intern, Center for Cyber Defenders *May 2022 – Aug 2022*
Summer internship on formal methods, mentored by Samuel Pollard
- Built a pipeline to detect compiler bugs using symbolic execution and the Compcert compiler

USC Information Sciences Institute **Marina del Rey, CA**
Undergraduate Research Assistant, Networking and Cybersecurity Division *Aug 2018 – May 2022*
Worked as an undergraduate research assistant at USC-ISI, advised by Jelena Mirkovic, Luis Garcia, and Christophe Hauser
- Implemented a prototype for **SMELL-CPS**, a tool for extracting natural expressions from cyber-physical binaries
- Developed **AutoCPS**, a generalized flight software autocoder that generates datasets for semantic reverse engineering
- Built **Harm-DoS**, a tool to automatically replace hash functions vulnerable to algorithmic complexity attacks in ELF binaries
- Created the prototype for **Leader**, an adaptive in-kernel defense to detect and mitigate low-rate denial of service attacks
- Constructed **Festoon**, a software-based line-rate FPGA SmartNIC emulator, as part of my senior thesis.
- Built and tested **dns-proxy**, a mitigation tool for NXDOMAIN flood attacks against DNS servers using DPDK

Harvard University **Cambridge, MA**
Research Assistant, School of Engineering and Applied Sciences *May 2021 – Aug 2021*
NSF REU-funded summer program in datacenter networking, mentored by Minlan Yu
- Developed an intrusion detection system integrating FPGA and CPU technologies with Hyperscan and the Alveo U250 SmartNIC.

Sandia National Laboratories **Livermore, CA**
R&D Intern, Scalable Modeling and Analysis Group *May 2019 – Aug 2019*
Summer internship on high-performance computing, mentored by Craig Ulmer
- Implemented a custom kernel bypass solution for on-machine packet capture and analysis at 100Gbps speeds on commodity NICs to enhance testbed experiment analysis

Software Engineering

NASA Jet Propulsion Laboratory **Pasadena, CA**

Engineering Graduate Student, Robot Operations *May 2023 – Aug 2023*

- Lead development of UART driver for Mars Sample Return flight software

Engineering Undergraduate Student, Robot Interfaces and Visualization Group *Jan 2020 – May 2021*

- Developed a bespoke fuzzer generating fully valid rover sequences that found multiple fatal bugs in Mars 2020 flight software
- Maintained CI and testing infrastructure for the **SSim** flight software and kinematics simulation software

Teaching

University of Southern California **Los Angeles, CA**

Course Producer, Department of Electrial and Computer Engineering *Aug 2019 – Dec 2019*

Assisted students with Arduino-based labs and questions for USC's EE109 class

Awards

NSF Graduate Research Fellow: 2022

IEEE SafeThings Best Paper Award: 2022

DoD NDSEG Fellow: 2022

USC Computer Science Award for Outstanding Research: 2022

Goldwater Scholar: 2021

National Merit Scholar: 2018

Publications

Conference Proceedings

V. Verma, J. Nash, L. Saldyt, Q. Dwight, H. Wang, S. Myint, J. Biesiadecki, M. Maimone, A. Tumbar, A. Ansar, G. Kubiak, and R. Hogg, "Enabling long and precise drives for the perseverance mars rover via onboard global localization," *IEEE Aerospace Conference*, 2024.

J. Nash, Q. Dwight, L. Saldyt, H. Wang, S. Myint, A. Ansar, and V. Verma, "Censible: A robust and practical global localization framework for planetary surface missions," *IEEE International conference on Robotics and Automation*, 2024.

H. Wang, S. Myint, V. Verma, Y. Winetraub, J. Yang, and A. Cidon, "Mars attacks! software protection against space radiation," *ACM Workshop on Hot Topics in Networks*, 2023.

R. Tandon, H. Wang, N. Weideman, S. Arakelyan, G. Bartlett, C. Hauser, and J. Mirkovic, "Leader: Defense against exploit-based denial-of-service attacks on web applications," *International Symposium on Research in Attacks, Intrusions and Defenses*, 2023.

N. Weideman, H. Wang, T. Kann, S. Zahabizadeh, W.-C. Wu, R. Tandon, C. Hauser, and J. Mirkovic, "Harmdos: Hash algorithm replacement for mitigating denial-of-service vulnerabilities in binary executables," *International Symposium on Research in Attacks, Intrusions and Defenses*, 2022.

H. Wang, C. Hauser, and L. Garcia, "Autocps: Control binary dataset generation for semantic reverse engineering," *IEEE Workshop on the Internet of Safe Things*, 2022. **Best Paper Award**.

Technical Reports

H. Wang, G. M. Baker, J. P. Kenny, and C. D. Ulmer, "An initial investigation of the design challenges associated with reliable 100gige packet capture," Tech. Rep. SAND2019-10319, Sandia National Laboratories, 2019.

Skills

Languages: C, C++, Python, Bash, Verilog, Coq, JavaScript
Libraries: angr, DPDK, SPDK, LLVM, OpenMP, MPI, SciPy, Bottle, Flask
Other: Linux, Docker, Git, AWS, Jenkins