

ASMITA

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EDUCATION

PhD Candidate in Electrical & Computer Engineering

University of California, Davis

Sept 2021 - Dec 2025

Graduate student researcher : Improving embedded firmware security assessment techniques.

Teaching Assistant (TA) : Embedded System Courses (EEEC007 x4, EEC172 x3) - Engaging lab sessions

Research Overview : Utilizing fuzzing techniques to uncover vulnerabilities in bare-metal firmware, developing automation framework, and contributing towards improving firmware security assessments techniques. [Link](#)

MS in Electrical & Computer Engineering

University of California, Davis

2021-23

Relevant courses : Computer security, Hardware security, Embedded computing, Computer architecture, Machine Learning, Digital system testing, Internet of Things (IoT) (GPA: 3.95)

Bachelor of Engineering in Electronics

International Institute of Information Technology, Pune, India

2014-18

SKILLS

Python, C, Firmware static & dynamic analysis, Fuzzing, Emulation, Firmware reverse engineering, Embedded systems, Firmware security | IoT security | Embedded security; Firmware security tools - Qemu, Unicorn, Renode, Qiling, AFL/AFL++, LibAFL, LibFuzzer, OSS-Fuzz, Ghidra, Radare, Binwalk, Avatar, Firmadyne

WORK EXPERIENCE

Firmware Security Intern — NetRise, USA

Summer 2023

• Conducted research on IoT firmware fuzzing techniques, including AFL++, LibFuzzer, LibAFL, and OSS-Fuzz, while also investigating the usage of LLMs in fuzzing. • Assisted NetRise in the development of an initial test prototype to integrate firmware fuzzing into their existing framework.— Conducted comprehensive testing on 263 Busybox packages, identifying potential vulnerabilities for mitigation.

Firmware Security Intern — NetRise, USA

Summer 2022

• Research and implementation for Control Flow Graph-based static analysis and prototyped binary function similarity using Python. • Assisted NetRise in creating a Proof of Concept (PoC) for adding binary similarity identification features to their framework, enhancing the identification of third-party software components more robustly.

IoT Security Consultant — Payatu, India

Oct'19 to Sept'21

• Embedded hardware and firmware security assessments including IoT protocol, and basic side-channel & fault injection attacks. • Conducted security assessments on diverse IoT products, including smart cameras, medical devices, access control systems, wireless modems, and ECUs. • Served as a security architect for an automotive client, integrating security into product design. • Trainer for IoT Hacking Training — Trained approx 50-100 participants at Nullcon, CPX360 Checkpoint. • Assisted Payatu in efficiently delivering security assessment outcomes to their clients and expand their training programs across different organizations.

PUBLICATIONS

1. R. Tsang, **Asmita**, D. Joseph, S. Salehi, P. Mohaptra, H. Homayoun. "FFXE: Dynamic Control Flow Graph Recovery for Embedded Firmware Binaries." Usenix 2023 - [Link](#).

2. R. Tsang, D. Joseph, **Asmita**, S. Salehi, P. Mohaptra, H. Homayoun. "FANDEMIC: Firmware Attack Construction and Deployment on Power Management IC and Impacts on IoT Applications." NDSS 2022. - [Link](#)

PROJECTS

Bare-metal Firmware Fuzzing Framework (*In progress*): Developing a framework to leverage the LibAFL fuzzer and the Renode emulator for fuzzing embedded targets.

IOSC2: IoT Firmware Security : Performed analysis on a dataset of 107 real-world firmware binaries for identifying thord-party softwrae components and corresponding CVEs. — Contributed to firmware dataset collection, automation script development, and analysis. — [GitHub Link](#)

Binary Similarity Project : Implemented machine learning algorithms to determine the similarity between binary functions. — Contributions included dataset generation, feature extraction from binary control flow graphs (CFGs), feature vectorization, and applying MLP and CNN algorithms. — [GitHub Link](#)

ACHIEVEMENTS

- Achieved root access on Google Pixel watch : HardPwn Contest by Google.

May 2023

- IEEE Best Teaching Assistant (TA) Award, UC Davis.

Sept 2022

- Best Outgoing Student & Academic Topper Award.

June 2018

- Best Paper Award at CEET, Kuala Lumpur, Malaysia.

April 2018

- AIT-Tiger Leong International Innovation and Leadership Camp

July 2017

- Invited talks and workshops : asmitaj08.github.io/trainings-and-talks/