

# Navid Emamdoost

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## Work Experience

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**Google** | Software Engineer | *Sunnyvale, CA, USA*

Sep 2021, Present

- **OSS-Fuzz and ClusterFuzz Maintainer**

Provided cloud-based fuzzing infrastructure for over 800 critical open-source projects. Implemented new features like **crash deduplication** and supporting new fuzzing engines. Wrote **new fuzzers** to increase code coverage and find new bugs.

- **FuzzIntrospector Engineering Lead**

Developed various static and dynamic code analysis techniques to evaluate the **fuzzing performance** and provide automated suggestions to improve the fuzzer. Integrated the FuzzIntrospector with **OSS-Fuzz** to improve fuzzing for hundreds of open-source projects.

- **Centipede Developer**

Implemented a new corpus prioritization approach using static code analysis for the **Centipede** fuzzing engine. Implemented a new feature for the **LLVM SanitizerCoverage** to instrument the binary and extract control-flow and call graphs.

**Mozilla** | Software Engineer Intern | *Portland, OR, USA*

Summer 2018

- **Bringing Dynamic Loading into WebAssembly**

Implemented a dynamic loading library for **Rust** that allows any module to be exported to **WebAssembly** and then instantiated at runtime by a wasm binary. It liberated the wasm binary from having a copy of commonly used library routines.

**TruScribe** | Software Engineer Intern | *Minneapolis, MN, USA*

Summer 2016

- **Developing Animation Generation Software**

Implemented new features like video in-lining, image background, text and image overlay in the animation generation software using **ffmpeg** library.

## Research Projects

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**University of Minnesota** | Research Assistant | *Minneapolis, MN, USA*

Sep 2013 - Aug 2021

- **Automatic Semantic Error Detection in the Linux Kernel**

Developed an **LLVM**-based static analysis tool to detect multiple classes of security bugs in the **Linux kernel** code. Found over **200** confirmed security bugs and received over **40 CVEs** for the detected vulnerabilities including **Use-After-Free**, **Null-Pointer-Dereference**, and **Memory-Leak**. Fixed the bugs by submitting patches to the Linux maintainers.

- **Software-based Fault Isolation**

Improved runtime performance of Google Native Client (NaCl) by reducing instruction padding overhead. Changed the NaCl instruction padding in GNU **Assembler** (GAS), updated NaCl validator to enforce security policies, and proved the validator correctness in **Coq**.

- **Binary Mutation for Test Analysis**

Evaluated the adequacy of a test suite, via **static binary rewriting**. The project demonstrated how binary mutation is effective in test quality measurement when no source-code or debugging information is available.

## Education

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**PhD**, Computer Science | *University of Minnesota*

2021

## Selected Publications

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- **Navid Emamdoost**, Qiushi Wu, Kangjie Lu, and Stephen McCamant. “Detecting Kernel Memory Leaks in Specialized Modules with Ownership Reasoning” *Published in NDSS Symposium 2021*.
- Qiushi Wu, Aditya Pakki, **Navid Emamdoost**, Stephen McCamant, and Kangjie Lu. “Understanding and Detecting Disordered Error Handling with Precise Function Pairing” *Published in USENIX Security Symposium 2021*.

## Technologies and Languages

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- **Languages:** C, C++, Python, Rust, C#.
- **Technologies:** LLVM, Google Cloud Platform, Valgrind, OProfile, IDA Pro, PostgreSQL, MySQL.
- **Other:** Fuzzing, Symbolic Execution, Dataflow analysis, Malware Analysis.