Rishi Ranjan

rish9101 | Rishi Ranjan | rishiranjan@vt.edu | +1 (540) 824-0797

Interests

My interests lie in systems, security, compilers and automated software and hardware testing.

Education

Virgina Tech *August 2022 - Present*
M.S. Computer Science, Advisor: Dr. Matthew Hicks

Indian Institute of Technology, Roorkee *July 2018 - May 2022*
B.Tech. Computer Science and Engineering GPA : 9.1/10

Work Experience

Research Assistant | Virginia Tech August 2022 - Present

- Research Assistant working under Dr Matthew Hicks at the Computer Science Dept, Virginia Tech.
- My work focuses on system security and automated vulnerability testing research.
- My work has found bugs in popular software like Linux Kernel's official BPF library, GoPro's metadata parser and other popular open-source projects like c-blosc2 and md4c.

Security Research Intern | FoRTE Research, Virginia Tech October 2021 - February 2022

- Research Assistant working under Dr Matthew Hicks at the Computer Science Dept, Virginia Tech.
- Designed and implemented a state-of-the-art fuzzer for Windows.
- Our fuzzer found bugs in popular open-source software such as go-pro metadata parser.
- Work published in the top security conference **USENIX Security 2023**.

Security Research Intern | HexHive, Summer@EPFL May 2021 - October 2021

- Selected among 10,000 applicants for a research internship at École Polytechnique Fédérale de Lausanne under Dr Mathias Payer in collaboration with Huawei.
- Worked on a project for designing a stateful network protocol fuzzer, designed and implemented a new structured input generator for the fuzzer.

Student Developer @AFLplusplus | Google Summer of Code May 2020 - August 2020

- Google Summer of Code is a global internship program focused on bringing student developers into open source software development.
- Designed and implemented the initial version of famous multithreaded scalable library for fuzzing called LibAFL in C. (Paper in ACM CCS 2022).

Projects

False-nine - A Compile-time memory optimisation project | Virginia Tech Github

- Implemented a compiler pass to automatically free dead memory objects on the heap.
- Reduces both the average and peak memory usage of a program significantly.
- Tech stack includes C++, LLVM and cmake.

LLVM based Compiler Optimizations | Virginia Tech Github

– Implemented LLVM passes to perform optimizations like Dead Code elimination, LICM on IR Code.
– Developed a framework to perform Dataflow analysis.
– Tech stack includes C++ and LLVM toolchain.

Content Management System | IMG, IIT Roorkee IITR Website

– As Chief Technical Coordinator of Information Management Group, IIT Roorkee, I designed and developed a modular Content Management System for IIT Roorkee's official website of 10,000 pages.
– The tech stack includes Scala, Django, NextJS and PostgreSQL.

Predicting Popularity of Reddit posts | IIT Roorkee

– As part of the Machine Learning course, worked with a team on designing and implementing a machine learning model for Reddit post upvote prediction.
– Implemented Sentiment Analysis for Reddit posts and GloVe embeddings calculation for the preprocessing phase and integrated with existing machine learning models.

Publications

Leo Stone, **Rishi Ranjan**, Matthew Hicks and Stefan Nagy. No Linux, No Problem: Fast and Correct Windows Binary Fuzzing via Target-embedded Snapshotting - ***USENIX Security 2023***

Acheivements

CSAW CTF 2020	Ranked **2nd** in India and **14th** globally as part of InfoSecIITR.
WhiteHat CTF 2020	Qualified for finals in Vietnam.
CSAW CTF 2019	Ranked **2nd** in India and **13th** globally as part of InfoSecIITR.
CyBrics CTF 2019 (Final)	Ranked **6th** in India as a part of InfoSecIITR.
James Thomason Scholarship Awardee	Ranked among the top candidates selected at IIT Roorkee.
Joint Entrance Examination 2018 (Advanced)	Ranked in top 0.3 percentile with a rank of **280** among 150,000 candidates.

Skills

Computer languages	C, C++, Python, Scala, Javascript, Bash, x86 Assembly language
Software Packages	LLVM, Ghidra, AFLplusplus, GDB, LibAFL, Angr, Django, REST framework, Docker, Git, Linux