ALI AHAD

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RESEARCH INTERESTS

System and Software Security; Cyber Forensics; Malware Analysis

EDUCATION

University of Virginia *Aug 2020 – Present*
Ph.D. in Computer Science Expected Graduation - 2025
Advisor - Prof. Yonghwi Kwon GPA: 4.0/4.0

University of Virginia *Aug 2020 – Aug 2023*
MS Computer Science GPA: 4.0/4.0

Lahore University of Management Science *Aug 2016 – June 2020*
BS Computer Science Major GPA: 3.90/4.0
Graduation with High Merit CGPA: 3.52/4.0

WORK EXPERIENCE

Software Intern, Security - NVIDIA *September 2023 – January 2024*

- Working on a project focused on TPM attestation, including AK provisioning, RIM generation, and evidence reporting mechanism.

Research Assistant - UVA *August 2020 – Present*
Supervised by Prof. Yonghwi Kwon

- Published 5 papers (CCS'21, FSE'21, S&P'22, S&P'23, and ASPLOS'24).
- Led two projects, with 2 internal and 7 external collaborators, to first-author publications in S&P'23 and ASPLOS'24.
- Mentored one undergraduate student (intern at Amazon for Summer'22).

Developer Advocate - Educative, inc. *December 2019 – August 2020*

- Created JavaScript course consisting of 137 lessons, 264 Coding playgrounds, and 4 projects.
- Deployed 300+ coding playgrounds and 62 coding challenges across 4 courses in JavaScript, C/C++, and Python.
- Collaborated with 2 external authors to deploy two courses under strict deadlines.

Research Assistant - LUMS *January 2019 – June 2020*
Supervised by Prof. Fareed Zaffar

- Completed one project (published in NDSS'22) in collaboration with STS Lab at UIUC.

PUBLICATIONS

[1] **FreePart: Hardening Data Processing Software via Framework-based Partitioning and Isolation**,
Ali Ahad, Gang Wang, Chung Hwan Kim, Suman Jana, Zhiqiang Lin, and Yonghwi Kwon, *In Proc. of the 29th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS '24)*

[2] **PyFET: Forensically Equivalent Transformation for Python Binary Decompilation**,
Ali Ahad, Chijung Jung, Ammar Askar, Doowon Kim, Taesoo Kim, and Yonghwi Kwon, *In Proc. of the 44th IEEE Symposium on Security and Privacy (S&P '23)*

[3] **SwarmFlawFinder: Discovering and Exploiting Logic Flaws of Swarm Algorithms**,
Chijung Jung, **Ali Ahad**, Yuseok Jeon, and Yonghwi Kwon, *In Proc. of the 43rd IEEE Symposium on Security and Privacy (S&P '22)*

[4] **Forensic Analysis of Configuration-based Attacks**,
Muhammad Adil Inam*, Wajih Ul Hassan*, **Ali Ahad**, Adam Bates, Rashid Tahir, Tianyin Xu, and Fareed Zaffar, *In Proc. of the 29th Network and Distributed System Security Symposium (NDSS '22)*

[5] **Swarmbug: Debugging Configuration Bugs in Swarm Robotics**,
Chijung Jung, **Ali Ahad**, Jinho Jung, Sebastian Elbaum, and Yonghwi Kwon, *In Proc. of 29th ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE'21)*

[6] **Spinner: Automated Dynamic Command Subsystem Perturbation**,
Meng Wang, Chijung Jung, **Ali Ahad**, and Yonghwi Kwon, *In Proc. of 28th ACM Conference on Computer and Communications Security (CCS'21)*

PROJECTS

Forced-execution of Python binaries using CPython *April 2021 – June 2021*
Research Project - UVA

- Customized CPython interpreter to enable execution of all program flows. Achieved 100% coverage for 100 sample python binaries.
- Crafted a logging mechanism within CPython to track dataflows and coverage on run-time.

Tracking fine-grained file changes at kernel level *October 2019 – December 2019*
Research Project - LUMS

- Wrote a **kernel-module** to hook and monitor sys-calls modifying targeted files.
- Reduced overall log size from tracking file writes by 95% by crafting a Python program to process logs with accommodating file-diffs in system provenance.

Obfuscation of code by flattening of control flow of binaries *June 2019 – September 2019*
Research Project - LUMS

- Made **LLVM passes** to analyze and shuffle program control flow to obfuscate it. No impact on correctness of resulting program executions.

TECHNICAL STRENGTHS

Languages	Python, C, C++, BASH, Dart, Javascript, Golang
Frameworks & Libraries	LLVM, Flutter, React-Native, Flask, Vue JS
Reverse Engineering	Uncompyle6, Decompyle3, IDA
Software Testing	American Fuzzy Lop (AFL), KLEE
Miscellaneous	Git, Linux, Postman, Wireshark, Docker

RELEVANT COURSES

Program Analysis	Software Analysis, Program Analysis
Security	Mobile & IoT Security, Network Security & Privacy, Cyber Forensics
Systems	Computer Architecture, Operating Systems
Machine Learning	Intro. to Artificial Intelligence, Machine Learning
Networks	Internet Infrastructure, Network-Centric Computing

AWARDS AND HONORS

Computer Science Scholar Fellowship, UVA *August 2020 – Present*
Dean's Honor List, LUMS *Fall'19 & Spring'20*