

# ALI AHAD

Dept. of Computer Science, UVA  
aliahad@virginia.edu / aliahad97.github.io / (+1) 773-280-0987

## RESEARCH INTERESTS

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System and Software Security; Cyber Forensics; Malware Analysis

## EDUCATION

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**University of Virginia**  
Doctorate in Computer Science  
Advisor - Prof. Yonghwi Kwon

*August 2020 – Present*  
Expected Graduation - 2025  
GPA: 4.0/4.0

**Lahore University of Management Science**  
BS Computer Science  
*Graduation with High Merit*

*August 2016 – June 2020*  
Major GPA: 3.90/4.0  
CGPA: 3.52/4.0

## PUBLICATIONS

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- [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)*

## WORK EXPERIENCE

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**Research Assistant - UVA**  
*Supervised by Prof. Yonghwi Kwon*

*August 2020 – Present*

- Published 5 papers (CCS'21, FSE'21, S&P'22, and S&P'23).
- 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 (accepted in NDSS'22) in collaboration with Secure & Transparent Systems Laboratory at the University of Illinois Urbana-Champaign.

## Teaching Assistant - LUMS

Spring 2018 & Fall 2019

*CS300 - Advanced Programming & CS310 - Algorithms*

- Designed and automated grading infrastructure for 6 assignments for a class of 90 students.
- Created a programming exam with real-time individual student progress to test asynchronous programming in JavaScript.

## PROJECTS

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### 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

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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

## AWARDS AND HONORS

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Computer Science Scholar Fellowship, UVA

August 2020 – Present

Dean's Honor List, LUMS

Fall'19 & Spring'20

## RELEVANT COURSES

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