

Zargham Ali

Security Researcher | PhD Student at Penn State

✉ zargham.ali@psu.edu | 🌐 m-zargham-ali.github.io | 🐙 [m-zargham-ali](https://github.com/m-zargham-ali) | 🎓 [Google Scholar](#) | [in](#) [m-zargham-ali](#)
📍 State College, PA

Research Interests

Security of embedded and cyber-physical systems. Every embedded system trusts more than it verifies; my research asks what an attacker can do with the difference. Six problem families follow. Implicit trust between composed components, including what an adversary on a sensor or field bus can assert; configuration and parameter space as an attack surface; firmware analysis at scale through rehosting, emulation and fuzzing; operating system and kernel security; memory safety in embedded C and C++; and resilience under adversarial input, for systems designed against noise but not malice.

Education

Ph.D., Computer Science and Engineering

The Pennsylvania State University

2026 – 2031 (expected)

State College, PA

- Advised by [Arslan Khan](#), Assistant Professor of Computer Science and Engineering, in the [Systems and Security Lab \(PSeclab\)](#), part of the [Institute for Networking and Security Research \(INSR\)](#).
- Coursework: Operating Systems (CSE 511), System Security (CSE 544), Research Colloquium (CSE 590).

M.S., Systems Engineering

Pakistan Institute of Engineering and Applied Sciences (PIEAS)

2017 – 2019

Islamabad, Pakistan

- GPA 3.77 / 4.00.
- Thesis on nonlinear quadcopter control, published at the IFAC World Congress 2020.

B.E., Electrical Engineering

National University of Sciences and Technology (NUST)

2013 – 2017

Islamabad, Pakistan

- GPA 3.68 / 4.00.

Publications

- [1] [Ali, M. Z.](#), [Ahmed, A.](#), & [Afridi, H. K.](#) (2020). Control system analysis and design of quadcopter in the presence of unmodelled dynamics and disturbances. *IFAC-PapersOnLine*, 53(2), 8840–8846.
[doi:10.1016/j.ifacol.2020.12.1397](https://doi.org/10.1016/j.ifacol.2020.12.1397)

Research Experience

Doctoral Researcher

Systems and Security Lab (PSeclab), The Pennsylvania State University

Aug 2026 – present

State College, PA

- Implicit trust between composed components in embedded firmware, and what an adversary on a peripheral or bus is able to assert.
- Configuration and parameter space as an attack surface: well-formed settings that pass every validity check and still change what the system does.
- Firmware rehosting, emulation and fuzzing infrastructure for exploring embedded attack surfaces at scale rather than one board at a time.
- Sensor models in OpenModelica for [FastDyn](#), which runs embedded firmware in QEMU against a Modelica physics plant, so that what the firmware reads comes from the physics and can be perturbed deliberately.

M.S. Thesis Research: Nonlinear Control under Unmodelled Dynamics

Pakistan Institute of Engineering and Applied Sciences (PIEAS)

2018 – 2019

Islamabad, Pakistan

- Derived a nonlinear quadcopter model with minimal approximation, retaining dynamics that linearised models discard.
- Designed a feedback linearization controller cascaded with sliding mode and backstepping control for robustness to disturbance and parameter variation.
- Demonstrated improved trajectory tracking over conventional controllers under disturbance and parameter variation.

Industry Experience

Control Engineer, Team Lead *SoftwareMotion Co., Ltd*

Dec 2024 – Aug 2026
Shanghai, China

- Led control feature development for ADAS software shipped in series production programs for major automotive clients, from requirements through implementation, test and analysis.
- Ran software-in-the-loop testing campaigns and analysed real fleet data to isolate system weaknesses and false positive triggers.
- Built internal tooling that automated test result analysis, cutting manual effort in every validation cycle.
- Led and mentored a team of five engineers; translated system-level requirements into scalable, testable implementations across teams.

Manager, Systems Engineering *Public Sector R&D Organization*

Dec 2021 – Apr 2026
Islamabad, Pakistan

- Led control system design and system-level integration for autonomous aerial platforms, from concept through flight validation.
- Owned integration across avionics, embedded software and hardware, resolving failures that appear only once subsystems meet.
- Planned and executed verification and validation campaigns across six platforms, spanning bench, hardware-in-the-loop and field testing.
- Investigated anomalous behaviour during flight testing and traced root causes across the hardware and software boundary.

Assistant Manager, Systems Engineering *Public Sector R&D Organization*

Nov 2019 – Dec 2021
Islamabad, Pakistan

- Implemented and tested embedded control and communication logic for autonomous platforms.
- Integrated avionics, sensors and onboard computing, including bring-up, calibration and bench-level test.
- Analysed system behaviour under test and drove debugging across the full stack.

Teaching

Graduate Teaching Assistant, CMPEN 270 Digital Design *The Pennsylvania State University*

Fall 2026
State College, PA

- Laboratory instruction for an undergraduate digital logic design course.
- Member of the grading and exam grading teams; cover for office hours and lectures when needed.

Teaching Assistant, Control Systems Laboratory *Pakistan Institute of Engineering and Applied Sciences (PIEAS)*

2018 – 2019
Islamabad, Pakistan

- Ran laboratory sessions for the graduate control systems course.
- Guided students through experiment setup, controller tuning and analysis of results.

Awards and Honours

- Second Best Thesis Award, M.S. Systems Engineering, Pakistan Institute of Engineering and Applied Sciences (PIEAS) (2019)
- Silver Medal for the second highest GPA in the graduating class, National University of Sciences and Technology (NUST) (2017)
- Fully funded merit scholarship for entrance examination performance, National University of Sciences and Technology (NUST) (2013)

Technical Skills

Languages	C, C++, Python, MATLAB/Simulink, shell
Security	Firmware analysis, fuzzing, emulation and rehosting, memory safety, bus and protocol analysis
Control	Nonlinear and adaptive control, state estimation, Kalman filtering, system identification
Platforms	ArduPilot, PX4, Pixhawk, Cube Orange, STM32, QEMU, ROS, RTOS, Linux
Engineering	SIL and HIL testing, GoogleTest, AUTOSAR, Git, CI pipelines