Ali Hamza Malik

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Skills

Programming Languages: Python, C/C++, Julia, Rust, JavaScript, Kotlin, MATLAB
Generative AI/ML: Huggingface, Transformers, PyTorch, TensorFlow, Keras, SFT, DPO, RLHF, RL-Automated Feedback, LoRA, QLoRA, RAG, Agentic AI, Specification-Aware Fine-Tuning
Formal Methods: Symbolic Execution, Linear Temporal Logic (LTL), Finite State Automata (FSA), Model Checking, SMT encoding, Model Checking (TLA+, nuXMV, STORM), Theorem Proving (Coq, Lean)
DevOps & Cloud: Git/GitHub, Docker, Shell Scripting, CMake, AWS (EC2, Route 53), MongoDB, N8N

Relevant Experience

Graduate Research Assistant, Khwarizmi Lab September 2023 – Present
University of Massachusetts Amherst

- Built a verification framework to analyze quantum key distribution (QKD) protocols; identified four new vulnerabilities arising from quantum–classical interactions
- Applied formal analysis to U.S. ACH banking systems to uncover security vulnerabilities in the access control and authorization of ACH direct payments

Undergraduate Research Assistant, Communication Systems and Networks Lab September 2022 – July 2023
National University of Sciences & Technology

- Collaborated in the design and implementation of an event-driven coordination protocol for multi-agent aerial swarms on Raspberry Pi companion computers with Pixhawk/ArduPilot flight controllers
- Designed and optimized leader–follower formation control (flock, line, helical) with dynamic reconfiguration, achieving under 2 min formation-switching latency
- Engineered a mesh networking stack (IEEE 802.11, UDP/TCP, MAVLink) to enable fault-tolerant communication for control coordination in real-time (under 100 ms latency)

Hardware Security Intern, IC Design Lab June 2022 – September 2022
National University of Sciences & Technology

- Lead the design of ENIGMA, a Python framework that automatically inserts logic-locking defenses into hardware designs, protecting IP designs from unauthorized use and reverse engineering
- Designed a parametrized key-insertion system (64–256 bits) with user-defined cell libraries to analyze the impact of logic obfuscation on a chip's area, delay, and power

Machine Learning Intern, TUKL Deep Learning Lab June 2021 - September 2021
National University of Sciences & Technology

- Implemented an automated pipeline to extract, structure, and preprocess raw court documents
- Fine-tuned Transformer–based models in for court-case outcome prediction achieving 83% accuracy

Education

PhD in Electrical & Computer Engineering Expected May 2028
University of Massachusetts Amherst
Teaching Assistant: ECE 304: Junior Design Project, ECE 361: Fundamentals of Electrical Engineering

BE in Electrical Engineering *and* Minor in Computer Science Completed June 2023
National University of Sciences and Technology
Capstone Project: Logic-Locking Security Evaluation: Developed an end-to-end pipeline to analyze the security-cost tradeoffs of hardware obfuscation techniques on proprietary RISC-V design files
Funded Project: Multi-Agent Aerial Swarm: Grant-funded research implementing event-driven, low-latency control and resilient control system for multi-UAV swarms

Honors and Awards

2023 - Rector's Gold Medal: Awarded for best senior project, National University of Sciences & Technology
2022 - 2nd Place, CSAW'22 LLC: For a global security hackathon competition, NYU School of Engineering