Nazmus Shakib Sayom

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Computer Science PhD student studying the safety and security of cyber-physical systems. Builds embedded Linux systems, firmware, and robotics research infrastructure; leads undergraduate researchers in hardware-in-the-loop UAV experimentation.

Education

PhD, Computer Science
University of Utah · Aug 2024 - Present; expected 2029
Advisor: Prof. Luis Garcia, IOTrust Lab.

BSc, Computer Science and Engineering
American International University-Bangladesh (AIUB) · 2017 - 2020
Summa Cum Laude; CGPA: 3.96/4.00.

Research Experience

Graduate Research Assistant
University of Utah, IOTrust Lab · Aug 2024 - Present

- Develop property-guided reductions of control logic and physical dynamics for safety analysis of robotic vehicles. Build executable surrogates and fuzzing pipelines to find safety violations.
- Study safety policies for multi-robot systems, including stakeholder roles, permission constraints, policy conflicts, and runtime monitoring.

Selected Publication

Property-Guided Cyber-Physical Reduction and Surrogation for Safety Analysis in Robotic Vehicles
Nazmus Shakib Sayom and Luis Garcia. SmartSP 2025, LNICST 699, pp. 21-40.
Published online September 2026. Published chapter · arXiv · Code: Buggy Drone

Industry Experience

Linux Developer
meldCX, Dhaka, Bangladesh (remote) · Jan 2023 - Jul 2024

- Built and maintained a Yocto-based Linux OS for enterprise ARM single-board computers, with security hardening and reliable over-the-air (OTA) updates for large-scale deployments.
- Developed multithreaded C/C++ and Python services hosted on the OS to expose sensitive peripherals, including document scanners and banknote recyclers, to applications across host operating systems.
- Worked with device vendors and QA on driver development, hardware requirements, release benchmarking, and system stability.

Senior Software Engineer
HelloTask Platform Ltd., Dhaka, Bangladesh · Apr 2021 - Dec 2021

- Led the design and development of a jobs platform for blue-collar workers.
- Built an interactive voice response (IVR) broadcasting and input-collection system for users without internet access.

Embedded Systems Engineer
HelloTask Platform Ltd., Dhaka, Bangladesh · Jun 2020 - Mar 2021

- Prototyped a self-checkout store network and built a centralized out-of-home advertising platform combining IoT devices with computer-vision analytics.

Honors and Awards

Honorable Mention, Minds and Machines: AI in Education Hackathon, University of Utah, 2026 (Team Mithril, Assign).
Summa Cum Laude, AIUB, 2020; **Dean's List**, three-time recipient.
Champion, Mobile App Showcasing, AIUB CS Fest, 2017 (Team Bangla Platoon).

Selected Projects

Thunderdome - Hardware-in-the-Loop UAV Research Testbed
ArduPilot, embedded firmware, UAV systems, virtual-flight integration

- Led a team of undergraduate researchers to build a physical UAV and controlled testing rig from scratch around ArduPilot.
- Contributed software and firmware to couple physical flight-control hardware with virtual flight, enabling controlled experiments on high-level missions and scenarios.
- Built a virtual world model of the University of Utah campus using LiDAR and publicly available geospatial survey data to support UAV mission and scenario testing.

Obadh - Bangla typing engine and apps
Rust, C ABI, WebAssembly; iOS, iPadOS, macOS · Source code

- Developed a shared Roman-to-Bangla typing engine with separate correction and suggestion layers, exposed through a C ABI and WebAssembly for native and web interfaces.
- Released apps for iPhone and iPad, as well as Mac, using the same core engine.

Robotic Perception with World Foundation Models
Python, NVIDIA Cosmos Predict 2.5, Webots, GPU computing · Source code

- Connected video generation on HPC GPUs with a Webots robot controller to test perception under varied visual conditions, including asphalt, glare, and Mars-like terrain.
- Built steering-error analysis, odometry-based trajectory reconstruction, and synchronized visual comparisons. Course project for Prof. Guanhong Tao at the University of Utah.

Voice Remote - voice-enabled smart TV controller
C++, Arduino, nRF24L01+, embedded firmware, audio processing · Source code

- Designed and prototyped a wireless voice remote for Android-based smart TVs, integrating keypad input, push-to-talk audio, and 2.4 GHz radio communication.
- Developed transmitter and receiver firmware, microphone amplification circuitry, and a protocol for carrying button events and voice data.
- Subsequently adopted by a local TV manufacturer for its smart TV lineup for the improved performance and voice-command accuracy it offered.

Teaching Experience

Teaching Assistant, CS 6494
University of Utah · Fall 2026
Cyber-Physical Systems and IoT Security; instructor: Prof. Luis Garcia.

- Helped organize two capture-the-flag (CTF) competitions in industrial control systems (ICS) and CPS security; graded coursework and helped deliver in-class demonstrations.
- Brought Thunderdome, the UAV testbed I helped build, into classroom security exercises connecting course concepts to physical flight-control hardware.

Lecturer, ETE/ICE
Daffodil International University, Dhaka, Bangladesh · Jan 2022 - Dec 2022

- Taught Operating Systems, Embedded Systems, and Computer Fundamentals.
- Co-authored two conference papers in deep learning and secured funding for low-cost educational technology research.

Technical Skills

Languages: C/C++, Python, Rust, Bash, JavaScript/TypeScript.
Systems: Embedded Linux, Yocto, device drivers, multithreading, Docker, Git, CMake.
Security: OS hardening, secure boot, signed OTA updates, AppArmor/SELinux, TLS/PKI.
Software and ML: FastAPI, Node.js, NestJS, PyTorch, OpenCV, SQL, MongoDB.
Hardware and protocols: ARM, ESP32, STM32, Arduino, UART, I2C, SPI, MQTT, BLE, LoRaWAN.