Ahmad Bhutta

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Education

Toronto Metropolitan University — Toronto, ON
Bachelor of Engineering, Computer Engineering — *Sep 2023 – Apr 2028*

- Relevant Courses: Operating Systems, Digital Systems, Microprocessors, Signals & Systems, Algorithms & Data Structures, Software Systems, Object-Oriented Engineering Analysis & Design

Technical Skills

Languages: C, C++, Python, Java, JavaScript, TypeScript, SQL, VHDL, Assembly, MATLAB, Bash
Software & Tools: Git/GitHub, Quartus, ModelSim, Docker, Kubernetes, Firebase, PostgreSQL, Linux, IBM Cloud, VS Code, Arduino IDE
Concepts: Embedded Systems, RTOS, Multithreading, Mutexes, Semaphores, State Machines, RTL Design, Firmware Development, System Validation, Signal Processing, Fault Detection, Debugging, Hardware-Software Integration
Hardware Tools: FPGA, Arduino, ESP32, Raspberry Pi, MOSFETs, ACS712, Oscilloscope, Logic Analyzer, Function Generator

Experience

Software Engineer — Oct 2025 – Present
Global Spark (Part-Time) — *Toronto, ON*

- Collaborating with a cross-functional engineering team to enhance the Hack the Globe 2026 dashboard, improving backend workflows, deployment pipelines, and UI components supporting thousands of users.
- Developing frontend and backend functionality using JavaScript and React while performing black-box functional testing and debugging to improve platform reliability and scalability.

Systems Engineer — Sep 2025 – Present
Toronto Met Hyperloop — *Toronto, ON*

- Collaborating with controls, battery, and propulsion teams to design and validate 100 V DC power integration for a Hyperloop pod using pre-charge sequencing, relays, contactors, and emergency disconnect systems.
- Supporting hardware integration and system testing using Arduino and Python for voltage/current monitoring, relay validation, and fault-condition analysis.

Electrical Systems Engineer — Sep 2024 – Present
Toronto Met BAJA Racing — *Toronto, ON*

- Designed and implemented vehicle-wide wiring and power distribution systems while ensuring compliance with electrical standards and safety protocols.
- Configured and validated MOSFETs and parallel busbar power distribution systems, improving electrical efficiency by **20%** and overall system performance by **25%**.
- Led troubleshooting and hardware validation efforts involving relays, distribution faults, and high-current power systems.

Camp Counselor — Jun 2024 – Aug 2024
STEM Camp — *Oakville, ON*

- Coordinated STEM-focused activities and collaborative learning environments while mentoring students in problem-solving and teamwork.
- Developed structured schedules and safety procedures for educational and recreational activities.

Projects

Mini RTOS Kernel | *C, Scheduling, Concurrency, Embedded Systems* — 2026

- Developed a lightweight RTOS kernel in C supporting cooperative task scheduling and priority-based task execution.
- Implemented synchronization primitives including mutexes and semaphores to coordinate concurrent execution and prevent race conditions.
- Designed process state management and fault-handling mechanisms supporting blocked, ready, and running task states.
- Validated deterministic execution behavior and scheduler timing through simulated embedded workloads.

Vehicle Telemetry & Fleet Monitoring System | *Python, Arduino, Firebase, Cloud Monitoring* — 2026

- Developed a real-time vehicle telemetry platform simulating fleet monitoring systems using Arduino-based sensor acquisition and Python data processing.
- Implemented serial communication pipelines to stream telemetry including current, voltage, temperature, fuel level, battery status, and GPS location.
- Integrated Firebase Realtime Database for cloud telemetry logging, remote monitoring, and threshold-based alert generation.
- Designed fault detection logic for abnormal operating conditions including overheating, overcurrent, and low-fuel scenarios.

Power Quality Validation Testbench | *Verilog, GTKWave, Icarus Verilog* — 2026

- Designed a timing-accurate power quality validation testbench modeling ADC-sampled electrical signals.
- Implemented RMS computation and threshold-based detection logic for voltage sag, swell, and interruption classification.
- Verified waveform behavior and timing correctness using GTKWave simulation analysis.

Docker Containerization Project | *Docker, Kubernetes, IBM Cloud* 2026

- Containerized applications using Dockerfiles and deployed services using Docker CLI workflows.
- Managed cloud container images using IBM Cloud Container Registry and deployment pipelines.
- Explored Kubernetes and OpenShift orchestration concepts for scalable containerized applications.

Autonomous Guider Robot | *HCS12 Assembly, ADC, Timers, Interrupts* 2025

- Engineered an autonomous navigation system using finite-state-machine logic implemented in HCS12 assembly.
- Implemented ADC-based guider sensor processing and threshold logic for real-time path correction and obstacle handling.
- Integrated timer interrupts and LCD diagnostics for movement timing and system-state monitoring.

Smart Application Fan Controller | *Arduino, Python, Tkinter* 2025

- Developed a desktop Python GUI for Arduino-controlled fan speed adjustment with live current monitoring and serial communication.
- Integrated ACS712 current sensing and CSV logging for real-time diagnostics and telemetry analysis.
- Implemented fan presets, ON/OFF controls, overcurrent protection logic, and live system status reporting.

Bookstore Management System | *Java, JavaFX, OOP, State Design Pattern* 2025

- Developed a JavaFX-based management application with separated UI and backend business logic.
- Applied the State Design Pattern to manage application flow, improving scalability and reducing software coupling.
- Implemented persistent file-based storage and structured data handling for application state management.

CPU Design Implemented on FPGA | *VHDL, Quartus, ModelSim* 2025

- Implemented a CPU architecture on a Cyclone II FPGA integrating ALU datapaths, registers, FSM-based control, and instruction decoding logic.
- Developed ModelSim testbenches to verify instruction sequencing, timing behavior, and hardware functionality.
- Performed waveform analysis and hardware debugging to validate system operation on FPGA hardware.

Power Grid Load Monitor | *Arduino, MOSFETs, OLED, ACS712* 2025

- Built a microcontroller-based load monitoring platform for real-time voltage and current measurement.
- Integrated MOSFET-controlled loads and overcurrent shutdown protection circuitry for hardware safety validation.
- Developed OLED telemetry display and serial logging functionality for embedded diagnostics.

Certifications

- **IBM Machine Learning Certification** 2026
- **IBM Cloud Technologies (Docker, Kubernetes, OpenShift)** 2026