

# Alex Forsyth

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## Education

**BASc Mechanical and Materials Engineering**, Queen's University

3<sup>rd</sup>/4

- Focus on closed-loop control systems & leveraging FEA/CFD for mechatronic design.
- Relevant Coursework: Physics of Nuclear Reactors, Manufacturing Methods, Automated Controls

## Experience

**Beam Instrumentation** | CERN Accelerator School

Nov 16-29, 2025

- Graduate course on particle dynamics, beam profile/RF measurements, and digital signal processing.

**Undergraduate Research Assistant** | MAX-Nuclear at Queen's University

May 2025 – Current

- Project lead under Tier 1 research chair Dr. Mark Daymond at the Reactor Materials Testing Laboratory.

## Projects

**Accelerator Target Slider (ATS) – Project Lead** | MAX-Nuclear at Queen's University

May 2025 – Current

- Designed and fabricated a \$10,000 multi-sample irradiation stage for CANDU reactor material research.
- Leveraged CFD modeling and ion-beam testing to design sample holders suitable for 500°C experiments.
- Implemented a LabVIEW/C++ control system to automate temperature, position, and irradiation dose.

**Beam Profile Monitor (SWIPR)** | MAX-Nuclear at Queen's University

May – Aug 2025

- Assisted development of a scanning wire beam profile monitor to enhance beam diagnostics.
- Designed the mounting mechanism that integrates the SWIPR and Faraday Cup Array onto the ATS.
- Built and tested a LabVIEW control system for comparative reconstruction resolution testing.

**Lightweight Brake Pedal – Team Lead** | Smith Engineering

Jan – Apr 2024

- Led a design team to develop a lighter weight brake pedal for the Queens Baja SAE Racing team.
- Reduced material with I-beam design and created stress uniformity with SolidWorks FEA static analysis.
- Outperformed the previous design by >50g while maintaining 1.5 FOS and driver ergonomics.

**Continuously Variable Transmission (CVT)** | Baja SAE

Sept 2024 – Apr 2025

- Remodelled primary CVT using SolidWorks CAD, lengthened cooling fins to further increase convection.
- Increased manufacturability and researched future methods of CVT tuning using MATLAB Simulink.

**Automated Chess Board** | Personal

Apr 2025 - current

- Modelled and fabricated a belt driven 2D gantry to move chess pieces with an electromagnet.
- Integrated a multiplexed hall sensor array and embedded chess engine for move detection and response.
- Developed path finding algorithm and control system with Arduino-C++ with 0.5mm accuracy.

## Skills

- **DAQ & Analysis:** Python, LabVIEW, Arduino-C++, Excel, MATLAB.
- **Design Tools:** SolidWorks CAD, Flow Simulation (CFD), Static Analysis (FEA), KiCad Schematics.
- **Proficiencies:** Technical Reports & Presentations, Research, Performance Testing.