# Aahil Ansari

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## Skills

**CAD:** Fusion360, SolidWorks
**Programming:** Python (MatPlotLib, Numpy, SciPy, OpenBCI, LabStreaming Layer), C#, MATLAB, Unity (ML Agents)
**Hobbies:** Badminton, Piano (Level 10 RCM), Mixed Martial Arts, Weightlifting

## Experience

**Robotic Surgery Research Assistant,** Telerobotic and Biorobotic Systems Group — September 2025 – Present

- Developed an autonomous ultrasound scanning system in Unity using ML-Agents with Soft Actor-Critic (SAC) and deformable tissue simulations (CRESSim-MPM), enabling realistic agent-environment interactions.
- Transitioned RL rewards from location-based to image-based, leveraging privileged state information to train SAC agents for accurate ultrasound tissue detection, improving clinical relevance and agent performance.
- Integrated synthetic ultrasound rendering, tissue deformation models, and SAC policies into a unified, high-fidelity simulation pipeline, applying domain randomization to ensure robust and generalizable AI-driven imaging experiments.

**NSERC-USRA Research Assistant,** Adesida Laboratory — April 2025 – Present

- Developed and implemented a Python-based script that reduced image quantification time for Brightfield and Immunofluorescent images by 50%.
- Performed histological analysis on cartilage samples including tissue culture, embedding, slicing, staining (Immunofluorescence, Safranin-O), and microscope imaging.
- Conducted RNA and cDNA extraction on meniscus samples to support RT-qPCR-based transcriptomic analysis.
- Executed colorimetric assays (DMMB) on samples to quantify proteoglycan and DNA content, identifying biochemical changes in response to mechanical stimulation.
- Calibrated the Lumen X Gen 3 Bioprinter for PEGDA-based bioinks by designing and printing custom chamber components in Fusion 360, enabling successful scaffold fabrication.

**Biocompatibility / Mock Circulatory Loop Member,** AlbertaHeart — September 2024 – Present

- Calibrated and validated multi-channel pressure transducers for a mock circulatory loop, converting raw voltage signals into accurate physiological pressure readings, improving experimental precision and reproducibility.
- Developed MATLAB scripts for real-time data acquisition and signal processing, translating DAQ voltage outputs into interpretable cardiovascular metrics, enabling streamlined monitoring and analysis.
- Created comprehensive system documentation and SolidWorks models for the mock circulatory setup, standardizing experimental procedures and facilitating knowledge transfer for future research teams.
- Completed 3 iterations on the design of a one way Mock Circulatory Loop, complete with a fluid reservoir, pumping mechanism, pinch valve, luer locks, and collection tank.

## Projects

**BEADDA** – An AI Physiotherapist, Integrating EEG, EMG, and Computer Vision — November 2025

- Integrated OpenBCI EEG/EMG hardware into a real-time biosensing pipeline using LabStreamingLayer (LSL), implementing filtering, artifact reduction, calibration, and feature extraction to generate reliable neural and muscle performance metrics.

## Education

**University of Alberta** – BSc in Mechanical Engineering, Biomed Co-op – GPA: 3.97/4.0 — September 2024 - Present

## Awards

**International HeartHackathon** – Finalist — June 2025
**Canadian Wide Science Fair** – Bronze Medal, $10000 in Scholarships — June 2024
**Edmonton Regional Science Fair** – Gold Medal, Best Senior Project, Senior Biology Award — March 2024
**CyberTitans National Qualifier** – 7th in Canada — January 2023