

Katherine Langille

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Languages: Python, C++, JavaScript, SQL, HTML/CSS

AI & Machine Learning: PyTorch, scikit-learn, LangGraph, Pandas, NumPy; LLM agents, agentic workflows, tool use, model evaluation and benchmarking, deep learning, transformers, diffusion models

Systems & Tools: Git, Linux, MongoDB, Jupyter, Arduino, QNX; REST APIs, FHIR, data pipelines, embedded and real-time systems, hardware-software integration

EXPERIENCE

Machine Learning Engineering Intern

Jun. 2026 – Present

Signal 1

Toronto, ON

- Built an **evaluation framework** that moves healthcare AI testing beyond benchmark accuracy, measuring whether agents complete real clinical workflows safely, consistently, and according to policy before deployment
- Developed clinically grounded test cases from **FHIR** patient records using **LangGraph** to compare models, tools, and agent architectures under realistic healthcare scenarios, with automated validation and human review
- Created **trace-based scoring** and regression tests that identify workflow failures, unsafe tool use, policy violations, and performance degradation when models or system components change

Bioinformatics Software Research Student

Sep. 2025 – Dec. 2025

The Hospital for Sick Children (SickKids) — Centre for Applied Genomics

Toronto, ON

- Designed and implemented an **end-to-end machine learning pipeline** integrating demographic, clinical, and imaging data to predict developmental outcomes, with an emphasis on interpretability and reproducibility
- Contributed to a **transformer-based protein language model** for variant-effect prediction by analyzing attention mechanisms and model behaviour

Data Science and Process Mining Analyst

Oct. 2024 – Mar. 2025

Software Solutions, Transport Canada

Ottawa, ON

- Led two **process-mining analyses** of large-scale event logs in Python, identifying workflow bottlenecks, rework, and process-conformance gaps
- Designed a computationally efficient and secure **machine learning classification pipeline** to reduce administrative burden, with dashboards translating findings for cross-functional stakeholders

PROJECTS & RESEARCH

Praxis | QNX-Powered Rehabilitation Assessment Platform

Hack the 6ix 2026

- Built a **QNX-powered rehabilitation device** integrating camera and IMU data to quantify tracing accuracy and movement stability across repeated assessments
- Connected QNX-based sensor capture to a MongoDB-backed web platform for longitudinal performance tracking

Modelling Cardiac Rhythm Breakdown and Recovery in an Excitable Media Cellular Automaton

2026

Accepted Oral Presentation, ALIFE 2026

- Developed a two-dimensional **Greenberg-Hastings cellular automaton** to model spontaneous cardiac re-entry, S1-S2 induction, structural fibrosis, and ablation-mediated termination
- Evaluated 60 substrate conditions and 817 stimulation configurations using excess activity, activity variance, and spatial entropy to characterize arrhythmia emergence and recovery

Predictive Modeling of Human Gait | Neuromechanics & Assistive Robotics Lab — Dr. Arami

Winter 2026

- Built a **multi-dataset pipeline** to harmonize heterogeneous human-gait datasets into a canonical representation through spatial mapping and temporal normalization
- Developed and evaluated a deep probabilistic model using **denoising diffusion** to predict full gait cycles from preceding kinematic measurements

EMG-Controlled Robotic Hand | YouTube

Summer 2025

- Built a low-cost embedded system enabling **real-time grasp control** from forearm EMG signals, designing the pipeline to amplify, filter, digitize, and classify physiological signals for reliable actuation

EDUCATION

University of Waterloo

Waterloo, ON

BASc. Biomedical Engineering, Honours, Co-Operative Program

Sep. 2023 – May 2028

- GPA: 3.95 (94.36%)**, First in Class 2B Term; Dean's Honours List; Fairfax Financial Academic All-Canadian
- Competitions:** 1st Place, Bio-Engineering — Ontario Engineering Competition 2026; "Best Story Told" (\$5,000) — Innovation North Systems Innovation Challenge 2026
- Awards:** First in Class Engineering Scholarship, Ontario Professional Engineers Foundation Scholarship, President's Scholarship of Distinction, Alumni @ Microsoft Scholarship in Engineering
- Engineering Society Representative; Varsity Squash; Campus Response Team Responder & Assistant Trainer