

Ethan Fung

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EDUCATION

University of Waterloo <i>Bachelor of Software Engineering</i>	Sep. 2025 – Present Waterloo, ON
• \$20,000 Scotiabank Software Engineering Entrance Scholarship; GPA 3.9/4.0	

EXPERIENCE

Toronto Metropolitan University <i>Robotics Junior Research Assistant</i>	Jun. 2024 – Jul. 2025 Toronto, ON
• Co-authored peer-reviewed papers comparing analytical vs. deep-learning inverse kinematic pipelines . • Presented full-stack 6-DOF manipulation system at IC-MSQUARE 2024, covering IK and control accuracy. • Achieved ±3 mm end-effector accuracy via 5th-order torque trajectory control in MATLAB/Simulink. • Integrated custom actuation hardware with AprilTag + OpenCV for autonomous pose estimation . • Published in JPCS 2024 (doi:10.1088/1742-6596/3027/1/012039) and IJSES 2024 .	
FIRST Tech Challenge Teams 16417 & 19446 <i>Robotics Team Captain</i>	Sep. 2023 – Jun. 2025 Markham, ON
• Built Java-based autonomous pipelines with OpenCV perception, odometry , and multithreaded PID control. • Directed 30+ members across programming, mechanical, and outreach subteams to deliver award-winning robots. • Achieved World Championship ranks #6 (2023) and #8 (2024) out of 7,000+ global teams; won 3 consecutive Provincial Championships and Control Awards.	
International Olympiad in Artificial Intelligence <i>Team Canada Competitor</i>	Jul. 2025 – Aug. 2025 Beijing, China
• Highest scorer on Team Canada ; ranked in the top 50% among 280+ competitors from 40+ countries. • Solved time-constrained multimodal ML tasks (retrieval, classification, vision) under offline compute limits. • Designed end-to-end ML pipelines (preprocessing, modeling, evaluation) in a competitive, research-style setting.	

TECHNICAL PROJECTS

Satellite Rainfall Segmentation (GOES-16) (IOAI) <i>Geospatial ML, Data Pre-processing</i>	
• Built SE-ResNet encoder + U-Net decoder for 18-channel rainfall segmentation with patch-stitch inference. • Boosted imbalanced rainfall signal via spectral re-weighting and fusion of precipitation-sensitive IR bands. • Improved model robustness through domain-consistent augmentations, achieving 0.86 IoU on validation.	
Hint-to-Word Semantic Retrieval (IOAI) <i>Retrieval Pipelines, Clustering</i>	
• Implemented an SBERT embedding-based retrieval using k-NN cosine similarity for top- k candidate ranking. • Built alternative retrieval heads and UMAP+KMeans clustering under offline <1B param constraints. • Applied contrastive fine-tuning on hint-label pairs, achieving 0.83 NDCG@10 on the validation set.	
MooseTrax — Biomechanics Evaluation <i>Computer Vision, Temporal Signal Analysis</i>	
• Stabilized pose keypoints from raw exercise videos with confidence pruning and temporal filtering. • Quantified and segmented reps via ground-truth-aligned joint-angle kinematics , measuring form deviations. • Built confidence-gated analytics to prune unreliable links and produce structured metrics for LLM feedback.	
Video-Based Motion Analysis for Badminton <i>Computer Vision, Object Tracking, Sequence Modeling</i>	
• Mapped YOLOv8 player/shuttle detections to court coordinates via Canny/Hough geometry and homography. • Applied Kalman filtering to recover smooth player and shuttle trajectories from noisy observations. • Trained a GRU on temporal sequences to predict shot-response patterns and produce actionable training insights.	
Text-to-Motion Reinforcement Learning for 6-DOF Robot <i>Embodied AI, Motion Planning, Unity</i>	
• Developing a physics-based 6-DOF manipulation simulator for reinforcement learning motion planning. • Investigating text-to-motion grounding by mapping language embeddings to goal-conditioned RL policies. • Integrating PyTorch policy networks with Unity via closed-loop inference for low-level joint-space control.	

TECHNICAL SKILLS

Languages: Python, C++, Java, MATLAB, C

ML / Modeling: PyTorch, TensorFlow, Transformers, Sequence Models, Reinforcement Learning

Systems / Tooling: ROS2, Unity, Simulink, Linux, Docker, Git