

EDUCATION

- **University of Toronto** Toronto, Ontario
Bachelor of Engineering Science & Robotics Specialization; Major GPA: 3.90 *Sep 2022 – Apr 2027*

RESEARCH EXPERIENCE

- **Huawei Technologies, Noah's Ark Lab — Embodied AI** Toronto, Ontario
Research Assistant *May 2025 – Present*
 - Conducted research on **Vision-Language-Action (VLA) models** such as **Pi05** for robotic manipulation in visually cluttered environments, studying perception–action coupling and **robustness degradation caused by distractors**. Designed experiments using UR5e and Franka robots, with ROS integration for policy execution from learned VLA models.
 - Explored **long-horizon symbolic planning** via **Plan-to-Evolve (P2E)** frameworks. Fine-tuned and conducted experiments on large language models including **Qwen3** and **LLaMA 3/4** using **PDDL-based domains** with **Chain-of-Thought** reasoning, and compared against multiple baselines such as majority voting and self-distillation. Integrated real-robot experiments combining **VLA** and motion planners that bridge **symbolic planning** with low-level continuous controls.
 - Contributed to a real-robot prototype of **Mem2Ego**, a global-to-egocentric memory architecture for **long-horizon embodied navigation**. Integrated **V-SLAM** and **Nav2** within ROS2 for agent-guided navigation, and conducted comparisons against classical baselines such as random exploration and heuristic-based exploration.
 - Served as one of the lead engineers on the **The North Star** team participating in the **Behavior Challenge** at the **NeurIPS 2025 Workshop**. Designed a **finite-state machine** pipeline integrating computer vision (object detection and pose estimation via **SAM6D**), **VLA-based execution** (via **Pi05**), and **TAMP**, enabling task execution across **50+ household tasks** in the **Isaac Sim** environment. Achieved **4th place** in the challenge.
 - Designed and executed systematic comparative evaluations between **World Action Models (WAM)** and **Vision-Language-Action (VLA)** models across diverse robotic manipulation benchmarks. Developed **standardized data collection and evaluation protocols**, running experiments across robustness to visual distractors, **out-of-distribution generalization**, and varying task conditions. Analyzed model behaviors and performance tradeoffs to provide empirical insights for real-world deployment.
- **University of Toronto Continuum Robotics Laboratory** Toronto, Ontario
Undergraduate Research Assistant (Part-time) *Feb 2024 – Apr 2025*
 - Conducted in-depth research on **state estimations for continuum robotics**, focusing on **constraints and degrees of freedom** in various actuation methods. Special emphasis was placed on **tendon-driven continuum robots (TDCR)**, where the **Clarke transformation** was extended to general models and used to unpack the system's constraints accurately.
 - Analyzed **TDCR forward kinematics** from first principles, evaluating the **influence of hardware factors** such as material stiffness, size effects, disk radius, and tendon length. Performed extensive testing on physical continuum robots, comparing their performance with simulations, and **introduced corrective factors** to improve accuracy.
 - Developed and simulated **TDCR models** using **MuJoCo** and **Pyplot**. Documented results through blog posts on the **OpenCR project**, demonstrating how these simulations can be generalized for broader applications.

PUBLICATIONS

- *Self-CriTeach: LLM Self-Teaching and Self-Critiquing for Improving Robotic Planning via Automated Domain Generation*, arXiv:2509.21543. Accepted at ICML 2026.
- *Data and Evaluation Protocols for Robust Robotic Manipulation*. Accepted at RSS 2026 Workshop.
- *H-WM: Robotic Task and Motion Planning Guided by Hierarchical World Model*, arXiv:2602.11291. Accepted at ICLR 2026 Workshop on World Models.
- *Do World Action Models Generalize Better than VLAs? A Robustness Study*, arXiv:2603.22078.
- *Mem2Ego: Empowering Vision-Language Models with Global-to-Ego Memory for Long-Horizon Embodied Navigation*, arXiv:2502.14254.
- *Distracted Robot: How Visual Clutter Undermines Robotic Manipulation*, arXiv:2511.22780. Accepted at ICRA 2026.
- *Improving Robotic Manipulation Robustness via NICE Scene Surgery*, arXiv:2511.22777. Accepted at ICRA 2026.

INDUSTRY EXPERIENCE

- **Prelude CA** Toronto, Ontario
Full-Stack Engineer / Frontend Lead (Part-time) *Jun 2025 – Present*
 - Led the frontend architecture of a **multi-tenant SaaS platform** using **Next.js 15 (App Router)**, **React 19**, and **TypeScript**. Built a modular design system with Radix UI and Tailwind CSS, implemented state management via **Zustand**, and optimized performance through **client-side caching**, reducing interaction latency by **40%**.
 - Implemented secure authentication using **OAuth** (Google/Microsoft), **role-based access control**, and team invitation flows. Designed multi-tenant isolation across application and data layers with **type-safe API contracts**.
 - Designed an AI-driven **multi-agent data processing** pipeline with a **CSV ingestion system** using **OpenAI embeddings** for semantic column matching, achieving **90%+** auto-mapping accuracy.
 - Designed a scalable **CRM relational schema** in **PostgreSQL** with normalization, indexed columns, foreign key constraints, and transaction-safe updates supporting real-time validation.

- **Yuhang International Flight(Dalian) (YIF)CO.LTD** Dalian, China
Full-Stack Engineer *Jul 2022 – May 2024*
 - Designed and developed an **online information management system** using Python, QtDesigner, SQL, and QML, enabling users to access, update, and output complex IOU data via an SQL database.
 - Leveraged **connection pooling** for concurrent users, **bcrypt-hashed authentication**, multi-key SQL search with **FuzzyWuzzy** fuzzy matching, and **real-time SQL triggers**.
 - Conducted rigorous testing handling **1M+ items** and **100+ concurrent users**; achieved **3–5 second** search on 100k+ IOUs, improving operational efficiency by **100%+**.

PERSONAL PROJECTS

- **Day Travel Map:**
 - Developed a **GIS map application** in **C++** designed for frequent commuters, featuring real-time route display and user-input capabilities on local devices. The application provided an intuitive interface for users to enter destinations, calculate routes, and view travel data, enhancing everyday navigation in Toronto.
 - Implemented a **shortest path** feature between intersections using the **A* Algorithm** combined with the **ezgl API**, ensuring **100% accuracy** in route calculations and achieving a **sub-1 second** response time for paths across Toronto.
 - Applied the **Multi-Dijkstra Algorithm** and **Greedy Algorithm** to solve the **Traveling Salesman Problem (TSP)**, optimizing multiple travel routes with **Three-Opt** and **Shift-Perturbation** techniques. Ranked within the **top 20%** for runtime efficiency in a school competition.
- **Desktop Mechatronic Robotic Pet:**
 - Developed a mechatronic robotic pet capable of **multi-modal interaction** through **voice commands**, **visual recognition**, and **wireless signals**. The design combined mechanical engineering, embedded systems, and software to create a responsive interactive system.
 - Built the **embedded system** using **ESP32-WROOM** and **C++**-based multi-threaded control algorithms, extended via a **Python API** for remote monitoring. Engineered hardware for **power distribution** and designed the **CAD model** for the robot's outer shell.
- **Delivery Turtle-Bot:**
 - Designed a **delivery robot** prototype using TurtleBot, ROS, and Python that navigates a test environment via a **color camera** and follows a pre-defined floor path to stop at designated delivery locations.
 - Implemented **PID control** for precise path-following and **Bayesian localization** for self-localization using visual landmarks, enabling the robot to reorient and return to its path after deviations.
- **Mahjong AI:**
 - Used **PyTorch with LSTM** to train an AI for Japanese M-League Mahjong, capable of analyzing played tiles and suggesting the optimal move. Incorporated **offensive and defensive strategies** to adapt to dynamic gameplay.
 - Developed **real-time game integration** by connecting to web-based Mahjong platforms via **HTTP requests**, enabling automatic reading of game state and immediate move recommendations during live gameplay.
 - Packaged the AI into an **intuitive application** via **QtDesigner**. Achieved the highest rank in Majsoul within 100 rounds of testing, demonstrating competitiveness at a professional level.

AWARDS

- **Putnam Math Contest:** Personal score 42, ranking **Top 154**. **Top 3** member of Top 5 Winning Team.
- **CEMC Math Contests:** Euclid 2-time Honor Roll (Rank 77), Hypatia, Fermat, CSMC Honor Roll (Rank 100)
- **AMC/AIME Math Contest:** AMC 2-time Honour Roll (Top 0.1%), AIME 2-time Honour Roll (Top 0.1%)
- **Canadian Mathematics Olympiad:** Invited participant.
- **University of Toronto Undergrad Mathematics Contest:** **Top 1** among all participants from all years, all campus.

PROGRAMMING SKILLS

- **Languages/Frameworks:** C, C++, Python, ROS/ROS2, Java, C#, Javascript, Three.js, React.js, Node.js, OpenCV, Langchain, Tensorflow, PyTorch, Keras, NumPy, scikit-learn, OpenAI, Unity, HTML, CSS/SCSS, Swift, MATLAB, R, Shell Scripting, LaTeX
- **Development Toolkit:** Linux Shell, Git, Docker, Vim, Jupyter Notebook, XCode, Compilers