



# MITHUN VANNIASINGHE

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## Research Interests

Robotics | Control Theory | Safe Control | Reachability | Reinforcement Learning | Imitation Learning

## Education

### University of Toronto

Sep/21 – Apr/26

Bachelor of Applied Science in Engineering Science, Major in Machine Intelligence, Minor in Robotics

Toronto, Canada

cGPA: 3.83/4.0, Dean's Honour's List 2021-2025

#### • Relevant Coursework:

ECE356 – Introduction to Control Theory (A+)	ECE421 – Machine Learning (A+)
ECE324 – Machine Intel., Software & Neural Nets (A+)	ROB311 – Artificial Intelligence (A)
ECE367 – Matrix Algebra & Optimization (A)	ECE368 – Probabilistic Reasoning (A)
ECE557 – Linear Control Theory (IPR)	ECE411 – Adaptive Control & Reinforcement Learning (IPR)
ROB501 – Computer Vision for Robotics (IPR)	ECE470 – Robot Modeling & Control (IPR)

## Research Experience

### Undergrad Thesis Student

Sep/25 – Present

LEAF Lab (Advisors: [Nick Rhinehart](#))

University of Toronto

- Investigating Hamilton-Jacobi reachability analysis and bisimulation-based representation learning to enhance safety in robotic systems, with the goal of improving both sample efficiency and operational safety.

### Imitation Learning & Robotics Researcher

May/25 – Sep/25

Autonomous Space Robotics Lab (Advisors: [Tim Barfoot](#), [Nick Rhinehart](#))

University of Toronto

- Developed and implemented an imitation learning model, Ratatouille, for human-robot social navigation. **Submitted as second author to ICRA 2026.**
- Designed and conducted real-world experiments, debugging hardware and managing distributed computation across devices using ROS communication.
- Debugged multimodal dynamics issues and identified key factors required for successful behavioral cloning, enabling robust model tuning and real-world deployment in human-robot social navigation.

### Reinforcement Learning Researcher

Aug/24 – Sep/25

DORL Lab (Advisors: [Jiayu Chen](#), [Chi-Guhn Lee](#))

University of Toronto, University of Hong Kong

- Co-developed LOKI, a hierarchical imitation learning framework for offline skill discovery, introducing a novel extrinsic-intrinsic objective (this idea served as the basis for the paper.) **Submitted as co-first author to ICRA 2026.**
- Built the codebase for the initial phase of the alignment-enforced Vector Quantized VAE and implemented a novel skill-segmentation pipeline.
- Conducted all experiments and performed detailed time-series analysis of learned skills, including the collection, preprocessing, and cleaning of the offline trajectory dataset to ensure high-quality inputs for hierarchical imitation learning.

### Machine Learning Researcher

May/23 – Present

Super CDMS International Collaboration (Advisors: [Scott Oser](#), [Yan Liu](#))

University of British Columbia

- Led the implementation of time series **GANs**, adapting model architectures for specific use cases to enhance blinding schemes. Utilized **Python** and **TensorFlow** to generate synthetic time series sensor data, reducing bias in experimental analyses.
- Applied ML techniques, including PCA and t-SNE, to validate the effects of dimensionality reduction in embedding spaces during time series GAN training.

### Physics Researcher

May/22 – Aug/22

Super CDMS International Collaboration (Advisors: [Miriam Diamond](#))

University of Toronto

- Designed **Python** testing protocols, utilizing the **unittest** framework, to decrease the risk of signal analysis software failure across a wide range of machines and hundreds of users. Leveraged **GitLab CI/CD** and **Singularity/Apptainer** containerization.
- Conducted benchmarking tests via **Bash** scripts in **High Performance Computing** environments and developed **Python** programs for runtime analysis informing software engineers about computing needs of the collaboration.

## Publications

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### Ratatouille: Imitation Learning Ingredients for Real-world Social Robot Navigation

*Submitted to ICRA 2026*

- J. R. Han, M. Vanniasinghe, H. Sahak, N. Rhinehart, and T. D. Barfoot, “Ratatouille: Imitation Learning Ingredients for Real-world Social Robot Navigation,” *arXiv preprint* arXiv:2509.17204, 2025. [Video Demo]

### Offline Discovery of Interpretable Skills from Multi-Task Trajectories

*Submitted to ICRA 2026*

- C. Zhu, M. Vanniasinghe, J. Chen, and C.-G. Lee, “Offline Discovery of Interpretable Skills from Multi-Task Trajectories, 2025.

## Teaching Experience

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### Linear Algebra Teaching Assistant

*Linear Algebra for Engineers*

**Sep/23 – Present**

*University of Toronto*

### Calculus Teaching Assistant

*Calculus for Engineers*

**Sep/23 – Present**

*University of Toronto*

## Industry Experience

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### Applied Machine Learning Engineer

*Tenstorrent Inc.*

**May/24 – Present**

*Toronto, Canada*

- **Model Bring-up + Inference Server:** Deployed Mistral 7B on internal inference server, integrated with ML model studio platform, and resolved complex batching and context leakage issues.
- **Model Benchmarking + Infrastructure:** Benchmarked 18+ CV, NLP, and diffusion models on custom hardware, modified 50+ demo scripts for multi-batch and dual-chip support, and added performance logging for internal metrics visibility.
- **LLM App Development + Evaluation:** Built real-time LLM agent app for internal demo day (search + multi-threaded chat), integrated Llama 3.1 70B for live inference, and implemented log-likelihood evaluation using vLLM for grounded model comparisons.

## Technical Skills

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**Languages:** Python, C, C++, Bash

**Libraries:** NumPy, TensorFlow, PyTorch, Keras, SciPy, Scikit-Learn, Matplotlib

**Technologies/Frameworks:** ROS2, MATLAB, Git, High Performance Computing, Docker

## Awards and Honours

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|---|----------|---------------|
| • Dean’s Undergraduate Student Summer Research Pivot Fellowship | \$8000   | <b>May/25</b> |
| • Gary L. Palmer Memorial Scholarship                           | \$1600   | <b>Aug/23</b> |
| • Herbert Gladish Memorial Scholarship                          | \$1100   | <b>Aug/23</b> |
| • NSERC USRA University of British Columbia                     | \$10,500 | <b>May/23</b> |
| • Engineering Science Research Opportunity Program Award        | \$7500   | <b>May/22</b> |

## Leadership and Mentorship

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### VP Technical Writing, UofT Machine Intelligence Student Team (UTMIST)

**Jul/25 – Present**

- Coordinated monthly AI/ML newsletter article publications across a team of 15+ writers.
- Initiated and managed the conversion of written articles into engaging short-form video content for social media.

### Engineering Mentor (NSight)

**Sep/24 – Present**

- Provide 1:1 mentorship to first-year engineering students, offering guidance on academic success, internship and research experience, study skills, and transitioning to university.

### Engineering Orientation Leader

**Sep/22 – Present**

- Served as orientation group leader to welcome incoming first-year students; volunteered at welcoming ceremonies, Frosh Week, and the club fair.