Gautham Vasan

vasan@ualberta.ca | gauthamvasan.github.io

Research Interests

I'm interested in building machines with animal-like intelligence. To this end, I aim to understand computational principles that could enable agents such as robots to continually learn, adapt, develop, and improve throughout their lives. I have worked on online reinforcement learning, imitation learning, and sim-to-real approaches for robotic manipulation.

Education

Ph.D. in Computing Science, University of Alberta, Canada 2020 - Present
- Supervisory Committee: Dr. Rupam Mahmood (advisor), Dr. Richard Sutton, Dr. Matthew Taylor
- Dissertation (proposed): Real-Time Reinforcement Learning For Robots

M.Sc. in Computing Science (Thesis), University of Alberta, Canada 2017
- Advisor: Dr. Patrick Pilarski
- Dissertation: Teaching a Powered Prosthetic Arm with an Intact Arm Using Reinforcement Learning

B.Tech. in Instrumentation and Control Engineering, National Institute of Technology, Tiruchirappalli, India 2015
- Advisors: Dr. G. Saravana Ilango, Dr. V. Sankaranarayanan
- Capstone Project: Autonomous Visual Tracking and Landing of a Quadrotor on a Moving Platform

Employment

Sanctuary AI, Research Intern: Reinforcement/Imitation Learning, Vancouver, Canada 05/2025 - 09/2025
- Design and development of novel reinforcement learning (RL) and imitation learning (IL) algorithms for real-world manipulation tasks.
- Developed value-based RL algorithms that leverage expert demonstrations and are applicable to diverse robotic platforms, including Sanctuary's flagship humanoid Phoenix and various industrial arms.

University of Freiburg, Visiting Researcher: DAAD Scholar, Freiburg im Breisgau, Germany 03/2023 - 06/2023
- Hosted by Dr. Joschka Boedecker as a part of a DAAD-Stiftung Unicore Fellowship.
- Deep reinforcement learning research for integrating noisy electroencephalogram (EEG) signals decoded from a patient's brain, which includes preference and failure information, into a framework for skill learning on assistive robots.

Ocado Technology (Formerly Kindred AI), Machine Learning Researcher, Toronto, Canada 2017 - 2020
- Devised deep reinforcement learning techniques for SORT, a piece-picking robot that grasps, scans and stows items in warehouses for clothing stores like GAP and American Eagle.
- Supported the development of SenseAct, an open-source computational framework for physical robot learning tasks.
- Deployed RLScan to production. It uses deep RL to learn a vision-based control policy to scan barcodes on clothing with a Fanuc arm. It was trained end-to-end in production, learning from a fleet of robots across multiple warehouses.

Awards & Achievements

- *AAMAS Scholarship* to present at the Doctoral Consortium (2024)
- *DAAD-Stiftung UNICORE Scholarship* for a three-month research visit to the University of Freiburg (2023)
- *DAAD AINet Postdoctoral Networking Fellowship* (2022) to visit and foster collaborations with German research labs
- *University of Alberta Doctoral Recruitment Scholarship* Fall 2020/21
- Winner of the *M.Sc Outstanding Thesis Award* in Computing Science at the University of Alberta (2017)
- *Phase-1 Winners and Finalist* at the *Texas Instruments Innovation Challenge India Design Contest* (2014)

Publications

Peer-Reviewed Publications

16. Gautham Vasan, Mohamed Elsayed, Alireza Azimi, Jiamin He, Fahim Shahriar, Colin Bellinger, Martha White, A. Rupam Mahmood, Deep Policy Gradient Methods Without Batch Updates, Target Networks, or Replay Buffers. *NeurIPS 2024* (Video/Code)

15. Mohamed Elsayed, Gautham Vasan, A. Rupam Mahmood, Streaming Deep Reinforcement Learning Finally Works. *NeurIPS FITML Workshop 2024,* (Code)
14. Gautham Vasan, Yan Wang, Fahim Shahriar, James S. Bergstra, Martin Jagersand, A. Rupam Mahmood, Revisiting Sparse Rewards for Goal-Reaching Reinforcement Learning. *RLC 2024* (Video/Code)
13. Huiyi Wang, Fahim Shahriar, Alireza Azimi, Gautham Vasan, A. Rupam Mahmood, Colin Bellinger, Versatile and Generalizable Manipulation via Goal-Conditioned Reinforcement Learning with Grounded Object Detection. *CoRL MRM-D Workshop 2024*
12. Gautham Vasan. Autonomous Skill Acquisition for Robots Using Graduated Learning. *AAMAS 2024*
11. Bram Grooten, Tristan Tomilin, Gautham Vasan, Matthew E. Taylor, Rupam Mahmood, Meng Fang, Decibal Mocanu, MaDi: Learning to Mask Distractions for Generalization in Visual Deep Reinforcement Learning. *AAMAS 2024* (Video/Code)
10. Gautham Vasan*, Yan Wang*, Fahim Shahriar, James S. Bergstra, A. Rupam Mahmood, Learning Sparse Reward Tasks on Real Robots From Scratch, *RAP4 Robotics Workshop, ICRA 2023*
9. Fengdi Che, Gautham Vasan, A. Rupam Mahmood, Correcting discount-factor mismatch in on-policy policy gradient methods, *ICML 2023*
8. Yan Wang*, Gautham Vasan*, A. Rupam Mahmood, Real-Time Reinforcement Learning for Vision-Based Robotics Utilizing Local and Remote Computers, *ICRA 2023* (Video/Code)
7. Dmytro Korenkevych, A. Rupam Mahmood, Gautham Vasan, James Bergstra, Autoregressive policies for continuous control deep reinforcement learning, *IJCAI 2019* (Video/Website)
6. A. Rupam Mahmood, Dmytro Korenkevych, Gautham Vasan, William Ma, James Bergstra, Benchmarking reinforcement learning algorithms on real-world robots, *CoRL 2018* (Video/Code/Website)
5. Gautham Vasan, Patrick M. Pilarski, Context-Aware Learning from Demonstration: Using Camera Data to Support the Synergistic Control of a Multi-Joint Prosthetic Arm, *IEEE BioRob 2018*
4. Gautham Vasan, Patrick M. Pilarski, Learning from Demonstration: Teaching a Myoelectric Prosthesis with an Intact Limb via Reinforcement Learning, *IEEE ICORR 2017* (Video)

    Top 10% of submissions. Selected for oral presentation.
3. Kenny Young, Gautham Vasan, Ryan Hayward, NeuroHex: A Deep Q-learning Hex Agent, *Computer Games Workshop at IJCAI 2016*
2. Juhi Ajmera, Siddharthan P. R., Ramaravind K. M., Gautham Vasan, Naresh Balaji R. and V. Sankaranarayanan, Autonomous visual tracking and landing of a quadrotor on a moving platform, *IEEE ICIIP 2015* (Video)
1. Gautham Vasan, Naresh Balaji Ravichandran, Gowtham Kumar T.S.B, Aravind Govindan, G Saravana Ilango, A Control Strategy for an Autonomous Robotic Vacuum Cleaner for Solar Panels, *Texas Instruments Educators Conference 2014* (Video)

Peer-reviewed Abstracts

- Gautham Vasan, Patrick M. Pilarski, Mirrored Bilateral Training of a Myoelectric Prosthesis with a Non-Amputated Arm via Actor-Critic Reinforcement Learning, Reinforcement Learning and Decision Making (RLDM) 2017.

    Top 8% of submissions. Selected for oral presentation.
- Craig Sherstan, Marlos C. Machado, Jaden Travnik, Adam White, Gautham Vasan, Patrick M. Pilarski, Confident Decision Making with General Value Functions, Reinforcement Learning and Decision Making (RLDM) 2017.

Thesis

- Gautham Vasan, Examining Committee: Patrick M. Pilarski, Martha White and K Ming Chan, Teaching a Powered Prosthetic Arm with an Intact Arm Using Reinforcement Learning, M.Sc Thesis, University of Alberta, Edmonton, Canada, 2017.

    Won the M.Sc Outstanding Thesis Award in Computing Science.

Teaching Experience

- CMPUT 340: Introduction to Numerical Methods (Winter 2024)
- CMPUT 653: Real-Time Policy Learning (Fall 2023)
- CMPUT 365: An Introduction to Reinforcement Learning (Winter 2021, Winter 2022, Fall 2022)
- CMPUT 174: Introduction to the Foundations of Computation I (Fall 2015, Winter 2016, Fall 2020)

Technical Skills

- Programming: Python, C++
- Tools: PyTorch, Jax, ROS, Docker
- Simulators: MuJoCo, Nvidia Isaac Sim, Gazebo
- Research Areas: Reinforcement Learning, Deep Learning, Robotics, Real-Time Systems
- Robot Platforms: Franka Emika Panda, UR5, iRobot Create2, Anki Vector, Petoi Bittle Quadruped, Dynamixel Servos

Selected Talks

- *Streaming Deep Reinforcement Learning*, Cohere For AI, 28 Jan 2025 (Invited)
- *Deep Policy Gradient Methods Without Batch Updates, Target Networks, or Replay Buffers*, ML Collective, 7 Feb 2025. Also presented earlier at Mila, McGill University, Brown University and IIT Madras (Invited)
- *From Q-learning to Dreamer*, Amii Tea Time Talks, University of Alberta, 27 Aug 2024
- *Two Issues of Autonomous Robot Learning*, Amii AI Seminar, University of Alberta, 27 Oct 2023
- *Reward (Mis-)Specification in Reinforcement Learning*, Amii Tea Time Talks, 23 Aug 2023
- *Reinforcement Learning for Robots*, natChat @NeurAlbertaTech, 16 Feb 2023 (Invited)
- *Learning from Demonstration: Teaching a Myoelectric Prosthesis using an intact Limb via Reinforcement Learning*, Cognition Seminar, Dept. of Psychology, University of Alberta, 3 Feb 2017 (Invited)

Conference & Workshop Organization

- Workflow Chair, AAAI 2026

Professional Activities

- *Reviewer:* ICML 2025 | RLC 2025 | Collas 2025 | ICLR 2025 | NeurIPS 2023, 2024 | IEEE BioRob 2024, 2018 | IEEE ICDL 2024 | IROS 2023, 2020
- Candidate selection for the CIFAR Deep Learning and Reinforcement Learning Summer School 2023 & 2024
- *Mentoring:* Six students at the University of Alberta (undergraduate and masters level) on robot learning research

Service & Outreach

- *Volunteer:* DiscoverE Summer Camp 2023, to showcase and explain robotics research and its real-world applications to Grade 4-6 students.
- Research Volunteer, The Hospital for Sick Children (SickKids, 2019)

Relevant Coursework

Graduate: Deep Policy Gradient Methods | Theoretical Foundations of Reinforcement Learning | Statistical Computing | Machine Learning and The Brain | Introduction to Reinforcement Learning | Introduction to Machine Learning | Convolutional Neural Nets for Image Processing | Actor-Critic Algorithms | Medical Robotics and Computer Assisted Surgery

Undergraduate: Linear Algebra and Probability Theory | Digital Signal Processing | Numerical Methods | Data Structures and Algorithms | Signals and Systems | Sensors and Transducers | Control Systems | Neural Networks and Fuzzy Logic

Personal

- **Citizenship:** Canada
- **Languages:** English, Tamil, Hindi

References

Available upon request.