# Gautham Vasan

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## EDUCATION

### UNIVERSITY OF ALBERTA

**Ph.D in Statistical Machine Learning**
Committee: Dr. A. Rupam Mahmood (advisor), Dr. Richard S. Sutton, Dr. Matthew E. Taylor | Sept 2020 - Present

**M.Sc (Thesis) in Computing Science**
Thesis Advisor: Dr. Patrick M. Pilarski | Edmonton, AB, Canada | 2017

### NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

**B.Tech in Instrumentation and Control Engineering**
Thesis Advisors: Dr. V. Sankaranarayanan, Dr. G. Saravana Ilango | Tiruchirappalli, TN, India | 2015

## EMPLOYMENT

### VISITING RESEARCHER | ALBERT-LUDWIGS-UNIVERSITÄT FREIBURG

Hosted by Dr. Joschka Boedecker | DAAD Scholar | Freiburg, Germany | 2023

- Deep Reinforcement Learning (RL) research for integrating very 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.
- Developed a novel learning algorithm called Composite Soft Actor Critic to better handle noisy reward signals.

### MACHINE LEARNING RESEARCHER | Kindred AI, Part of Ocado Group

Manager: Dr. James Bergstra, Artificial Intelligence Research Team | Toronto, Canada | 2017-2020

- Designed, implemented and evaluated learning algorithms and robot infrastructure.
- Devised Artificial Intelligence (AI) techniques for SORT, a piece-picking robot that grasps, scans and stows items in warehouses for clothing stores like GAP and American Eagle.
- Supported design and development of SenseAct , an open-source computational framework for physical robot learning tasks. SenseAct facilitates the easy, systematic design of robotic tasks and reproducible real-world reinforcement learning.
- Developed RLScan , which uses deep reinforcement learning to learn a closed-loop control scanning policy conditioned on a real-time video feed. It was trained end-to-end in production, learning from a fleet of robots across multiple warehouses.
- RLScan achieved optimal barcode scanning behavior for handling complex product assortments. This is among the **first successful demonstrations of vision-based deep RL in warehouse automation.**

## AWARDS & ACHIEVEMENTS

- **AAMAS Scholarship** to present at the Doctoral Consortium (2024)
- Awarded the **DAAD-Stiftung UNICORE Scholarship** for a three-month research visit to the University of Freiburg (2023)
- Awarded the **DAAD AINet Postdoctoral Networking Fellowship** (2022) to visit and foster collaborations with research labs in Germany
- Awarded the **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)
- Certificates of distinction in International and National Math, Science and Cyber Olympiads

# ACADEMIC EXPERIENCE

### Graduate Research Assistant Fellow | University of Alberta

RLAI Lab, University of Alberta | 2016-2017, Sept 2020 to Present

- Design and development of Reinforcement Learning (RL) algorithms and continual learning systems for real-world robots
- Developed learning methods that would allow an amputee to use their non-amputated arm to teach their prosthetic arm how to move through a wide range of coordinated motions and grasp patterns.
- Collaborated on a medical study to assess functional gain with the use of assistive robots in patients affected by stroke or spasticity. Built tools to analyze the recorded sensory information and set up a robot interface for 12 patients.

### Technical Advisement - Client Coaching | Amii

Work Integrated Learning Opportunity | Alberta Machine Intelligence Institute (Amii), Canada | 2023

- Attended client coaching sessions with Amii research scientists to provide coaching support for various start-ups.
- Conducted independent research and consultant report writing tasks within the scope of the project.

# 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)

# 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* . Pre-Print (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.

## LANGUAGES, TOOLS & LIBRARIES

Most familiar:
Python • Pytorch • ROS • Matlab

Familiar
C++ • Jax • Embedded C • Go • Tensorflow • Docker

## TRAVEL AWARDS & SCHOOLS

- **Attended the 2017 edition of the Deep Learning Summer School** organized by the **University of Montreal** , Canada. Acceptance rate: 20%
- Won a travel fellowship and various prizes at **Hack the North 2016** , Canada's biggest hackathon at the University of Waterloo. Acceptance rate: 20%

## SELECTED TALKS

- Streaming Deep Policy Gradient Methods , IIT Madras, 2 Dec 2024 (Invited)
- Deep Policy Gradient Methods Without Batch Updates, Target Networks, or Replay Buffers , RL Sofa, Mila & McGill University, 29 Nov 2024 (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)

# RELEVANT COURSEWORK

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 | Linear Algebra and Probability Theory | Digital Signal Processing | Numerical Methods | Data Structures and Algorithms | Signals and Systems | Circuit Theory

# PROFESSIONAL ACTIVITIES

### Reviewing

ICLR 2025 | NeurIPS 2023 & 2024 | IEEE BioRob 2024 | IEEE ICDL 2024 | DLRL Summer School 2023 & 2024 | IROS 2023 | IROS 2020 | IEEE BioRob 2018

### Advising

- Mentored five students (undergraduate and masters) with their robot learning research.

# COMMUNITY SERVICE

- Mentored Grade 4-6 students at DiscoverE Summer Camp 2023, showcasing and explaining robotics research and its real-world applications.
- Research Volunteer, The Hospital for Sick Children (SickKids) (02/2019 - 08/2019).