

## 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 that can better handle noisy reward signals.

### MACHINE LEARNING RESEARCHER | KINDRED AI, PART OF OCADO GROUP

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** (2022) for a three-month research visit to the University of Freiburg
- 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

- Gautham Vasan<sup>†</sup>, Yan Wang, Fahim Shahriar, James S. Bergstra, Martin Jagersand, A. Rupam Mahmood, *Revisiting Sparse Rewards for Goal-Reaching Reinforcement Learning*. [RLC 2024](#) ([Video/Code](#))
- Gautham Vasan. *Autonomous Skill Acquisition for Robots Using Graduated Learning*. [AAMAS 2024](#)
- Bram Grooten, Tristan Tomilin, Gautham Vasan<sup>†</sup>, 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](#))
- Gautham Vasan<sup>†</sup>, Yan Wang, Fahim Shahriar, James S. Bergstra, A. Rupam Mahmood, *Learning Sparse Reward Tasks on Real Robots From Scratch*, [RAP4 Robotics Workshop, ICRA 2023](#)
- Fengdi Che, Gautham Vasan<sup>†</sup>, A. Rupam Mahmood, *Correcting discount-factor mismatch in on-policy policy gradient methods*, [ICML 2023](#)
- Yan Wang\*, Gautham Vasan<sup>\*†</sup>, A. Rupam Mahmood, *Real-Time Reinforcement Learning for Vision-Based Robotics Utilizing Local and Remote Computers*, [ICRA 2023](#) ([Video/Code](#))
- Dmytro Korenkevych, A. Rupam Mahmood, Gautham Vasan<sup>†</sup>, James Bergstra, *Autoregressive policies for continuous control deep reinforcement learning*, [IJCAI 2019](#) ([Video/Website](#))
- A. Rupam Mahmood, Dmytro Korenkevych, Gautham Vasan<sup>†</sup>, William Ma, James Bergstra, *Benchmarking reinforcement learning algorithms on real-world robots*, [CoRL 2018](#) ([Video/Code/Website](#))
- Gautham Vasan<sup>†</sup>, 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](#)
- Gautham Vasan<sup>†</sup>, 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.
- Kenny Young, Gautham Vasan<sup>†</sup>, Ryan Hayward, *NeuroHex: A Deep Q-learning Hex Agent*, [Computer Games Workshop at IJCAI 2016](#)
- Juhi Ajmera, Siddharthan P. R., Ramaravind K. M., Gautham Vasan<sup>†</sup>, Naresh Balaji R. and V. Sankaranarayanan, *Autonomous visual tracking and landing of a quadrotor on a moving platform*, [IEEE ICIIP 2015](#) ([Video](#))
- Gautham Vasan<sup>†</sup>, 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*, [TIEC 2014](#) ([Video](#))

## PEER-REVIEWED ABSTRACTS

- Gautham Vasan<sup>†</sup>, 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 Travník, Adam White, Gautham Vasan<sup>†</sup>, Patrick M. Pilarski, *Confident Decision Making with General Value Functions*, Reinforcement Learning and Decision Making (RLDM) 2017.

## THESIS

- Gautham Vasan<sup>†</sup>, 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 Dr. Graham Taylor, Dr. Aaron Courville and Dr. Yoshua Bengio at 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%

## RELEVANT COURSEWORK

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

**UNDERGRADUATE:** Linear Algebra and Probability Theory | Control Systems | Logic and Distributed Control | Numerical Methods | Signals and Systems | Digital Signal Processing | Biomedical Instrumentation | Process Control | Sensors and Transducers | Circuit Theory | Linear Integrated Circuits | Data Structures and Algorithms | Computer Networks | Neural Networks and Fuzzy Logic

## PROFESSIONAL ACTIVITIES

### REVIEWING

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).