# Gautham Vasan

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## EDUCATION

### UNIVERSITY OF ALBERTA

**Ph.D in Statistical Machine Learning**
Thesis Advisor: Dr. A. Rupam Mahmood | Sept 2020 to Present | Edmonton, AB, Canada

**M.Sc (Thesis) in Computing Science**
Thesis Advisor: Dr. Patrick M. Pilarski | Sept 2015 to Sept 2017 | Edmonton, AB, Canada

### NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

**B.Tech in Instrumentation and Control Engineering**
Project Advisor: Dr. V. Sankaranarayanan | First Class | July 2011 to June 2015 | Tiruchirappalli, TN, India

## EXPERIENCE

### MACHINE LEARNING RESEARCHER | Kindred Systems Inc

Artificial Intelligence Research Team | Toronto, Canada | Sep 2017 to Aug 2020

- Designed, implemented and evaluated learning algorithms and robot infrastructure as a part of the research and publication efforts at Kindred.
- 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.
- Developed **RLScan** , which uses deep reinforcement learning (RL) to learn a closed-loop control scanning policy, conditioned on a real-time video feed. An RL agent is trained end-to-end directly in production, learning from a fleet of robots across multiple production sites.
- 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** .

### GRADUATE RESEARCH ASSISTANT FELLOW

RLAI Robotics Lab headed by Dr. A. Rupam Mahmood, University of Alberta | Sept 2020 to Present

- Design and development of Reinforcement Learning (RL) algorithms and continual learning systems for real-world robots.
- Lab manager for RLAI Robtics. I'm responsible for the maintenance of robots, hardware and resource allocation for the lab.
- Organizer of a weekly AI reading group to discuss research papers in the intersection of reinforcement learning, deep learning, neuroscience and robotics.

**BLINC and RLAI**
Labs headed by Dr. Patrick M. Pilarski and Dr. Richard S. Sutton, University of Alberta | May 2016 to Aug 2017

- Developed Actor-Critic Reinforcement Learning (ACRL) 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. This study included 3 able-bodied subjects and 1 trans-radial amputee.
- Developed interfaces for human robot interaction using Delsys Trigno, Thalmic Myo, CyberGlove and the Bento Arm.
- 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.

### TEACHING ASSISTANT

**CMPUT 365: An Introduction to Reinforcement Learning**
Instructor: Dr. A. Rupam Mahmood, University of Alberta | W21, W22, F22

- This course provides an introduction to reinforcement learning intelligence, which focuses on the study and design of agents that interact with a complex, uncertain world to achieve a goal.

**CMPUT 174: Introduction to the Foundations of Computation I**
Instructors: Dr. Sadaf Ahmed and Dr. Jorg Sander, University of Alberta | 09/2020-12/2020; 09/2015-04/2016

- A problem-based intro to computing science to focus on expressing problems precisely, solving them algorithmically by showing how to construct a solution, and then implementing that solution by writing a program using python.

**RESEARCH VOLUNTEER** | The Hospital for Sick Children (SickKids)
Computer Vision Research | Toronto, Canada | May 2019 to Dec 2019

- Developing neural network models capable of segmenting and calculating Wilm's tumor volume from CT scan images.

## ACHIEVEMENTS

- 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 (CAD 5000).
- Winner of the **2017 M.Sc Outstanding Thesis Award** in Computing Science at the University of Alberta.
- Fully funded M.Sc (Thesis) in Computing Science at the University of Alberta.
- **Phase - 1 Winners and Finalist** at the **Texas Instruments Innovation Challenge India Design Contest - 2014** for the project titled 'A Control Strategy for an Autonomous Robotic Vacuum Cleaner for Solar Panels'.
- Certificates of distinction in International and National Math, Science and Cyber Olympiads.

## PRE-PRINTS

- Gautham Vasan, Yan Wang, Fahim Shahriar, James S. Bergstra, A. Rupam Mahmood, **Learning Sparse Reward Tasks on Real Robots From Scratch,** Submitted to The 22nd International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2023.
- Fengdi Che, Gautham Vasan, A. Rupam Mahmood, **Correcting discount-factor mismatch in on-policy policy gradient methods,** Submitted to International Conference on Artificial Intelligence and Statistics (AISTATS), 2023.
- Yan Wang*, Gautham Vasan*, A. Rupam Mahmood, **Real-Time Reinforcement Learning for Vision-Based Robotics Utilizing Local and Remote Computers,** Submitted to 2023 IEEE international conference on robotics and automation (ICRA)

## PUBLICATIONS

- Dmytro Korenkevych, A. Rupam Mahmood, Gautham Vasan, James Bergstra, **Autoregressive policies for continuous control deep reinforcement learning** , In Proceedings of the 28th International Joint Conference on Artificial Intelligence, 2019.
- A. Rupam Mahmood, Dmytro Korenkevych, Gautham Vasan, William Ma, James Bergstra, **Benchmarking reinforcement learning algorithms on real-world robots** , In Proceedings of the 2nd Annual Conference on Robot Learning 2018.
- Gautham Vasan, Patrick M. Pilarski, **Context-Aware Learning from Demonstration: Using Camera Data to Support the Synergistic Control of a Multi-Joint Prosthetic Arm** , 7th IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob), August 26-29, Enschede, The Netherlands, 2018. 8 pages.
- Gautham Vasan, Patrick M. Pilarski, **Learning from Demonstration: Teaching a Myoelectric Prosthesis with an Intact Limb via Reinforcement Learning** , Proc. of the 2017 IEEE International Conference on Rehabilitation Robotics (ICORR). London, United Kingdom, 2017.

  [Highlights] - Selected among the top 29 out of 257 accepted papers for oral presentation.
- Kenny Young, Gautham Vasan, Ryan Hayward, **NeuroHex: A Deep Q-learning Hex Agent** , Computer Games Workshop at IJCAI 2016, New York City, NY, USA, July 9th, 2016.
- Juhi Ajmera, Siddharthan P Rajasekaran, Ramaravind K. M., Gautham Vasan, Naresh Balaji Ravichandran and V. Sankaranarayanan, **Autonomous visual tracking and landing of a quadrotor on a moving platform** , 2015 Third International Conference on Image Information Processing (ICIIP), Waknaghat, 2015, pp. 342-347.
- 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 India Educators Conference, IEEE Xplore, Bangalore, India, April 4th, 2014.

## 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** , 2017 Multi-disciplinary Conference on Reinforcement Learning and Decision Making, Ann Arbor, MI, United States, 2017.

  [Highlights] - Selected among the top 16 out of 200+ accepted papers for oral presentation.

- Craig Sherstan, Marlos C. Machado, Jaden Travnik, Adam White, Gautham Vasan, Patrick M. Pilarski, **Confident Decision Making with General Value Functions** , 2017 Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM). Ann Arbor, MI, United States, 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, AB, Canada, Aug 29th, 2017.

  [Highlights] - Won the M.Sc Outstanding Thesis Award in Computing Science.

## 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%

## LANGUAGES, TOOLS & LIBRARIES

Most familiar:
Python • Pytorch • C++ • ROS • Matlab • Tensorflow • Keras

Over 5000 lines:
Embedded C • Go • Assembly • Theano

## RELEVANT COURSEWORK

Graduate: Deep Policy Gradient Methods | Theoretical Foundation 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

## LEADERSHIP EXPERIENCE

- Research Volunteer , The Hospital for Sick Children (SickKids) (02/2019 - 08/2019).

- Treasurer , Computing Science Graduate Students' Association (CSGSA) at the University of Alberta (04/2016 - 04/2017).

- Head of Treasury, Festember'14 the annual International cultural festival of NIT Trichy.
  I handled the finances of the festival worth INR 20 Million and executed several key decisions with regards to budget, expenditure, resource management for teams, etc.

- Researcher at Spider , The official R&D club of NIT Trichy - We conducted tech talks and workshops focusing on microcontrollers and embedded programming.