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 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 Advisors: Dr. V. Sankaranarayanan, Dr. G. Saravana Ilango | July 2011 to June 2015 | Tiruchirappalli, TN, India

EXPERIENCE

VISITING RESEARCHER | ALBERT-LUDWIGS-UNIVERSITÄT FREIBURG

Neurobotics lab, Hosted by Dr. Joschka Boedecker | DAAD Scholar | Freiburg, Germany | March 2023 to June 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.

MACHINE LEARNING RESEARCHER | Kindred AI, Part of Ocado Group

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

- Designed, implemented and evaluated learning algorithms and robot infrastructure as part of Kindred's research and publication efforts.
- 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.**

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 Robotics. 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 | 2016-2017

- 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 653: Real-Time Policy Learning

Instructor: Dr. A. Rupam Mahmood, University of Alberta | Fall 2023

- In this graduate course, students learn how to develop control methods that they can evaluate in their own created worlds by understanding the fundamentals of MDPs, iterative methods, stochastic approximation methods and policy gradient methods. Then they apply their developed methods to learn to control physical robots.

CMPUT 365: An Introduction to Reinforcement Learning

Instructor: Dr. A. Rupam Mahmood, University of Alberta | Winter 2021, Winter 2022, Fall 2022

- This course introduces reinforcement learning and artificial intelligence, focusing 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 | Fall 2015, Winter 2016, Fall 2020

- 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.
- 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.

PUBLICATIONS

- Gautham Vasan, Yan Wang, Fahim Shahriar, James S. Bergstra, A. Rupam Mahmood, **Learning Sparse Reward Tasks on Real Robots From Scratch,** In Proceedings of the RAP4 Robotics Workshop, 2023 IEEE international conference on robotics and automation (ICRA)
- Fengdi Che, Gautham Vasan, A. Rupam Mahmood, **Correcting discount-factor mismatch in on-policy policy gradient methods,** In Proceedings of the 40th International Conference on Machine Learning (ICML).
- Yan Wang*, Gautham Vasan*, A. Rupam Mahmood, **Real-Time Reinforcement Learning for Vision-Based Robotics Utilizing Local and Remote Computers,** In Proceedings of the 2023 IEEE international conference on robotics and automation (ICRA)
- 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 • ROS • Matlab

Familiar
C++ • Embedded C • Go • Assembly • Tensorflow • Keras

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

PROFESSIONAL ACTIVITIES

Reviewing

- 2023 Conference on Neural Information Processing Systems
- 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

- 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- The 2018 7th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob)

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.