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

EMPLOYMENT

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.
- 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 | 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.**

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.
- **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.

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 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 for robots by understanding the fundamentals of MDPs, iterative methods, stochastic approximation methods and policy gradient methods.

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.

PRE-PRINTS

- Gautham Vasan, Yan Wang, Fahim Shahriar, James S. Bergstra, A. Rupam Mahmood, **Task Specification for Reinforcement Learning on Real Robots Using Sparse Rewards,** Submitted to IEEE Transactions on Robotics.

PUBLICATIONS

- 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.
- Fengdi Che, Gautham Vasan, A. Rupam Mahmood, **Correcting discount-factor mismatch in on-policy policy gradient methods,** ICML 2023.
- Yan Wang*, Gautham Vasan*, A. Rupam Mahmood, **Real-Time Reinforcement Learning for Vision-Based Robotics Utilizing Local and Remote Computers,** ICRA 2023.
- Dmytro Korenkevych, A. Rupam Mahmood, Gautham Vasan, James Bergstra, **Autoregressive policies for continuous control deep reinforcement learning** , IJCAI 2019.
- A. Rupam Mahmood, Dmytro Korenkevych, Gautham Vasan, William Ma, James Bergstra, **Benchmarking reinforcement learning algorithms on real-world robots** , CoRL 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** , IEEE BioRob 2018.
- Gautham Vasan, Patrick M. Pilarski, **Learning from Demonstration: Teaching a Myoelectric Prosthesis with an Intact Limb via Reinforcement Learning** , IEEE ICORR 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
- 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** , IEEE ICIIP 2015.
- 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** , Conference by Texas Instruments 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** , Reinforcement Learning and Decision Making (RLDM) 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** , 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, AB, Canada, Aug 29th, 2017.

  [Highlights] - 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%

PROFESSIONAL ACTIVITIES

Reviewing

- 2024 IEEE Transactions on Cognitive and Developmental Systems
- 2023 Conference on Neural Information Processing Systems (NeurIPS)
- 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)

Advising

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

COMMUNITY SERVICE

- **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.