Rushiv Arora

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Research Interests

Machine Learning, Reinforcement Learning, Robotics

Education

University of Massachusetts Amherst *May 2023*
M.S. in Computer Science, **GPA: 4.0**
Supported by Bay State Fellowship
Advisors: Bruno Castro da Silva, Eliot Moss, Hava Siegelmann

University of Massachusetts Amherst *May 2021*
B.S. in Computer Science, **GPA: 3.974**
Summa Cum Laude
Thesis: Machine Learning and Path Optimisation Algorithms for Autonomous Drones
CICS Outstanding Undergraduate Award (link)

University of Massachusetts Amherst *May 2021*
B.S. in Computer Engineering, **GPA: 3.974**
Summa Cum Laude
Member of Commonwealth Honors College
ECE Award of Excellence (link)
Capstone Honorable Mention (link)

Honors and Grants

Dell Technologies Research Recognition Award *Oct. & Nov. 2023*
Bay State Fellow, College of Information and Computer Science *May. '21 - May. '23*
Award by MILA organizers of DARL@ICML: CAD 450 *July 2022*
CICS Outstanding Undergraduate Award (link): Highest award for CS undergraduates *May. 2021*
ECE Award of Excellence (link): Highest award for ECE undergraduates *May. 2021*
SDP Honorable Mention (link): Led team of 4 for capstone project *May. 2021*
Commonwealth Honors Research Grant: $ 1,000 (Highest of the year) *Sep. 2020*
Dell Technologies Research Recognition Award *July. 2020*
University of Massachusetts Amherst Chancellor's Award: $ 14,000/year *May '17 - '21*
Dean's List *2017 - 2021*
Award for Excellence in Computer Science, Mathematics & Physics *May '15, May '17*

Publications

Locally Constrained Representations in Reinforcement Learning *2024*
Somjith Nath, Rushiv Arora, Samira Ebrahimi Kahou
Under Review

A Search and Detection UAV System: from Design to Implementation *2024*
Mohammadjavad Khosravi, Rushiv Arora, Saeede Ennayti, Hossein Pishro-Nik
IEEE Transactions on Automation Science and Engineering

On the Dynamics of Learning Time-Aware Behavior with Recurrent Neural Networks *2023*
Peter Delmastro, Rushiv Arora, Terry Sejnowski, Hava Siegelmann
Under Review

Model-Based Reinforcement Learning with SINDy *2022*
Rushiv Arora, Eliot Moss, Bruno Castro da Silva
DARL Workshop @ The Thirty-ninth International Conference on Machine Learning

Deployment of a UAV-Based Fire Detection System *2022*
Rushiv Arora, Mohammadjavad Khosravi, Saeede Enayati, Hossein Pishro-Nik
2023 IEEE 97th Vehicular Technology Conference (VTC2023-Spring)

In Preparation:

Hierarchical Universal Value Function Approximators *2024*
Rushiv Arora, Ignacio Gavier, Eliot Moss
Preprint. To be submitted Fall 2024

DIY Mujoco: Building and Testing Physical Robots for RL Generalization *2024*
Rushiv Arora
Preprint. To be submitted Fall 2024

Options for Multi-Task Reinforcement Learning *2024*
Rushiv Arora, Aline Weber, Bruno Castro da Silva
Preprint.

Research Experience

AI Research and Innovation Group @ Dell Technologies *March. '24 - Present*
Advanced Hardware + AI/ML Researcher

- Advised by Michael Robillard and Ken Durazzo
- Lead Researcher on AI Hardware for Small and Large Language Models
- Lead Researcher on AI Scale and Deployment
- Filing Patents on Edge AI Algorithms
- Relevant skills learned: Scaling AI and Bottleneck Analysis, Scaling Foundation Models, Stereo Depth Perception and AI, Multiple Model Alignment, Robotic Perception, Kubernetes, Airflow

Office of the Global CTO @ Dell Technologies *June. '22 - March '24*

Advanced Hardware + AI/ML Researcher

Full-Time (June '23 - March '24) and Intern (June '22 - May '22)

- Advised by Michael Robillard
- Lead Researcher the Robotics Research for FY 24 Theme
- Leading Research on Large-Scale AI Systems
- Research also includes Generative AI and Real-Time AI Compute at the Edge

RL + Vision Lab @ MILA *Sept. '23 - Present*

Independent External Collaborator

- Advised by Professor Samira Ebrahimi Kahou
- Research on Representation Learning and Reinforcement Learning

Autonomous Learning Lab @ UMass Amherst CICS *Jan. '22 - May '23*

Master's Thesis and Independent Study

- Advised by Professor Bruno Castro da Silva
- Master's Thesis: Multi-task option learning
- Independent Study: Options for Early Life

BiNDS Lab @ UMass Amherst CICS *Jan. '21 - Sept. 2023*

Graduate Research Assistant and Independent Study

- Advised by Professors Hava Siegelmann & Terrence Sejnowski
- Temporal Aspects of Machine Intelligence, and Memory Models
- Part of TAMI project under DARPA

Office of the Global CTO - OCTO Research @ Dell Technologies *Jun. '22 - May '23*

Advanced Hardware (MA, USA) and Reinforcement Learning (Brazil) Research Intern

- Advised by Mike Robillard, Trevor Conn, Romulo Pinho
- Topics: Intelligent Functional Edge & Reinforcement Learning for Digital Twin

College of Engineering, UMass Amherst *Mar. '19 - May '21*

Undergraduate Researcher

- Advised by Professor Hossein Pishro-Nik
- Thesis/Project: Machine Learning, Autonomous Drones, Algorithms for Autonomy

Office of the Global CTO - OCTO Research @ Dell Technologies *Jun. '20 - Jul '20*

Advanced Hardware Research Intern

- Advised by Michael Healy, Mike Robillard
- Project I: Research oneAPI and Heterogeneous Computing
- Project II: Self-driving cars on Edge
- Project III: Benchmarking Edge Machine Learning performance

Non-Research Work Experience

CICS Advising Center, UMass Amherst *Sep. '19 - May '21*

Academic Peer Advisor

- Advised by Alicia Clemente, Laura Melbin

New York Stem Cell Foundation Research Institute *Jun. '19 - Aug. '19*

Software Engineering Intern

- Advised by Sean DesMarteau, Daniel Paull
- Projects: Code Migration and Web Applications for Array Team

Teaching Experience

CICS, UMass Amherst *Fall '21 - Present*

Graduate Teaching Assistant

- CS 390A: Machine Learning - Head TA (Spring 2022)
- CS 383: Artificial Intelligence - TA (Fall 2021, Fall 2022)

M5 ECE Makerspace, UMass Amherst *Fall '18, Fall '19*

Undergraduate Instructional Assistant

- Advised by Professor Baird Soules
- Primary Responsibilities: Supervising Design Projects, Planning Labs, Teaching Content.

CICS, UMass Amherst *Spring '19*

Undergraduate Teaching Assistant

- Course: CS 220 - Programming Methodology
- Primary Responsibilities: Holding Office hours, Proctoring and Grading

Leadership Experience

Capstone Project, UMass Amherst *Aug. '20 - May '21*

Team Leader

- Advised by Professor Dennis Goeckel
- Primary Responsibilities: Responsible for technical integration and making all technical decisions. Working on Cloud, Bluetooth, and Hardware aspects of the project. Overseeing PCB Design.

Service

IEEE T-ASE - Reviewer (Multi-Robot) *2023*

IEEE TVT - Reviewer (Reinforcement Learning) *2022*

UMass CICS College Outstanding Teacher Award Committee *2021*

UMass Commencement Speaker Selection Committee *2021*

Relevant Coursework

Graduate Courses: Machine Learning, Reinforcement Learning, Probabilistic Graphical Models, Neural Networks and NeuroDynamics, Natural Language Processing, Algorithms in Data Science, Research Methods in Empirical Computer Science, Quantum Computing, Data Visualization and Exploration, Advanced Information Assurance

Undergraduate Courses: Artificial Intelligence, Algorithms, Introduction to Computation, Computer Architecture, Security Engineering, Systems and Networking, Embedded System I & II

References

Professor Bruno Castro da Silva
Assistant Professor, Co-Director of the Autonomous Learning Lab
bsilva@cs.umass.edu, (413) 658-4869

Professor Eliot Moss
Professor Emeritus, Graduate Program Director
moss@cs.umass.edu, (413) 695-4226

Professor William Leonard
Undergraduate Program Director, UMass Amherst College of Engineering
leonard@ecs.umass.edu, (413) 545-3513

Michael Robillard
Senior Director/Senior Distinguished Engineer, AI Group at Dell Technologies
Michael.Robillard@dell.com, (508) 335-9543

Mike Healy
Senior Principal Engineer Technologist-Distinguished Member of Technical Staff, Research Group at Dell Technologies
Mike.Healy@dell.com, (617) 797-4052

Skills

Programming	Python, Java, Javascript, C, C++, Matlab, Obj-C, Swift, & counting
Machine Learning Frameworks	TensorFlow, PyTorch, Onnx, Scikit-Learn, Caffe, Keras, Theano
Robotics Tools	Sim2Real, Isaac-Gym, Isaac-Sim, Orbit, ROS
Hardware Research Expertise	NPU, GPU, FPGA, DLA
Heterogeneous Computing	SYCL, Data Parallel C++, Intel oneAPI, CUDA
Microprocessors/Microcontrollers	x86, ARM, AVR, NIOS, RPi
Software Development	Angular, React, ExpressJS, NodeJS, .net, iOS Swift/SwiftUI, Postman, Windows Copilot Runtime
Cloud Computing	AWS, Microsoft Azure
Engineering Tools	Qiskit, PSPICE, Altium, Verilog
Scaling	Docker, Kubernetes, Airflow
Version Control	Git
Miscellaneous	Public Speaking, Communication, Presenting

Adventure Interests/Hobbies

NAUI Certified Advanced Scuba Diver
License: FRCB4R1

SkyDiving Certification (In Progress)
Preliminary Jumps: Banff AB, Niagara ON and Orange MA

Amateur Broadway Enthusiast
Live Music Enthusiast