John D. Martin

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https://jdmartin86.github.io

RESEARCH INTERESTS

Artificial Intelligence and Reinforcement Learning, including topics such as planning, model-based learning, meta learning, representation, utility theory, and embodiment.

EDUCATION

Stevens Institute of Technology — 2015 − 2021
Ph.D. in Mechanical Engineering

Columbia University — 2013 − 2015
Graduate coursework in Computer Science

University of Maryland — 2009 − 2012
Dual B.S. in Physics and Aerospace Engineering

APPOINTMENTS

Intel AI Labs. — 2022 − Present
Research Scientist

I develop core algorithms for reinforcement learning and the computational and statistical theory to understand their properties.

Reinforcement Learning and AI Lab - University of Alberta. — 2021 − Present
Postdoctoral Fellow – Advisor: Michael Bowling

I supervise a group of three graduate students that performs fundamental research in reinforcement learning and artificial intelligence. One of my projects studies how RL systems can learn to use different kinds of sensory input without an inductive bias. My other projects study various aspects of model-based RL, focusing on ways to improve the planning process and fast methods to learn transition models. Additionally, my supervisory responsibilities involve reviewing dissertations and participating in thesis defenses.

Robust Field Autonomy Laboratory - Stevens Institute of Tech. — 2015 − 2021
Graduate Research Assistant – Advisor: Brendan Englot

I studied algorithms for reinforcement learning applied to mobile robots in risky environments. My work lead to new methods for learning and incorporating representations of aleatoric and epistemic uncertainty in the RL process. This served as the basis for a successful NSF CAREER award and an ONR Young Investigator award.

DeepMind - Edmonton — June 2020 − Nov. 2020
Research Scientist Intern – Host: Joseph Modayil

I studied how RL systems can adaptively construct nonlinear representations in the incremental online learning setting. This remains a central topic of my current research.

Google Brain - Montréal — May 2019 − Feb. 2020
Research Scientist Intern / Student Researcher – Host: Marc G. Bellemare

I conducted two research projects about reinforcement learning in the continual setting. The first studied efficient exploration under symmetrical transition structures. The other project studied how to detect catastrophic interference in deep neural networks, leading to a best poster award at a NeurIPS 2019 workshop.

Piasecki Aircraft Corporation — 2017 − 2019
Part-time Analytical Consultant

I wrote proposals for new autonomy research initiatives, one of which was awarded $500,000.

Sikorsky Aircraft — 2012 − 2015
Robotics and Flight Controls Engineer

I worked with a small group of researchers and engineers that took two experimental helicopters to first flight.

TEACHING EXPERIENCE	**Nepal Applied Mathematics and Informatics Institute** December 2021

Nepal Applied Mathematics and Informatics Institute   December 2021
Program Chair.
I was the principle organizer of an introductory lecture series on reinforcement learning. This consisted of four ninety-minute lectures, two of which I gave. In addition, I helped find speakers for other introductory machine learning topics.

Stevens Institute of Technology, Advanced Robotics (ME-654) Spring 2020, 2021
Guest Lecture: Seeking Certainty in An Uncertain World
I gave a guest lecture centered on uncertainty-sensitive decision making in RL.

Stevens Institute of Technology, Advanced Robotics (ME-654)   Spring 2017
Guest Lecture: Reinforcement Learning Basics
I co-taught a lecture with other instructors, introducing students to the basics of RL.

REFEREED PUBLICATIONS

Stochastically Dominant Distributional Reinforcement Learning,
John D. Martin, Michal Lyskawinski, Xiaohu Li, Brendan Englot,
37th International Conference on Machine Learning (ICML), (2020).

Variational Filtering with Copula Models for SLAM,
John D. Martin*, Kevin Doherty*, Caralyn Cyr, Brendan Englot, John Leonard,
International Conference on Intelligent Robots and Systems (IROS), (2020).

Autonomous Exploration Under Uncertainty via Deep Reinforcement Learning on Graphs,
Fanfei Chen, **John D. Martin**, Yewei Huang, Jinkun Wang, Brendan Englot
International Conference on Intelligent Robots and Systems (IROS), (2020).

Fusing Concurrent Orthogonal Wide-aperture Sonar Images for Dense Underwater 3D Reconstruction,
John McConnell, **John D. Martin**, Brendan Englot
International Conference on Intelligent Robots and Systems (IROS), (2020).

Sparse Gaussian Process Temporal Difference Learning for Marine Robot Navigation,
John D. Martin, Jinkun Wang, Brendan Englot,
2nd Annual Conference on Robot Learning (CoRL), (2018).

Extending Model-based Policy Gradients for Robots in Heteroscedastic Environments,
John D. Martin, Brendan Englot,
1st Annual Conference on Robot Learning (CoRL), (2017).

WORKING PAPERS

Adapting the Function Approximation Architecture in Online Reinforcement Learning,
John D. Martin*, Joesph Modayil*
ArXiv 2106.09776, (2021)

On Catastrophic Interference in Atari 2600 Games,
William Fedus*, Dibya. Ghosh*, **John D. Martin**, Marc G. Bellemare, Yoshua Bengio, Hugo Larochelle
ArXiv 2002.12499, (2020)

WORKSHOP PUBLICATIONS

Learning to Prioritize Planning Updates in Model-based Reinforcement Learning,
Brad Burega, **John D. Martin**, Michael Bowling
NeurIPS Workshop on Meta Learning, (2022)

The Stochastic Road Network Environment for Robust Reinforcement Learning,

John D. Martin, Paul Szenher, Xi Lin, Brendan Englot
ICRA Workshop on Releasing Robots into the Wild, (2022)

Adapting the Function Approximation Architecture in Online Reinforcement Learning,
John D. Martin*, Joesph Modayil*, Fatima Davelouis Gallardo, Michael Bowling
The Multi-disciplinary Conference on Reinforcement Learning and Decision Making, (2022)

Should Models Be Accurate?,
Esra'a Saleh, **John D. Martin**, Anna Koop, Arash Pourzarab, Michael Bowling
The Multi-disciplinary Conference on Reinforcement Learning and Decision Making, (2022)

Stochastically Dominant Distributional Reinforcement Learning,
John D. Martin, Michal Lyskawinski, Xiaohu Li, Brendan Englot,
New York Academy of Sciences, Machine Learning Symposium, (2020)

MEMENTO: Further Progress Through Forgetting,
William Fedus*, Dibya. Ghosh*, **John D. Martin**, Marc G. Bellemare, Yoshua Bengio, Hugo Larochelle
NeurIPS Workshop on Biological and Artificial RL (2019). (Best Poster Award)

Stochastically Dominant Distributional Reinforcement Learning,
John D. Martin, Michal Lyskawinski, Xiaohu Li, Brendan Englot,
NeurIPS Workshop on Safety and Robust Decision Making (2019).

Distributed Gaussian Process Temporal Differences for Actor-critic Learning,
John D. Martin, Zheng Xing, Zhiyuan Yao, Ionut Florescu, Brendan Englot,
New York Academy of Sciences, Machine Learning Symposium, (2018)

INVITED TALKS   **Google Brain, Sparsity Reading Group (Virtual),**   **August 2021**
Adapting the Function Approximation Architecture in Online Reinforcement Learning.

University of California Berkeley RAIL (Virtual),   **November 2020**
Uncertainty, Perception, and Their Lessons for Creating General-purpose Robots.

Massachusetts Institute of Technology (MIT) CSAIL,   **November 2019**
From Tasks to Timescales: A path to generalization in reinforcement learning.

Deepmind, Edmonton   **October 2019**
From Tasks to Timescales: A path to generalization in reinforcement learning.

Google Robotics, New York   **August 2019**
Exploiting Transition Invariance for Multi-stage Reinforcement Learning Tasks.

Stevens Institute of Technology, Senior Design (ME-423)   **Fall 2014**
Sikorsky R&D: Motion Planning for Autonomous Rotorcraft.

AWARDS   **Robert Crooks Stanley Fellow**   **Jul. 2019, Jul. 2020**
Two-time recipient. Provided one year of research funding.

Department of Homeland Security Doctoral Fellow   **Sep. 2015**
Provided four years of academic and research funding.

American Helicopter Society Howard Hughes Award   **Feb. 2015**
Accepted on behalf of the Sikorsky Autonomous Research Aircraft team, for achieving completely autonomous flight with an S-76 helicopter, including takeoff, path planning, navigation to an objective, and landing zone selection.

ACADEMIC SERVICE	**Workflow Chair** AAAI, 2023
	Program Chair NAAMII Winter AI School, 2021 ICML Reinforcement Learning Social, 2020
	Program Committee ICLR, 2021 NeurIPS, 2022, 2021, 2020 ICML, 2021, 2020 ICML, Robust RL Workshop, 2021 AAAI, 2019 CoRL, 2020 WAFR, 2019 RAL, 2019 ICRA, 2020, 2019, 2018 IROS, 2017 JOE, 2020
	Mentor Neuromatch Academy, 2022 NeurIPS New in ML Workshop, 2020
LANGUAGES	**Computer** Python, C/C++, R, OCaml, Matlab
	Natural English, Nepalese