John D. Martin

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EDUCATION	**Stevens Institute of Technology** Ph.D. in Mechanical Engineering	**2015 − Present**
	Columbia University Graduate coursework in Computer Science	**2013 − 2015**
	University of Maryland Double B.S. in Physics and Aerospace Engineering	**2009 − 2012**

RESEARCH EXPERIENCE

DeepMind - Edmonton **April 2020 − Present**
Research Intern – Host: Joseph Modayil

I plan to investigate catastrophic interference in the context of continual reinforcement learning. Specifically, I hope to identify and characterize sources of interference that arise when using recurrent function approximators.

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

I studied methods for continual reinforcement learning that exploit notions of invariance to explore more efficiently, focusing on settings with non-stationary data and application to deep neural networks.

Robust Field Autonomy Laboratory - Stevens Institute of Technology **2015 −**
Graduate Research Assistant – Advisor: Brendan Englot

I develop models and algorithms to support safe and efficient learning for robotic systems. My current work lies at the intersection of optimization, control, probabilistic modeling, and optimal transport. Much of my previous work relates to Bayesian non-parametric learning.

Alfred Gessow Rotorcraft Center - University of Maryland **2011 − 2012**
Undergraduate Research Assistant

Researched various techniques to control an RC-sized tilt-wing air vehicle. My studies focused on dynamic modeling, system identification, feedback control, and software design for embedded processors.

Autonomous Vehicle Laboratory - University of Maryland **2010 − 2011**
Undergraduate Research Assistant

Investigated navigation strategies for novel robotic platforms, including an insect-inspired crawling robot. I implemented *optical-flow algorithms* for quad-rotor velocimetry, integrated sensors, and developed a method for maneuvering toward radiation sources.

Robotics@Maryland - University of Maryland **2009 − 2011**
Project Leader

Managed anywhere from 20 to 30 undergraduates designing and fabricating an autonomous underwater robot from scratch. With the help of other leaders, I coordinated project demonstrations, design reviews, and university showcases. Additionally, I provided technical advice to junior engineers throughout the design and fabrication process.

PROFESSIONAL EXPERIENCE

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

I provide technical direction for new research initiatives relating to autonomous systems that require artificial intelligence and machine learning software. I lead the proposal writing efforts for various SBIR/STTR and DARPA programs, where my contributions have resulted in full

Phase II SBIR funding. Among my technical contributions, I have developed an adaptive flight controller, a deep model for object detection, 6-DOF aircraft simulator, and a communication interface for an Iridium data link.

Sikorsky Aircraft   2012 − 2015
Robotics and Flight Controls Engineer

For three years, I worked with a small group of engineers and researchers that took two experimental helicopters to first flight. For the X-76, I was a lead contributor on the motion planning effort, which involved designing, writing, and flight testing code. For the S-97, I contributed designs for flight-critical subsystems, such as the main rotor servos, and triply-redundant flight control voting logic. Below are some further details.

- Developed, integrated, and flight tested motion planning algorithms on a full-scale S-76 helicopter
- Developed a C-based *simplex linear program solver* to optimize speeds along a curve
- Developed and maintained visualization software with OPEN-SCENE-GRAPH and PYTHON
- Developed, integrated, and tested flight control algorithms on the X-76 OPV and S-97 helicopters
- Developed a simulation interface to emulate the entire S-97 avionics system
- Generated C-code from MATLAB and integrated the output into a real-time operating system
- Participated in peer reviews to qualify flight-critical software
- Reviewed and generated avionic-systems wiring schematics

TEACHING EXPERIENCE

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.

Stevens Institute of Technology, Senior Design (ME-423)   Fall 2014
Guest Lecture: Sikorsky R&D: Motion Planning for Autonomous Rotorcraft
I gave an industry guest lecture on motion planning algorithms for autonomous helicopters.

REFEREED PUBLICATIONS

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

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)

Stochastically Dominant Distributional Reinforcement Learning,
John D. Martin, Michal Lyskawinski, Xiaohu Li, Brendan Englot,
NeurIPS Workshop on Safety and Robust Decision Making (2019), ArXiv 1905.07318.

WORKSHOP PUBLICATIONS

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).

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

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.

AWARDS

Robert Crooks Stanley Fellow　　　　　**Jul. 2019**
Provides one year of research funding.

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

AHS 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

Reviewer: AAAI (2019), WAFR (2020,2018), RAL (2019), ICRA (2020,2019,2018), IROS (2019,2017)

COMPUTER SKILLS

Languages

- *Currently Proficient:* PYTHON, C, C++, R, CMAKE, MAKE, MATLAB
- *Was once Proficient:* OCAML, YACC, SIMULINK, PDDL, BASH, SED
- *Competent:* FORTRAN, AWK, LISP, LABVIEW, VBSCRIPT, HTML, XML, CSS, PHP

Libraries/Tools

- TENSORFLOW, PTHREAD, OPENMP, GTEST, EIGEN, BOOST, OPENSCENEGRAPH, REAL-TIME WORKSHOP,THREADSANITIZE, VALGRIND