

James Harrison

Email: jharrison@stanford.edu
Web: web.stanford.edu/~jh2
Office: Durand 009, Stanford, CA

Education

Stanford University, Stanford, CA
Ph.D. Mechanical Engineering. Advisor: Marco Pavone. Expected Summer 2021.
M.S. Mechanical Engineering, 2018.

McGill University, Montreal, QC
B.Eng. Mechanical Engineering (Honours). Advisor: József Kövecses. 2015.

Experience

Stanford University, Graduate Researcher, 2016 – Current.

Advisor: Marco Pavone

Working on robustness, safety, and efficiency in robotic learning. Currently researching Bayesian meta-learning, meta-learning in reinforcement learning and control, and the intersection of continuous/lifelong learning and meta-learning.

DeepMind, Research Scientist Intern, Summer 2018.

Researched latent-space dynamics models for visuomotor control and reinforcement learning.

McGill University, Undergraduate Researcher, 2014.

Advisor: József Kövecses

Developed methods and algorithms for navigating large virtual environments, considering interface dynamics and human interaction factors.

McGill University, Undergraduate Researcher, 2013 – 2014.

Advisors: Christopher Barrett & Richard Chromik

Researched the photsoftening and thermal softening mechanisms of azobenzene-containing polymers. Designed and constructed a device for combinatorial optimization of polyelectrolyte multilayer coatings.

Concordia University, Undergraduate Researcher, Summer 2012.

Advisor: Andreas Athienitis

Characterized weather effects on a large vertical combined solar photovoltaic/thermal solar array.

Selected Papers in Preparation

20. Meta-Learning Deep Input-Output HMMs for Imitation Learning.
James Harrison*, Ahmed Ahmed*, Marco Pavone, Chelsea Finn. (*Denotes equal contribution)
19. Few-Shot Learning with Spatial Memory: A Neural Semiparametric Approach.
James Harrison, Somrita Banerjee, Nick Rhinehart, Dhruv Shah, Sergey Levine, Marco Pavone.

Preprints and Papers Under Review

18. Safe Active Dynamics Learning and Control: A Sequential Exploration-Exploitation Framework.
Thomas Lew, Apoorva Sharma, James Harrison, Andrew Bylard, Marco Pavone.
Under review at *Transactions on Robotics (TRO)*. arXiv:2008.11700
17. Open-Set Incremental Learning via Bayesian Prototypical Embeddings.
John Willes, James Harrison, Ali Harakeh, Chelsea Finn, Marco Pavone, Steven Waslander.
Under review at *Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*.

16. Graph Neural Network Reinforcement Learning for Autonomous Mobility-on-Demand Systems.
Daniele Gammelli, Kaidi Yang, James Harrison, Filipe Rodrigues, Francisco Pereira, Marco Pavone.
Under review at *Conference on Decision and Control (CDC)*, 2021. arXiv: 2104.11434
15. Robust Adaptive Model Predictive Control with Matched and Unmatched Uncertainty.
Rohan Sinha, James Harrison, Spencer M. Richards, Marco Pavone.
Under review at *Conference on Decision and Control (CDC)*, 2021. arXiv: 2104.08261
Extended version under review at *Transactions on Automatic Control (TAC)*.
14. Particle MPC for Uncertain and Learning-Based Control.
Robert Dyro, James Harrison, Apoorva Sharma, Marco Pavone.
Under review at *International Conference on Intelligent Robots and Systems (IROS)*, 2021. arXiv:2104.02213

Publications¹

13. Deep Reinforcement Learning amidst Continual Structured Non-Stationarity.
Annie Xie, James Harrison, Chelsea Finn.
International Conference on Machine Learning (ICML), 2021.
Best paper award at the *ICML Lifelong Learning Workshop*, 2020.
12. Network Offloading Policies for Cloud Robotics: a Learning-Based Approach.
Sandeep Chinchali, Apoorva Sharma, James Harrison, Amine Elhafi, Daniel Kang, Evgenya Pergament, Eyal Cidon, Sachin Katti, Marco Pavone.
Autonomous Robots, 2021.
Conference version: *Robotics: Science and Systems (RSS)*, 2019.
Best Systems Paper Finalist and **Best Student Paper Finalist** at RSS, 2019.
11. Continuous Meta-Learning without Tasks.
James Harrison, Apoorva Sharma, Chelsea Finn, Marco Pavone.
Neural Information Processing Systems (NeurIPS), 2020.
10. Adaptive Meta-Learning for Identification of Rover-Terrain Dynamics.
Somrita Banerjee, James Harrison, P. Michael Furlong, Marco Pavone.
International Symposium on Artificial Intelligence, Robotics and Automation in Space (i-SAIRAS), 2020.
9. Robust and Adaptive Planning under Model Uncertainty.
Apoorva Sharma, James Harrison, Matthew Tsao, Marco Pavone.
International Conference on Automated Planning and Scheduling (ICAPS), 2019.
8. BaRC: Backward Reachability Curriculum for Robotic Reinforcement Learning.
Boris Ivanovic, James Harrison, Apoorva Sharma, Mo Chen, Marco Pavone.
International Conference on Robotics and Automation (ICRA), 2019.
7. Meta-Learning Priors for Efficient Online Bayesian Regression.
James Harrison, Apoorva Sharma, Marco Pavone.
Workshop on the Algorithmic Foundations of Robotics (WAFR), 2018.
6. Control Adaptation via Meta-Learning Dynamics.
James Harrison*, Apoorva Sharma*, Roberto Calandra, Marco Pavone. (*Denotes equal contribution)
NeurIPS Workshop on Meta-Learning, 2018.
5. Learning Sampling Distributions for Robotic Motion Planning.
Brian Ichter*, James Harrison*, Marco Pavone. (*Denotes equal contribution)
International Conference on Robotics and Automation (ICRA), 2018.
Extended Version: arXiv:1709.05448

¹Google Scholar: <https://scholar.google.com/citations?user=-tEiRFcAAAAJ>

4. ADAPT: Zero-Shot Adaptive Policy Transfer for Stochastic Dynamical Systems.
James Harrison, Animesh Garg, Boris Ivanovic, Yuke Zhu, Silvio Savarese, Li Fei-Fei, Marco Pavone.
International Symposium on Robotics Research (ISRR), 2017.
3. Integrated Structure-Control Design Optimization of an Unmanned Quadrotor Helicopter for Object Grasping and Manipulation.
Abolfazl Mohebbi, Colin Gallacher, James Harrison, John Willes, Sofiane Achiche.
International Conference on Engineering Design (ICED), 2017.
2. Characterizing Device Dynamics for Haptic Manipulation and Navigation.
Colin Gallacher, James Harrison, József Kövecses.
IEEE International Conference on Robotics and Automation (ICRA), 2015.
1. Nanoindentation Studies to Separate Thermal and Optical Effects in Photo-Softening of Azo Polymers.
James Harrison, Dina Goldbaum, Christopher Corkery, Christopher Barrett, Richard Chromik.
Journal of Materials Chemistry C, 2015.
Selected by reviewers as “Hot Paper of 2015”.

Books and Theses

3. Optimal and Learning Control.
James Harrison, Edward Schmerling, Marco Pavone (Eds.).
In Progress.
2. Uncertainty and Efficiency in Adaptive Robot Learning and Control.
James Harrison.
Ph.D. Thesis, Stanford University, 2021. In Progress.
1. Dynamically Optimal Haptic Navigation.
James Harrison.
Undergraduate Honours Thesis, McGill University, 2015.

Teaching

AA203: Optimal and Learning-Based Control

Instructor (Spring 2021).

Co-Instructor and Teaching Assistant (Spring 2019, 2020).

Co-designed a new course on optimal control and model-based reinforcement learning. Lectured, wrote course notes, supervised projects, and held office hours.

CS234: Reinforcement Learning

Teaching Assistant, Winter 2018.

Supervised class projects, held office hours, and graded assignments.

AA289/CS529: Robotics and Autonomous Systems Seminar

Co-Organizer, 2017 – 2020.

Organized speakers, managed seminar class.

Service

Conference Reviewing:

AAAI Conference on Artificial Intelligence (AAAI)

Conference on Computer Vision and Pattern Recognition (CVPR)

Conference on Decision and Control (CDC)

Conference on Neural Information Processing Systems (NeurIPS)

Conference on Robot Learning (CoRL)

International Conference on Automation Science and Engineering (CASE)

International Conference on Intelligent Robots and Systems (IROS)
International Conference on Learning Representations (ICLR)
International Conference on Robotics and Automation (ICRA)
International Conference on Machine Learning (ICML)
International Symposium on Robotics Research (ISRR)
Robotics: Science and Systems (RSS)
Workshop on the Algorithmic Foundations of Robotics (WAFR)

Journal Reviewing:

Autonomous Robots
Control Systems Magazine (CSM)
Robotics and Automation Letters (RA-L)
Journal of Materials Chemistry C

Mentoring

Raghav Samavedam (Computer Science B.S., Stanford), 2021
Ahad Rauf (Mechanical Engineering Ph.D., Stanford), 2021
Ahmed Ahmed (Math. and Comp. Science B.S./Computer Science M.S., Stanford), 2021
Jared Davis (Computer Science Ph.D., Stanford), 2020
Luke Merrick (Independent Researcher), 2020
Rohan Sinha (Aeronautics and Astronautics M.S., Stanford), 2020
Somrita Banerjee (Aeronautics and Astronautics M.S., Stanford), 2020
Aldo Carranza (Computational and Mathematical Engineering Ph.D., Stanford), 2019
Ali Mottaghi (Electrical Engineering Ph.D., Stanford), 2019
Annie Xie (Computer Science Ph.D., Stanford), 2019
Manuel Retana (Aeronautics and Astronautics M.S., Stanford), 2019
Robert Dyro (Aeronautics and Astronautics M.S., Stanford), 2019
Roman Engeler (Mechanical Engineering M.S., ETH Zurich), 2019
Saarthak Sarup (Electrical Engineering Ph.D., Stanford), 2019
Xinrui Wang (Mechanical Engineering M.S., Stanford), 2019
Andrew Deveau (Computational and Mathematical Engineering M.S., Stanford), 2018
Dhruv Samant (Mechanical Engineering M.S., Stanford), 2018
Olaoluwa Shorinwa (Mechanical Engineering M.S., Stanford), 2018
Oriana Peltzer (Mechanical Engineering M.S., Stanford), 2018
Shane Barratt (Electrical Engineering Ph.D., Stanford), 2018
Stephanie Schneider (Aeronautics and Astronautics M.S., Stanford), 2018
Thomas Lew (Robotics M.S., ETH Zurich), 2018
Apoorva Sharma (Aeronautics and Astronautics M.S., Stanford), 2017
Boris Ivanovic (Computer Science M.S., Stanford), 2017
Khaled Saab (Electrical Engineering Ph.D., Stanford), 2017

Honours and Awards

Best Paper Award, ICML Lifelong Learning Workshop, 2020
Best Student Paper Award Finalist, Robotics: Science and Systems (RSS), 2019.
Best Systems Paper Award Finalist, Robotics: Science and Systems (RSS), 2019.
NSERC Doctoral Postgraduate Scholarship (PGS-D), Stanford University, 2017-2020.
Office of Technology Licensing Stanford Graduate Fellowship (SGF), Stanford University, 2015 – 2018.
School of Engineering KUT Fellowship (Declined), Massachusetts Institute of Technology, 2015 – 2016.
Ram & Durga Panda Scholarship, McGill University, 2015.
Beverly & Arthur Mendel Scholarship, McGill University, 2015.
NSERC Undergraduate Student Research Award (Declined), Simon Fraser University, 2014.
Engineering Class of '83 Scholarship, McGill University, 2013.

NSERC Undergraduate Student Research Award, McGill University, 2013.
Mr. & Mrs. T. R. McLagan Scholarship, McGill University, 2012.
James & Daisy Mathison Scholarship, McGill University, 2012.
Dean's Honour List, McGill University, 2011 – 2015.