Thomas Power

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https://scholar.google.com/citations?user=anmZ_fMAAAAJ&hl

Education

University of Michigan *Ann Arbor, MI, USA*
PhD Robotics *08/2018 - 06/2024*
- Thesis title: *Learning & Inference for Adaptable Manipulation Planning*
- Advisor: Prof. Dmitry Berenson

University of Michigan *Ann Arbor, MI, USA*
MS Robotics *08/2018 - 05/2020*

Imperial College London *London, UK*
MEng Mechanical Engineering *10/2012 - 07/2016*

Publications

Preprints

F. Yang, **T. Power**, S. A. Marinovic, S. Iba, R. S. Zarrin, D. Berenson. Multi-finger Manipulation via Trajectory Optimization with Differentiable Rolling and Geometric Constraints, *arXiv preprint arXiv:2408.13229*, 2024

A. Khumar*, **T. Power***, F. Yang, S. A. Marinovic, S. Iba, R. S. Zarrin, D. Berenson. Diffusion-Informed Probabilistic Contact Search for Multi-Finger Manipulation, *arXiv preprint arXiv:2410.00841*, 2024

Journal

T. Power & D. Berenson. Constrained Stein Variational Trajectory Optimization, *IEEE Transactions on Robotics*, 2024

T. Power & D. Berenson. Learning a Generalizable Trajectory Sampling Distribution for Model Predictive Control. *IEEE Transactions on Robotics*, 2024

T. Power & D. Berenson. Keep it Simple: Data-efficient Learning for Controlling Complex Systems with Simple Models. *IEEE Robotics and Automation Letters (presented at ICRA)*, 2021.

D. McConachie, **T. Power**, P. Mitrano, & D. Berenson. Learning When to Trust a Dynamics Model for Planning in Reduced State Spaces. *IEEE Robotics and Automation Letters (presented at ICRA)*, 2020

Conference

T. Power & D. Berenson, Variational Inference MPC using Normalizing Flows and Out-of-Distribution Projection. *Robotics: Science and Systems, 2022*

Refereed Workshop

T. Power, R. Soltani-Zarrin, S. Iba & D. Berenson, Sampling Constrained Trajectories Using Composable Diffusion Models. *Differentiable Probabilistic Robotics Workshop, IROS, 2023*

M.S. Sharma, **T. Power** & D. Berenson, Task-space Kernels for Diverse Stein Variational MPC, *Differentiable Probabilistic Robotics Workshop, IROS, 2023*

T. Power & D. Berenson, Improving Sample-based MPC with Normalizing Flows & Out-of-distribution Projection. *Motion Planning with Implicit Neural Representations of Geometry Workshop, ICRA, 2022*

T. Power & D. Berenson, Variational Inference MPC for Robot Motion with Normalizing Flows. *Robot Learning Workshop, NeurIPS, 2021*

T. Power & D. Berenson, Data-efficient Control from Images by Learning How to Use a Simple Model. *Machine Learning in Planning and Control of Robot Motion Workshop, ICRA, 2020*

Experience

Graduate Research Assistant *Ann Arbor, MI, USA*

University of Michigan, Robotics Institute, ARM Lab *08/2018 - Present*

- Research on using machine learning & trajectory optimization for robotic manipulation. Particularly interested in accelerating trajectory optimization under uncertainty using inference and generative modeling techniques
- Published work in T-RO, RSS, RA-L, and workshops at IROS, ICRA & NeurIPS

Research Intern *San Jose, CA, USA*

Honda Research Institute *05/2022 - 08/2022*

- Developed algorithms combining reinforcement learning and planning for dexterous manipulation and tool-use with multi-fingered hand

Artificial Intelligence Engineer *Oxford, UK*

Luffy AI *02/2021 - 08/2021*

- Neuroevolution for learning adaptive controllers & sim-to-real transfer
- Built proof-of-concept test set-up for training controller in simulation and deploying in hardware

Robotics Developer *Bristol, UK*

Consequential Robotics *08/2017 - 08/2018*

- Developing and implementing Navigation & perception for mobile companion robot
- Provided support for users using robot for academic research

Invited Talks

July 2021. *Learning Where to Trust Unreliable Models for Deformable Object Manipulation*. RSS Workshop on Deformable Object Simulation in Robotics

Teaching Experience

Winter 2023	**Machine Learning for Planning and Control**, Graduate Student Instructor	*University of Michigan*
Spring 2015	**Mechanical Engineering, Mathematics II**, Teaching Assistant	*Imperial College London*

Mentoring

11/19-12/20	**Chenxi Gu**, B.S. C.S. & Mathematics, U. of Michigan	*Now at Meta*
09/21-12/21	**Haoxuan Shan**, B.S. C.S., U. of Michigan	*Now PhD student at Duke*
01/22-06/22	**Sheng'ao Wang**, M.S. Robotics, U. of Michigan	*Now PhD student at BU*
09/22-09/23	**Madhav Shekhar Sharma**, B.S. C.S. & Mathematics, U. of Michigan	
01/24-04/24	**Joseph Taylor**, M.S. Robotics, U. of Michigan	
01/24-04/24	**Jiamu Wang**, M.S Robotics, University of Michigan	

Service

Robotics Outreach Ambassador at the University of Michigan Robotics Department (2023)
Mentor for African Undergraduate Research Adventure (AURA) program at the University of Michigan (2023)
Reviewer for ICRA (2021), RA-L (2021, 2024), WAFR (2022), IJRR (2023), CoRL (2023, 2024), T-RO (2023, 2024), RSS (2023, 2024)
Program Committee for Robot Learning Workshop, NeurIPS, (2021, 2022)
Organizer for Differentiable Probabilistic Robotics Workshop, IROS, 2023
Scientific Committee for *Back to the Future: Robot Learning Going Probabilistic* Workshop, ICRA 2024

Skills

Computer Languages, Python, C++, MatLab
Tools & Libraries, Git, ROS, PyTorch, NumPy, Gazebo, Bullet, MuJoCo, IsaacGym, Linux