Michael Burgess

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Education

2023 - 2025	Massachusetts Institute of Technology (MIT)	Cambridge, MA
	M.S. in Mechanical Engineering	GPA: 5.0 / 5.0
	Advisor: Edward Adelson Focus: Robotic Manipulation & Tactile Sensing	
2018 - 2023	Massachusetts Institute of Technology (MIT)	Cambridge, MA
	B.S. in Mechanical Engineering	GPA: 5.0 / 5.0
	Courses: Underactuated Robotics, Generative AI, Nonlinear Control, Dynamics	

Technical Skills

Software	Concepts:	Machine Learning, Computer Vision, Controls, RL, Algorithms, App Dev
	Languages:	Python, C++, C, MATLAB, ROS, Drake, Isaac Gym, JavaScript, TypeScript,
		React, TensorFlow, PyTorch, NumPy, Git, AWS
Hardware	CAD:	Solidworks, Autodesk, NX, ANSYS, Fluids, Statics, FEA / CFD Simulation
	Manufacturing:	CNC, Lathe, Waterjet, 3D Printing, Injection Molding, Wet Lab
	Electrical:	Arduino, Raspberry Pi, Circuit Analysis, Simulink, Soldering

Professional Experience

Sep. 2024 -	The AI Institute / Research Intern	
Dec. 2024	 Worked alongside team members in developing a robust and agile manipulation hardware platform for dynamic, contact-rich manipulation tasks. Core responsibilities included developing an efficient computer vision system to track a baseball in real-time via high-speed camera to catch a baseball on hardware. 	
May 2024 -	Animo Robotics / Lead Robotic Controls Engineer	
Aug. 2024	 Lead developer of a teleoperation system for novel robotic hardware at a stealth startup, enabling the execution of dynamic manipulation tasks from remote stations. Leveraged skills in robotic controls and user interface design to create this system. 	
May 2023 -	Commonwealth Fusion Systems / Mechanical Engineering Intern	
Aug. 2023	 Modeled parts for magnet subsystems on a novel tokamak fusion reactor using NX and ANSYS software. Specifically designed supports for poloidal field (PF) coils. Key takeaways from the internship were skills in electromechanical analysis, communication of results, and mechanical modeling techniques. 	
Jan. 2022 -	MIT Biomimetic Robotics Lab / Undergraduate Researcher	
May 2023	 Performed research to create better trajectory optimization frameworks for planning quadruped (cheetah-like) locomotion over non-flat terrain. 	

	- Developed a novel controller that decouples kinematic and dynamic constraints to empower online planning over discrete uneven terrain.	
May 2022 - Aug. 2022	 Markforged / Software Engineering Intern Developed a simulated annealing-based algorithm to improve printer bed packing, thereby increasing number of parts per print. All code was written in Typescript. Learned soft skills through the responsibility of hosting meetings and presentations. 	
Jan. 2021 <i>-</i> May 2021	 NASA Langley Research Center / Engineering Intern Optimized convolutional neural network (CNN) models to estimate where a fluid flow becomes turbulent along the surface of an airfoil. Incorporated these models into flight simulation CFD solvers for practical use in minimizing viscous drag for wing design. 	
May 2020 - Aug. 2020	 General Motors (GM) / Controls Engineering Intern Automated suite of standardized hardware-in-the-loop test cases for engine controller software using tools in Python and dSpace. Built streamlined code libraries to locate and diagnose errors across cars' control communication infrastructure, written in C code. 	

Publications

- [1] Michael Burgess, Edward H. Adelson. "Grasp EveryThing (GET): 1-DoF, 3-Fingered Gripper with Tactile Sensing for Robust Grasping". In: *arXiv*:2505.09771 (2025).
 URL: <u>https://arxiv.org/pdf/2505.09771</u>.
- [2] Michael Burgess, Jialiang Zhao, Laurence Willemet. "Learning Object Compliance via Young's Modulus from Single Grasps with Camera-Based Tactile Sensors". In: arXiv:2406.15304 (2024). URL: <u>https://arxiv.org/abs/2406.15304</u>.
- [3] **Michael Burgess**. "Decoupled Kinodynamic Planning for a Quadruped Robot over Complex Terrain". In: MIT dSpace (2023). URL: <u>https://dspace.mit.edu/handle/1721.1/151851</u>.

Teaching

Sept. 2023 - Dec. 2023	Robotic Manipulation / Teaching Assistant (TA) Massachusetts Institute of Technology (MIT)	Cambridge, MA
	 Assisted in teaching a graduate course alongside Prof. Russ Tedrake. Topics covered included motion planning, deep perception, robotic simulation, and more. Advised student final projects, created homeworks, and held office hours. 	
Jan. 2020 -	MIT Global Teaching Labs (GTL)	Rho, Italy
Feb. 2020	ITIS Stanislao Cannizzaro	
	- Spent a month in Rho, Italy teaching robotics concepts to high	h school students.
	 Created and taught my own curriculum covering simple circu systems, including lectures, exams, and experiments with Ard 	its and PID control uino / breadboarding.

Portfolio

Dec. 2022	Rock Skipping Robot
	 Developed a control architecture and simulation environment to perform the task of rock skipping on a Kuka IIWA robot arm using Drake and Python. Project required knowledge in dynamic trajectory optimization, fluid physics modeling, and robotic simulation techniques.
Dec. 2022	 Hula Hooping Robot Designed, built, and controlled a 2 DoF robot system that was capable of hula hooping, in order to study how humans are able to hula hoop most effectively. Project required use of Matlab, embedded controls, and hardware design.
May 2022	 Underactuated Skateboard Control System Created a trajectory planner using non-linear hybrid dynamic trajectory optimization to perform skateboard tricks in an abstracted simulation. Project was developed using Drake and required knowledge of non-linear controls.
For my full p	ortfolio, please visit my website at <u>mburgjr.github.io/portfolio/</u> .