

Martin Peticco Robotics PhD Student, MIT EECS

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Education

Doctor of Philosophy, Master of Science – Massachusetts Institute of Technology (Cambridge, MA)

📅 August 2024 – Present

- Advisor: Dr. Pulkit Agrawal, Improbable AI Lab (CSAIL), EECS Department
 - S.M. awarded May 2026. Thesis: "Hardware Priors for Dexterous Robotic Manipulation."
 - Developing proprioceptive wrist and hand hardware for dexterous robotic manipulation with learning-based control.
 - Relevant Coursework:
 - Robotic Manipulation (6.4212): Task & Motion Planning, Position and Force Control, Perception, Visuomotor policies, RL, Drake.
 - Deep Learning (6.7960): Grids & Graphs, Optimization, Representation Learning, Generative Models, Transfer Learning.
 - Introduction to Machine Learning (6.3900): Linear classifiers/regression, CNN's, Transformers, Autoencoders, RL.
 - Power Electronics (6.622): Switching converter topologies, magnetics, semiconductor devices, and closed-loop converter control.
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Bachelor of Science - California Institute of Technology (Pasadena, CA)

📅 October 2019 – June 2023

- Major: Mechanical Engineering (Advisor: Dr. Jose Andrade)
 - Minor: Aerospace Engineering (Advisor: Dr. Soon-Jo Chung)
 - GPA: 4.1/4.3
 - Relevant Coursework:
 - Engineering Design Laboratory (ME72ab): Mechanical and drivetrain lead building competitive sumo robots on the winning team.
 - Robotics (ME133ab): Forward/inverse kinematics, dynamics, pathfinding, and localization/mapping.
 - Analysis/Design of Feedback Control Systems (CDS 110): State-space control, frequency analysis, and disturbances.
 - Space Engineering (Ae105abc): Orbital mechanics, spacecraft systems engineering, and mission design.
 - Experiments/Modelling in Mechanical Engineering (ME50ab): FEA and CFD in ANSYS along with underlying theory.
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Associate of Applied Science - SUNY Orange (Middletown, NY)

📅 August 2016 – May 2019

- Major: Cybersecurity
 - GPA: 3.94/4.0 (Summa Cum Laude)
 - Relevant Coursework:
 - Networking 1 and 2 (CIT 116 & CIT 203): Network protocols & equipment, subnets, administration, and the OSI model.
 - Operating Systems (CIT 118): CPU scheduling, processes, threads, devices, memory management, and file systems.
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Research & Professional Experience

SpaceX – Starship Structures Engineer I

Manager: Daniel Gillund

📅 May 2024 – August 2024

- Completed the structural design of the Block 2 Starship payload door through ANSA/ABAQUS finite element analysis.
 - Worked closely with technicians to achieve the build of two full 24ft door weldments in the span of three weeks.
 - Designed a tool for installing and temporarily fixturing both 16ft payload barrel feedlines.
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NASA Jet Propulsion Laboratory – Robotics Mechanical Engineer I

Manager: Matthew Gildner

📅 August 2023 – April 2024

- Led mechanical efforts during the field testing of two separate EELS snake robot platforms during a 3-week expedition on the Canadian Athabasca Glacier—on two group papers accepted at AIAA SciTech 2024.
 - Identified potential complications before the field test and upgraded/built hardware to mitigate them.
 - Procured a system for cryogenic dynamometer testing of robotic actuators to -184°C.
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NASA Jet Propulsion Laboratory – Research Intern

Mentors: Matthew Gildner (Extreme Environment Robotics), Albert Rieck (Electronics Packaging), Dr. Yoseph Bar-Cohen (NDEAA)

📅 March 2022 – June 2023

- Developed and built testbeds for the EELS project as part of JPL's Extreme Environmental Robotics group.
- Designed and analyzed proof tests using NX and NASTRAN for ESA's ARIEL mission in the Electronics Packaging Group.
- Aided in developing a proof-of-concept piezoelectric motor for use in cold, dusty environments, the NDEAA Group.

Epirus - Mechanical Engineering Intern

Manager: Dr. Bill Dower

📅 June 2021 – August 2021

- Tested and repaired drones, trained field technicians, and became certified as a commercial Part 107 FAA drone pilot.
- Led the mechanical development of a waveguide chamber concept and amplifier module shipping containers.
- Created an accurate 1:25 scale model of the company's flagship product to demonstrate functions to customers.

Caltech CAST Lab - Summer Undergraduate Researcher

Mentors: Dr. Soon-Jo Chung and Dr. Yashwanth Kumar Nakka

📅 June 2020 – April 2021

- Completed as part of a Summer Undergraduate Research Fellowship at Caltech.
- Designed two systems for demonstrating in-orbit fuel transfer with how moment of inertia varies in frictionless space.
- Simulated the system's changing inertial properties during fuel transfer, showing how a disturbance torque affects flight.

International Business Machines (IBM) - Intern

📅 July 2018 – August 2018

- Built fixtures that emulated IBM's Z systems cooling for testing storage drives as part of the Memory Development Lab.
- Repaired two non-functional 3D printers and upgraded them using 3D-printed parts and a custom relay circuit.

Publications

- **M. Peticco**, P. Agrawal. "KaRMA: A Kinematic Metric for Fine Manipulation Ability in Robotic Hands." *IROS*, accepted, 2026.
- **M. Peticco**, G. Ulloa, J. Marangola, N. Dashora, P. Agrawal. "DexWrist: A Robotic Wrist for Constrained and Dynamic Manipulation." *IEEE Robotics and Automation Letters (RA-L)*, under review, 2026.
- N. Fey, G. Margolis, **M. Peticco**, P. Agrawal. "Bridging the Sim-to-Real Gap for Athletic Loco-Manipulation." *Robotics: Science and Systems (RSS)*, accepted, 2025.
- E. Marteau, L. P. Tosi, ..., **M. Peticco**, et al. "To Boldly Go Where No Robots Have Gone Before - Part 3: The Screw Mobility System of EELS for Robust Surface and Subsurface Mobility on Highly Unknown Terrains." *AIAA SciTech*, accepted, 2024.
- M. Ono, R. Thakker, ..., **M. Peticco**, et al. "To Boldly Go Where No Robots Have Gone Before - Part 1: EELS Robot to Spearhead a New One-Shot Exploration Paradigm with In-situ Adaptation." *AIAA SciTech*, accepted, 2024.
- M. Paton, R. Rieber, ..., **M. Peticco**, et al. "2023 EELS Field Tests at Athabasca Glacier as an Icy Moon Analogue Environment." *IEEE Aerospace Conference*, accepted, 2024.

Presentations

- "DexWrist: A Robotic Wrist for Constrained and Dynamic Manipulation." RSS 2025 Dex. Manipulation Workshop, NEMS 2026.
- "Sumo Robots." SpaceX Job Talk, 2024.
- "Robots that Fight, Robots that Fly, and Robots that Place Dominos." NASA JPL Job Talk, 2023.

Outreach

- Discover Mechanical Engineering, MIT – Gave research talk, "Robotic Hands & Wrists," to ~30 incoming students (2025).
- Newburgh P-TECH – visited summer cohort to discuss college, Caltech, and careers in engineering (2023, 2025).
- P-TECH Alumni Round Table – joined a panel of program alumni for a Q&A with current and incoming students (2023).

Teaching Experience

Design & Fabrication – Professor: Dr. Michael Mello, Justin Koch

📅 March 2023 – June 2023, March 2022 – June 2022

- Helped teach mechatronics, GD&T, gear train design, motor calculation, and fabrication to over 40 students.
- Attended design reviews for mechatronics and gear transmission projects of eight student teams.

Engineering Design Laboratory – Professor: Dr. Michael Mello

📅 September 2022 – March 2023

- Developed an FRC-style robotics competition for five student teams to compete over two terms.
- Designed and built field elements along with creating class materials for safe lithium battery handling.
- Supported over 30 students in their design work and assisted with programming, electronics, and mechanical design.

Introduction to Robotics – Professor: Günter Niemeyer

📅 September 2022 – January 2023

- Supported over 60 students in learning how to build and program 3-DoF robotic arms using HEBI actuators, SolidWorks, Python, and Robotic Operating System (ROS).

Mechanical Prototyping – Professor: Paul Stovall

📅 January 2022 – March 2022

- Taught students (group & 1-on-1) how to use lathes, mills, waterjets, laser cutters, 3D printers, and SolidWorks CAD.

Individual Projects

Domino Placing Robot

📅 January 2023 – March 2023

- Designed, built, and helped program a robotic arm powered by six HEBI motors, ROS, Python, and OpenCV as mechanical lead of Team Domino as part of the ME134 class at Caltech.
- Capable of placing standard-sized dominos on a five-foot by five-foot table in the form of a user-drawn path.
- Designed and built the 5-DoF arm, gripper assembly, and automatic domino dispenser.

Sumo Robot

📅 September 2021 – March 2022

- Completed as part of Caltech's Engineering Design Laboratory (ME72ab) capstone design course in which teams competed with three robots: wheeled RC, wheeled autonomous, and walking RC robot.
- Served as the mechanical design and drivetrain lead, developing a robot capable of pushing over 100kg at a weight of just 3kg. This was achieved using two electric-skateboard-sized motors and over 180kg of magnetic downforce.
- Placed first in the 37th Annual Engineering Design Competition at Caltech as part of Major SSASS.

GoPro Mavic Drone

📅 April 2021 – June 2021

- Designed and built the world's smallest drone with a 3-axis stabilized GoPro.
- Supported live-streamed view from the GoPro, GPS emergency return-to-home, remote camera tilting, and live telemetry including GPS coordinates, heading, and distance flown.

Phone Drone

📅 December 2020 – March 2021

- Designed and developed the first quadcopter to use a removable smartphone on a gimbal as a camera.
- Allowed for use in three configurations: handheld phone, handheld phone on gimbal, and flight.
- Supported live-streamed view from a secondary camera, GPS emergency return-to-home, remote camera tilting, and live telemetry including GPS coordinates, heading, and distance flown.

Combat Robot

📅 July 2018 – August 2019

- 30lb replica of combat robot "Tombstone" from "Battlebots."

3-Axis Camera Stabilizer

📅 December 2016 – July 2019

- Designed and built a 3-axis brushless phone gimbal using CAD, 3D printing, metal fabrication, and PID control.

Portable Wii Console

📅 January 2018 – February 2018

- Re-engineered the Nintendo Wii into a portable tablet form factor.
- Efficiently packaged numerous system components into a comprehensive package (display, speakers, AV driver, motherboard, cooling, sensor bar).

Leadership & Extracurriculars

Tau Beta Pi – President of the CA β chapter of Tau Beta Pi, the oldest engineering honor society. 📅 June 2022 – April 2023

Caltech Robotics – Designed the 2-axis camera gimbal on the 'Gerald' mini-submarine. 📅 March 2020 – December 2021

Caltech UAV Club – Designed, built, and iterated on two novel quadcopter concepts. 📅 September 2020 – March 2021

Skills

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|---------------------------|----------------------------------|-----------------------|--------------------------------|
| ▪ SolidWorks | ▪ Drafting (GD&T) | ▪ Python | ▪ Part 107 FAA License |
| ▪ Siemens NX | ▪ Mechanical Design/Fabrication | ▪ MATLAB | ▪ Bilingual (English, Spanish) |
| ▪ Fusion 360 | ▪ Electronics Design/Fabrication | ▪ JavaScript/CSS/HTML | ▪ Supplier Procurement |
| ▪ FEA (Ansys, NX NASTRAN) | ▪ CNC Machining | ▪ ROS/Gazebo | ▪ Trade Studies |
| ▪ PDM (SOLIDWORKS, NX) | ▪ 3D-Printing | ▪ Autodesk Recap | ▪ Unmanned Aerial Vehicles |