

Mateusz Jaszczuk

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Education

University of Pennsylvania

M.S.E. in Mechanical Engineering and Applied Mechanics – Mechatronics and Robotics

Aug 2024 – Present

Philadelphia, PA

GPA: 4.00/4.00

Thesis: *Learning to Feel: Force-Aware Data-Driven Estimation and Control for Adaptive Physical Interactions*

Purdue University

B.S. in Aeronautical and Astronautical Engineering – Autonomy and Control

Aug 2020 – May 2024

West Lafayette, IN

GPA: 3.71/4.00

Skills

Programming & Tools - Python (PyTorch, JAX), C++, Isaac Lab, MATLAB, ROS, PyBullet, Gazebo, Drake, CUDA

Machine Learning - Reinforcement Learning, Imitation Learning (Behavior Cloning), Sim-to-Real (Domain Randomization), Neural Networks (MLP, CNN, Transformers, NeRF), Probabilistic Modeling (Bayesian, Variational Inference)

Control & Estimation - Impedance Control, Operational Space Control, Inverse Dynamics, Optimal Control (MPC, iLQR, DP), State Estimation (EKF, UKF, PF), Safety-Critical Control (CLF-QP, CBF-QP), System Identification, SLAM

Hardware - Franka Research 3 (7-DoF), LiDAR, RealSense RGB-D, OptiTrack Motion Capture, Sensor Integration

Experience

Figuroa Robotics Lab (GRASP)

Graduate Research Assistant

Jan 2025 – Present

Philadelphia, PA

- Developed *Rapid Mismatch Estimation* – a real-time data-driven framework identifying unknown payload dynamics *online* on a 7 DoF manipulator, enabling safe and reactive manipulation under load uncertainty; published at CoRL 2025.
- Implemented an operational space impedance controller with a DS-based motion policy, enabling compliant and reactive manipulation; deployed a full pipeline on Franka Research 3 via custom ROS packages, validated across sim and hardware.
- Designed a transformer-based interaction-aware adaptive controller that fuses point cloud and force modalities via self-attention over stacked latent tokens, enabling real-time classification of human perturbations vs. payload loads – achieving simultaneous unknown load compensation, precise tracking performance, and compliant response to physical interactions.
- Supported research on learning DS from demonstrations, contributing to imitation learning-based policy development.

Composite Manufacturing & Simulation Center

Undergraduate Research Assistant

Oct 2022 – May 2024

West Lafayette, IN

- Developed a Physics-Guided Transfer Learning framework using Bayesian model with Gaussian Process surrogates for data-efficient composite's property prediction across varying process conditions, reducing required characterization efforts.
- Co-authored a peer-reviewed journal publication and designed visualizations to demonstrate the model's evaluation.

Air Force Research Lab - Purdue UAS Research and Test Facility

Undergraduate Research Assistant, Project Lead

Aug 2023 – Dec 2023

West Lafayette, IN

- Developed autonomous fixed-wing aircraft for enclosed hangar-flight with Windracers (UK), including aircraft sizing, flight simulations, and led motion capture integration for indoor localization and autonomous safety protocols validation.
- Managed client communications and project coordination, aligning the development cycle with the client's requirements.

Purdue Space Program NASA Student Launch

Project Manager (2022-2023), Launch Vehicle Construction Engineer (2021-2022)

Aug 2021 – May 2023

West Lafayette, IN

- Led a 60-member interdisciplinary team through the full project life cycle for the NASA Student Launch competition.
- Coordinated project deliverables and communications with NASA, ensuring the system meets mission requirements.
- Led launch vehicle development and 6-DOF flight simulations for trajectory optimization and mission design.

Publications

- [1] **M. Jaszczuk** and N. Figuroa, "Rapid mismatch estimation via neural network informed variational inference," in *9th Annual Conference on Robot Learning (CoRL)*, 2025.
- [2] A. J. Thomas, **M. Jaszczuk**, E. Barocio, G. Ghosh, I. Bilonis, and R. B. Pipes, "Probabilistic physics-guided transfer learning for material property prediction in extrusion deposition additive manufacturing," *Computer Methods in Applied Mechanics and Engineering*, vol. 419, p. 116660, 2024.