Matthew H. Bronars

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EDUCATION

Carnegie Mellon University, Robotics Institute – School of Computer Science *Aug 2024 – PRESENT*
PhD: *Robotic* | Cumulative GPA: 4.3/4.0

Georgia Institute of Technology, School of Interactive Computing *Aug 2022 – Aug 2024*
Master of Science: *Computer Science – Concentration in Computational Perception and Robotics*
Cumulative GPA: 4.0/4.0

University of California Berkeley, College of Engineering *Aug 2017 – May 2022*
Bachelor of Science: *Electrical Engineering and Computer Science (EECS) & Mechanical Engineering*
Commendations: Dean's List (Fall 2020), Certificate in Design Innovation
Cumulative GPA: 3.7/4.0

RESEARCH EXPERIENCE

Graduate Research Assistant – *Katerina Fragkiadaki*, Carnegie Mellon University *Aug 2024 – PRESENT*
- Researching world models for robotics – investigating how 3D representations, massively scaled simulation, and test-time search can improve the accuracy and generalization of robots equipped with a learned world model.
- Other interests: Accelerating planning and inference with diffusion models, real-world policy adaptation with reinforcement learning, and runtime safety assurances for robots in dynamic human environments.

Graduate Research Assistant – *Danfei Xu*, Georgia Tech *Aug 2022 – Aug 2024*
- Researched offline imitation learning, representation learning, and data driven approaches to human robot interaction
- Developed a framework for guided diffusion policies which can autonomously generate legible robot motion

Undergraduate Research Assistant – *Lydia Sohn*, UC Berkeley *Aug 2020 – May 2022*
- Automated analysis of stem cell data by implementing a pipeline for instance segmentation and object tracking
- Annotated and cleaned an internal training dataset then finetuned the parameters of a U-Net CNN

PROFESSIONAL EXPERIENCE

Machine Learning Intern – Symbotic *May 2023 – Aug 2023*
- Analyzed correlations between robot failures and structural locations. Wrote procedures for validation data collection.
- Designed, implemented, and deployed machine learning models for classifying structural failures.

Computer Vision Intern – Schlumberger Doll Research *May 2021 – Dec 2021*
- Built and trained a neural network for visual failure detection. Made a pipeline for semi-supervised data collection.
- Work is patented under US 12406352 B1 - Cable Damage Detection by Machine Vision

Robotics Intern – National Security Innovation Network *May 2020 – Sept 2020*
- Designed, specified, and constructed a prototype UAV based on constraints set by the Department of the Navy.

SELECTED PAPERS

R. Ren*****, **M. Bronars***, H. Zu, Y. Tang, J. Zhang, S. Zakharov, P. Tokmakov, K. Fragkiadaki "GPWM: Generative Particle World Models for 3D Prediction and Planning" *In Submission*
- TLDR; We train a 3D particle world model that achieves state-of-the-art dynamics prediction across diverse materials. Latent noise optimization lets the same generative world model serve as an effective planner for contact rich tasks.

M. Bronars, S. Cheng, D. Xu, "Legibility Diffuser**:** Offline Imitation for Intent Expressive Motion." *IEEE RA-L 2024*
- TLDR; We generate legible robot motion by training a guided diffusion-based policy on multi-modal human demonstrations. This end-to-end approach does not require hand designed cost functions or classical motion planners.

V. Saxena, **M. Bronars**, N. Arachchige, K. Wang, W. Shin, S. Nasiriany, A. Mandlekar, D. Xu "What Matters in Learning From Large-Scale Datasets for Robot Manipulation" *International Conference on Learning Representations (ICLR) 2025*
- TLDR; MimicLabs is a simulation dataset and generation pipeline for systematically evaluating sources of variation in robotics datasets. We identify crucial dimensions for diversity in data collection and alignment in retrieval.

N. Gkanatsios, J. Xu, **M. Bronars**, A. Mousavian, T. Ke, K. Fragkiadaki "3D FlowMatch Actor: Unified 3D Policy for Single and Dual Arm Manipulation" *Internation Conference on Intelligent Robot Systems (IROS) 2026*
- TLDR; We train a flow matching robot policy that leverages 3D relative attention between action and visual tokens. Achieve SOTA performance with 30x faster training and inference than previous 3D diffusion-based policies.

MISC

Graduate Teaching Assistant – Deep Learning for Robotics and Reinforcement Learning *Aug 2023 – PRESENT*
- Deep Reinforcement Learning (CMU) – Created an assignment on PPO and advanced policy gradient methods
- Deep Learning (Georgia Tech) - Created an assignment on generative models (theory and coding)
- Deep Learning for Robotics (Georgia Tech) - Created an assignment on robot learning from demonstrations