Alison Bartsch (She/Her/Hers)

abartsch@andrew.cmu.edu | https://alison-bartsch.github.io/ | Google Scholar

Education

Carnegie Mellon University *Pittsburgh, PA*
PhD Candidate in Mechanical Engineering | GPA: 3.92/4.0 Anticipated Grad. Aug. 2025
Relevant Coursework: Deep Learning for Engineers, Deep RL & Control, Computer Vision, Learning for Manipulation, Robot Cognition, Math Fundamentals for Robotics, Project Management

Stanford University *Stanford, CA*
BS in Aeronautics and Astronautics | GPA: 3.78/4.0 June 2021
Relevant Coursework: Principles of Robot Autonomy I, Principles of Robot Autonomy II, Topics in Advanced Robotic Manipulation, Feedback Control Design, Space Flight, Space Mechanics, Spacecraft Design Laboratory

Research Experience

PhD Researcher | Carnegie Mellon University *Pittsburgh, PA*
Mechanical and AI Lab Sept. 2021 – Present
Reinforcement Learning:
- Developed a novel replay buffer sampling algorithm for off-policy RL to improve convergence.
- Built a trajectory augmentation strategy of a single human demonstration to seed the replay buffer to significantly improve convergence times.

Deformable Dynamics:
- Designed a latent dynamics model to predict plasticine deformation dynamics leveraging pre-trained PointBERT point cloud embeddings to reduce the real-world data requirements.

3D Vision:
- Built a multi-camera RGB-D system that can reconstruct 3D surfaces in the scene accurately and real-time for the lab's 3D deformable object manipulation projects.

Sculpting Imitation Learning:
- Created and developed a novel point cloud-based diffusion policy for imitation learning for the 3D clay sculpting task with a parallel gripper.
- Collected and released a real-world dataset of demonstration robot trajectories for the 3D sculpting task aiming to encourage reproducibility of deformable manipulation research.

LLMs for Sculpting Reasoning:
- Built a system leveraging LLMs as high-level planners for a discretized top-down sculpting task to investigate how LLMs reason about highly complex robot-object interactions.

Undergraduate Researcher | Stanford University *Stanford, CA*
Autonomous Systems Lab Jan. 2018 – June 2021
Gecko-Adhesive Grippers:
- Created a simulation to model the dynamics of the grasping scenario of a gecko-adhesive gripper to test various controllers and optimize the robot design.

Novel ReachBot Robot:
- Modeled the novel robot's behavior in simulation by re-factoring existing manipulation models in which the object being "manipulated" is the robot's body, and the fingers are the robot's legs.

Skills

Programming: Python, C/C++, Java, Matlab
Applications: ROS, SolidWorks, Gym, ManiSkill2, Git, Pybullet, Mujoco, PlasticineLab
Robot Hardware: Franka arm/parallel gripper, LEAP hand, DeltaHand, Oculus-based Teleoperation
Libraries: Pytorch, Tensoflow, Pytorch3d, Open3d

Publications

A Bartsch, AB Farimani. LLM-Craft: Robotic Crafting of Elasto-Plastic Objects with Large Language Models. Under review 2024.

A Bartsch, A Car, C Avra, AB Farimani. SculptDiff: Learning Robotic Clay Sculpting from Humans with Goal Conditioned Diffusion Policy. Accepted IROS 2024.

A Bartsch, C Avra, AB Farimani. SculptBot: Pre-Trained Models for 3D Deformable Object Manipulation. ICRA 2024.

A Car, SS Yarlagadda, **A Bartsch**, A George, AB Farimani. PLATO: Planning with LLMs and Affordances for Tool Use. Under review 2024.

JH Park, GP Dalwankar, **A Bartsch**, A George, AB Farimani. Fluid Viscosity Prediction Leveraging Computer Vision and Robot Interaction. Engineering Applications of Artificial Intelligence 2024.

A Dikshit*, **A Bartsch***, A George, AB Farimani. RoboChop: Autonomous Framework for Fruit and Vegetable Chopping Leveraging Foundational Models. Under review 2023.

A George, **A Bartsch**, AB Farimani. Minimizing Human Assistance: Augmenting a Single Demonstration for Deep Reinforcement Learning. ICRA 2023.

F Zhu, S Hu, L Leng, **A Bartsch**, A George, AB Farimani. Pour Me A Drink: Robotic Precision Pouring Carbonated Beverages into Transparent Containers. arXiv preprint 2023.

A George, **A Bartsch**, AB Farimani. OpenVR: Teleoperation for Manipulation. Under review 2023.

K Wang, **A Bartsch**, AB Farimani. MAN: Multi-Action Networks Learning. arXiv preprint 2022.

Conference Presentations

IROS 2024 Talk | SculptDiff | *Abu Dhabi, UAE*

ICRA 2024 Talk | SculptBot | *Yokohama, JPY*

ICRA 2023 Poster | Minimizing Human Assistance | *London, UK*

Awards

2024 CMU Mechanical Engineering Shaw Fellowship | In recognition of academic excellence

2023 CMU Engineering Dowd Research Fellowship | In recognition of cutting-edge research

Leadership Experience

Robotics Team Lead | Carnegie Mellon University — *Pittsburgh, PA*

Mechanical and AI Lab — Sept. 2022 – Present

- Lead meetings, create project ideas, and guide experimental design and paper writing for the robotics research sub-group of the MAIL Lab consisting of 10 masters and PhD students.

Starting Central Defender — *St. Thomas, USVI*

US Virgin Islands National Women's Soccer Team — Sept. 2015 – Sept. 2021

- Led the defensive back line while representing the USVI on the international scale at Olympic and World Cup qualification tournaments for the US Virgin Islands women's soccer team.

Student Mentor | Stanford University — *Stanford, CA*

Women's Leadership Innovation Lab — Sept. 2018 – June 2020

- Conducted field studies to assist with research and analysis of women's leadership in STEM.
- Led a leadership class for high school girls teaching interventions previously studied by the lab to help students facing gender biases in STEM.

Teaching Assistant Experience

Teaching Assistant | Carnegie Mellon University — *Pittsburgh, PA*

Engineering Design II: Conceptualization & Realization — Aug. 2024 – Dec. 2024

- Provide feedback and critiques to assist teams in the design and prototyping of their projects.

Introduction to Deep Learning & Intermediate Deep Learning — Jan. 2024 – May 2024

- Taught core machine learning concepts in recitation and office hours and created homework.