

Brad Saund PhD

I build systems that let robots learn: ML planning algorithms, simulation frameworks, and evaluation pipelines. My work spans manipulation research (generative models, contact-based planning, shape completion, teleop) and large-scale real-world deployments (autonomous vehicles, high precision aerospace robots).

Work Experience

2022–present **Staff Applied Scientist**, *Cruise*, San Francisco.

I built tooling to evaluate the Autonomous Vehicle robotics stack in simulation

- Closed key Sim-to-Real gaps by grounding simulation metrics to human reference trajectories. This caught 9 of 15 modes of test escapes previously only discovered on the physical robot.
- Designed and built core tooling for evaluating simulations of the ML driving stack. This reduced evaluation time from 3 hours to 10 minutes, enabling faster iteration of the ML stack.
- Led a workstream that authored the majority of the simulation scenarios used in AV validation. I wrote a pipeline that programmatically authors AV driving simulations based on human examples. These simulations use a customized game engine to simulate physics, sensor data (cameras, radars, lidars), and other road agents. 2 million scenarios authored by this pipeline run per week.
- Developed ML planning algorithms (PyTorch/C++/CUDA) that consume prediction outputs to generate trajectories. The stack has evolved from classical planners to an ML trajectory model.

2021–2022 **SDE II**, *AWS Robotics*, Sunnyvale.

- Founded a small team prototyping a new AWS robotics service. I designed and built a robotic arm picking system with AWS cloud integration.

2014–2015 **SDE**, *Amazon*, Seattle.

2012–2014 **Robotics Engineer**, *Electroimpact*, Seattle.

- Designed, built, and programmed robots that build airplanes.
- Created a robot deformation model that I trained using data collected from a laser tracker to improve robot arm precision to 10 thou over a 1,000 cubic foot volume.

Education (BS, MS, PhD in Robotics)

2017–2021 **PhD Robotics**, *University of Michigan*.

Contact-rich planning for robotic manipulation

- Normalizing Flow generative models for trajectory generation: I explored early use of Normalizing Flows for robotic trajectory generation by adapting techniques from computer vision several years before diffusion models and action chunking with transformers became the standard.
- LLM-conditioned task planning: Before ChatGPT existed, I connected GPT-3 with a classical robot planning stack to perform complex tasks such as "put the apple in the fridge."
- Dual-arm teleoperation: I used a Vive and Unity to collect data from a dual-arm manipulator making pancakes, folding laundry, and loading shopping bags.
- Contact-rich manipulation planning algorithms: I implemented graph search (A* variants) and sample-based planners (RRT and PRM variants) and CV (e.g. voxel prediction CNNs) to solve POMDPs with contact sensing.

2015–2017 **MS in Robotics**, *Carnegie Mellon*.

Path planning and precision localization in confined spaces

- RL for robotic pathfinding and search. I implemented Deep Q-Learning for a robot maximizing reward while searching a simulated environment
- Imitation learning: I collected data and trained ML models for a variety of robot morphologies (snake robots, hyper-redundant manipulators, hexapods, and inverted pendulums)

2008–2012 **BS Mechanical Engineering**, *Caltech*.

San Carlos, CA

📞 +1 (650) 787 4726 • ✉ brad.saund@gmail.com • 🌐 www.bradsaund.com

Skills

Programming PyTorch, OpenCV, C++, Python, Git, ROS, TensorFlow
Robotics ML/RL for planning and control, sensor fusion, localization, autonomous vision and navigation

Selected Publications (see www.bradsaund.com for a complete list)

- 2021 **Brad Saund** and Dmitry Berenson "CLASP: Constrained Latent Shape Projection for Refining Object Shape from Robot Contact", CoRL
- 2020 **Brad Saund** and Dmitry Berenson "Diverse Plausible Shape Completions from Ambiguous Depth Images", CoRL
Brad Saund and Dmitry Berenson "Fast Planning Over Roadmaps via Selective Densification" 2020, RA-L (with ICRA presentation)
- 2019 **Brad Saund**, Sanjiban Choudhury, Siddhartha Srinivasa and Dmitry Berenson "The Blindfolded Robot: A Bayesian Approach to Planning with Contact Feedback", ISRR
- 2018 **Brad Saund** and Dmitry Berenson "Motion Planning for Manipulation with Uncertainty from Contact Sensing" 2018, ISER
- 2017 Shiyuan Chen, **Brad Saund**, and Reid Simmons "The datum particle filter: Localization for objects with coupled geometric datums" IROS
- 2017 **Brad Saund** "Planning and Localizing under Contact Uncertainty", Carnegie Mellon Master's Thesis
Alex Ansari, Julian Whitman, and **Brad Saund**. "Modular platforms for advanced inspection, locomotion, and manipulation" 2017. Waste Management Symposium
- 2016 **Brad Saund**, Shiyuan Chen, and Reid Simmons. "Touch based localization of parts for high precision manufacturing", 2016 ICRA
- 2013 **Brad Saund** and Russell DeVlieg. "High Accuracy Articulated Robots with CNC Control Systems", 2013 SAE-Aerotech

San Carlos, CA

📞 +1 (650) 787 4726 • ✉ brad.saund@gmail.com • 🌐 www.bradsaund.com