Bernadette K. Bucher

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Experience

Assistant Professor (August 2024 — present)
Robotics Department (primary), University of Michigan
Computer Science and Engineering, University of Michigan

Research Scientist (April 2023 — June 2024)
Boston Dynamics AI Institute

- Technical leadership role building mobile manipulators which can reliably operate autonomously in novel and dynamic environments.
- Helped scale research institute from first year of operation to 200+ employees through initial project formation, interviewing, and iterating organizational decisions with leadership.

Robotics Research Intern (June 2021 — December 2021)
Seattle Robotics Lab, NVIDIA Research, NVIDIA Corporation

Senior Software Engineer (September 2016 — August 2019)
Rotary and Mission Systems, Lockheed Martin Corporation

- Engineering team author for $200+ million winning government proposal. Interviewed 50+ engineering candidates to support division staffing for winning proposal.
- Architecture team lead for internal research effort of 2 to 12 people. Executed demos for customer engagements. Transitioned technology to affiliated business capture efforts.
- Designed and developed suite of configurable digital signal processing algorithms for real-time software defined radio platforms in C++ and CUDA.

Software Engineer (September 2014 — September 2016)
Space Systems Company, Lockheed Martin Corporation

- Led 3 to 8 person software engineering team as an Agile Scrum Master.
- Designed, developed, and maintained full stack web-based mapping software.

Awarded Funding

Samsung LEAP-U Program
Principle Investigator, ($103,754), 2025-2026
Title: *Instruction Following Mobile Manipulators.*

General Motors Company Student Project Gift
Principle Investigator, ($5,000), 2025
Title: *Software to Identify Object Types from Camera Images*

NASA ROSES New Frontiers Data Analysis Program
Subcontractor for NASA JPL - University of Michigan Principle Investigator, ($334,668), 2024-2027
Title: *Disentangling Jupiter's Complex Atmospheric Processes Through the Application of Machine Learning Methods to JunoCam Data.*

Education

University of Pennsylvania
Ph.D. Computer Science — *August 2018 - May 2023*[†]
Advisors: Dr. Kostas Daniilidis and Dr. Nikolai Matni
M.S.E. Robotics — *August 2018 - December 2020*
Fully funded through fellowships, department, and advisors

Georgia Institute of Technology — *August 2016 - August 2018*
15 graduate credits, School of Computer Science
Fully funded by Lockheed Martin Corporation

The University of Alabama
M.A. Economics — *January 2012 - May 2014*
M.A. Mathematics, *Thesis Advisor:* Dr. Kabe Moen — *August 2012 - May 2014*
B.S. Mathematics and Economics — *August 2010 - May 2014*
Fully funded through academic scholarships

Preprints Under Review

An Dang, Jayjun Lee, Mustafa Mukadam, X Alice Wu, **Bernadette Bucher**, Manikantan Nambi, Nima Fazeli. *HydroShear: Hydroelastic Shear Simulation for Tactile Sim-to-Real Reinforcement Learning.* arXiv, 2026.

Aditya Pratap Singh, Shrey Shah, Ramanakumar Sankar, Emma Dahl, Gerald Eichstädt, Georgios Georgakis, **Bernadette Bucher**. *Structure-Preserving Unpaired Image Translation to Photometrically Calibrate JunoCam with Hubble Data.* arXiv, 2025.

Basavasagar Patil, Sydney Belt, Jayjun Lee, Nima Fazeli, **Bernadette Bucher.** *Using Temperature Sampling to Effectively Train Robot Learning Policies on Imbalanced Datasets.* arXiv, 2025.

Katrina Ashton, Chahyon Ku, Shrey Shah, Wen Jiang, Kostas Daniilidis, **Bernadette Bucher**. *HELIOS: Hierarchical Exploration for Language-grounded Interaction in Open Scenes.* arXiv, 2025.

Publications

Jianing Qian, Emmanuel Panov, Qinhe Peng, Leonor Fermoselle, Dinesh Jayaraman*, **Bernadette Bucher***, Tarik Kelestemur*. *Expanding Spatial and Temporal Context for Robotic Imitation Learning With Scene Graphs.* CVPR, 2026.

Yun Chang, Leonor Fermoselle, Duy-Nguyen Ta, **Bernadette Bucher**, Luca Carlone, Jiuguang Wang. *ASHiTA: Automatic Scene-grounded HIerarchical Task Analysis.* CVPR, 2025.

Russell Mendonca, Emmanuel Panov, **Bernadette Bucher**, Jiuguang Wang, Deepak Pathak. *Continuously Improving Mobile Manipulation with Autonomous Real-World RL.* CoRL, 2024.

Jianing Qian, Yunshuang Li, **Bernadette Bucher**, Dinesh Jayaraman. *Task-Oriented Hierarchical Object Decomposition for Visuomotor Control.* CoRL, 2024.

Xiaoyi Cai, Siddharth Ancha, Lakshay Sharma, Philip R. Osteen, **Bernadette Bucher**, Stephen

[†]On maternity leave during Fall 2020 and Summer 2022 semesters.

Phillips, Jiuguang Wang, Michael Everett, Nicholas Roy, Jonathan P. How. *EVORA: Deep Evidential Traversability Learning for Risk-Aware Off-Road Autonomy.* T-RO, 2024.

Bo Wu, Bruce D Lee, Kostas Daniilidis, **Bernadette Bucher**, Nikolai Matni. *Uncertainty Aware Deployment of Pre-trained Task Conditioned Imitation Learning Policies.* IROS, 2024.

Naoki Yokoyama, Sehoon Ha, Dhruv Batra, Jiuguang Wang, **Bernadette Bucher**. *VLFM: Vision-Language Frontier Maps for Zero-Shot Semantic Navigation.* **Best Paper in Cognitive Robotics at ICRA 2024.** 1 of 3,937 submissions (0.025%)

Georgios Georgakis*, **Bernadette Bucher***, Karl Schmeckpeper, Siddharth Singh, Kostas Daniilidis. *Learning to Map for Active Semantic Goal Navigation.* ICLR, 2022.

Frederik Ebert*, Yanlai Yang*, Karl Schmeckpeper, **Bernadette Bucher**, Georgios Georgakis, Kostas Daniilidis, Chelsea Finn, Sergey Levine. *Bridge Data: Boosting Generalization of Robotic Skills with Cross-Domain Datasets.* RSS, 2022.

Georgios Georgakis, **Bernadette Bucher**, Anton Arapin, Karl Schmeckpeper, Nikolai Matni, Kostas Daniilidis. *Uncertainty-driven Planner for Exploration and Navigation.* ICRA, 2022.

Bernadette Bucher*, Karl Schmeckpeper*, Nikolai Matni, Kostas Daniilidis. *An Adversarial Objective for Scalable Exploration.* IROS, 2021.

Sudeep Dasari, Frederik Ebert, Stephen Tian, Suraj Nair, **Bernadette Bucher**, Karl Schmeckpeper, Siddharth Singh, Sergey Levine, Chelsea Finn. *RoboNet: Large-Scale Multi-Robot Learning.* CoRL, 2019.

Selected Refereed Workshop Papers

Katrina Ashton, Chahyon Ku, Shrey Shah, Wen Jiang, Kostas Daniilidis, **Bernadette Bucher**. *HELIOS: Hierarchical Exploration for Language-grounded Interaction in Open Scenes.* CoRL Workshop on Learning Effective Abstractions for Planning (LEAP), 2025.

Aditya P. Singh, Shrey Shah, Gerald Eichstädt, Emma Dahl, Ramanakumar Sankar, **Bernadette Bucher**, Georgios Georgakis. *Structure-Preserving Image Translation to Photometrically Calibrate JunoCam with Hubble Data.* CVPR Workshop on Computer Vision for Science, 2025.

Bernadette Bucher*, Katrina Ashton*, Bo Wu, Karl Schmeckpeper, Nikolai Matni, Georgios Georgakis, Kostas Daniilidis. *Unordered Navigation to Multiple Semantic Targets in Novel Environments.* CVPR Embodied AI Workshop, 2023.

Bernadette Bucher*, Siddharth Singh*, Clélia de Mulatier, Kostas Daniilidis, Vijay Balasubramanian. *Curiosity Increases Equality in Competitive Resource Allocation.* ICLR Workshop on Bridging AI and Cognitive Science, 2020.

Bernadette Bucher, Anton Arapin, Ramanan Sekar, Feifei Duan, Marc Badger, Kostas Daniilidis, Oleh Rybkin. *Perception-Driven Curiosity with Bayesian Surprise.* RSS Workshop on Combining Learning and Reasoning Towards Human-Level Robot Intelligence, 2019.

Kenneth Chaney*, **Bernadette Bucher***, Evangelos Chatzipantazis, Jianbo Shi, Kostas Daniilidis. *Unsupervised Monocular Depth and Latent Structure.* CVPR Workshop on 3D Scene Understanding for Vision, Graphics, and Robotics, 2019.

*Denotes equal contribution.

Selected Presentations

From Words to Actions: Mobile Manipulators that Follow Diverse Instructions. (2025)
Michigan AI Seminar

A Tale of Two Fields: World Models Across AI and Robotics. (2025)
CoRL Workshop on Robotic World Modeling

Building Visual Representations with Foundation Models for Mobile Manipulation. (2025)
Lockheed Martin AI Lab Seminar
NASA JPL Seminar
Samsung Research Seminar
Amazon Lab 126 Seminar
Canadian Conference on Robots and Vision Symposium Speaker
SFU at ICML Workshop
Montreal Robotics Summer School Invited Speaker
General Motors Company Seminar

The Impact of VLMs on Semantic Navigation: A Before and After View of Object Search. (2024)
University of Michigan AI Symposium: Embodied AI
Robotics Seminar, Cornell University

Sampling Policies and State Representations in Robotic Manipulation and Navigation Pipelines. (2022)
Samsung Research Seminar
Siemens Healthineers
Robotics Seminar, University of Utah

Adversarial Curiosity. (2019)
Honda Research Institute

Teaching

Instructor *Fall 2025*
Computer Vision (EECS 442)
Electrical Engineering and Computer Science Department, University of Michigan

Instructor and Course Developer *Winter 2025*
3D Robot Perception (ROB 498/598)
Robotics Department, University of Michigan

Instructor *Fall 2024*
Mapping, Localization, and Navigation (ROB 330)
Robotics Department, University of Michigan

Current PhD Students

Katrina Ashton - Computer and Information Science, co-advised with Professor Kostas Daniilidis
Aditya Pratap Singh - Computer Science and Engineering
Chahyon Ku - Robotics
Anton Arapin - Computer Science and Engineering
Gan Zhen Hao - Robotics

Julianne Barteck - Robotics, co-advised with Professor Nima Fazeli
An Dang - Robotics, co-advised with Professor Nima Fazeli
Junzhe Wu - Naval Architecture & Marine Engineering, co-advised with Professor Maani Ghaffari

Selected Service

RA-L Associate Editor - Visual Perception and Learning *2026*

CoRL Inclusion Chair *2025*

IROS Associate Editor *2025*

Reviewing Activity *2022-present*
ICLR, NeurIPS, JMLR, ICRA, IROS, RSS, RA-L, CVPR

Selected Honors and Awards

IEEE ICRA Best Paper Award in Cognitive Robotics *2024*
Haidas and Chryssikou Fellowship *2020-2021*
Rising Stars Executive Mentoring Program, Lockheed Martin Corporation *2018-2019*
Special Recognition Award, Lockheed Martin Corporation *2017*
New Business Capture Award, Lockheed Martin Corporation *2017*
2 Spot Awards, Lockheed Martin Corporation *2016-2017*
10+ Peer Awards, Lockheed Martin Corporation *2015-2018*
Outstanding Presenter Award, Joint Mathematics Meetings *2014*
University of Alabama Presidential Scholarship *2010-2014*