Bernadette K. Bucher

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Updated November 2026

Appointments

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.

Education

University of Pennsylvania
Ph.D. Computer Science — *August 2018 - May 2023*[†]
Advisors: Professors Kostas Daniilidis and 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*

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

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	*August 2012 - May 2014*
B.S. Mathematics and Economics	*August 2010 - May 2014*

Fully funded through academic scholarships

Honors and Awards

Outstanding Reviewer, European Conference on Computer Vision (ECCV)	*2026*
IEEE ICRA Best Paper Award in Cognitive Robotics	*2024*
Haidas and Chryssikou Fellowship	*2020-2021*
NSF Travel Grant Award for RSS Conference Presentation	*2019*
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*
Vice President, Pi Mu Epsilon, National Mathematics Honorary Society	*2013-2014*
Faculty Excellence Award in Economics	*2013*
Analytic Excellence in Business Award	*2013*
Special Achievement Award in Economics	*2012*
University of Alabama Presidential Scholarship	*2010-2014*
Presidential National Merit Housing Scholarship, The University of Alabama	
University of Alabama Engineering Scholarship	*2010-2012*

Research Funding (amount to my lab)

Draper Scholars Program Award
Principal Investigator (award transferred in 2026 from Prof. Katie Skinner), ($112,639), 2024-2027
Title: *Hazard Prediction Using Orbital Data for Safe Lunar Landing*

General Motors Company Sponsored Research
Principal Investigator, ($145,191), 2026-2027
Title: *Lineside Subassembly Using AI–Driven Dual-Arm Robotic Handling and Installation*

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

General Motors Company Student Project Gift
Principal 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 Principal Investigator, ($334,668), 2024-2027
Title: *Disentangling Jupiter's Complex Atmospheric Processes Through the Application of Machine Learning Methods to JunoCam Data.*

Preprints

Anton Arapin, Chahyon Ku, **Bernadette Bucher**. *Action Jets: Learning the Local Shape of the Action-Conditioned Data Manifold.* arXiv:2610.19007, 2026.

Anton Arapin, Aditya Singh, Yixin Wang, Jun Gao, **Bernadette Bucher**. *Decoupled Drift-Diffusion World Models for Consistent Future Frame Prediction.* arXiv:2610.19212, 2026.

Chahyon Ku, Erica Tevere, Georgios Georgakis, Rudra Mukherjee, **Bernadette Bucher**. *OWLS: Open-world Language-conditioned Speed Fields for Zero-Shot Rover Navigation.* arXiv:2610.32596, 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:2511.22668, 2025.

Basavasagar Patil, Sydney Belt, Jayjun Lee, Nima Fazeli, **Bernadette Bucher.** *Using Temperature Sampling to Effectively Train Robot Learning Policies on Imbalanced Datasets.* arXiv:2510.19373, 2025.

Katrina Ashton, Chahyon Ku, Shrey Shah, Saumit Vedula, Tingrui Zhang, Wen Jiang, Kostas Daniilidis, **Bernadette Bucher**. *HELIOS: Hierarchical Exploration for Language-grounded Interaction in Open Scenes.* arXiv:2509.22498, 2025.

Sonia Raychaudhuri, Duy Ta, Katrina Ashton, Angel X. Chang, Jiuguang Wang, **Bernadette Bucher**. *Zero-shot Object-Centric Instruction Following: Integrating Foundation Models with Traditional Navigation.* arXiv:2411.07848, 2024.

Sadat Shaik*, **Bernadette Bucher***, Nephele Agrafiotis, Stephen Phillips, Kostas Daniilidis, William Schmenner. *Learning Portrait Style Representations.* arXiv:2012.04153, 2020.

Publications

*Equal contribution.

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.* RSS, 2026.

Jianing Qian, Qinhe Peng, Emmanuel Panov, 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 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 Language-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.

Refereed Workshop Papers

Anton Arapin, Chahyon Ku, **Bernadette Bucher**. *Action Jets: Learning the Local Shape of the Action-Conditioned Data Manifold.* CoRL Workshop on Do Robots Need World Models?, 2026.

Aditya Pratap Singh, Sanyam Mehta, Yixin Wang, Nima Fazeli, **Bernadette Bucher**. *JEVA: Joint Encoders for Variational Action World Models.* CoRL Workshops on The Action Gap: Large Generative Models Learn Rich Knowledge and Do Robots Need World Models?, 2026.

Aparajito Saha, Zhen Hao Gan, Jinjia Guo, Jacob Skwirsk, Jeremy Acheampong, Anton Arapin, Chahyon Ku, Yue Hu, Nima Fazeli, **Bernadette Bucher**. *PhyGS: Physically-Grounded Controllable Scene Generation.* CVPR Workshop on Multi-Agent Embodied Intelligent Systems, 2026.

Chahyon Ku, Erica Tevere, Georgios Georgakis, Rudra Mukherjee, **Bernadette Bucher**. *OWLS: Open-World Language-driven Servoing for Zero-Shot Traversability.* CVPR Workshop on AI4Space, 2026.

Katrina Ashton, Chahyon Ku, Shrey Shah, Saumit Vedula, Tingrui Zhang, 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.

Conference Abstracts and Datasets

Ramanakumar Sankar, **Bernadette Bucher**, Emma Dahl, Gerald Eichstädt, Georgios Georgakis, Aditya Singh, Shrey Shah, et al. *Deep Neural Network-based Characterization of Jovian Moist Convection.* AGU Fall Meeting, P51B-06, 2025.

Emma Dahl, Ramanakumar Sankar, **Bernadette Bucher**, Aditya Singh, Shrey Shah, Gerald Eichstädt, Michael Wong, et al. *Characterizing the Color and Structure of Jupiter's Clouds and Aerosols with Deep Learning.* AGU Fall Meeting, P31C-07, 2025.

Georgios Georgakis, Ramanakumar Sankar, Emma K. Dahl, **Bernadette Bucher**, Michael Wong, Gerald Eichstädt, et al. *JunoCam Machine Learning Calibration Bundle.* NASA Planetary Data System, 2025.

Ph.D. Dissertation

Bernadette Bucher. *Active Learning of Vision-Based Representations for Robotics.* University of Pennsylvania, 2023.

Invited Presentations

Building Visual Representations with Foundation Models for Mobile Manipulation. (2026)
IROS Workshop on AI Meets Autonomy
IROS SeMaNa Workshop: Semantic-Aware Mapping and Navigation Towards Cognitive and Adaptive Robots

Uncertainty in Grounding and Prediction: Scene Graphs and World Models for Robotic Planning. (2026)
IROS Workshop on Rethinking Uncertainty for Modern Robotics Paradigms

How Much Pose Does a Robot Need? (2026)
11th ECCV Workshop on Recovering 6D Object Pose

Bridging the Interaction Gap in Embodied Search: Low-Level Control in Large-Scale Procedural Worlds (2026)
Toronto Robotics Conference (Keynote)
3rd CVPR Workshop on Multi-Agent Embodied Intelligent Systems Meet Generative-AI Era

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

Active Learning of Vision-based Representations for Robotics. (2023)
Robotics Department Research Seminar, University of Michigan

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

Adversarial Curiosity. (2020)
Honda Research Institute, Curious Minded Machines Winter Seminar Series

Improving Predictive Models with Curiosity. (2020)
GRASP Student Seminar Series, University of Pennsylvania

Perception-Driven Representations for Autonomous Robotics. (2019)
Robotics Seminar, CSAIL, Massachusetts Institute of Technology

Perception-Driven Curiosity with Bayesian Surprise. (2019)
Honda Research Institute, Curious Minded Machines Workshop

Geometric Deep Learning. (2019)
Applied Mathematics Seminar, Department of Mathematics, The University of Alabama

Professional Service

IEEE RAS Women in Engineering Committee, Member *2026*

Workshop Co-Organizer, CVPR *2026*
Multi-Agent Embodied Intelligent Systems Meet Agentic-AI Era

Workshop Co-Organizer, ICML *2025*
Multi-Agent Systems in the Era of Foundation Models: Opportunities, Challenges and Futures

RSS Area Chair *2027*

CoRL Area Chair *2026*

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

CoRL Inclusion Chair *2025*

IROS Associate Editor *2025*

Reviewer *2022-present*
Journals: *JMLR, IEEE Robotics and Automation Letters (RA-L)*
Conferences: *ICLR, NeurIPS, CVPR, ECCV (Outstanding Reviewer, 2026), ICRA, IROS, RSS*

GRASP Lab Student Advisory Committee, Founding Representative *2020-2021*
University of Pennsylvania

Research and Engineering Apprenticeship Program Mentor *2019*
Army Educational Outreach Program

Current Ph.D. Students

Aditya Pratap Singh - Computer Science and Engineering
Chahyon Ku - Robotics
Anton Arapin - Computer Science and Engineering
Gan Zhen Hao - Robotics
Aparajito Saha - Robotics
An Dang - Robotics, co-advised with Professor Nima Fazeli
Junzhe Wu - Naval Architecture & Marine Engineering, co-advised with Professor Maani Ghaffari

External Advising

Katrina Ashton - Ph.D. student, University of Pennsylvania

Teaching

Instructor (sole instructor; 244 students) *Fall 2025*
Computer Vision (EECS 442)
Electrical Engineering and Computer Science Department, University of Michigan

Instructor, Major Course Revision *Fall 2026, Winter 2025*
3D Robot Perception (ROB 498/599)
Robotics Department, University of Michigan
https://bucherb.github.io/rob-3d-perception-site/

Co-Instructor with Professor Xiaoxiao Du *Fall 2024*
Mapping, Localization, and Navigation (ROB 330)
Robotics Department, University of Michigan

Faculty Advisor *2025–2026*
Multidisciplinary Design Program (ENGR 255/355/455/555), off-road autonomy team sponsored by Hyundai America Technical Center
College of Engineering, University of Michigan

Head Teaching Assistant *Spring 2020*
Automata, Computability and Complexity (CIS 262)
Dr. Jean Gallier, University of Pennsylvania

Teaching Assistant *Fall 2019*
Advanced Topics in Machine Perception (CIS 680)
Dr. Jianbo Shi, University of Pennsylvania

Mathematics Technology Learning Center Lab Instructor *January 2013 - May 2014*
The University of Alabama