

Andreea Bobu

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Research Interests

I work at the intersection of robotics, machine learning, and mathematical human modeling. Specifically, I study algorithmic human-robot interaction, with a focus on how autonomous agents and humans can efficiently and interactively arrive at shared representations of their tasks for more seamless and reliable interaction.

Position

August 2023 – **Research Scientist**

July 2024 *Boston Dynamics AI Institute (BDAIL)*

Fall 2024 **Boeing Assistant Professor**

Massachusetts Institute of Technology (MIT), Department of Aeronautics and Astronautics

Education

2017–2023 **Ph.D. in Electrical Engineering and Computer Science**

University of California, Berkeley.

GPA: 4.0/4.0

Advisor: Anca Dragan

Thesis: Aligning Robot Representations with Humans

2013–2017 **B.S. in Computer Science and Engineering, Minor in Mathematics**

Massachusetts Institute of Technology (MIT).

GPA: 5.0/5.0

Advisors: Adrian Dalca, Polina Golland, Stefanie Jegelka

Awards and Recognitions

2023 **Emerging Research Award at the Int. Symp. on the Mathematics of Neuroscience**

For the talk on “Aligning Robot and Human Representations”.

2022 **Rising Stars Academic Career Workshop in EECS**

Chosen to participate in an intensive workshop for historically marginalized graduate students and postdocs who are interested in pursuing academic careers in EE, CS, and AI and decision-making.

2022 **Robotics: Science and Systems (RSS) Pioneers**

Selected for workshop bringing together top early career researchers in robotics.

2021 **Apple PhD Scholars in Artificial Intelligence and Machine Learning Fellowship**

Two-year fellowship with an annual stipend of \$45,000 for graduate students in AI/ML.

2021 **Best Paper Award Finalist at ACM/IEEE HRI**

For the paper “Feature Expansive Reward Learning: Rethinking Human Input”.

2021 **Best Paper Award Honorable Mention at IEEE T-RO**

For the paper “Quantifying Hypothesis Space Misspecification in Learning From Human-Robot Demonstrations and Physical Corrections”.

2020 **Best Paper Award Winner at ACM/IEEE HRI**

For the paper “LESS is More: Rethinking Probabilistic Models of Human Behavior”.

2020 **Human-Robot Interaction (HRI) Pioneers**

Chosen to participate in a highly selective workshop seeking to foster creativity, communication, and collaboration across Human-Robot Interaction.

2019 **Cadence Women in Technology Scholarship**

A \$5,000 scholarship for women in EECS demonstrating leadership and a strong academic record.

- 2019 **IBM PhD Fellowship Finalist**
One of three students nominated by the EECS department at UC Berkeley.
- 2019 **Google PhD Fellowship Finalist**
One of four students nominated by the EECS department at UC Berkeley.
- 2018 **Microsoft Research Ada Lovelace Fellowship Finalist**
One of two students nominated by the EECS department at UC Berkeley.
- 2016 **Best Paper Award Winner at MICCAI Patch-MI**
For the paper “Patch-Based Discrete Registration of Clinical Brain Images”.
- 2016 **Google Anita Borg Memorial Scholarship**
A \$10,000 scholarship for women in EECS demonstrating leadership and a strong academic record.
- 2015–present **Member of Tau Beta Pi (TBP) National Honor Society for Engineering**
Honors society for engineering students with the strongest academic records at their university.
- 2015–present **Member of Eta Kappa Nu (HKN) National Honor Society for EECS**
Honors society for EECS students with the strongest academic records at their university.

Journal Articles

- [paper link](#) **Learning Perceptual Concepts by Bootstrapping from Human Queries**
Andreea Bobu, Chris Paxton, Wei Yang, Balakumar Sundaralingam, Yu-Wei Chao, Maya Cakmak, Dieter Fox.
IEEE Robotics and Automation Letters (RA-L), 2022.
Also presented as an oral presentation at *Scaling Robot Learning (ICRA, 2022)* and as a spotlight at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.
- [paper link](#) **Inducing Structure in Reward Learning via Feature Learning**
Andreea Bobu, Marius Wiggert, Claire Tomlin, Anca D. Dragan.
The International Journal of Robotics Research (IJRR), 2022.
- [paper link](#) **Quantifying Hypothesis Space Misspecification in Learning from Human-Robot Demonstrations and Physical Corrections**
Andreea Bobu, Andrea Bajcsy, Jaime F. Fisac, Sampada Deglurkar, Anca D. Dragan.
IEEE Transactions on Robotics (T-RO), 2019.
Best paper award honorable mention.

Conference Publications

- in review **Aligning Robot and Human Representations**
Andreea Bobu^{*}, Andi Peng^{*}, Pulkit Agrawal, Julie Shah, and Anca D. Dragan.
Submitted to the ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2024.
- [preprint](#) **Diagnosing and Augmenting Feature Representations in Correctional Inverse Reinforcement Learning**
Inês Lourenço, **Andreea Bobu**, Cristian R. Rojas, Bo Wahlberg.
IEEE Conference on Decision and Control (CDC), 2023.
- [paper link](#) **Diagnosis, Feedback, Adaptation: A Human-in-the-Loop Framework for Test-Time Policy Adaptation**
Andi Peng, Aviv Netanyahu, Mark K. Ho, Tianmin Shu, **Andreea Bobu**, Julie Shah, Pulkit Agrawal.
International Conference on Machine Learning (ICML), 2023.
- [paper link](#) **SIRL: Similarity-based Implicit Representation Learning**
Andreea Bobu^{*}, Yi Liu^{*}, Rohin Shah, Daniel S. Brown, and Anca D. Dragan.
ACM/IEEE International Conference on Human Robot Interaction (HRI), 2023.
- [paper link](#) **Teaching Robots to Span the Space of Functional Expressive Motion**
Arjun Sripathy, **Andreea Bobu**, Zhongyu Li, Koushil Sreenath, Daniel S. Brown, and Anca D. Dragan.
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.

- [paper link](#) **Dynamically Switching Human Prediction Models for Efficient Planning**
Arjun Sripathy*, **Andreea Bobu***, Daniel S. Brown, Anca D. Dragan.
IEEE International Conference on Robotics and Automation (ICRA), 2021.
- [paper link](#) **Situational Confidence Assistance for Lifelong Shared Autonomy**
Matthew Zurek*, **Andreea Bobu***, Daniel S. Brown, Anca D. Dragan.
IEEE International Conference on Robotics and Automation (ICRA), 2021.
Also presented as an oral presentation at *Lifelong Learning and Personalization in Long-Term Human-Robot Interaction (HRI, 2021)*.
- [paper link](#) **Feature Expansive Reward Learning: Rethinking Human Input**
Andreea Bobu*, Marius Wiggert*, Claire Tomlin, Anca D. Dragan.
ACM/IEEE International Conference on Human Robot Interaction (HRI), 2021.
Best paper award finalist.
Also presented at *AI & Its Alternatives in Assistive & Collaborative Robotics: Decoding Intent (RSS, 2020)* and *Workshop on Human in the Loop Learning (ICML, 2020)*.
- [paper link](#) **LESS is More: Rethinking Probabilistic Models of Human Behavior**
Andreea Bobu*, Dexter Scobee*, Jaime F. Fisac, Shankar Sastry, Anca D. Dragan.
ACM/IEEE International Conference on Human Robot Interaction (HRI), 2020.
Best paper award winner.
- [paper link](#) **Learning Under Misspecified Objective Spaces**
Andreea Bobu, Andrea Bajcsy, Jaime F. Fisac, Anca D. Dragan.
Conference on Robot Learning (CoRL), 2018.
Invited to special issue.

Workshop Publications

- [preprint link](#) **Time-Efficient Reward Learning via Visually Assisted Cluster Ranking**
David Zhang, Micah Carroll, **Andreea Bobu**, Anca D. Dragan.
Workshop on Human-in-the-Loop Learning, NeurIPS 2022.
- [paper link](#) **Efficient Robot Teaching by Learning Intermediate Human-Guided Representations**
Andreea Bobu.
Companion of the Robotics: Science and Systems (RSS), 2022.
- [preprint link](#) **Aligning Robot Representations with Humans**
Andreea Bobu, Andi Peng.
Workshop on Collaborative Robots and the Work of the Future, ICRA 2022.
Also presented at *Social Intelligence in Humans and Robots (RSS, 2022)*.
- [paper link](#) **Detecting Hypothesis Space Misspecification in Robot Learning from Human Input**
Andreea Bobu, Anca D. Dragan.
Companion of the ACM/IEEE International Conference on Human-Robot Interaction, 2020.
- [paper link](#) **Adapting to Continuously Shifting Domains**
Andreea Bobu, Eric Tzeng, Judy Hoffman, Trevor Darrell.
Workshop at the International Conference on Learning Representations (ICLR), 2018.
- [paper link](#) **Patch-Based Discrete Registration of Clinical Brain Images**
Adrian V. Dalca, **Andreea Bobu**, Natalia S Rost, Polina Golland.
Patch-based Techniques in Medical Imaging (MICCAI Patch-MI), 2016.
Best paper award winner.

Patents

- [patent link](#) **Concept Training Technique for Machine Learning**
Andreea Bobu, Balakumar Sundaralingam, Christopher Jason Paxton, Maya Cakmak, Wei Yang, Yu-Wei Chao, Dieter Fox.
U.S. Patent 17982401.

Work Experience

- Summer 2021 **NVIDIA Corporation** *Seattle, WA*
Research Intern under Prof. Maya Cakmak and Dieter Fox
- Developed a method for learning perceptual concepts describing multi-object prepositional relationships from a small amount of human input.
 - Demonstrated the learned concepts in motion planning tasks on a 7-DoF Franka Panda robot arm.
 - Published a paper in the IEEE Robotics and Automation Letters (RA-L), 2022.
- 2016–2017 **MIT Computer Science and Artificial Intelligence Laboratory** *Cambridge, MA*
Undergraduate Researcher under Prof. Polina Golland and Stefanie Jegelka
- Utilized machine learning techniques (principal component analysis, Gaussian mixture models, and latent topic models) to construct 3D representations for leukoaraiosis, a small vessel brain disease.
 - Predicted diseased areas in the brain by modeling white matter hyperintensity in 3D brain images.
- Summer 2015 **Microsoft** *Cambridge, MA*
Software Development Intern
- Helped build a health-oriented food-tracking application for the Microsoft Band.
 - Developed the entire back-end side of the cloud server used for the application.
 - Implemented part of the user interface and helped create user studies (C#, node.js, Azure).
- 2015–2017 **MIT Computer Science and Artificial Intelligence Laboratory** *Cambridge, MA*
Undergraduate Researcher under Prof. Polina Golland and Dr. Adrian Dalca
- Utilized machine learning, inference, and image analysis techniques to create a patch-based discrete image registration algorithm for sparse 3D brain images in MATLAB.
 - Released code that is applicable to a variety of image shapes, dimensions, and modalities. The open-source code can be found [here](#).
 - Published a paper in the MICCAI Patch-MI workshop 2016 that won **Best Paper Award**.
- Summer 2014 **Bloomberg** *New York, NY*
Research and Development Intern (Software Development)
- Developed a unit-testing framework for a large-scale C++ system (Internal and Web Applications team).
 - Winner of the B-Puzzled algorithmic competition – out of approximately 20 teams.
- Spring 2014 **MIT Koch Institute for Integrative Cancer Research** *Cambridge, MA*
Undergraduate Researcher under Prof. Daniel Anderson
- Utilized NLP tools to mine biomedical literature for drug and toxin biodistribution in the human body.
 - Created an ontological tree of human organ subparts and worked on linking mined chemicals to the organ area where they are most prevalent.

Teaching

- Spring 2021 **CS 287H: Algorithmic Human-Robot Interaction** *UC Berkeley*
Graduate Student Instructor
Created and graded weekly quizzes and hands-on programming homework assignments, brainstormed and provided feedback on project proposals, led some of the lectures, and guest lectured.
- Fall 2019 **CS 188: Introduction to Artificial Intelligence** *UC Berkeley*
Graduate Student Instructor
Taught a weekly one-hour discussion section of 30 students, held weekly office hours, designed and graded homework and exams.
- January 2016 **6.178: Introduction to Software Engineering in Java** *MIT*
Instructor and Lecturer
Co-organized and taught a 70-student course, held regular office hours, and designed and graded homework.
- 2015–2017 **6.046: Design and Analysis of Algorithms** *MIT*
Tutor
Tutored students in the class as part of Tau Beta Pi's Tutoring Committee.
- Spring 2014 **6.01: Introduction to Electrical Engineering and Computer Science** *MIT*
Student Lab Assistant
Assisted my peers in completing the weekly lab assignments.

Invited Talks

Aligning Robot and Human Representations

2023	International Symposium on the Mathematics of Neuroscience	<i>ISMoN</i>
2023	Center for Human-Compatible AI Workshop	<i>CHAI</i>
2023	Stanford Robotics Seminar	<i>Stanford</i>
2023	Department Seminar	<i>Cornell</i>
2023	Department Seminar	<i>Princeton</i>
2023	Department Seminar	<i>Georgia Tech</i>
2023	Department Seminar	<i>UCSD</i>
2023	Department Seminar	<i>UPenn</i>
2023	Department Seminar	<i>Brown</i>
2023	Department Seminar	<i>NYU</i>
2023	Department Seminar	<i>MIT</i>
2023	Department Seminar	<i>UT Austin</i>
2023	Department Seminar	<i>University of Maryland</i>
2023	Department Seminar	<i>University of Michigan</i>
2023	Department Seminar	<i>UIUC</i>
2023	Microsoft Research Seminar Series	<i>MSR</i>
2022	UW Robotics Colloquium	<i>UW</i>
2022	New Trends in Aerospace Seminar Series	<i>MIT</i>
2022	Cornell Robotics Seminar	<i>Cornell</i>
2022	CS 6960: Human-AI Alignment	<i>U of Utah</i>
2022	Robot Autonomy and Interactive Learning (RAIL) Lab	<i>Georgia Tech</i>
2022	Illinois Robotics Seminar	<i>UIUC</i>
2022	Intelligent and Interactive Autonomous Systems Group (ILIAD) Group	<i>Stanford</i>
2022	Workshop on Complex Feedback in Online Learning	<i>ICML</i>
2022	Workshop on AI and Humanity	<i>UC Berkeley</i>
2022	AI/ML Seminar	<i>Apple</i>

Inducing Structure in Robot Learning via Human-Guided Representations

2022	SemiAutonomous Vehicles Seminar	<i>UC Berkeley</i>
2021	Workshop on Aware Learning: How to Benefit from Priors	<i>CDC</i>
2021	Interactive Robotics Group	<i>MIT</i>
2021	Workshop on Human-AI Collaboration in Sequential Decision-Making	<i>ICML</i>
2021	Human And Robot Partners (HARP) Lab Reading Group	<i>CMU</i>
2021	Internal Research Seminar	<i>Apple</i>
2021	CS287H: Algorithmic Foundations of Human-Robot Interaction	<i>UC Berkeley</i>

Feature Expansive Reward Learning: Rethinking Human Input

2022	BAIR Robotics and Systems Workshop	<i>UC Berkeley</i>
2021	BAIR Commons Symposium	<i>UC Berkeley</i>
2021	CMSC-33281: Topics in Human-Robot Interaction	<i>UChicago</i>

LESS is More: Rethinking Probabilistic Models of Human Behavior

2020	Multi-Agent Reinforcement Learning Seminar	<i>UC Berkeley</i>
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Learning Under Misspecified Objective Spaces

2020	CS287H: Algorithmic Foundations of Human-Robot Interaction	<i>UC Berkeley</i>
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2018 [Center for Human-Compatible Artificial Intelligence](#) *UC Berkeley*

[Domain Adaptation for Fixed and Continuously Varying Domains](#)

2018 [Berkeley Artificial Intelligence Research \(BAIR\) Seminar Series](#) *UC Berkeley*

Organized Workshops & Seminars

July 2023 [Workshop on Interactive Learning with Implicit Human Feedback](#) *ICML*
Co-Organizer

Bringing together interdisciplinary experts in interactive machine learning, reinforcement learning, human-computer interaction, cognitive science, and robotics to explore and foster discussions on challenges in interactive learning with implicit human feedback.

December 2022 [Workshop on Aligning Robot Representations with Humans](#) *CoRL*
Co-Organizer

Bringing together robot learning, cognitive science, human-robot interaction, and representation learning experts to better understand how humans and robots can align their representations for better interaction.

2022–2023 [Dream/CPAR Seminar](#) *UC Berkeley*
Lead Organizer

Weekly seminar hosting professors/professionals in robotics, control, human-centered autonomy.

June 2021, [Social Intelligence in Humans and Robots Workshop](#) *ICRA, R:SS*
June 2022 **Co-Organizer**

Brought together cognitive science and developmental psychology experts to better understand human social intelligence, and AI and robotics experts to discuss engineering socially intelligent artificial agents.

July 2020 [Advances and Challenges in Imitation Learning for Robotics Workshop](#) *R:SS*
Co-Organizer

Brought together AI and robotics experts to discuss the challenges facing imitation learning for robotics.

2020–2021 [SemiAutonomous Vehicles Seminar](#) *UC Berkeley*
Co-Organizer

Weekly robotics and controls seminar for students and professors internal and external to Berkeley.

Research Mentorship

2021–2023 [Regina Wang \(now Masters student at Stanford University\)](#)

Research on robot reward learning from multiple types of human input.

2021–2023 [Yi Liu \(now Masters student at University of California, Berkeley\)](#)

Research on learning rewards by first learning task-agnostic representations from human input.

2021–2022 [David Zhang \(Undergraduate at University of California, Berkeley\)](#)

Research on a more efficient visual interface for learning complex rewards from human input.

2020–2022 [Arjun Sripathy \(now ML Scientist at Tesla\)](#)

Research on meta-planning with a fleet of human models, and learning representations for expressive robot motions using human input and active learning.

2020–2021 [Matthew Zurek \(now PhD student at the University of Wisconsin-Madison\)](#)

Research on confidence-aware shared autonomy.

2018–2019 [Sampada Deglurkar \(now PhD student at University of California, Berkeley\)](#)

Research on confidence-aware learning from human input.

Outreach

Summer 2019 [Girls in Engineering Camp](#) *UC Berkeley*
Lecturer and Mentor

I co-organized one of the Self-Driving Cars workshops, where I got to teach the girls about sensing, planning, and control in autonomous driving, and work together on experimenting with an Evo robot.

August 2018 [AI4ALL](#) *UC Berkeley*
Teaching Assistant

I mentored a team of underrepresented high school students as they learned to train a deep reinforcement learning agent in MuJoCo.

- 2018–present **Berkeley Artificial Intelligence Research** *UC Berkeley*
Mentor
 I have been meeting up regularly with underrepresented undergraduate students and mentoring them in research and career planning. I helped one student find a robotics summer internship, a research position in robotics lab, and a Master’s position at UC Berkeley.
- 2018–2019 **Women in Computer Science and Engineering** *UC Berkeley*
Mentor
 I mentored early-stage female PhD students in career planning and navigating life at UC Berkeley.
- 2016 **Women in Science and Engineering** *MIT*
Mentor
 I mentored high school girls from the Greater Boston area during monthly sessions designed to introduce them to engineering at MIT.
- 2013–2015 **Educational Studies Program** *MIT*
Lecturer
 I taught courses on “Water Security in Asia”, “Introduction to Probability”, and “Group Theory” to middle school students in the New England region.

Review Activities

- 2023 IEEE Robotics and Automation Letters (RA-L)
- 2021-2022 IEEE Transactions on Robotics (T-RO)
- 2022 IEEE Transactions on Mechatronics (T-MECH)
- 2022-2023 ACM Transactions on Human-Robot Interaction (T-HRI)
- 2020 Nature: Machine Intelligence
- 2020-2024 ACM/IEEE International Conference on Human-Robot Interaction (HRI)
- 2021-2024 IEEE International Conference on Robotics and Automation (ICRA)
- 2021-2022 IEEE International Conference on Intelligent Robots and Systems (IROS)
- 2021, 2023 Robotics: Science and Systems (R:SS)
- 2021-2023 Conference on Robot Learning (CoRL)
- 2023 Learning for Dynamics & Control Conference (L4DC)
- 2021-2023 Companion of the International Conference on Human-Robot Interaction (HRI Pioneers)
- 2021-2022 Companion of the Robotics: Science and Systems (RSS Pioneers)
- 2022 Workshop on Progress and Challenges in Building Trustworthy Embodied AI (NeurIPS)
- 2022 Workshop on Collaborative Robots and the Work of the Future (ICRA)
- 2022 Workshop on Gamification and Multiagent Solutions (ICLR)
- 2021 Cooperative AI at Conference on Neural Information Processing Systems (NeurIPS)
- 2019 Adaptive & Multitask Learning at International Conference on Machine Learning (ICML)