

Dylan P. Losey

Contact

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Research Interests

I am interested in human-robot interaction, learning from humans, and control theory.

During my graduate and postdoctoral studies, I developed a novel formalism for *personalizing* robots that collaborate with human partners. My approach lies at the intersection of mechanical engineering and computer science: I use control algorithms to enable robots to work alongside humans, and then learn from the resulting interactions to adapt the robot's behavior. I have applied my formalism to robotic rehabilitation and assistive robotics, where personalization is often necessary.

Education

Rice University

Ph.D. in Mechanical Engineering 2018
M.S. in Mechanical Engineering 2016
Research focus: Physical human-robot interaction
Advisor: Marcia K. O'Malley

Vanderbilt University

B.E. in Mechanical Engineering 2014

Research Experience

Stanford University

Postdoctoral Scholar in Computer Science 2019 – Present
Advisor: Dorsa Sadigh

Rice University

NSF Research Fellow 2014 – 2018
Advisor: Marcia K. O'Malley

University of California, Berkeley

Visiting Scholar in Computer Science 2017
Advisor: Anca D. Dragan

Vanderbilt University

Undergraduate Researcher 2013
Advisor: Robert J. Webster III

Honors & Awards

Rice University, Department of Mechanical Engineering
Outstanding Ph.D. Thesis Award 2019

IEEE/ASME Transactions on Mechatronics
Best Paper Award 2017

IEEE Conference on Biomedical Robotics and Biomechatronics
Best Student Paper Award, Finalist 2016

National Science Foundation Graduate Research Fellowship	2014
Rice University Graduate Research Fellowship	2014
Vanderbilt University Dynamics & Controls Award	2014
Vanderbilt University Cornelius Vanderbilt Scholarship	2010

Journal Papers

9. **Dylan P. Losey**, Krishnan Srinivasan, Ajay Mandlekar, Animesh Garg, and Dorsa Sadigh, "Controlling assistive robots with learned latent actions," *IEEE Robotics and Automation Letters*, 2020 (in review).
8. **Dylan P. Losey**, Andrea Bajcsy, Marcia K. O'Malley, and Anca D. Dragan, "Physical interaction as communication: Learning robot objectives online from human corrections," *The International Journal of Robotics Research*, 2020 (in review).
7. **Dylan P. Losey** and Marcia K. O'Malley, "Learning the correct robot trajectory in real-time from physical human interactions," *ACM Transactions on Human-Robot Interaction*, 2019 (in press).
6. **Dylan P. Losey**, Laura Blumenschein, Janelle Clark, and Marcia K. O'Malley, "Improving short-term retention after robotic training by leveraging fixed-gain controllers," *Journal of Rehabilitation and Assistive Technologies Engineering*, vol. 6, pp. 1-13, 2019.
5. **Dylan P. Losey** and Marcia K. O'Malley, "Enabling robots to infer how end-users teach and learn through human-robot interaction," *IEEE Robotics and Automation Letters*, vol. 4, no. 2, pp. 1956-1963, 2019.
4. **Dylan P. Losey** and Marcia K. O'Malley, "Trajectory deformations from physical human-robot interaction," *IEEE Transactions on Robotics*, vol. 34, no. 1, pp. 126-138, 2018.
3. **Dylan P. Losey**, Craig G. McDonald, Edoardo Battaglia, and Marcia K. O'Malley, "A review of intent detection, arbitration, and communication aspects of shared control for physical human-robot interaction," *Applied Mechanics Reviews*, vol. 70, no. 1, 2018.
2. **Dylan P. Losey**, Andrew Erwin, Craig G. McDonald, Fabrizio Sergi, and Marcia K. O'Malley, "A time domain approach to control of series elastic actuators: Adaptive torque and passivity-based impedance control," *IEEE/ASME Transactions on Mechatronics*, vol. 21, no. 4, pp. 2085-2096, 2016. **Best Paper Award**.
1. Ali Utku Pehlivan*, **Dylan P. Losey***, and Marcia K. O'Malley, "Minimal assist-as-needed controller for upper limb robotic rehabilitation," *IEEE Transactions on Robotics*, vol. 32, no. 1, pp. 113-124, 2016.

Refereed Conference Proceedings

14. Hong Jun Jeon, **Dylan P. Losey**, and Dorsa Sadigh, "anonymous submission," *Robotics: Science and Systems (RSS)*, 2020.
13. Minae Kwon, Erdem Biyik, Aditi Talati, Karan Bhasin, **Dylan P. Losey**, and Dorsa Sadigh, "When humans aren't optimal: Robots that collaborate with risk-aware humans," *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 2020 (accepted).
12. **Dylan P. Losey***, Mengxi Li*, Jeannette Bohg, and Dorsa Sadigh, "Learning from my partner's actions: Roles in decentralized robot teams," *Conference on Robot Learning (CoRL)*, 2019. **Oral Presentation**.

11. Erdem Biyik, Malayandi Palan, Nicholas C. Landolfi, **Dylan P. Losey**, and Dorsa Sadigh, "Asking easy questions: A user-friendly approach to active reward learning," *Conference on Robot Learning (CoRL)*, 2019.
10. **Dylan P. Losey** and Dorsa Sadigh, "Robots that take advantage of human trust," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2019.
9. **Dylan P. Losey** and Marcia K. O'Malley, "Including uncertainty when learning from human corrections," *Conference on Robot Learning (CoRL)*, pp. 123-132, 2018.
8. Andrea Bajcsy, **Dylan P. Losey**, Marcia K. O'Malley, and Anca D. Dragan, "Learning from physical human corrections, one feature at a time," *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 2018.
7. Andrea Bajcsy*, **Dylan P. Losey***, Marcia K. O'Malley, and Anca D. Dragan, "Learning robot objectives from physical human interaction," *Conference on Robot Learning (CoRL)*, pp. 217-226, 2017. **Oral Presentation.**
6. **Dylan P. Losey** and Marcia K. O'Malley, "Effects of discretization on the K-width of series elastic actuators," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 421-426, 2017.
5. Ali Utku Pehlivan, **Dylan P. Losey**, Chad G. Rose, and Marcia K. O'Malley, "Maintaining subject engagement during robotic rehabilitation with a minimal assist-as-needed (mAAN) controller," *IEEE International Conference on Rehabilitation Robotics (ICORR)*, pp. 62-67, 2017.
4. **Dylan P. Losey**, Laura H. Blumenschein, and Marcia K. O'Malley, "Improving the retention of motor skills after reward-based reinforcement by incorporating haptic guidance and error augmentation," *IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob)*, pp. 865-871, 2016.
3. **Dylan P. Losey**, Craig G. McDonald, and Marcia K. O'Malley, "A bio-inspired algorithm for identifying unknown kinematics from a discrete set of candidate models by using collision detection," *IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob)*, pp. 418-423, 2016. **Best Student Paper Award Finalist.**
2. Ben D. Kramer, **Dylan P. Losey**, and Marcia K. O'Malley, "SOM and LVQ classification of endovascular surgeons using motion-based metrics," *Workshop on Self-Organizing Maps (WSOM)*, pp. 227-237, 2016.
1. **Dylan P. Losey***, Peter A. York*, Philip J. Swaney, Jessica Burgner, and Robert J. Webster III, "A flexure-based wrist for needle-sized surgical robots," *SPIE Medical Imaging*, pp. 86711G, 2013.

Teaching & Mentoring

Teaching Assistant

MECH 311: Instrumentation Laboratory

Spring 2016

I served as the head teaching assistant, where I was in charge of teaching twice-weekly classes, developing and updating the curriculum, managing the course logistics, and grading lab reports for this undergraduate class.

MECH 343: Modeling of Dynamic Systems

Fall 2014, 2016

I taught discussion sections, held office hours, and wrote the homework assignments for this undergraduate class. I also gave occasional guest lectures.

MECH 488: Design of Mechatronic Systems

Spring 2017

I mentored students during mechatronic labs, setup and maintained the lab hardware, and graded assignments for this graduate class.

MECH/ELEC 420: Fundamentals of Control Systems Spring 2015
I instructed lab groups as they learned to control an inverted pendulum, and graded assignments for this undergraduate class.

Guest Lectures

COMP/ELEC/MECH 498: Introduction to Robotics Spring 2018
I created and delivered lectures for this graduate class, covering linear control theory and its applications for robotic manipulators.

MECH 343: Modeling of Dynamic Systems Fall 2014, Fall 2018
I wrote and gave lectures on how to draw block diagrams from systems of equations, as well as how to simulate and control dynamical systems.

Graduate Research Mentor

- *Hong Jun Jeon*: Teleoperating assistive robots to perform precise manipulation tasks by combining shared autonomy with intuitive embeddings.
- *Allan Zhou*: Enabling robots to learn collaborative and adaptive behaviors by training with other simulated agents before playing with humans.
- *Minae Kwon*: Developing robots which recognize that humans are not purely rational in scenarios with risk and uncertainty.
- *Krishnan Srinivasan*: Leveraging self-supervised models to learn embeddings that humans can use to control high-dimensional robot arms.
- *Mengxi Li*: Developing algorithms for decentralized multi-robot teams that enable the teammates to communicate via actions.
- *Erdem Biyik, Malayandi Palan, Nicholas C. Landolfi*: Formalizing active learning so that robots ask informative questions that humans can easily answer.

Undergraduate Research Mentor

- *Shoko Sano*: Designing and controlling a torsional haptic rocker that provides tactile feedback to the human wearer.

High School Research Mentor

- *Aditi and Karan*: Creating games for human-robot interaction that provide insight into how robots should model human decision making.

Leadership & Service

Program Committee Member
AAAI Conference on Artificial Intelligence 2019

Editorial Board
Stanford Artificial Intelligence Lab (SAIL) Blog 2019 – Present

TOMODACHI-STEM Mentor Spring 2018
I mentored a female undergraduate student from Japan, and introduced her to robotics and mechatronics research over a five week program at Rice University.

AI4ALL Guest Speaker Summer 2019
I demoed our lab's research in human-robot interaction to female high-school students, and explained how we write code to control robots at Stanford University.

SAIL Undergraduate Mentoring Program Fall 2019
I met monthly with a freshman Stanford undergraduate from an under-represented group, and helped her identify classes & research interests in AI.

Invited Paper Reviews

- International Journal of Robotics Research
- IEEE Transactions on Robotics
- IEEE Robotics and Automation Letters
- IEEE/ASME Transactions on Mechatronics
- ACM Transactions on Human-Robot Interaction
- Conferences including ICRA, RSS, CoRL, IROS, HRI, and ICORR

Invited Talks

Personalizing Robots with Physics and Intelligence (October 2019)

Personalizing Robots with Physics and Intelligence (October 2019)

- MIT – Computer Science & Artificial Intelligence Lab
- Harvard University – Materials Science and Mechanical Engineering
- Boston University – Center for Information & Systems Engineering

Responding to Physical Human-Robot Interaction

- University of Illinois Urbana-Champaign, February 2019 – Department Seminar for Mechanical Engineering and Computer Science
- Stanford University, January 2019 – Robotics Seminar

Grant Writing

Cyber-Human Systems

(In Review)

National Science Foundation

Learning and leveraging conventions in human-robot interaction

I worked with Dorsa Sadigh to develop the research questions and write the proposal.

Mission Connect

(Awarded)

TIRR Memorial Hermann

Providing personalized robotic assistance: Learning preferred robot behaviors from surface electromyography

I introduced and developed the project idea, and led the proposal writing.

National Robotics Initiative

(Awarded)

National Science Foundation

Wearable Multi-Scale Haptics

I edited sections related to my research, and added relevant citations and background.

Press

Stanford AI Blog

[Controlling Assistive Robots with Learned Latent Actions](#)

The Batch

[Robotic Control, Easy as Apple Pie](#)

Stanford AI Blog

[Learning from My Partners Actions: Roles in Decentralized Robot Teams](#)

Tech Xplore

[A User-Friendly Approach for Active Reward Learning in Robots](#)

AI: Hype vs. Reality Podcast

[AI On The Job: Robot Co-Workers](#)

Futurity

[Gentle Nudges Teach Robots to Better Assist Us](#)

Berkeley AI Research Blog

[Learning Robot Objectives from Physical Human Interaction](#)

Robohub Podcast
[CoRL 2017 Selected Interviews](#)
Wired
[What is a Robot?](#)

References

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