Kayleigh "Kaleb" Bishop

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Research Interests

I am interested in researching embodied computational models of human behavior, especially perceptual, linguistic, and social skills. Using knowledge of how humans perceive and operate on the world and the social beings around them can inform the creation of more intelligent, adaptive, and communicative systems. I am particularly interested in the potential application of these skills in the creation of **socially assistive robotics** and **educational robotics**. My other interests include human-robot interaction, natural language processing, artificial intelligence, and social learning across cultures.

Education

University of Colorado at Boulder — Boulder, CO
Ph.D. in Computer Science, Advisors: Bradley Hayes & Alessandro Roncone — 2020–Current

Yale University — New Haven, CT
B.S. in Cognitive Science, GPA: 3.92/4.00 — 2016–2020

- Magna Cum Laude; Honors in the Major
- Concentration: Mind and Computation
- Thesis: "Towards Flexible Referring Expression Generation for a Collaborative Robot," Advisor Brian Scassellati

Research Positions

University of Colorado at Boulder — Boulder, CO
Graduate Research Assistant — Fall 2020—Current
Human Interaction & Robotics Group *and* Collaborative AI and Robotics Lab

Yale University — New Haven, CT
Undergraduate Research Assistant — Fall 2017—Spring 2020
Yale Social Robotics Lab

Publications

[1] K. Bishop, B. Hayes, and A. Roncone, "Teaching grounded reading skills via an interactive robot tutor", presented at the Workshop on Robots for Learning, 2021 ACM International Conference on Human-Robot Interaction, Mar. 2021.

Mentorship & Teaching

- **Senior Advising Fellow** at Matriculate — 2018—2020
  Non-profit college advising for low-income high school students
- **First-year Counselor** at Yale University — 2019—2020
  Academic and residential advisor to first-year students
- **Yale Summer Session Counselor** at Yale University — Summer 2019
  Residential advisor to high school students in summer course program

- **Computer Science Tutor** at Yale University 2018—2019
  Artificial Intelligence (CPSC470) and Data Structures & Programming Techniques (CPSC223)
- **ONEXYS Mathematics Leader** at Yale University Summer 2017
  Teaching college math fundamentals for incoming Yale students from low-income backgrounds

Scholarships and Awards

- Chancellor's Fellowship, University of Colorado at Boulder 2020–2021
- Richard U. Light Fellowship, Yale University 2018
- Nathan Hale Scholarship, Yale University 2016–2017

Skills

- **Programming:** Python, C/C++, Java, Lisp
- **ML & CV libraries:** PyTorch, Tensorflow, SciPy, OpenCV, Panda
- **Robotics misc.:** ROS, Webots, PyBullet, Flask

Languages

- **Spanish:** Advanced I
- **Korean:** Intermediate II

Projects

- **Towards equitable robot tutoring: an intersectional analysis of human-robot interaction in racially diverse classrooms, 2021-present** *(ongoing); with Alessandro Roncone, Ph.D. and Tiera Tanksley, Ph.D.* We investigate the potential of autonomous pedagogical interventions for students from racially minoritized backgrounds. More specifically, this work will evaluate the performance of AI partners with early middle school Students of Color from low-income urban districts within the context of small group tutoring, with the goal of providing foundational insights on the specific needs of underserved students. Our long-term goal is to design and deploy socially and intellectually engaging AI partners that support both content learning and the development of constructive learning behaviors that will prepare students for their continuing educational careers.

- **Teaching Grounded Language Skills via an Interactive Robot Tutor, 2021-present** *(ongoing); with Bradley Hayes, Ph.D. and Alessandro Roncone, Ph.D.* We propose and develop a classroom-based social robot tutoring system that targets reading comprehension skills using methods inspired by successful embodied reading pedagogical practices. This system will incorporate skill tracing of comprehension skills in order to identify problem areas, and to help students ground their reading in concrete experiences.

- **Grounded Natural Language for Collaborative Robotics; Undergraduate thesis project, 2019-2020.** *with Jake Brawer and Brian Scassellati, Ph.D.* Social and communicative barriers between humans and robots limit human-robot collaboration from reaching the fluency and intuitiveness of human-human interactions. I helped to address this limitation by creating a cognitively-inspired semantic grounding model for language generation, based largely on recent work in psychophysics and psycholinguistics. I collected a corpus of original referring expression data from human participants and analyzed it to ensure the model was based on sound and consistent principles of human speech. This model allowed the robot to dynamically generate natural and informative requests for tools and other task-relevant objects from a human partner.

- **Lights! Camera! Action! Learning a Lighting Policy for Robot Photography; CPSC490 Building Interactive Machines, Fall 2020.** I collaborated with two other undergraduates to design an autonomous lighting adjustment system for a robot photographer. The system utilizes deep reinforcement learning to learn how to adjust studio lighting for portrait-taking based on the environment, camera pose, and subject pose.

- **Network controller for the Baxter robot; Yale Social Robotics Lab, Spring 2019.** Our lab worked in collaboration with a New York-based research laboratory on a novel cognitive architecture. My primary contribution was the creation of a Flask-based controller that allowed our local robot to receive data and instructions from our partner lab's remote server and translate them to environment models and joint commands for our local Baxter robot.

- **Exploring robots as team-builders; Yale Social Robotics Lab, Fall 2018.** I led data extraction and analysis for the preliminary phase of a mentor's project exploring the role of social robots as boosting team cohesion and psychological safety. I also assisted in planning the next round of trials, including adjusting the algorithmic approaches of the autonomous system.