Eley Ng

CONTACT

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SUMMARY

5+ years of experience in applying ML (Transformers, generative models) to robot learning and deploying real robot systems with human in the loop.

EDUCATION

Stanford University — Stanford, CA
PhD in Mechanical Engineering (Robotics) — Sept. 2019 – June 2023
Advisor: Monroe Kennedy, **Committee**: Dorsa Sadigh, Mac Schwager

Stanford University — Stanford, CA
MS in Mechanical Engineering — Sept. 2017 – June 2019

University of Texas at Austin — Austin, TX
BS in Mechanical Engineering, Top 5% of Class — Aug. 2013 – May 2017

RELEVANT EXPERIENCE

Diffusion Co-Policy for Human-Robot Collaboration
• Developed a diffusion Transformer-based robot policy via imitation learning to predict human and robot action trajectories, executing robot actions in a model predictive control framework.
• Achieved 10-20% improvement on the collaborative table carrying task success state-of-the-art learning methods for human-robot collaborative table-carrying, in both simulation and real robot experiments.
• Demonstrated compelling robot behaviors, such as shared task understanding and leadership (e.g. pivoting to prevent obstacle collision).
• Led, executed, and managed all project stages to completion within 5 months, including ideation, simulation, real robot setup, model training/evaluation, experimentation, and technical communication.

Sampling Waypoint Predictions for a Cooperative Planner
• Developed a learned, sampling-based planner with a Variational Recurrent Neural Network (VRNN) for generating waypoint trajectories.
• Designed and executed human-in-the-loop experiments that showed 10-40% improvement in task success rate over non-learning methods, and a Turing Test that demonstrated perceived human-likeness of generated trajectories.

Learning Sampling Distributions for States and Joint Actions
• Developed a model-based reinforcement learning framework using learned models of long-horizon human-robot actions and task dynamics.
• Implemented behavior recognition models with various generative models in PyTorch, including mixture density recurrent networks, VAEs, and VQVAEs.

PUBLICATIONS	[5] **E. Ng**, Z. Liu, and M. Kennedy. Diffusion Co-Policy for Synergistic Human-Robot Collaborative Tasks. *IEEE Robotics and Automation Letters (RA-L), 2023.*

[4] **E. Ng**, Z. Liu, and M. Kennedy. It Takes Two: Learning to Plan for Human-Robot Cooperative Carrying. *IEEE International Conference on Robotics and Automation (ICRA), 2023.*

[3] **E. Ng**, Z. Liu, and M. Kennedy. Learning Action and State Sampling Distributions for Human-Robot Collaboration. *Workshop on Learning from Diverse, Offline Data, Robotics: Science and Systems (RSS), 2022.*

[2] G. E. Gorospe Jr., M. J. Daigle, S. Sankararaman, C. S. Kulkarni, and **E. Ng**. GPU accelerated prognostics. *Annual Conference of the PHM Society, 2017.*

[1] S. Yang, **E. Ng**, and N. Lu. Indium Tin Oxide (ITO) serpentine ribbons on soft substrates stretched beyond 100%. *Extreme Mechanics Letters, 2015.*

WORK EXPERIENCE

Amazon Robotics, Boston, MA   Sept - Dec 2023
Applied science internship with the Robotic Manipulation Group under Erica Aduh and Dr. Taskin Padir. Developed diffusion-based visuo-motor policies with 3D perception on real robots for scooping from cluttered bins.

NASA Ames, Mountain View, CA   Jun - Aug 2017
Research internship with the Diagnostics and Prognostics Group in the Intelligent Systems Division under Christopher Teubert.

Intel Corporation, Hillsboro, OR   Jun - Aug 2016
Mechanical design internship on Project Alloy in the New Technology Group.

Oregon State University, Corvallis, OR   Jun - Aug 2015
Research Internship in soft robotic actuators under Dr. Yiğit Mengüç.

Sandia National Laboratories, Albuquerque, NM   Jun 2014 - Jun 2015
Internship in computational finite element analysis under Dr. Michael Pasik.

SKILLS

Programming *Proficient*: Python, MATLAB, Bash; *Familiar*: C++
Data Science NumPy, Matplotlib, SciPy, scikit-learn, Pandas
Learning PyTorch, PyTorch Lightning, AWS, Hydra
Robotics/HW ROS, Open AI Gym, UR5e/Robotiq/Locobot, Zivid/Realsense

AWARDS & GRANTS

Joel H. Ferziger Memorial Fellowship	2020-2023
Human-Centered AI (HAI) Seed Grant	2020
NSF Graduate Research Fellowship	2017
UT Austin Leadership Collaborative Award	2017

	Undergraduate Research Fellowship	2014
	SanDisk Engineering Scholarship	2013
	2nd Place National Winner, Toshiba Science Competition	2012

TEACHING

CS 339R (ME 326): Collaborative Robotics   Winter 2022

Teaching Assistant, Stanford University. *Average student rating: 4.25/5.00.*

ENGR 15: Dynamics   Fall 2021

Teaching Assistant, Stanford University. *Average student rating: 4.33/5.00.*

MENTORING

Ziang Liu (PhD CS, Cornell), Bryn M. Hughes (BS CS, Stanford), J.D. Kelly (BS EE, Stanford), Ahad Rauf (ME PhD, Stanford)

OUTREACH

Stanford Mechanical Engineering Women's Group   2020 – Present
Co-organize Women's Seminar Series (ENGR 311A) with regular attendance of 30, Dine with Professor events.

Research Mentor, SURI Program   2019 - 2020
Mentored undergraduates on developing an American Sign Language app.

WME President, VP, Outreach Chair   2014 - 2017
Sought and secured $8,500 (1000% increase in funding, starting from a budget deficit) from corporate sponsors in 2016 as club president. Coordinated a series of speakers from industry and academia for weekly meetings, outreach, and recruitment events.

MEUAB Nominated Member   2016 - 2017
Selected by the department to serve on the UT Austin Mechanical Engineering Undergraduate Advisory Board to discuss and implement department and curriculum changes with faculty of Mechanical Engineering.