XIJIA "POLINA" ZHANG

zhang.xijia@gatech.edu 🎓 Xijia Zhang 🔇 xijia.me in Xijia Polina Zhang 🔿 Annivia

INTERESTS

My research revolved around enabling humans and robots to communicate and understand each other's intentions. My current interest broadly lies in human-robot interaction, explainable artificial intelligence, RLHF, natural language processing, and collaborative decision making.

EDUCATION

Georgia Institute of Technology Ph.D. in Robotics	Aug.	2024 – May	. 2029
University of Michigan B.S.E in Computer Science	Sep.	2022 – May	. 2024
Shanghai Jiao Tong University B.S.E in Electrical and Computer Engineering	Sep.	2020 – Aug	. 2024
PUBLICATIONS			
 [1] <u>"Explaining Agent Behavior with Large Language Models"</u> Z Xijia Zhang, Yue Guo, Simon Stepputtis, Katia Sycara, Joseph Campbell 		IROS Wor	rkshop
 [2] "Understanding Your Agent: Large Language Models for Behavior Explan Zhang Xi-Jia, Yue Guo, Simon Stepputtis, Katia Sycara, Joseph Campbell 	ation" 🖸	s (in submi	ission)
[3] <u>"Learning Effective Action Advising in the Face of Changing Rewards"</u> Yue Guo, Zhang Xi-Jia , Simon Stepputtis, Joseph Campbell, Katia Sycara		CoLLAs	(Oral)
[4] "Sensor Array Optimization for the Electronic Nose via Different Deep Lea Xijia Zhang*, Tao Wang*, Wangze Ni, Yongwei Zhang, Wen Lv, Min Zeng, Rui Zhan, Guang Li, Zhiqiang Hong, Zhi Yang	arning M Jianhua Sensora	$\frac{\text{fethods}^{"}}{\text{Yang, Nanta}}$	ao Hu, ors: B

Research Experience

Leveraging Large Language Models for Behavior Explanation	June. 2023 - Nov. 2023
Advisor: Katia Sycara	Carnegie Mellon University

- **Objectives**: Explain the reasoning behind agent decisions to human counterparts. Generate natural language explanations for an agent's behavior based only on observations of states and actions.
- **Contributions**: Established a framework that generates natural language explanations for an agent's behavior based only on observations of states and actions; Distilled agents' policy into locally interpretable models and retrieved behavior representations injected into text prompts; Assessed the framework using different policies and goal states collected through policy rollouts, and evaluated the accuracies of the explanations in terms of policy-agnostic metrics; Conducted empirical experiments and designed user studies to verify that this framework generates plausible explanations with minimum hallucination; Leveraged the framework to predict next actions through natural language interactions to show its ability of reasoning over and explaining agent behaviors. [1] [2]

Learning Effective Action Advising in the Face of Changing Rewards May. 2023 - Apr. 2024 Advisor: Katia Sycara Carnegie Mellon University

- **Objectives**: In the context of *Action Advising*, where a teacher possessing a pre-trained policy advises a student with its actions calculated from the student's observations, allow the teacher to learn by observing the student and adapt to unfamiliar environments with different reward structures.
- Contributions: Conduct sim-to-real transfer for reinforcement learning policies on real-world Khepera robots; Train a transition model that predicts next states based on current state and action; Run reward adaptation experiments in *CoppeliaSim* and the transition environment. [3]

Theory-of-Mind and Belief Maintenance in Human Environments Advisor: Joyce Chai

- Objectives: Introduce a dataset of ego-centric scenarios recorded from a real-world robot navigating in human environments. This dataset aims to present the challenges of perspective-taking on a robot co-situated with humans, focusing on scenarios where humans alter the location and state of objects.

Contributions: Facilitate the collection of sensory data across visual, auditory, and motional dimensions on a real-world TIAGO robot; Configure the robot to execute basic movements such as grasping, picking, and placing; Enable the robot to execute motions based on keyboard inputs; Designed scripts and gathered multi-modal data through teleoperating the robot in real-world.

Enhancing Performance of the E-Nose through Deep Learning Sep. 2021 - May. 2023 Advisor: Zhi Yang Shanghai Jiao Tong University

- **Objectives**: Enhance the performance of the electronic nose using deep learning methods.
- Contributions: Applied Convolutional Neural Network Modeling, Recurrent Neural Network Modeling, and classical machine learning models to analyze the sensor signals for identifying gas components and deducing gas concentrations; Investigated sensor array optimization and quantified the overall performance under various array sizes; Designed an optimization criterion that assesses the advantages of adjusting sensor quantities. [4]

SKILLS

Robot Operating System, Linux, Docker, RLlib Toolchain C/C++, Python, Matlab, Mathematica, LATEX, Elm Programming Languages Frameworks & Libraries Gym, NLTK, Transformers, Pytorch, Scikit-Learn, OpenAI

HANDS-ON ROBOTICS

TIAGo – Human-like mobile manipulator robot

Configure the robot to execute basic movements such as grasping, picking, and placing; Facilitate the collection of sensory data across visual, auditory, and motion paradigms; Develop programs to direct the end-effector towards regions marked with ArUco identifiers; Enable the robot to execute motions based on keyboard inputs and, through voice-to-text processing, recognize and act upon spoken commands.

Khepera IV – Compact mobile robot with rotational capability May. 2023 - Aug. 2023

Coordinate with the Vicon system to track the robot's position and velocity; Conduct sim-to-real transfer for reinforcement learning policies.

Fetch – Human-like mobile manipulator robot

Enable robot movement using keyboard inputs and ensure obstacle avoidance with radar feedback.

Jan. 2023 - Apr. 2023

Sep. 2022 - Apr. 2024

Jan. 2023 - Apr. 2024

University of Michigan

Honors & Awards

Sep. 2024	Robotics Fellowship	Georaia Institute of Technology
Mar. 2024	James B. Angell Scholar	University of Michigan
Apr. 2023	Member – Michigan Gamma	Tau Beta Pi Engineering Honor Society
Dec. 2023	Dean's List	University of Michigan
Apr. 2023	Dean's List	University of Michigan
Dec. 2022	Dean's List	University of Michigan
Feb. 2021	Honorable Mention	The Mathematical Contest in Modeling
May. 2021	Chun-Tsung Scholarship	Shanghai Jiao Tong University
Oct. 2021	Rongchang Innovation Scholarship Nomination	Shanghai Jiao Tong University
Nov. 2021	Silver Medal	The University Physics Contest (UPC)

COURSE WORK

EECS 595 Natural Language Processing	A+
ROB 498 Robot Learning for Planning and Control	A
EECS 367 Introduction to Autonomous Robotics	А
EECS 281 Data Structures and Algorithms	А