

XIJIA ZHANG

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INTERESTS

My undergraduate research revolved around enabling humans and robots to communicate and understand each other's intentions. My general interest lies in human-robot interaction, with a current focus on the intersection of robotics and natural language processing.

EDUCATION

University of Michigan

B.S.E Computer Science

Sep. 2022 – May. 2024

GPA: 3.9/4.0

Shanghai Jiao Tong University

B.S.E Electrical and Computer Engineering

Sep. 2020 – Aug. 2024

GPA: 3.5/4.0

PUBLICATIONS

[1] [“Explaining Agent Behavior with Large Language Models”](#) 

Xijia Zhang, Yue Guo, Simon Stepputtis, Katia Sycara, Joseph Campbell

IROS Workshop

[2] [“Understanding Your Agent: Leveraging Large Language Models for Behavior Explanation”](#) 

Xijia Zhang, Yue Guo, Simon Stepputtis, Katia Sycara, Joseph Campbell

ICLR; in submission

[3] [“Learning Effective Action Advising in the Face of Changing Rewards”](#)

Yue Guo, Xijia Zhang, Simon Stepputtis, Joseph Campbell, Katia Sycara

IJCAI; to be submitted

[4] [“Sensor Array Optimization for the Electronic Nose via Different Deep Learning Methods”](#) 

Xijia Zhang*, Tao Wang*, Wangze Ni, Wen Lv, Yongwei Zhang, Min Zeng, Jianhua Yang, Yanjie Su, Nantao Hu, Zhi Yang

Sensors and Actuators: B; in submission

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 - Present

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

Jan. 2023 - Present

University of Michigan

- **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

Advisor: Zhi Yang

Sep. 2021 - May. 2023

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

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

HANDS-ON ROBOTICS

TIAGo – Human-like mobile manipulator robot

Sep. 2022 - Present

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

Jan. 2023 - Apr. 2023

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

HONORS & AWARDS

23 Winter	Dean's List	University of Michigan
22 Fall	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	China National Encouragement Scholarship	Ministry of Education of China
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	A
EECS 281 Data Structures and Algorithms	A