

# XIJIA “POLINA” ZHANG

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## INTERESTS

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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

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**Georgia Institute of Technology** Aug. 2024 – May. 2029  
*Ph.D. in Robotics*


**University of Michigan** Sep. 2022 – May. 2024  
*B.S.E in Computer Science*

**Shanghai Jiao Tong University** Sep. 2020 – Aug. 2024  
*B.S.E in Electrical and Computer Engineering*


## PUBLICATIONS

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[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 *IJCAI (in submission)*

[3] [“Learning Effective Action Advising in the Face of Changing Rewards”](#)  
Yue Guo, **Xijia Zhang**, Simon Stepputtis, Joseph Campbell, Katia Sycara *CoLLAs (in submission)*

[4] [“Sensor Array Optimization for the Electronic Nose via Different Deep Learning Methods”](#)   
**Xijia Zhang\***, Tao Wang\*, Wangze Ni, Yongwei Zhang, Wen Lv, Min Zeng, Jianhua Yang, Nantao Hu, Rui Zhan, Guang Li, Zhiqiang Hong, Zhi Yang *Sensors and Actuators: B*

## RESEARCH EXPERIENCE

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**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** Jan. 2023 - Present  
Advisor: Joyce Chai 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** 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

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Toolchain	Robot Operating System, Linux, Docker, RLLib
Programming Languages	C/C++, Python, Matlab, Mathematica, L <sup>A</sup> T <sub>E</sub> X, Elm
Frameworks & Libraries	Gym, NLTK, Transformers, Pytorch, Scikit-Learn, OpenAI

## HANDS-ON ROBOTICS

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**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

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23 Winter	Dean's List	<i>University of Michigan</i>
22 Fall	Dean's List	<i>University of Michigan</i>
Feb. 2021	Honorable Mention	<i>The Mathematical Contest in Modeling</i>
May. 2021	Chun-Tsung Scholarship	<i>Shanghai Jiao Tong University</i>
Oct. 2021	Rongchang Innovation Scholarship Nomination	<i>Shanghai Jiao Tong University</i>
Nov. 2021	China National Encouragement Scholarship	<i>Ministry of Education of China</i>
Nov. 2021	Silver Medal	<i>The University Physics Contest (UPC)</i>

## COURSE WORK

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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