

# Tao, Yiran (Elaine)

Tel: 412-216-6754 Email: [yirantao@andrew.cmu.edu](mailto:yirantao@andrew.cmu.edu)

Personal Webpage: [yirantao1000.github.io](https://yirantao1000.github.io)

## Education

<b>Carnegie Mellon University (CMU)</b> , Pittsburgh, PA, US	Aug. 2023 - Aug. 2025 (expected)
<ul style="list-style-type: none"><li><b>Master of Science in Robotics (MSR)</b></li></ul> Advisor: Prof. Zackory Erickson	<b>GPA: 4.0/4.0</b>
<b>Wuhan University (WHU)</b> , Wuhan, China	Sept. 2019 - Jun. 2023
<ul style="list-style-type: none"><li>Bachelor of Engineering in Computer Science and Technology</li></ul>	<b>GPA: 3.87/4.0</b>
<ul style="list-style-type: none"><li>Bachelor of Arts in English</li></ul>	<b>GPA: 3.86/4.0</b>
<b>Harvard College</b> , Cambridge, MA, US	Jan. 2022- May. 2022
<ul style="list-style-type: none"><li><b>Visiting Undergraduate Student Program(Concentration on Computer Science)</b></li></ul>	<b>GPA: 4.0/4.0</b>
<ul style="list-style-type: none"><li><b>Co-enrolled in Massachusetts Institute of Technology (MIT)</b></li></ul>	<b>GPA: 5.0/5.0</b>

### Awards:

LuoJia Excellent Overseas Communication Scholarship of Wuhan University	2022
First-class Excellent Student Scholarship of Wuhan University (top 5%)	2021
Yugang-Songxiao Special Scholarship of Wuhan University (top 1%)	2021
Runner-up, Crowd Counting Track, ICCV 2021 VisDrone Challenge	2021

## Publications

- Yiran Tao**, Guixiu Qiao, Dan Ding, Zackory Erickson. "Incremental Learning for Robot Shared Autonomy". submitted to ICRA 2025.
- Yiran Tao**, Jehan Yang, Dan Ding, Zackory Erickson. "LAMS: LLM-Driven Automatic Mode Switching for Assistive Teleoperation". submitted to HRI 2025.
- Yiran Tao**, Yaosi Hu, Zhenzhong Chen. "Memory-Guided Representation Matching for Unsupervised Video Anomaly Detection". Journal of Visual Communication and Image Representation, 2024.
- Weijian Ruan\*, **Yiran Tao**\*, Linjun Ruan, Xiujun Shu, Yu Qiao. "Temporal Weighting Appearance-Aligned Network for Nighttime Video Retrieval". IEEE Signal Processing Letters, 2022.
- Yiran Tao**, Yaosi Hu, Zhenzhong Chen. "Learn to Look Around: Deep Reinforcement Learning Agent for Video Saliency Prediction". IEEE International Conference on Visual Communications and Image Processing, 2021.

## Research Experience

**RA, Robotic Caregiving and Human Interaction Lab, CMU** Pittsburgh, PA, US  
Advisor: Prof. **Zackory Erickson** (CMU)

**Project 1: Incremental Learning for Robot Shared Autonomy** Oct. 2023-Jul. 2024

- Developed a Incrementally Learned Shared Autonomy framework that improves a learning-based shared control policy through continual user interactions, eliminating the need for expert demonstrations.
- Implemented the method on a Kinova robotics arm and conducted quantitative ablation studies.
- Organized and conducted a user study subject to a university-approved IRB protocol with 20 participants.
- Submitted a first-author academic paper to ICRA 2025.

**Project 2: LLM-Driven Automatic Mode Switching for Assistive Teleoperation** May 2024-Sep. 2024

- Developed an LLM-driven framework for automatic mode switching to facilitate the control of high-DoF robotic arms with low-DoF controllers, eliminating the need for task-specific demonstrations or predefined heuristics.
- Implemented the method using a single joystick on an Xbox controller to control a Kinova robotic arm.
- Organized and conducted a user study subject to a university-approved IRB protocol with 10 participants.
- Submitted a first-author academic paper to HRI 2025.

**RA, Visual Computing Group, Harvard University**

Cambridge, MA, US

Advisor: Prof. **Hanspeter Pfister** (Harvard University)**Semi-supervised Edge-Guided Cell Instance Segmentation for Embryo Images** Mar. 2022-Dec. 2022

- Implemented baseline methods to analyze key morphokinetic features of human embryos, including fragmentation grading, developmental stage classification, and instance segmentation of cells.
- Developed a semi-supervised edge detection model that uses labeled data to capture typical embryo edge patterns and aligns unlabeled data with these patterns, improving cell instance segmentation performance.

**RA, Intelligent Information Processing Lab, Wuhan University**

Wuhan, China

Advisor: Prof. **Zhenzhong Chen** (Wuhan University)**Project 1: Memory-Guided Representation Matching for Unsupervised Video Anomaly Detection**

Dec.2021-Jun. 2022

- Developed a novel model for unsupervised video anomaly detection by capturing normal event patterns and identifying anomalies based on mismatches in event representations.
- Introduced two protocols: pseudo-label generation and anomalous event generation, to facilitate learning under strict unsupervised settings. The model outperformed state-of-the-art methods.
- Published a first-author academic paper in Journal of Visual Communication and Image Representation.

**Project 2: Crowd Counting for UAV RGB-T Images (ICCV 2021 Challenge)**

May 2021-Jul. 2021

- Analyzed the data distribution of a UAV RGB-T dataset for crowd counting.
- Designed a novel model to extract multiscale features from different modalities and generate adaptive crowd density maps for crowd counting.
- Ranked 1<sup>st</sup> and 2<sup>nd</sup> on two metrics in the Crowd Counting Track of VisDrone 2021 Challenge at ICCV 2021, receiving the Runner-Up team award.

**Project 3: Video Saliency Prediction with Deep Reinforcement Learning**

Aug. 2020-Jun. 2021

- Developed a reinforcement learning agent using deep Q-network to generate frames with highly correlated information for saliency prediction, enhancing temporal information extraction.
- Applied the proposed agent to state-of-the-art models without deconstructing their structures, improving their performance to achieve state-of-the-art saliency prediction accuracy.
- Published a first-author academic paper in IEEE VCIP 2021.

**RA, Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences** Shenzhen, ChinaAdvisor: Dr. **Weijian Ruan** (Shenzhen Institute of Advanced Technology, Chinese Academy of Sciences)**Nighttime Video-based Person Re-identification**

Aug. 2021-Dec. 2021

- Built a dataset for video-based person re-identification during nighttime, ensuring accurate representation of complex nighttime scenarios distinct from existing daytime datasets.
- Developed a temporal weighting appearance-aligned model that aligns features across video frames and assigns weights based on frame quality to enhance video representations.
- Published a co-first author academic paper in IEEE Signal Processing Letters.

**Teaching Experience****Tutor of High School Mathematics**, Wuhan, China

May 2019- May 2021

- Tutored high school students twice a week for two academic years, fostering a genuine interest in mathematics.
- Organized key concepts and tailored problem sets to each student's academic level, providing personalized guidance through the solution process.

**Skills**

<b>Programming</b>	Python, Java, C/C++, R language, Matlab, ROS, Pytorch, Tensorflow, Linux
<b>English</b>	TOEFL: Total 108 (Reading 29, Listening 28, Speaking 25, Writing 26) GRE: Verbal 157, Quantitative 170, AW 4.0
<b>Other Languages</b>	Chinese (Native), Japanese (Intermediate), French (Intermediate), Spanish (Elementary)