Tao, Yiran (Elaine)

Tel: 412-216-6754 Email: yirantao@andrew.cmu.edu
Personal Webpage: yirantao1000.github.io

Education

Carnegie Mellon University (CMU), Pittsburgh, PA, US — Aug. 2023 - Aug. 2025 (expected)
- **Master of Science in Robitics (MSR)** — **GPA: 4.0/4.0**
  Advisor: Prof. Zackory Erickson

Wuhan University (WHU), Wuhan, China — Sept. 2019 - Jun. 2023
- Bachelor of Engineering in Computer Science and Technology — **GPA: 3.87/4.0**
- Bachelor of Arts in English — **GPA: 3.86/4.0**

Harvard College, Cambridge, MA, US — Jan. 2022- May. 2022
- **Visiting Undergraduate Student Program(Concentration on Computer Science)** — **GPA: 4.0/4.0**
- **Co-enrolled in Massachusetts Institute of Technology (MIT)** — **GPA: 5.0/5.0**

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. "Learn to Look Around: Deep Reinforcement Learning Agent for Video Saliency Prediction". IEEE International Conference on Visual Communications and Image Processing, 2021.
- 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. "Memory-Guided Representation Matching for Unsupervised Video Anomaly Detection". Journal of Visual Communication and Image Representation, 2024.

Research Experience

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

Project 1: Incremental Learning forRobot 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 1st and 2nd 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, China
Advisor: 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

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