Peihong Yu

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peihong-yu

Research Interests

I currently work in the field of **Reinforcement Learning**, with a focus on **Multi-Agent RL**. My research aims to improve **training efficiency** and **generalizability**, enabling autonomous agents to learn effectively and perform robustly across diverse scenarios. I also work on **VLM**s and **VLA**s for robust robotic manipulation and grounding in real-world environments. In addition, I explore **RLHF**, particularly in learning from multi-dimensional preferences to balance multi-faceted criteria in decision-making. My experience extends to **3D Reconstruction** and Simultaneous Localization and Mapping (**SLAM**).

Education

2019–Present **University of Maryland, College Park**, *Maryland, United States*
PhD Student in Computer Science.
Advisor: Pratap Tokekar

2016–2020 **University of Chinese Academy of Sciences**, *Shanghai, China*
(Associated program with **ShanghaiTech University**)
Master of Science in Engineering, Communication and Information Systems.
Advisors: Jingyi Yu, Laurent Kneip

2012–2016 **Shanghai University**, *Shanghai, China*
Bachelor of Engineering, Computer Science and Technology
Ranking: 10/285

Employments

Summer 2023 **Research Intern, Multi-Agent Reinforcement Learning** at *SRI International, CVT*.
Advised by Aswin Raghavan.

- Developed a robust multi-agent coordination framework by integrating historical observations and communications into a unified Common Operating Picture (COP), demonstrating significant improvements in policy robustness to out-of-distribution scenarios (Published in CoRL OOD Workshop 2023)

Summer 2022 **Research Intern, 3D Computer Vision/Machine Learning (PhD)** at *Meta Reality Lab*.
Advised by True Price.

- Developed a novel permutation-equivariant network architecture for robust pose graph optimization and achieved reliable convergence with poor initializations, addressing critical challenges in large-scale 3D reconstruction and mapping).

Publications

* denotes equal contribution.

DC @ AAMAS'25 **Learning with Less Effort: Efficient Training and Generalization in (Multi-)Robot Systems**
Peihong Yu.
Doctoral Consortium at International Conference on Autonomous Agents and Multi-Agent Systems, 2025

AAMAS'25 **TACTIC: Task-Agnostic Contrastive pre-Training for Inter-Agent Communication.**
Peihong Yu, Manav Mishra, Syed Zaidi, and Pratap Tokekar.
International Conference on Autonomous Agents and Multi-Agent Systems, 2025 [Paper Link]

TMLR'25 **Beyond Joint Demonstrations: Personalized Expert Guidance for Efficient Multi-Agent Reinforcement Learning.**
Peihong Yu, Manav Mishra, Alec Koppel, Carl Busart, Priya Narayan, Dinesh Manocha, Amrit Singh Bedi, and Pratap Tokekar.
Transactions on Machine Learning Research, 2025. [Paper Link]

OOD @ CoRL'23 **Enhancing Multi-Agent Coordination through Common Operating Picture Integration.**
Peihong Yu, Bhoram Lee, Aswin Raghavan, Supun Samarasekara, Pratap Tokekar, James Zachary Hare.
First Workshop on Out-of-Distribution Generalization in Robotics at CoRL 2023. [Paper Link]

IEEE Access'20 **Accurate Line-Based Relative Pose Estimation with Camera Matrices.**
Peihong Yu, Cen Wang, Zhirui Wang, Jingyi Yu, and Laurent Kneip.
IEEE Access, 2020. [Paper Link]

ICCV'17 **Ray Space Features for Plenoptic Structure-from-Motion.**
Yingliang Zhang, Peihong Yu, Wei Yang, Yuanxi Ma, and Jingyi Yu.
IEEE International Conference on Computer Vision, 2017. [Paper Link]

ICCP'17 **The Light Field 3d Scanner.**
Yingliang Zhang, Zhong Li, Wei Yang, Peihong Yu, Haiting Lin, and Jingyi Yu.
IEEE International Conference on Computational Photography, 2017. [Paper Link]

Preprints

* denotes equal contribution.

In Submission **Sketch-to-Skill: Bootstrapping Robot Learning with Human Drawn Trajectory Sketches.**
Peihong Yu*, Amisha Bhaskar*, Anukriti Singh, Zahiruddin Mahammad, and Pratap Tokekar.
[Paper Link]

In Submission **VARP: Reinforcement Learning from Vision-Language Feedback with Agent Regularized Preferences**
Amisha Bhaskar, Anukriti Singh, Peihong Yu*, Souradip Chakraborty, Ruthwik Dasyam, Amrit Singh Bedi, and Pratap Tokekar.

In Submission **Equitable Optimization Across Preferences: A Maximinimalist Approach to Persistent Monitoring with Preference-based Reinforcement Learning.**
Manav Mishra, Peihong Yu, Sujit PB, Pratap Tokekar.

Preprint **On the Sample Complexity of a Policy Gradient Algorithm with Occupancy Approximation for General Utility Reinforcement Learning.**
Anas Barakat, Souradip Chakraborty, Peihong Yu, Pratap Tokekar, Amrit Singh Bedi.
Arxiv, 2024. [Paper Link]

Preprint **Insta-RS: Instance-wise Randomized Smoothing for Improved Robustness and Accuracy.**
Chen Chen, Kezhi Kong, Peihong Yu, Juan Luque, Tom Goldstein, Furong Huang.
Arxiv, 2021. [Paper Link]

Professional Services

Reviewer ICRA 2023, ICLR 2025, RA-L 2025.
Mentoring AI4ALL Summer Program at UMD.

Technical Skills

Languages Python, C++, Matlab
Librarys PyTorch, Tensorflow, PyMARL, RLlib, Stable Baseline 3, OpenAI Gym
Other Tools ROS, Gazebo, Unreal Engine