

# PEIHONG YU

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## RESEARCH INTERESTS

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Multi-agent Reinforcement Learning, Simultaneous Localization and Mapping (SLAM), 3D Reconstruction, Robotics, Computer Vision

## EDUCATION

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**University of Maryland, College Park**, Maryland, US  
*PhD student in Computer Science*

*Sep. 2019 - Present*  
Advisor: [Pratap Tokekar](#)

**University of Chinese Academy of Science**, Shanghai, China  
(Associated program with **ShanghaiTech University**)  
*Master of Science in Engineering, Communication and Information Systems*

*Sep. 2016 - Jun. 2020*

Advisors: [Jingyi Yu](#), [Laurent Kneip](#)

**Shanghai University**, Shanghai, China  
*Bachelor of Engineering, Computer Science and Technology*

*Sep. 2012 - Jun. 2016*  
Ranking: 10/285

## PUBLICATIONS

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**Expert Guided Multi-Agent Reinforcement Learning in Sparse Reward Environments.** In submission.  
*Peihong Yu*, Amrit Singh Bedi, Alec Koppel, Brian Sadler, and Pratap Tokekar.

**Accurate Line-Based Relative Pose Estimation with Camera Matrices.** In *IEEE Access*, 2020.  
*Peihong Yu*, Cen Wang, Zhirui Wang, Jingyi Yu, and Laurent Kneip.

**Ray Space Features for Plenoptic Structure-from-Motion.** In *ICCV*, 2017.  
Yingliang Zhang, *Peihong Yu*, Wei Yang, Yuanxi Ma, and Jingyi Yu.

**The Light Field 3d Scanner.** In *ICCP*, 2017.  
Yingliang Zhang, Zhong Li, Wei Yang, *Peihong Yu*, Haiting Lin, and Jingyi Yu.

## RESEARCH EXPERIENCES

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**Research Scientist Intern, 3D Computer Vision/Machine Learning (PhD)**  
Advisor: *True Price*

Meta Reality Lab, Seattle  
*Jun. 2022 - Dec. 2022*

- **Learning Pose-Graph Optimization**

- Proposed to utilize permutation-equivariant network for large-scale pose graph optimization when the initialization is bad or contains false-positives.

**Research Assistant**

Advisor: *Pratap Tokekar*

University of Maryland, College Park  
*Jun. 2020 - Present*

- **Expert Guided Multi-Agent Reinforcement Learning in Sparse Reward Environments**

- Proposed to utilize independent expert demonstrations for single agent, which is much easier to collect than cooperative demonstrations, to inspire exploration under multi-agent learning scenarios and help learning meaningful policies more effectively.

**Research Assistant**

Advisor: *Laurent Kneip, Jingyi Yu*

ShanghaiTech University  
*Sep. 2017 - Jun. 2019*

- **Accurate Line-Based Relative Pose Estimation with Camera Matrices**

- Proposed a novel relative pose solver for stereo cameras that solves the problem directly from original measured 2D-2D line correspondences using trifocal tensor geometry.

- Demonstrated the applicability of this approach to the plenoptic case, and realized a powerful, purely line-based relative pose solver for camera matrices.
  - Embedded this plenoptic relative pose solver into a continuous, purely line-based visual odometry pipeline for camera matrices by adding line-based bundle adjustment in the back-end.
- (Accepted by IEEE Access in 2020)

## Research Assistant

Advisor: Jingyi Yu

ShanghaiTech University

Sep. 2016 - Jun. 2017

- **Ray Space Features for Plenoptic Structure-from-Motion**

- Presented a comprehensive theory on ray geometry transforms under light-field pose variations, derived the transforms of three typical ray manifolds across LFs and proposed a novel pose estimation method by matching those manifolds.
  - Validated the theory and framework on synthetic and real data on LFs of different scales, and showed that PSfM technique can significantly improve the accuracy and reliability on traditionally challenging scenes.
- (Accepted by ICCV 2017)

- **The Light Field 3D Scanner**

- Proposed a novel light-field structure-from-motion (SfM) framework which exploits ray manifolds across LFs and a new light-field stereo matching technique which preserves the sharpness of the occlusion boundary.
  - Conducted light-field bundle adjustment for jointly optimization of pose and geometry to obtain high-fidelity 3D reconstruction on topologically complex objects.
- (Accepted by ICCP 2017)

## Research Intern

Advisor: Jingyi Yu

DGene Digital Technology (Shanghai) Co.

Jun. 2016 - Sep. 2016

- **G20 VR Trailer:** participated in the production of the 360° VR trailer for G20 Hangzhou Summit, in which mainly accounted for video synchronization and stitching.
- **Virtual Exhibition:** participated in the virtual exhibition project of the Site of the First National Congress of the Chinese Communist Party, in which mainly accounted for point cloud data collection, fusion and colorization.

## PROJECTS

### Multi-Fidelity Model-Free Reinforcement Learning with Neural Networks

Sep. 2019 - Nov. 2019

- Proposed DDQN-MFRL algorithm, which adopts Double DQN to learn the Q values and uses the running average reward as the transfer indicator. Tested the algorithm on a tow-fidelity simulation environment.

### Cross-view Geo-localization

Sep. 2019 - Nov. 2019

- Examined recent studies in deep-learning-based approaches for cross-view matching on our own synthesized dataset with different settings.

## AWARDS

- **Shanghai Outstanding Graduate**, Shanghai University (Top 1%, 2016)
- **Outstanding Students**, Shanghai University (Top 3%, 2014)
- **1st Place Academic Scholarship**, Shanghai University (Top 10% in specialty, 2015)
- **1st Place Academic Scholarship**, Shanghai University (Top 10% in specialty, 2014)
- **2nd Place National Prize**, Computer Design Competition of Chinese College Students (2015)
- **2nd Place Provincial Prize**, Computer Application Contest of Shanghai College Students (2015)
- **1st Place Prize**, Computer Application Competition of Shanghai University (2014)