

# PEIQI YU

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## EDUCATION

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### **Tsinghua University**

2019.8 - 2023.6

#### ***B.E. in Automation***

GPA: 3.81/4.0 Mentor: Chao Shang, Associate Professor

Major Courses: The Artificial Intelligence, Control Theory, Random Mathematics and Statistics, Signal and System Analysis, Numerical Analysis and Algorithms, Data Structure, Digital Image Processing

### **Carnegie Mellon University**

2023.7 - 2024.2

#### ***Research Intern in Robotics Institute***

Advisor: Changliu Liu, Associate Professor

## PUBLICATIONS

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### **Recovering Realistic Details for Magnification Arbitrary Image Super-Resolution**

2022

#### ***IEEE Transactions on Image Processing***

[\[url\]](#)

Cheng Ma, Peiqi Yu, Jiwen Lu and Jie Zhou

- \* Proposed Implicit Pixel Flow (IPF) to bridge the gap between blurry Implicit Neural Representation(INR) distribution and sharp real-world distribution by assigning pixel-coordinate offsets near blurry edges.
- \* Noticed blockings effects of previous models and proposed using feature aggregation module instead of local ensemble model to avoid blocking effects, largely promoting model performances.
- \* Introduced double constraint strategy and confidence map to ensure the stability of performances.
- \* The first successful method for recovering perceptually-pleasant details in single image super-resolution, outperforming SoTA models.

### **Hierarchical and Multimodal Human-Robot Collaboration**

2023

#### ***IEEE Robotics and Automation Letters (ready to submit in December, 2023)***

[\[url\]](#)

Peiqi Yu, Abulikemu Abuduweili, Ruixuan Liu and Changliu Liu

- \* Developed a multimodal framework enabling efficient collaboration between robots and humans by hierarchically predicting human intentions and adapting to human trajectories.
- \* Integrated vision and speech signals, enhancing the robustness and flexibility of human-robot collaboration.
- \* Proposed hierarchy in both human detection and planning prediction, enhancing the precision and efficiency of human-robot collaboration.
- \* Designed algorithms than endowed the robot with the ability to adapt to different human trajectories and manipulation speeds.

## SELECTED RESEARCH EXPERIENCES

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### **Transformer-based Bayesian Optimization**

2022 - 2023

#### ***Graduation Thesis, Tsinghua University***

Supervisors: Prof.Yilin Mo, Department of Automation, Tsinghua University

Prof.Yanan Sui, School of Aerospace Engineering, Tsinghua University

- \* Proposed using Transformer for Bayesian Optimization(BO) by leveraging its alignment with the sequential decision-making characteristics of Bayesian optimization.
- \* The first to incorporate two mathematical characteristics of BO: translation&rotation invariance and input equivariance into the Transformer network, promoting the accuracy of the network.
- \* Demonstrated an impressive 80% performance improvement compared to state-of-the-art (SoTA) models in few-shot learning.

- \* Combined the applicability of BO with the high-dimensional scalability of Transformer, enhancing the robustness and adaptability, potentially applicable in continuous learning and online learning.

**Learning From the Wild: Imitation Learning From Real Life Demonstrations** 2022  
*Cooperative Research Project, Tsinghua University*

Supervisors: Prof.Yanan Sui, School of Aerospace Engineering, Tsinghua University  
 Prof.Dorsa Sadigh, Department of Computer Science, Stanford University

- \* Designed a Reinforcement Learning framework that enables robots to observe and perform actions through imitation learning on real-life videos.
- \* Considering the diversity of real-life videos, introduced domain adaptation to align robot and human actions during training, promoting robustness and achieving generalization.
- \* To avoid being interfered by moving backgrounds, incorporated optical flow to extract human actions, leading to more effective and precise learning outcomes.

**Wearable Sensor Data-Based Intelligent Sleep Stage Detection** 2021  
*Enterprise Internship Project, Beijing Academy of Blockchain and Edge Computing*

Supervisor: Tianyu Feng, Beijing Academy of Blockchain and Edge Computing

- \* Developed precise sleep-staging algorithms using Support Vector Machines (SVM), Random Forest, and Neural Networks, controlling the prediction error within 5-minutes range.
- \* Proficiently managed a MySQL database, overseeing the storage and retrieval of critical data, including heart rate, temperature, and motion signals.

## ACHIEVEMENTS

**Academic excellence award** 2020  
 Huang Yicong Scholarship (top 3%)  
**Science&technology excellence Award** 2021  
 School Management Scholarship (top 10%)  
**Academic excellence award** 2022  
 National Inspirational Scholarship (top 3%)

## TECHNICAL SKILLS

**Languages** Python, C++, Matlab, L<sup>A</sup>T<sub>E</sub>X  
**Libraries** PyTorch, RosPy, Numpy  
 Matplotlib, Sci-kit, GPytorch  
**Hardware** Kinova, Raspberry Pi  
**Software** Mujoco, ROS, Openai-Gym, MySQL  
**Systems** Ubuntu, Windows

Please visit my homepage for more information: <https://patricia1019.github.io>