

# LEI YAO

Email: rayyoh@hust.edu.cn Homepage: rayyoh.github.io  
Address: No.1037 Luoyu Road, Hongshan, Wuhan, China

## EDUCATION

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**Huazhong University of Science and Technology (HUST)** Wuhan, China  
*Master, Mechanical Engineering* Sep. 2020 - Present  
School of Mechanical Science and Engineering (MSE) GPA: 88.14  
Adviser: Prof. Youping Chen and Assoc. Prof. Dailin Zhang

**Imperial College London (IC)** London, UK  
*Robotic and Artificial Intelligence Winter School* Jan. 2019 - Feb. 2019  
Hamlyn Center  
Organizer: Prof. Guang-Zhong Yang

**Huazhong University of Science and Technology (HUST)** Wuhan, China  
*Bachelor, Measurement and Control Technology and Instruments* Sep. 2016 - Jun. 2020  
School of Mechanical Science and Engineering (MSE) GPA: 87.9  
Thesis: *Research on industrial robot teaching system based on traction force sensor*

## HONORS AND AWARDS

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### National:

- National Scholarship (Top 2%) 2021
- National Encouragement Scholarship 2019

### Inter-school:

- Merit Graduate Student 2021
- Outstanding Graduate Award 2020
- First-class Graduate School Fellowship 2020, 2021
- Outstanding Student Leadership Award 2017, 2019
- GoerTek Scholarship (Sponsored by GoerTek Co., Ltd.) 2019

## RESEARCH EXPERIENCE

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**Robot dynamic nonprehensile manipulation policy learning.** May. 2022 - Present  
*Robotics X Lab, Tencent.*

I served as a research intern responsible for

- Robot nonprehensile manipulation policy learning in MuJoCo using RL algorithms,
- Establishing a robotic manipulation-imitation learning framework, using a combination of DMP and ES algorithms to learn human-like manipulation skill.

**Deep reinforcement learning-based robot assembly.** Aug. 2021 - Present  
*Lab of Prof. Youping Chen and Assoc. Prof. Dailin Zhang, MSE, HUST.*

The project aims at utilizing deep reinforcement learning algorithms to achieve automatic robotic precision assembly.

- Studied deep reinforcement/imitation learning algorithms (DQN, SAC, PPO, GAIL etc.) and posted notes to blogs, [Blog]
- Developed a beginner-oriented BasicRL repository which contained easy and fundamental codes for deep reinforcement learning ,
- Designed a safe deep reinforcement learning algorithm combining DQN and admittance control, which got impressive performance on UR10 for assembly,
- Adopted the open source codes of robosuite to build own simulation environment in PyBullet and tested DRL/IL based skill learning algorithms.

**Intelligent compliant robot platform based on six-axis force sensor.** Dec. 2019 - Aug. 2021  
*Lab of Prof. Youping Chen and Assoc. Prof. Dailin Zhang, MSE, HUST.*

The intelligent robot platform aims at improving the compliance of robot to conduct contact-rich manipulation tasks using tandem six-axis force sensor.

- Assisted in research proposal to apply for a grant (NSFC No.5217051531),
- Designed the structure of the platform and constructed its 3D model by Solid Works,
- Developed the force sensor data visualization and robot control software based Qt which was useful for observing real-time sensor data and controlling the robot on computer 🖥,
- Proposed an integrated method which could provide effective and robust compensation for force disturbance and achieve high measurement accuracy for the six-axis force sensor [1][2],
- Completed the impedance-based compliant control for the robot.

### Machine vision-based classification system.

Mar. 2019 - Jun. 2019

Machine Vision Lab of Assoc. Prof. Wenyong Yu, MSE, HUST.

- Constructed the experimental platform and used MATLAB robot tool box & Arduino to control the robot,
- Studied featured extraction and ML algorithms, then completed the codes of extracting the histogram of directional gradients and grayscale covariance matrix of image, as well as SVM,
- Learnt the writing format of patents and published an invention patent [3].

## PUBLICATIONS

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[1]. L. Yao, Q. Gao, D. Zhang, W. Zhang, and Y. Chen. “An Integrated Compensation Method for the Force Disturbance of a Six-Axis Force Sensor in Complex Manufacturing Scenarios”. *Sensors*. 2021; 21(14):4706. 📄

[2]. D. Zhang, Q. Gao, W. Zhang, L. Yao. Experimental platform and operation method of robot based on tandem six-dimensional force sensor [P]. *Chinese invention patents*, CN113478507A. 2021-10-08. 📄

[3]. W. Yu, L. Yao. A method of automatic waste separation [P]. *Chinese invention patents*, CN110689059A. 2020-01-14. 📄

## COMPETITIONS

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1. The **Third Prize** of the *China Postgraduate Robot Innovation and Design Competition*.
2. The **Third Prize** of *Mathematical Modeling in Central China*.

## TEACHING AND INDUSTRY EXPERIENCE

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### Teaching:

Teaching assistant of Theory of Machines and Mechanisms(III)

Spring 2021

### Industry:

Summer Internship at Shenzhen MIRAN Technology Co., Ltd.

Jul. 2019-Aug. 2019

## SKILLS

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### Theory:

Robotics; Machine learning; Engineering control; Mechanical principles; Sensor technology.

### Tools:

Python; Pytorch; MuJoCo; ROS; Markdown; MATLAB; C++; Qt; PyBullet; LaTeX; JavaScrip; CAD; Solid Works.

## ACTIVITIES AND VOLUNTEERING

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Wuhan Metro Volunteer Team

Volunteer

Oct. 2017-Dec. 2019

China College Students Internet+ Innovation and Entrepreneurship Competition

Volunteer

Oct. 2016

The Organization Department of the Communist Youth League of HUST

Assistant

Sep. 2016-Sep. 2017