

# Kai Lu

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## EDUCATION

### University of Oxford (OX)

Oxford, UK

*Ph.D. Candidate in Computer Science, Supervisor: Prof. Andrew Markham*

*Oct. 2020 - Present*

- Focus: Embodied AI, Robot Learning, 3D Robotics, Reinforcement Learning

### Tsinghua University (THU)

Beijing, China

*B.Eng. in Automation with Outstanding Graduate Honor*

*Aug. 2016 - Jul. 2020*

- Thesis: QP-WBC for Humanoid Robot Motion Control, *Advisor: Prof. Mingguo Zhao*
- Academics: Student Research Assistant in Computer Science, *Advisor: Prof. Huaping Liu*
- Admission: Selected to Tsinghua Leading Talent Program

### University of Illinois Urbana-Champaign (UIUC)

Champaign & Durham, USA

### & Duke University (Duke)

*Visiting Student at IML Lab in Computer Science, Supervisor: Prof. Kris Hauser*

*Jul. 2019 - Sep. 2019*

- Project: Deformable Object Modeling and Manipulation

## PUBLICATIONS

### Learning Generalizable Manipulation Policy with Adapter-Based Parameter Fine-Tuning

In Submission

*Kai Lu, Kim Tien Ly, William Hebbard, Kaichen Zhou, Ioannis Havoutis, Andrew Markham*

### See, Imagine, Plan: Discovering and Hallucinating Tasks from a Single Image

Tech. Report 2024

*Chenyang Ma, Kai Lu, Ta-Ying Cheng, Niki Trigoni, Andrew Markham*

### Learning to Catch Reactive Objects with a Behavior Predictor

ICRA 2024

*Kai Lu, Jia-Xing Zhong, Bo Yang, Bing Wang, Andrew Markham*

### Decoupling Skill Learning from Robotic Control for Generalizable Object Manipulation

ICRA 2023

*Kai Lu, Bo Yang, Bing Wang, Andrew Markham*

### Dynpoint: Dynamic neural point for view synthesis

NeurIPS 2023

*Kaichen Zhou, Jia-Xing Zhong, Sangyun Shin, Kai Lu, Yiyuan Yang, Andrew Markham, Niki Trigoni*

### Multi-body SE (3) Equivariance for Unsupervised Rigid Segmentation and Motion Estimation

NeurIPS 2023

*Jia-Xing Zhong, Ta-Ying Cheng, Yuhang He, Kai Lu, Kaichen Zhou, Andrew Markham, Niki Trigoni*

### Weakly Supervised Descriptor Learning for Pixel-Level Feature Matching

Term Report 2021

*Kai Lu, Andrew Markham*

### Semi-Empirical Simulation of Learned Force Response Models for Heterogeneous Elastic Objects

ICRA 2020

*Yifan Zhu, Kai Lu, Kris Hauser*

### Deep Reinforcement Learning for Robotic Pushing and Picking in Cluttered Environment (\*: Co-first Author, Equal Contribution)

IROS 2019

*Yuhong Deng\*, Xiaofeng Guo\*, Yixuan Wei\*, Kai Lu\*, Bin Fang, Di Guo, Huaping Liu, Fuchun Sun*

### A Composite Robotic Manipulator Based on Gripper and Suction Cup

Patent 2019

*Bin Fang, Huaping Liu, Yuhong Deng, Xiaofeng Guo, Kai Lu, Yixuan Wei*

## PROFESSIONAL SERVICES

**Reviewer:** ICRA 2024, NeurIPS 2023, ICLR 2023

**Marker:** Oxford Mathematics Admissions Test (MAT)

## SKILLS

**Machine Learning:** Python, C++/C#, Matlab, PyTorch, Tensorflow

**Robotics Related:** Nvidia Isaac Gym, SAPIEN ManiSkill, RL-Games, ROS, V-REP, Klampt

**Robots:** UR Series, Toyota HSR, UBTECH Walker, Franka Panda, Unitree Aliengo & Z1; RealSense/STM32/Arduino

## RESEARCH EXPERIENCES

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- Collaboration with Oxford Robotics Institute, Oxford, UK** *Jan. 2024 - Apr. 2024*
- Designed a method for generalizable manipulation skill learning using the adapter techniques.
  - Proposed to transfer learned skills to various robotic mobile manipulators e.g., HSR, Aliengo-Z1.
  - Submitted a paper to IROS 2024 (my role: first author).
- Visiting Scholar at vLAR lab, PolyU, Hong Kong, China** *Mar. 2022 - Oct. 2022*
- Designed an RL method for a mobile manipulator to catch reactive objects via a learned behavior predictor.
  - Evaluated the method on catching fixed-trajectory dynamic objects and evasive objects.
  - Published a paper in ICRA 2024 (oral presentation, my role: first author).
- Bachelor Thesis at Robot Locomotion Lab, Tsinghua University, Beijing, China** *Dec. 2019 - Jul. 2020*
- Developed a quadratic programming (QP) based whole-body control (WBC) method.
  - Applied the method to adult-size torque-control Humanoid Robot Tsinghua Walker, realizing balancing, dancing, and ball kicking (my role: thesis author).
- Research Intern at IML Lab, UIUC, Champaign, USA** *Aug. 2019 - Sep. 2019*
- Proposed a semi-empirical method for simulating contact with elastically deformable objects.
  - Published a paper in ICRA 2020 (my role: second author).
- Research Intern at IML Lab, Duke University, Durham, USA** *Jul. 2019 - Aug. 2019*
- Collected data from robotic poking of heterogeneous elastic objects using different probes.
- Tsinghua Team Member in RoboCup 2019 Humanoid League, Sydney, Australia** *Sep. 2018 - Jul. 2019*
- Won the 2nd place in Technical Challenge and Drop-in Contest, the 3rd place in 2v2 Soccer Competition.
  - Applied segmentation and particle filter algorithm for vision-based localization (my role: main developer).
- Research Assistant at State Key Lab in CS, Tsinghua University, Beijing, China** *Apr. 2017 - Jun. 2019*
- Proposed an active robot-picking algorithm using deep reinforcement learning to facilitate the robot actively exploring the environment and picking objects. Published a paper in IROS 2019 (my role: co-first author).
  - Won the first prize in the 37th Tsinghua Challenge Cup, and gave an oral presentation to the United Nations official at the International AI Educational Conference - Tsinghua Exhibition (my role: first author).

## MISC

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- Board Member**, UK Tsinghua Alumni Association (UKTA) *2021 - Present*
- Student Ambassador**, Department of Computer Science, University of Oxford *2021 - 2023*
- Member**, Student Science Society, Department of Automation, Tsinghua University *2017 - 2019*
- Organizer**, C Language Programming Competition, Department of Automation, Tsinghua University *2018*
- Volunteer School Teacher**, Teaching Support Program in Underdeveloped Areas (Taiping Village, China) *2017*

## HONORS

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- Outstanding Graduate Honor**, Department of Automation, Tsinghua University *2020*
- First Prize** (Top 1% of all students), The 37th Tsinghua Challenge Cup Competition *2019*
- Second Place**, Adult-Size Technical Challenge, RoboCup 2019 World Final *2018*
- Champion**, Robotic Innovation Contest, The 20th Chinese Robotics and Artificial Intelligence Competition *2018*
- Tsinghua Leading Talent Program** (Top 1% of all students), Tsinghua University *2016*
- Provincial First Prize** (Top 10 in Province), Chinese Physics Olympiad(CPhO) Provincial Contest *2015*
- Provincial First Prize** (Top 10 in Province), Chinese Mathematical Olympiad (CMO) Provincial Contest *2014*
- Bronze Medal**, China Western Mathematical Olympiad (CWMO) *2014*