

Qingbiao Li

15 JJ Thomson Ave, Cambridge, UK, CB3 0FD

☎ +44 (0) 776-304-7574 | ✉ ql295@cam.ac.uk | 🏠 qingbiaoli.github.io | 🌐 qingbiaoli | 🎓 Qingbiao Li

Education

University of Cambridge

Cambridge, UK

PhD in Computer Science (Supervisor: **Prof Amanda Prorok**)

Oct 2018 - Present

- **Research Interest:** Robot Learning, Multi-robot Path Planning, On-device Learning, Graph Neural Networks (GNNs), Imitation Learning, Reinforcement Learning and Computer Vision (Medical Imaging).
- **Programming Languages:** Python, PyTorch, Tensorflow, PyTorch Geometric, Jax, Jraph, Deep Graph Library, C++.
- **Framework and Simulator:** Unity ML-Agent, Pybullet, Mujoco, Gazebo, AWS Robomaker, RLlib, ROS2 and ROS.

Imperial College London

London, UK

MRes Medical Robotics and Image Guided Intervention (Distinction)

Oct 2017 - Sep 2018

- **Master Thesis** (Supervisor: **Prof Daniel Elson**): Developed a tissue oxygenation monitoring technique using multispectral imaging and conditional generative adversarial networks (cGANs)

The University of Edinburgh

Edinburgh, UK

M. Eng (Hons) Mechanical Engineering (Thesis Supervisor: **Dr Filipe Teixeira-Dias**)

Sep 2013 - June 2016

- **MEng Thesis:** Missile impact on snow inspired by British Antarctic Survey's project.

South China University of Technology

Guangzhou, China

B. Eng. Mechanical Engineering and Automation

Sep 2011 - July 2013

Work Experience

Research Intern in Project Silica

Cambridge, UK

Microsoft Research Cambridge (Supervisor: Dr Ioan Stefanovici & Dr Katja Hofmann)

July 2021 - Oct 2021

Explore explainable RL-based approaches to scheduling in the Silica glass library, towards a scheduler for production deployment.

Research Experience

ROBOTICS

Graph Neural Networks for Decentralized Multi-robot Path Planning

Cambridge, UK

Prorok Lab, University of Cambridge (Supervisor: Dr Amanda Prorok)

Oct 2018 - Present

- The **first** to use graph neural networks (GNNs) for explicit communication between a cooperative multirobot team for motion planning.
- Efficient, collision-free navigation for thousands of agents, using our Message-Aware Graph Attention Networks (MA-GATs): **video**
- Sim2Real for reinforcement learning to navigate robot team through a narrow passage in continuous motion: **video**

Academic Research Internship in Legged Robots

Hangzhou, China

Intelligence Robots Lab, Zhejiang University (Supervisor: Dr Zhibin Li & Qiuguo Zhu)

June 2017 - Sep 2017

- Physical experiment for trajectory planning and generation of bipedal walking in Linear Inverted Pendulum (LIPM) and robust control of bipedal walking via online parameter estimation: **video**.

Research Assistant in Bipedal Walking of Humanoid Robot

Edinburgh, UK

SLMC, The University of Edinburgh (Supervisors: Dr Zhibin Li & Prof Sethu Vijayakumar)

Sep 2016 - June 2017

- Robust control for bipedal locomotion using online Tikhonov regularisation: **video**.

Research Assistant in Industrial Robotics (Funded by Erasmus+)

Hannover, Germany

IFW, Leibniz University of Hanover (Supervisor: Dipl.-Ing Thomas Lepper)

March 2015 - Aug 2015

- Mechanical transmission design for an industrial robotic arm: **video**.

COMPUTER VISION (MEDICAL IMAGING)

Real-time Surgical Environment Enhancement for Robot-Assisted MIS

London, UK

Imperial College London, University of Cambridge (Supervisor: Dr Benny Lo)

Mar 2020 - Sep 2020

- Multi-scale super-resolution Generative Adversarial Network (GAN) for Robot-Assisted Minimally Invasive Surgery.
- Co-supervised Master student, provided academic guidance, revised paper and iterated it as ICRA 2021 paper: **video**

Vision-based Navigation in Flexible Endoscopy

London, UK

Hamlyn Centre, Imperial College London (Supervisor: Dr George Mylonas)

Sep 2017 - Dec 2017

- Customised multiple visual-inertial SLAM methods for endoscope use within the human body: **video**.

Publications

JOURNAL ARTICLES - ROBOTICS & MACHINE LEARNING

Jiajun Cao*, **Qingbiao Li***, Liping Xu, Rui Yang, Yuejin Dai. "Non-parametric Surrogate Model Method for Low-pressure Turbine Exhaust System," *Journal of Engineering for Gas Turbines and Power (JCR Q3, IF 1.209)*, Under Review. 2021

Qingbiao Li, Weizhe Lin, Zhe Liu, Amanda Prorok. "Message-Aware Graph Attention Networks for Large-Scale Multi-Robot Path Planning," *IEEE Robotics and Automation Letters (JCR Q2, IF 3.74)*. 2020. **PDF**

Fernando Gama, **Qingbiao Li**, Ekaterina Tolstaya, Amanda Prorok, Alejandro Ribeiro. "Decentralized Control with Graph Neural Networks," *IEEE Transactions on Signal Processing (JCR Q1, IF 4.931)*

Binyu Wang, Zhe Liu, **Qingbiao Li**, Amanda Prorok. "Mobile Robot Path Planning in Dynamic Environments through Globally Guided Reinforcement Learning," *IEEE Robotics and Automation Letters (JCR Q1, IF 4.931)* pp. 6932–6939. 2020. **PDF**

CONFERENCE PROCEEDINGS - ROBOTICS & MACHINE LEARNING

Benjamin Hudson, **Qingbiao Li**, Matthew Malencia, Amanda Prorok. "Graph Neural Network Guided Local Search for the Traveling Salesperson Problem," *International Conference on Learning Representations (CCF-A, Qualis-A1)*, 2022, **PDF**

Jan Blumenkamp, Steven Morad, Jennifer Gielis, **Qingbiao Li**, Amanda Prorok. "A Framework for Real-World Multi-Robot Systems Running Decentralized GNN-Based Policies," *IEEE International Conference on Robotics and Automation (CCF-B, Qualis-A1)*, 2021

Jan Blumenkamp, **Qingbiao Li**, Amanda Prorok. "Evaluating the Sim-to-Real Gap of Graph Neural Network Policies for Multi-Robot Coordination," *IEEE International Conference on Robotics and Automation (CCF-B, Qualis-A1)*, *Real World Swarms Workshop*, 2021, **PDF**

Qingbiao Li, Fernando Gama, Alejandro Ribeiro, Amanda Prorok. "Graph Neural Networks for Decentralized Multi-robot Path Planning," *IEEE/RSJ International Conference on Intelligent Robots and Systems (CCF-C, ERA-A, Qualis-A1)*, 2020, **PDF**

Qingbiao Li, Fernando Gama, Alejandro Ribeiro, Amanda Prorok. "Graph Neural Networks for Decentralized Path Planning," *International Conference on Autonomous Agents and MultiAgent Systems (ERA-A, Qualis-A1)*, 2020, **PDF**

Qingbiao Li, Iordanis Chatzinikolaïdis, Yiming Yang, Sethu Vijayakumar, Zhibin Li. "Robust Foot Placement Control for Dynamic Walking using Online Parameter Estimation," *IEEE-RAS 17th International Conference on Humanoid Robotics (Humanoids) (ERA-C, Qualis-B2)*, 2017, **PDF**

JOURNAL ARTICLES - COMPUTER VISION

Weizhe Lin, Indigo Orton, **Qingbiao Li**, Gabriela Pavarini, Marwa Mahmoud. "Looking At The Body: Automatic Analysis of Body Gestures and Self-Adaptors in Psychological Distress," *IEEE Transactions on Affective Computing (JCR Q1, IF 10.506)*. Springer, 2020. **PDF**

Qingbiao Li, Jianyu Lin, Neil T Clancy, Daniel S Elson. "Estimation of Tissue Oxygen Saturation from RGB Images and Sparse Hyperspectral Signals based on Conditional Generative Adversarial Network," *International Journal of Computer Assisted Radiology and Surgery (JCR Q3, IF 2.924)*. pp. 987–995. Springer, 2019. **PDF**

CONFERENCE PROCEEDINGS - COMPUTER VISION

Ruoxi Wang, Dandan Zhang, **Qingbiao Li**, Xiao-Yun Zhou, Benny Lo. "Real-time Surgical Environment Enhancement for Robot-Assisted Minimally Invasive Surgery Based on Super-Resolution," *IEEE International Conference on Robotics and Automation (CCF-B, Qualis-A1)*, 2021, **PDF**

Qingbiao Li, Xiao-Yun Zhou, Jianyu Lin, Jian-Qing Zheng, Neil T Clancy, Daniel S Elson. "Estimation of Tissue Oxygen Saturation from RGB Images based on Pixel-level Image Translation," *The Hamlyn Symposium on Medical Robotics*, 2018, **PDF**

Invited Talks

Message-Aware Graph Attention Networks for Large-Scale Multi-Robot Path Planning

April. 2021

University of Pennsylvania, Philadelphia, United States

From Graph Neural Networks to Decentralized Multi-Robot Path Planning

Dec. 2020

Zhejiang University, Hangzhou, China

Graph Neural Networks for Decentralized Path Planning

Dec. 2019

Robotics X Tencent, Shenzhen, China

Honors & Awards

Travel Award

2021

Conference on Robot Learning

Wiseman Prize

2020

Department of Computer Science and Technology, University of Cambridge

Subsystem Excellence Award at Hyperloop Pod Competition

2016

Space Exploration Technologies Corporation

International Student Scholarship

2013-2016

The University of Edinburgh

Community Activities

Contributing to Chinese Documentation of Deep Graph Library (GDL)

2020

Department of Computer Science and Technology, University of Cambridge

Journal/Conference Reviewer

2017-Present

T-RO, Autonomous Robots (AURO), RA-L, IROS, ICRA, RA-L, AAMAS

Skills and Language Proficiency

Courses and Software MOOC Certificate, AutoCAD, PTC Creo, Microsoft Office, DaVinci Resolve, MATLAB, ￼x
Chinese Mandarin (Native), Cantonese (Intermediate)

English Proficient

German Basic (Passed A2)