

Qingbiao Li

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Education

University of Cambridge

Cambridge, UK

PhD in Computer Science (Supervisor: **Dr 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++.

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

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

Autonomous Robots, T-RO, RA-L, IROS, ICRA, RA-L, AAMAS

Skills and Language Proficiency

Courses and Software MOOC Certificate, AutoCAD, PTC Creo, Microsoft Office, DaVinci Resolve, MATLAB, \LaTeX

Chinese Mandarin (Native), Cantonese (Intermediate)

English Proficient

German Basic (Passed A2)