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 mulispectral 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 inspried 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 continous 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 Chatzinikolaidis, 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, LaTeX
Chinese Mandarin (Native), Cantonese (Intermediate)
English Proficient **German** Basic (Passed A2)