

Keyan Miao

University College, University of Oxford, OX1 4BH

☎ (+44) 7410195979 | ✉ keyan.miao@eng.ox.ac.uk | 🏠 kymiao.github.io | 🎓 Keyan Miao

Research Interests

My research lies at the intersection of **machine learning and control theory**, focusing on **learning for control** and **control for learning** to improve the performance and reliability of machine learning models. I am particularly interested in **generative modeling**, where I incorporate **dynamical structure and constraints** (e.g., stability and safety) into learning and decision-making for applications including robotics and biological systems.

Education

D.Phil. University of Oxford

Oxford, UK

DEPARTMENT OF ENGINEERING SCIENCE: CONTROL GROUP

2021.10 - 2026.06

- Supervised by **Prof. Antonis Papachristodoulou** and **Dr. Konstantinos Gatsis**
- Funded by EPSRC DTP& Univeristy of Oxford (Oxford-Ashton Memorial Graduate Scholarship)
- Visiting researcher at ETH Zurich, Switzerland (2025.02 - 2025.07): hosted by **Prof. Andreas Krause** at AI center, funded by **NCCR Automation Exchange Fellowship**

M.Sc. Imperial College London

London, UK

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING: CONTROL SYSTEMS

2019.09 - 2020.09

- Award: Outstanding Achievement: Control Systems MSc & Hertha Ayrton Centenary Prize (Best Project)
- Supervised by **Prof. Richard Vinter**
- Overall GPA: 83.02/100 Graduation Project: 84.90/100 Distinction
- Ranking: Top 1
- Main Courses: Game Theory, Optimization, System Identification, Discrete-time System and Computer Control

B.Eng. Northwestern Polytechnical University

Xi'an, Shaanxi

COMPUTER SCIENCE AND TECHNOLOGY (2015.09 - 2016.09)

2015.09 - 2019.06

DETECTION, GUIDANCE AND CONTROL (2016.09 - 2019.06)

- Award: Outstanding Graduation Thesis
- Overall GPA: 89.8/100 Major GPA: 92.88/100 Graduation Project: 96.8/100
- Ranking: 2 (Top 1 based on major courses)
- Main Courses: Automatic Control Theory, Modern Control Theory, Complex Analysis, Linear Algebra, Discrete Mathematics, Digital Electronics, Analog Electronics

Honors & Awards

2026	Gold Reviewer , ICML	Seoul, South Korea
2025	NCCR Automation Fellowship , NCCR Automation	Zurich, Switzerland
2023	G-Research November 2023 Grant Winners , G-Research	Oxford, UK
2021	Research Studentship & Oxford-Ashton Memorial Graduate Scholarship , University of Oxford	Oxford, UK
2020	Prize for Outstanding Achievement in the Control Systems Master of Science , Department of Electrical and Electronic Engineering, Imperial College London	London, UK
2020	Hertha Ayrton Centenary Prize (Best Project) , Department of Electrical and Electronic Engineering, Imperial College London	London, UK
2019	Outstanding Graduation Thesis , Northwestern Polytechnical University	Xi'an, Shaanxi
2018	First Prize Scholarship , Northwestern Polytechnical University	Xi'an, Shaanxi
2017	Provincial Second Prize (String Quintets <Spring>) , The 5th China Undergraduate Art Exhibition	Xi'an, Shaanxi

Publications

- [1] Jingyi Huang, **Keyan Miao**, Kostas Margellos, and Paul Goulart. Accelerating neural network training with augmented koopman dynamics. In *under review*, 2026
- [2] **Keyan Miao**, Han Wang, Xuda Ding, Konstantinos Gatsis, Andreas Krause, and Antonis Papachristodoulou. Learning koopman representations with controllability guarantees. In *The Fourteenth International Conference on Learning Representations (ICLR)*, 2026
- [3] Zuxun Xiong, Zhenyi Yuan, **Keyan Miao**, Han Wang, Jorge Cortes, and Antonis Papachristodoulou. Data-enabled predictive control for nonlinear systems based on a koopman bilinear realization. In *2025 IEEE 64th Conference on Decision and Control (CDC)*. IEEE, 2025
- [4] Han Wang*, **Keyan Miao***, Diego de S. Madeira, and Antonis Papachristodoulou. Designing neural controllers with optimality and stability guarantees by learning input-output dissipativity. *Automatica to appear*, 2025
- [5] **Keyan Miao**, Liqun Zhao, Han Wang, Konstantinos Gatsis, and Antonis Papachristodoulou. Opt-ODENet: Neural ode controller design with differentiable optimization layers for safety and stability. In *Learning for Dynamics and Control Conference (L4DC)*. PMLR, 2025
- [6] Liqun Zhao, **Keyan Miao**, Hongpeng Cao, Konstantinos Gatsis, and Antonis Papachristodoulou. Nlbac: A neural ode-based algorithm for state-wise stable and safe reinforcement learning. *Neurocomputing*, 2025
- [7] **Keyan Miao** and Konstantinos Gatsis. How deep do we need: Accelerating training and inference of Neural ODEs via control perspective. In *Proceedings of the 41st International Conference on Machine Learning (ICML)*, 2024
- [8] **Keyan Miao** and Konstantinos Gatsis. Towards optimal network depths: Control-inspired acceleration of training and inference in Neural ODEs. In *The Symbiosis of Deep Learning and Differential Equations III, NeurIPS*, 2023
- [9] **Keyan Miao** and Konstantinos Gatsis. Learning robust state observers using Neural ODEs. In *Learning for Dynamics and Control Conference (L4DC)*, pages 208–219. PMLR, 2023
- [10] **Keyan Miao** and Richard Vinter. Optimal control of a growth/consumption model. *Optimal Control Applications and Methods*, 42(6):1672–1688, 2021

Experience

ECOPT (Smart Agriculture Startup)

Shanghai, China

CO-FOUNDER & TECHNICAL LEAD

2025.06 – Present

- Co-founded ECOPT, a startup developing AI-driven plant modelling and intelligent greenhouse control systems.
- Led R&D efforts on machine learning and control-based models for predicting plant growth and optimizing environmental regulation.
- Currently seeking investment; established collaborations with the Chinese Academy of Sciences and Shenzhen Academy of Agricultural Sciences on pilot projects.

Advanced Institute of Information Technology, Peking University

Hangzhou, Zhejiang

RESEARCH INTERN

2021.04 - 2021.07

- Worked on the forward and inverse kinematics of manipulators, especially inverse kinematics, including the pieper method, Cyclic Coordinate Descent, Forward and Backward Reach Inverse Kinematics.

Presentation

ETH AI Center Post-Doctoral Fellowship Symposium

Virtual

<WHEN CONTROL THEORY MEETS MACHINE LEARNING: TOWARDS RELIABLE AND EFFICIENT AI>

Feb. 2026

Co-PI Seminar by University of California, San Diego (UCSD)

San Diego, US

<LEARNING NEURAL CONTROLLERS WITH OPTIMALITY AND STABILITY GUARANTEES USING INPUT-OUTPUT DISSIPATIVITY>

Jun. 2025

UKACC 2024 PhD Showcase

London, UK

PRESENTER FOR <BRIDGING CONTROL AND LEARNING VIA NEURAL ODES>

Jul. 2024

Supervision

Nilesh Balu

MASTER STUDENT (w/ H. WANG AND L. LINDEMANN)

ETH Zurich

Spring 2026

- Project: Safe Flow Matching Using Control Barrier Functions.

Jingyi Huang

DPHIL STUDENT

University of Oxford

Spring 2026

- Project: Accelerating NN training with Augmented Koopman Operators.

Professional Service

Journal Reviewer

IEEE Transactions on Automatic Control; Artificial Intelligence; Nonlinear Dynamics; International Journal of Robust and Nonlinear Control

Conference Reviewer

International Conference on Machine Learning (ICML); Advances in Neural Information Processing Systems (NeurIPS); Learning for Dynamics and Control Conference (L4DC); European Control Conference (ECC); IEEE Conference on Decision and Control (CDC); American Control Conference (ACC)

Extracurricular Activity

Oxford Women in Computer Science Society

MEMBER

Oxford, UK

2022.09 - now

Hertford College Music Society - Orchestra

MEMBER / VIOLINIST

Oxford, UK

2022.09 - 2025.01