

# Chunyang Zhang

PH.D. CANDIDATE · SCHOOL OF ENGINEERING AND INFORMATION TECHNOLOGY · UNIVERSITY OF NEW SOUTH WALES

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## Education

### University of New South Wales

Canberra, Australia

DOCTOR OF PHILOSOPHY (PH.D.)

2024.01 - Ongoing

- Major Concentration - Computer Science
- Supervisor - Prof. Dr. Daoyi Dong
  - Professor of ANU College of Engineering, Computing and Cybernetics
  - Fellow of the IEEE and Future Fellow of the Australian Research Council
- Supervisor - Dr. Huadong Mo
  - Senior Lecturer of School of Engineering and Information Technology

### Beihang University

Beijing, China

MASTER OF ENGINEERING (M.E.)

2020.09 - 2023.06

- Major Concentration - Control Science and Engineering
- Supervisor - Prof. Dr. Qing Gao
  - Professor of School of Automation Science and Electrical Engineering
  - Chief Scientist of Key R&D Plan of Ministry of Science and Technology
- Supervisor - Prof. Dr. Jinhu Lü
  - Vice President of Beihang University
  - Dean and Professor of School of Automation Science and Electrical Engineering
  - Fellow of the IEEE/CAA/ORSC/CICC
- GPA - 3.59/4.0
- Rank - 10/128

### Beijing Institute of Technology

Beijing, China

BACHELOR OF SCIENCE (B.S.)

2016.09 - 2020.07

- Major - Mechatronics Engineering
- Supervisors - Prof. Dr. Derong Chen and Prof. Dr. Yuxin Xu
- GPA - 3.51/4.0
- Rank - 3/30

## Personal Statement

Over the past several years, my main focus has been on intelligent control theory in nonlinear systems, deep learning-based anomaly detection for various sensory data, and distributed optimization for robust operation. Currently, I am pursuing a fully-funded Ph.D. at the University of New South Wales. Along my academic journey, I have made contributions to the field, including authoring six journal papers and presenting four conference papers.

## Research Interests

- [1] Deep Learning with Its Application to Anomaly Detection
- [2] Safe Reinforcement Learning and Distributed Optimization
- [3] Intelligent Control Theory

## Research Experiences

### University of New South Wales

Canberra, Australia

PH.D. RESEARCH

2022.08 - Ongoing

- **Deep Learning for Anomaly Detection [Ongoing Project]**
  - Deep learning for anomaly detection: A survey
  - Encoder-decoder-based Transformer and Masked autoencoder
  - Knowledge distillation and ensemble learning
  - Generative probabilistic diffusion model
  - Multi-scale message passing graph neural network

### Beihang University

Beijing, China

GRADUATE RESEARCH

2022.01 - Ongoing

- **Safe Reinforcement Learning and Optimal Control [Ongoing Project]**
  - Model-based and policy-based learning algorithm
  - Constrained Markov decision process with long-term safety and theoretical convergence
  - Bi-level partial differential equations constrained optimization

• **Deep Learning for Partial Differential Equations**

- Deep learning for partial differential equations: A survey
- Neural operator learning
- Message passing graph neural networks
- Inverse design and system identification

**Beihang University and Beijing Institute of Technology**• **Robust Control Approach of Stochastic Partial Differential Systems**

- Robust parallel controller design and Stability analysis

• **Universal Integral Sliding-Mode Control of General Nonlinear ODE Systems**

- Robust control design via piecewise affine linear models and Universal controller problem

**Selected Publications [10]****JOURNAL ARTICLES (PUBLISHED) [3]**

1. **Chunyang Zhang**, Qing Gao, Michael V. Basin, et al. "Robust control of multi-line re-entrant manufacturing plants via stochastic continuum models", *Early Access in IEEE Transactions on Automation Science and Engineering*, 2023, DOI: 10.1109/TASE.2023.3305308, LINK: <https://ieeexplore.ieee.org/document/10227338>.
2. **Chunyang Zhang**, Dianjun Gong, Qing Gao, et al. "A fuzzy integral sliding-mode parallel control approach for nonlinear descriptor systems", *Information Science*, 2022, 615: 491 - 503, DOI: <https://doi.org/10.1016/j.ins.2022.10.035>.
3. **Chunyang Zhang**, Qing Gao, Jinhu Lü, et al. "An integral sliding-mode parallel control approach for general nonlinear systems via piecewise affine linear models", *International Journal of Robust and Nonlinear Control*, 2023, 33(8): 4438 - 4458, DOI: <https://doi.org/10.1002/rnc.6617>.

**CONFERENCE PAPERS (PUBLISHED) [4]**

4. **Chunyang Zhang**, Qing Gao, Kexin Liu, et al. "Dynamic sliding-mode control for piecewise affine systems", in *Proceedings of the Chinese Automation Congress, IEEE*, 2020: 5196 - 5201.
5. **Chunyang Zhang**, Qing Gao, Peng Zhang, et al. "Integral sliding-mode control of piecewise linear systems", in *Proceedings of the 39th Chinese Control Conference, IEEE*, 2020: 416 - 421.
6. Wangbo Gao, **Chunyang Zhang**, Qing Gao, et al. "A dynamic robust control approach of hyperbolic nonlinear PDE systems", in *Proceedings of the 41st Chinese Control Conference, IEEE*, 2022: 2478 - 2483.
7. Jingyi Li, **Chunyang Zhang**, and Qing Gao. "Fuzzy integral sliding-mode parallel tracking control approach for a class of nonlinear systems", in *Proceedings of the 42nd Chinese Control Conference, IEEE*, 2023: 2536 - 2541.

**CHINESE PATENTS (ISSUED) [3]**

8. Qing Gao, **Chunyang Zhang**, Jinhu Lü, and Kexin Liu, "Integral sliding-mode control method, device and equipment for control system", *Patent for An Invention*, 2020-07-02, Patent Number: ZL 2020 1 0634111.3.
9. Qing Gao, **Chunyang Zhang**, and Jinhu Lü, "Fuzzy dynamic integral sliding-mode control strategy for re-entrant industrial manufacturing systems", *Patent for An Invention*, 2022-04-12, Patent Number: ZL 2022 1 0024338.5.
10. Jinhu Lü, Qing Gao, and **Chunyang Zhang**, "A hierarchical control methodology for re-entrant manufacturing systems", *Patent for An Invention*, 2022-10-22, Patent Number: ZL 2022 1 1015438.8.

**Technical Skills**

**Programming** Python, C++, C, MatLab, LaTeX, Pycharm, Clion  
**Platform & IoT Hardware** Pytorch, JAX, Tensorflow, Ubuntu, Shell, ROS

**Honors & Awards**

2023.09 - 2027.01	<b>University International Postgraduate Award</b> , University of New South Wales	Canberra, Australia
2023.06	<b>Outstanding Thesis Award</b> , Beihang University	Beijing, China
2023.06	<b>Excellent Master Graduate</b> , Beihang University	Beijing, China
2020.09 - 2023.06	<b>First Class Graduate Fellowship</b> , Beihang University	Beijing, China
2017.09 - 2019.06	<b>National Encouragement Scholarship</b> , Beijing Institute of Technology	Beijing, China
2018.12	<b>Champion of Formula Student Autonomous China</b> , Beijing Institute of Technology	Guangdong, China
2016.08 - 2020.07	<b>First Class Undergraduate Fellowship</b> , Beijing Institute of Technology	Beijing, China

**Declaration**

The above statements are true to the best of my knowledge and belief  
 PLACE: BEIJING, CHINA

Date: January 18, 2024  
 Yours Faithfully

*Chunyang Zhang*  
 (Chunyang Zhang)