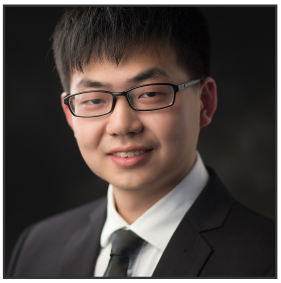

Zhao **FENG**

Mechatronic Engineering · Ph.D

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Summary

From July 2025, I become an associate professor in the School of Robotics, Wuhan University. From November 2022 to July 2025, I was an associate professor in the School of Power and Mechanical Engineering, Wuhan University, and joint the Advanced Robotics and Intelligent Control Laboratory (ARIC). I received the B.S degree from the School of Power and Mechanical Engineering, Wuhan University, China in June 2014, and PH.D. degree of Mechatronic Engineering from the School of Power and Mechanical Engineering, Wuhan University, China in June 2020. I also studied at the Department of Electrical and Computer Engineering, National University of Singapore (NUS), Singapore, for one year as a joint PhD student. From October 2020 to October 2022, I was a research fellow sponsored by the UM Macao Postdoctoral Associateship (UMPA) at the Department of Electrical and Computer Engineering, Faculty of Science and Technology, University of Macau. My research interests include mechanical design and precision control of piezoelectric nanopositioning systems, robot learning and control. My website can be found here (`https://mefengzhao.github.io/`).

Experience

Wuhan University — *School of Robotics*

Associate Professor — *2025.07 - now*

Wuhan University — *School of Power and Mechanical Engineering*

Associate Professor — *2022.10 - 2025.07*

University of Macau (Supervisor: Prof. Feng WAN) — *Department of Electrical and Computer Engineering*

Research Fellow (UM Macao Postdoctoral Associateship) — *2020.10 - 2022.10*

Wuhan University (Supervisor: Prof. Xiaohui XIAO) — *School of Power and Mechanical Engineering*

PhD in Mechatronic Engineering — *2014.09 - 2020.06*

National University of Singapore (Supervisor: Prof. Tong Heng LEE and Prof. Kok Kiong TAN) — *Department of Electrical and Computer Engineering*

Joint PhD student (Sponsored by China Scholarship Council) — *2019.01 - 2020.03*

Wuhan University (Supervisor: Prof. Xiaohui XIAO) — *School of Power and Mechanical Engineering*

B.Eng. in Mechanical Design, Manufacturing and Automation — *2010.09 - 2014.06*

Research

- Compliant mechanism; Mechanical metamaterial; Cross scale driving mechanism
- Iterative learning and repetitive control; Force and impedance control; Data-driven Control
- Micro manipulation robot; Surgical robot

Projects

National Natural Science Foundation of China (Grant No. 52405034) — *Wuhan University*

Principle Investigator — *2025.01 - 2027.12*

Hubei Provincial Natural Science Foundation of China (Grant No. 2024AFB126) — *Wuhan University*

Principle Investigator — *2024.07 - 2026.07*

Guangdong Basic and Applied Basic Research Foundation (Grant No. 2023A15151101566) — *Wuhan University Shenzhen Research Institute*

Principle Investigator — *2023.11 - 2026.10*

Knowledge Innovation Program of Wuhan-Shuguang Project (Grant No. 2023010201020252) — *Wuhan University*

Principle Investigator — *2023.06 - 2026.06*

Aeronautical Science Foundation of China (Grant No. ASFC202400020S5001) — *Wuhan University*

Principle Investigator — *2024.05 - 2025.11*

Natural Science Foundation of China (Grant No. 51375349) — *Wuhan University*

Participant — *2014.09 - 2017.12*

Shenzhen Science and Technology Program (Grant No. JCYJ20170306171514468) — *National University of Singapore*

Participant — *2017.05 - 2019.05*

Science and Engineering Research Council, Singapore (SERC Grant No. 1031490002) — *Wuhan University*

Participant — *2019.01 - 2020.03*

Honors & Awards

2024.08 **Session Chair,** International Conference on Intelligent Robotics and Applications — *Xi'an, China*

2023.07 **Best Conference Paper Finalist,** IEEE International Conference on Advanced Robotics and Mechatronics — *Sanya, China*

2020.06 **Outstanding Graduate,** Graduate students in Wuhan University — *Wuhan University*

2020.04 **Recepient,** UM Macao Postdoctoral Associateship (UMPA) — *University of Macau*

2018.07 **Best Conference Paper Finalist,** IEEE International Conference on Advanced Robotics and Mechatronics — *Singapore*

2018.06 **State Scholarship,** As a Joint PH.D. student supported by China Scholarship Council(CSC) — *CSC*

2017.09 **2nd Prize Scholarship,** Semester year of 2016 as graduate — *Wuhan University*

2016.08 **Best Student Paper Award,** International Conference on Intelligent Robotics and Applications — *Tokyo, Japan*

2014.06 **Outstanding Graduate,** Undergraduate students in Wuhan University — *Wuhan University*

2013.12 **1st Prize Scholarship,** Semester year of 2012 as undergraduate (top 5%) — *Wuhan University*

2013.12 **National Encouragement Scholarship,** Semester year of 2012 as undergraduate (top 2%) — *Wuhan University*

2012.12 **3rd Prize Scholarship,** Semester year of 2011 as undergraduate (top 15%) — *Wuhan University*

Domestic

Publications

Journal Papers (First/Corresponding Author)

1. Zhu, C., **Feng, Z.***, He, J., & Xiao, X. (2025). Rail Transit Line-Sign Text Detection with Patch-based Region Proposal Network. **IEEE Transactions on Intelligent Transportation Systems**. Accepted.
2. Chen, W., Li, R., Li, Y., Ye, T., & **Feng, Z.*** (2025). A novel low-frequency driving and high-speed motion stick-slip piezoelectric actuator based on two-stage compliant amplification mechanisms. **Smart Materials and Structures**. Accepted.
3. Zuo, C., **Feng, Z.***, & Xiao, X. (2024). CMDS-SLAM: real-time efficient centralized multi-robot dense surfel SLAM. **Measurement Science and Technology**, 35(11), 116303.
4. Li, Y., Ye, T., Ling, J., Xiao, X., & **Feng, Z.*** (2024). A novel F-shaped linear guiding mechanism based compliant positioning stage with restricted parasitic motion. **Precision Engineering**, 88, 674-685.
5. Zuo, C., **Feng, Z.***, & Xiao, X. (2024). CCMD-SLAM: communication-efficient centralized multi-robot dense SLAM with real-time point cloud maintenance. **IEEE Transactions on Instrumentation and Measurement**. Accepted.
6. Zhang, H., Zhang, X., **Feng, Z.***, & Xiao, X. (2023). Heterogeneous multi-robot cooperation with asynchronous multi-agent reinforcement learning. **IEEE Robotics and Automation Letters**, 9(1), 159-166.
7. **Feng, Z.**, Liang, W., Ling, J., Xiao, X., Tan, K. K., & Lee, T. H. (2022). Precision force tracking control of a surgical device interacting with a deformable membrane. **IEEE/ASME Transactions on Mechatronics**, 27(6), 5327-5338.
8. **Feng, Z.**, Liang, W.Y., Ling, J., Xiao, X.H., Tan, K.K.,& Lee, T.H.(2021) Adaptive Robust Impedance Control for an Ear Surgical Device with Soft Interaction. **IEEE/ASME Transactions on Mechatronics**, 27(3), 1784-1795.

9. **Feng, Z.**, Ming, M., Ling, J., Xiao, X.H., Yang, Z.X.,& Wan, F. (2022). Fractional Delay Filter based Repetitive Control for Precision Tracking: Design and Application to a Piezoelectric Nanopositioning Stage. **Mechanical Systems and Signal Processing**, 164, 108249.
10. **Feng, Z.**, Liang, W.Y., Ling, J., Xiao, X.H., Tan, K.K.,& Lee, T.H. (2020). Integral Terminal Sliding Mode based Adaptive Integral Backstepping Control for Precision Motion of a Piezoelectric Ultrasonic Motor. **Mechanical Systems and Signal Processing**, 144, 106856.
11. **Feng, Z.**, Ling, J.,Ming, M., Liang, W.Y., Tan, K.K., & Xiao, X.H. (2020). Signal-transformation-based Repetitive Control of Spiral Trajectory for Piezoelectric Nanopositioning Stages. **IEEE/ASME Transactions on Mechatronics**, 25(3), 1634-1645.
12. **Feng, Z.**, Ling, J., Ming, M., & Xiao, X.H. (2019). Integrated Modified Repetitive Control with Disturbance Observer of Piezoelectric Nanopositioning Stages for High-speed and Precision Motion. **Journal of Dynamic Systems, Measurement, and Control**, 141(8), 081006.
13. **Feng, Z.**, Ling, J., Ming, M., & Xiao, X.H. (2018). A Model-data Integrated Iterative Learning Controller for Flexible Tracking with Application to a Piezo Nanopositioner. **Transactions of the Institute of Measurement and Control**, 40(10), 3201-3210.
14. **Feng, Z.**, Ling, J., Ming, M., & Xiao, X.H. (2017). Data-based Double-feedforward Controller Design for a Coupled Parallel Piezo Nanopositioning Stage. **Proceedings of the Institution of Mechanical Engineers, Part I: Journal of Systems and Control Engineering**, 231(10), 881-892.
15. **Feng, Z.**, Ling, J., Ming, M., & Xiao, X.H. (2017). High-bandwidth and Flexible Tracking Control for Precision Motion with Application to a Piezo Nanopositioner. **Review of Scientific Instruments**, 88(8), 085107.

Conference Papers (First/Corresponding Author)

1. Li, Y., Ye, T., Ling, J., Xiao, X., & **Feng, Z.*** (2023, July). Design, Optimization and Analysis of a Novel Compliant Guiding Mechanism for Piezo-Driven Vibration Microinjection. In 2023 International Conference on Advanced Robotics and Mechatronics (**ICARM**) (pp. 19-24). IEEE.
2. Li, R., Li, J., Li, Y., Chen, W., & **Feng, Z.*** (2024, July). A Modified K-Means GMM-GMR Hysteresis Model for Piezo-Actuated Positioning System. In International Conference on Intelligent Robotics and Applications (pp. 3-14). Singapore: Springer Nature Singapore.
3. **Feng, Z.**, Ling, J., & Shen, Y. (2022, August). Discrete-Time Integral Terminal Sliding Mode based Repetitive Control for Periodic Motion Tracking. In 2022 IEEE 11th Data Driven Control and Learning Systems Conference (**DDCLS'22**) (pp. 1031-1036).
4. **Feng, Z.**, Ling, J., Wan. F., & Yang, Z. X. (2021, May). Iterative Learning Enhanced Integral Terminal Sliding Mode Control for Precision Motion Systems. 2021 IEEE 10th Data Driven Control and Learning Systems Conference (**DDCLS'21**) (pp. 778-783).
5. Liang, W. Y#., **Feng, Z.#**, Wu, Y., Gao, J., Ren, Q., & Lee, T. H. (2020, August). Robust Force Tracking Impedance Control of an Ultrasonic Motor-actuated End-effector in a Soft Environment. In 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**) (pp. 7716-7722).
6. **Feng, Z.**, Ling, J., Ming, M., & Xiao, X.H. (2019, August). Model-assisted Extended State Observer based Repetitive Control for High Precision Tracking of Piezoelectric Nanopositioning Stages. In 38th Chinese Control Conference (**CCC2019**).
7. **Feng, Z.**, Ling, J., Ming, M., & Xiao, X.H. (2016, August). Data-driven Feedforward Decoupling Filter Design for Parallel Nanopositioning Stages. In International Conference on Intelligent Robotics and Applications (**ICIRA**) (pp. 709-720). Springer, Cham.

Co-author papers

1. Ye, T.,**Feng, Z.**, Ling, J., & Li, Y. (2024). A Novel W-Shaped Flexure-Guided Mechanism for High-Frequency Piezo-Actuated Micromanipulations. **IEEE/ASME Transactions on Mechatronics**. Accepted.
2. Duan, Y., Ling, J., **Feng, Z.**, Ye, T., Sun, T., & Zhu, Y. (2024). A survey of needle steering approaches in minimally invasive surgery. **Annals of Biomedical Engineering**, 52(6), 1492-1517.
3. Ling, J., **Feng, Z.**, Chen, L., Zhu, Y., & Pan, Y. (2023). Neural network-based iterative learning control of a piezo-driven nanopositioning stage. **Precision Engineering**, 81, 112-123.
4. Ling, J., Ye, T., **Feng, Z.**, Zhu, Y., Li, Y., & Xiao, X.H (2022). A Survey on Synthesis of Compliant Constant force/torque Mechanisms. **Mechanism and Machine Theory**, 176, 104970.
5. Ling, J., Chen, L., **Feng, Z.**, & Zhu, Y. (2022). Development and test of a high speed pusher-type inchworm piezoelectric actuator with asymmetric driving and clamping configuration. **Mechanism and Machine Theory**, 176, 104997.
6. He, S., Lu, H.,**Feng, Z.**, & Xiao, X.H. Position Tracking for Multi-Channel Double-Crystal Monochromator Scanning Based on Iterative Learning Control. **Actuators** (Vol. 11, No. 7, p. 177).
7. Chen, L., Zhu, Y., Ling, J., & **Feng, Z.** (2022). Theoretical Modeling and Experimental Evaluation of a Magnetostrictive Actuator with Radial-nested Stacked Configuration. **Nonlinear Dynamics**, 1-17.
8. Ren, Q., Zhu, W., **Feng, Z.**, & Liang, W.Y. (2021). Learning-Based Force Control of a Surgical Robot for Tool-Soft Tissue Interaction. ***IEEE Robotics and Automation Letters***, 6(4), 6345-6352.
9. Ming, M., Liang, W.Y., **Feng, Z.**, Ling, J., Al Mamun, A., & Xiao, X.H. (2021). PID-type Sliding Mode-based Adaptive Motion Control of a 2-DOF Piezoelectric Ultrasonic Motor Driven Stage. **Mechatronics**, 76, 102543.
10. Ling, J., **Feng, Z.**, Kang, X., & Xiao, X.H. (2021). Bandwidth Enhancement in Damping Control for Piezoelectric Nanopositioning Stages with Load Uncertainty: Design and Implementation. **Journal of Vibration and Control**, 27(11-12), 1382-1394.
11. Chen, L., Zhu, Y.C., Ling, J., & **Feng, Z.** (2021). Development and Test of a Two-dimensional Stacked Terfenol-D Actuator with High Bandwidth and Large Stroke. **IEEE/ASME Transactions on Mechatronics**, 26(4), 1951-1959.
12. Qiu, C.C., Ling, J., Zhang, Y.K., Ming, M.,**Feng, Z.**, & Xiao, X.H. (2021). A Novel Cooperative Compensation Method to Compensate for Return Stroke of Stick-slip Piezoelectric Actuators. **Mechanism and Machine Theory**, 159, 104254.
13. Ye, T.T., Ling, J., Kang, X., **Feng, Z.**, & Xiao, X.H. (2021). A Novel Two-stage Constant Force Compliant Micrograpper. **Journal**

of Mechanical Design, 143(5).
14. Ling, J.,**Feng, Z.**, Zheng, D., Yang, J., Yu, H., & Xiao, X.H. (2021). Robust Adaptive Motion Tracking of Piezoelectric Actuated Stages using Online Neural-network-based Sliding Mode Control. ***Mechanical Systems and Signal Processing***, 150, 107235.
15. Ming, M., **Feng, Z.**,Ling, J., & Xiao, X.H. (2020). Disturbance Observer based Model Prediction Control with Real-time Modified Reference for a Piezo-actuated Nanopositioning Stage. **Transactions of the Institute of Measurement and Control**, 42(4), 813-822.
16. Ling, J., **Feng, Z.**, Ming, M., Guo, Z., & Xiao, X.H. (2019). Signal Transformed Internal Model Control for Non-raster Scanning of Piezo-actuated Nanopositioning Stages. ***International Journal of Control, Automation and Systems***,18(8), 1915-1925.
17. Ling, J., **Feng, Z.**, Ming, M., & Xiao, X.H. (2019). Model Reference Adaptive Damping Control for a Nanopositioning Stage with Load Uncertainties. **Review of Scientific Instruments**, 90(4), 045101.
18. Ling, J., Rakotondrabe, M., **Feng, Z.**, Ming, M., & Xiao, X.H. (2019). A Robust Resonant Controller for High-Speed Scanning of Nanopositioners: Design and Implementation. ***IEEE Transactions on Control Systems Technology***. 28(3), 1116-1123.
19. Ming, M., Ling, J., **Feng, Z.**, & Xiao, X.H. (2018). A Model Prediction Control Design for Inverse Multiplicative Structure based Feedforward Hysteresis Compensation of a Piezo Nanopositioning Stage. ***International Journal of Precision Engineering and Manufacturing***, 19(11), 1699-1708.