Curriculum Vitae of Andong Liu

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Education

PhD, Control Theory and Control Engineering 09/2008-01/2014
Zhejiang University of Technology, Hangzhou, China

B.Eng., Automation 09/2003-06/2007
Guangxi University, Nanning, China

Academic Positions

Associate Professor, College of Information Engineering 12/2019-Present
Zhejiang University of Technology, Hangzhou, China

Hong Kong Scholar, Department of Electronic Engineering 02/2016-02/2018
City University of Hong Kong, Hong Kong

Visiting Scholar, Department of Mechanical Engineering 08/2015-09/2015
University of Hong Kong, Hong Kong

Assistant Professor, College of Information Engineering 04/2014-12/2019
Zhejiang University of Technology, Hangzhou, China

Awards and Honors

2024	4th International Conference on Control Theory and Applications (ICoCTA 2024), Outstanding Paper Award
2023	5th International Conference on Robotics, Intelligent Control and Artificial Intelligence (RICAI 2023), Best Paper Award
2023	Second prize of Science and Technology Progress Award of China Association of Automation (2/6)
2021	Second prize of Technological Invention Award of Zhejiang Provincial (4/6)
2021	Second prize of Technological Invention Award of Chinese Association of Automation (4/6)
2016	Nomination Award for Excellent Doctoral Dissertation of Chinese Association of Automation
2016	Hong Kong Scholars Award

Research Interests

- Networked and Distributed Control Systems
- Navigation and Control of Robot Systems
- Human-Robot Collaboration
- Robot Imitation Learning
- Visual servo control
- Model Predictive Control

Projects

1. Zhejiang Provincial NSFC (LR23F030002): Distributed model predictive control for networked multi-agent systems, 2023-2025. **PI**
2. Zhejiang Province Agricultural Machinery R&D and Manufacturing Project: Research and development, manufacturing of intelligent livestock robots, 2023-2024. **PI**
3. Zhejiang Lab Research Project: Development of comprehensive simulation software for complex electromechanical systems, 2022. **PI**
4. NSFC (61973275): Distributed cooperation control for multiple robots in cyber-physical systems, 2020-2023. **PI**
5. Provincial Universities of Zhejiang Fund (RF-A2020004): Multi robot collaborative assembly predictive control for large components, 2020-2022, **PI**
6. Zhejiang Provincial NSFC (LY17F030019): Distributed model predictive control for multiple mobile robot systems, 2017-2019. **PI**
7. NSFC (61403344): Distributed control theory and methodology of large-scale systems based on model predictive control, 2015-2017. **PI**

Publications

Journal Papers ……...

[1] Zhehao Jin, **Andong Liu**, Wen-an Zhang, Li Yu, Chenguang Yang. Learning stable state-dependent variable impedance control for compliant manipulation. *IEEE/ASME Transactions on Mechatronics*, 2024, Doi: 10.1109/TMECH.2024.3466950.

[2] Zhitao He, Yongyi Chen, Yang Zhao, Dan Zhang, **Andong Liu**, Hui Zhang. TSAN: A New Deep Learning-based Detection Method for Sensor Anomaly in Mobile Robots. *IEEE Transactions on Industrial Electronics*, 2024, Doi: 10.1109/TIE.2024.3454488.

[3] Zhehao Jin, **Andong Liu**, Wen-an Zhang, Li Yu, Chenguang Yang. Learning an autonomous dynamic system to transfer periodic human motion skills. *IEEE Transactions on Neural Networks and Learning Systems*, 2024, Doi: 10.1109/TNNLS.2024.3397356.

[4] **Andong Liu**, Wenqi He, Yang Zhao, Hongjie Ni, Ye Wang. Moving horizon estimation for localization of mobile robots with measurement outliers. *Journal of Systems and Control Engineering*, 2024, 238(8): 1367-1379.

[5] **Andong Liu**, Yawen Zhang, Jiayun Fu, Yuankun Yan, Wen-an Zhang. 3D-AMM: a 3D artificial moment method for path planning of manipulator in multiple obstacles scenario. *Industrial Robot*, 2024, 51(5): 761-771.

[6] Jiayun Fu, Zhehao Jin, **Andong Liu**, Wen-an Zhang, Li Yu. Non-parametric Gaussian process movement primitive with via-point constraint for effective and safe robot skill learning. *Neurocomputing*, 2024, 589, 127711.

[7] **Andong Liu**, Jiayun Fu, Shuwen Zhan, Zhehao Jin, Wen-an Zhang. A policy searched-based optimization algorithm for obstacle avoidance in robot manipulators. *IEEE Transactions on Industrial Electronics*, 2024, 71(9): 11262-11271.

[8] Jinhui Wu, Zhehao Jin, **Andong Liu**, Li Yu, Fuwen Yang. A hierarchical data-driven predictive control of image-based visual servoing systems with unknown dynamics. *IEEE Transactions on Cybernetics*, 2024, 54(5): 3160-3173.

[9] **Andong Liu**, Shuwen Zhan, Zhehao Jin, Wen-an Zhang. A variable impedance skill learning algorithm based on kernelized movement primitives. *IEEE Transactions on Industrial Electronics*, 2024, 71(1): 870-879.

[10] Dongdong Qin, Zhehao Jin, **Andong Liu**, Wen-An Zhang, Li Yu. Asynchronous event-triggered distributed predictive control for multiagent systems with parameterized synchronization constraints. *IEEE Transactions on Automatic Control*, 2024, 69(1): 403-409.

[11] Zhehao Jin, Weiyong Si, **Andong Liu**, Wen-an Zhang, Li Yu, Chenguang Yang. Learning a flexible neural energy function with a unique minimum for globally stable and accurate demonstration learning. *IEEE Transactions on Robotics*, 2023, 39(6): 4520-4538.

[12] Huazhong Zhu, Zhehao Jin, **Andong Liu**, Hongjie Ni. Gaussian process based cautious model predictive control for visual servoing of mobile robots. *Nonlinear Dynamics*, 2023,

111: 21779-21796.
[13] Dongdong Qin, **Andong Liu**, Wen-an Zhang, Jianming Xu, Li Yu. Learning from human demonstrations for wheel mobile manipulator: An unscented model predictive control approach. *IEEE Transactions on Neural Networks and Learning Systems*, 2023, 34(12): 10864-10874.
[14] Jinyuan Liu, Minglei Fu, **Andong Liu**, Wen-an Zhang, Bo Chen. A homotopy invariant based on convex dissection topology and a distance optimal path planning algorithm. *IEEE Robotics and Automation Letters*, 2023, 8(11): 7695-7702.
[15] Dongdong Qin, Zhehao Jin, **Andong Liu**, Wen-an Zhang, Li Yu. Event-triggered distributed predictive cooperation control for multi-agent systems subject to bounded disturbances. *Automatica*, 2023, 157, 111230.
[16] Dongdong Qin, **Andong Liu**, Wen-An Zhang, Li Yu, Huaicheng Yan. Event-based distributed predictive approach for the cooperation of networked mobile manipulators. *IEEE Systems Journal*, 2023, 17(3): 4895-4906.
[17] Zhehao Jin, **Andong Liu**, Wen-an Zhang, Li Yu, Chenguang Yang. Gaussian process movement primitive. *Automatica*, 2023, 155, 111120.
[18] Wei Zhou, Jinhui Wu, **Andong Liu**, Wen-an Zhang, Li Yu. Neurodynamics-based distributed model predictive control of a low-speed two-stroke marine main engine power system. *ISA Transactions*, 2023, 138: 341-358.
[19] Dongdong Qin, Zhehao Jin, Xiang Wu, **Andong Liu**, Wen-An Zhang, Li Yu. A distributed unscented predictive cooperation approach for networked mobile manipulators. *IEEE Transactions on Control of Network Systems*, 2023, 10(3): 1462-1471.
[20] Zhehao Jin, Dongdong Qin, **Andong Liu**, Wen-an Zhang, Li Yu. Learning neural-shaped quadratic Lyapunov function for accurate and generalizable motion-skills transfer. *Robotics and Computer-Integrated Manufacturing*, 2023, 82, 102526.
[21] Zhehao Jin, Dongdong Qin, **Andong Liu**, Wen-an Zhang, Li Yu. Model predictive variable impedance control of manipulators for adaptive precision-compliance tradeoff. *IEEE/ASME Transactions on Mechatronics*, 2023, 28(2): 1174-1186.
[22] Dongdong Qin, **Andong Liu**, Wen-an Zhang, Li Yu. Cooperation and coordination transportation for nonholonomic mobile manipulators: A distributed model predictive control approach. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 2023, 53(2): 848-860.
[23] **Andong Liu**, Tao Chen, Huazhong Zhu, Minglei Fu, Jianming Xu. Fuzzy variable impedance-based adaptive neural network control in physical human-robot interaction. *Journal of Systems and Control Engineering*, 2023, 237(2): 220-230.
[24] Zhehao Jin, **Andong Liu**, Wen-an Zhang, Li Yu, Chunyi Su. A learning-based framework for human-robot collaboration. *IEEE Transactions on Automation Science and Engineering*, 2023, 20(1): 506-517.
[25] Jianwei Dong, Jianming Xu, Lei Wang, **Andong Liu**, Li Yu. External force estimation of the industrial robot based on model and SWVAKF. *IEEE Transactions on Instrumentation and Measurement*, 2022, 71, 7505311.
[26] Jinhui Wu, Zhehao Jin, **Andong Liu**, Li Yu, Fuwen Yang. A hybrid deep-Q-network and model predictive control for point stabilization of visual servoing systems. *Control Engineering Practice*, 2022, 128, 105314.
[27] Yaowei Wang, **Andong Liu**, Wen-An Zhang, MinWu. Synchronization tracking control of networked multi-axis motion systems: A cooperative distributed model predictive control approach. *Control Engineering Practice*, 2022, 126, 105233.
[28] Zhehao Jin, **Andong Liu**, Wen-an Zhang, Li Yu. An optimal variable impedance control with consideration of the stability. *IEEE Robotics and Automation Letters*, 2022, 7(2): 1737 -1744.
[29] **Andong Liu**, Enjun Yang, Jinhui Wu, You Teng, Li Yu. Double sparse low rank decomposition for irregular printed fabric defect detection. *Neurocomputing*, 2022, 482: 287-297.
[30] Jinhui Wu, Zhehao Jin, **Andong Liu**, Li Yu, Fuwen Yang. A survey of learning-based control of robotic visual servoing systems. *Journal of the Franklin Institute*, 2022, 359(1): 556-577.
[31] Zhehao Jin, Jinhui Wu, **Andong Liu**, Wen-an Zhang, Li Yu. Policy-based deep reinforcement learning for visual servoing control of mobile robots with visibility constraints. *IEEE Transactions on Industrial Electronics*, 2022, 69(2): 1898 - 1908.

[32] Jinhui Wu, Zhehao Jin, **Andong Liu**, Li Yu. Vision-based neural predictive tracking control for multi-manipulator systems with parametric uncertainty. *ISA Transactions*, 2021, 110, 247-257.
[33] Zhehao Jin, Jinhui Wu, **Andong Liu**, Wen-an Zhang, Li Yu. Gaussian process-based nonlinear predictive control for visual servoing of constrained mobile robots with unknown dynamics. *Robotics and Autonomous Systems*, 2021, 136, 103712.
[34] **Andong Liu**, Wen-an Zhang, Li Yu. Robust predictive trajectory tracking control for mobile robots with intermittent measurement and quantization. *IEEE Transactions on Industrial Electronics*, 2021, 68(1): 509 - 518.
[35] Wei Zhou, Wen-an Zhang, **Andong Liu**. Distributed predictive control of interconnected systems based on disturbance observation. *IET Control Theory & Applications*, 2020, 14(19): 3260-3269.
[36] Dongdong Qin, **Andong Liu**, Dan Zhang, Hongjie Ni. Formation control of mobile robot systems incorporating primal-dual neural network and distributed predictive approach. *Journal of the Franklin Institute*, 2020, 357(17): 12454-12472.
[37] **Andong Liu**, Wen-an Zhang, Li Yu, Huaicheng Yan, Rongchao Zhang. Formation control of multiple mobile robots incorporating an extended state observer and distributed model predictive approach. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 2020, 50(11): 4587-4597.
[38] Jinhui Wu, Zhehao Jin, **Andong Liu**, Li Yu. Nonlinear model predictive control for visual servoing systems incorporating iterative linear quadratic gaussian. *IET Control Theory & Applications*, 2020, 14(14): 1989-1994.
[39] Xusheng Yang, Wen-an Zhang, **Andong Liu**, Li Yu. Linear fusion estimation for range-only target tracking with nonlinear transformation. *IEEE Transactions on Industrial Informatics*, 2020, 16(10): 6403-6412.
[40] Wen-an Zhang, Kang Zhou, Xusheng Yang, **Andong Liu**. Sequential fusion estimation for networked multisensor nonlinear systems. *IEEE Transactions on Industrial Electronics*, 2020, 67(6): 4991-4999.
[41] Jinhui Wu, Xu Chen, **Andong Liu**, Li Yu. Predictive control for visual servoing control of cyber physical systems with packet loss. *Peer-to-Peer Networking and Applications*, 2019, 12: 1774-1784.
[42] Dan Ma, Jianqi Chen, **Andong Liu**, Jie Chen, Silviu-Iulian Niculescu. Explicit bounds for guaranteed stabilization by PID control of second-order unstable delay systems. *Automatica*, 2019, 100: 407-411.
[43] Yaowei Wang, **Andong Liu**, Wen-an Zhang, Li Yu. GESO-based control for networked systems with time-varying delays. *Measurement*, 2019, 133: 281-287.
[44] **Andong Liu**, Liye Bai. Distributed model predictive control for wide area measurement power systems under malicious attacks. *IET Cyber-Physical Systems: Theory & Applications*, 2018, 3(3): 111-118.
[45] **Andong Liu**, Wen-an Zhang, Bo Chen, Li Yu. Networked filtering with Markov transmission delays and packet disordering. *IET Control Theory & Applications*, 2018, 12(5): 687-693.
[46] Wen-an Zhang, Michael Chen, **Andong Liu**, Steven Liu. Aperiodic optimal linear estimation for networked systems with communication uncertainties. *IEEE Transactions on Cybernetics*, 2017, 47(8): 2256-2265.
[47] **Andong Liu**, Rongchao Zhang, Wen-an Zhang, You Teng. Nash-optimization distributed model predictive control for multi mobile robots formation. *Peer-to-Peer Networking and Applications*, 2017, 10(3): 688-696.
[48] **Andong Liu**, Wen-an Zhang, Michael Chen, Li Yu. Moving horizon estimation for mobile robots with multirate sampling. *IEEE Transactions on Industrial Electronics*, 2017, 64(2): 1457-1467.
[49] Qiuxia Chen, **Andong Liu**. D-stability and disturbance attenuation properties for NCSs switched system approach. *Journal of Systems Engineering and Electronics*, 2016, 27(5): 1108-1114.
[50] Wen-an zhang, **Andong Liu**, Kexing Xing. Stability analysis and stabilization of aperiodic sampled-data systems based on a switched system approach. *Journal of the Franklin Institute*, 2016, 353: 955-970.
[51] **Andong Liu**, Wen-an Zhang, Li Yu, Steven Liu, Michael Z.Q. Chen. New results on

stabilization of networked control systems with packet disordering. *Automatica*, 2015, 52: 255-259.

[52] **Andong Liu**, Li Yu, Wen-an Zhang. Moving horizon SINR estimation for wireless networked systems. *IEEE Transactions on Industrial Informatics*, 2014, 10(1): 431-438.

[53] Hongxiang Hu, **Andong Liu**, Qi Xuan, Li Yu, Guangming Xie. Second-order consensus of multi-agent systems in the cooperation-competition network with switching topologies: A time-delayed impulsive control approach. *Systems & Control Letters*, 2013, 62(12): 1125-1135.

[54] **Andong Liu**, Li Yu, Dan Zhang, Wen-an Zhang. Finite-time H_∞ control for discrete-time genetic regulatory networks with random delays and partly unknown transition probabilities. *Journal of the Franklin Institute*, 2013, 350(7): 1944-1961.

[55] **Andong Liu**, Li Yu, Wen-an Zhang, Michael Z.Q. Chen. Moving horizon estimation for networked systems with quantized measurements and packet dropouts. *IEEE Transactions on Circuits and Systems I: Regular Papers*, 2013, 60(7): 1823-1834.

[56] Bo Chen, Li Yu, Wen-an Zhang, **Andong Liu**. Robust information fusion estimation for multiple delay-tolerant sensors with different failure rates. *IEEE Transactions on Circuits and Systems I: Regular Papers*, 2013, 60(2): 401-414.

[57] **Andong Liu**, Li Yu, Wen-an Zhang. Moving horizon estimation for networked systems with multiple packet dropouts. *Journal of Process Control*, 2012, 22(9): 1593-1608.

[58] **Andong Liu**, Li Yu, Wen-an Zhang, Bo Chen. H_∞ filtering for discrete-time genetic regulatory networks with random delays. *Mathematical Biosciences*, 2012, 239(1): 97-105.

[59] **Andong Liu**, Li Yu, Wen-an Zhang. H_∞ control for network-based systems with time-varying delay and packet disordering. *Journal of the Franklin Institute*, 2011, 348(5): 917-932.

[60] **Andong Liu**, Li Yu, Wen-an Zhang. One-step receding horizon H_∞ control for networked control systems with random delay and packet disordering. *ISA Transactions*, 2011, 50(1): 44-52.

Selected Conference Papers ……..

[1] Chengyu Zhu, Yicheng Wang, Hantuo Chen, **Andong Liu**, Hongjie Ni. Robust formation predictive control of image-based mobile robots with neural network optimization. *2024 43rd Chinese Control Conference* (CCC), Kunming, China, 2024, 2793-2798.

[2] Huachi Xiao, Haotian Huang, Zhehao Jin, **Andong Liu**, Xiang Qiu and Wen-an. Zhang. Robot manipulation skill learning based on stable sparse Gaussian process. *2024 IEEE International Conference on Industrial Technology* (ICIT), Bristol, United Kingdom, 2024, 1-5.

[3] Zhehao Jin, **Andong Liu**, Wen-an. Zhang, Li Yu. Robotic demonstration learning stability-accuracy trade-off: From an energy function learning viewpoint. *2023 5th International Conference on Robotics, Intelligent Control and Artificial Intelligence* (RICAI), Hangzhou, China, 2023, 57-65.

[4] Wenqi He, Yuhao Sun, Huazhong Zhu, **Andong Liu**. Ultra-wideband localization of mobile robots based on moving horizon optimization. *Proceedings of the 8th International Conference on Advanced Robotics and Mechatronics* (ICARM), 2023, 457-463.

[5] Zhehao Jin, Dongdong Qin, **Andong Liu**, Wen-an. Zhang, Li Yu. Constrained Variable Impedance Control using Quadratic Programming. *Proceedings of the 2022 IEEE International Conference on Robotics and Automation* (ICRA), Philadelphia, USA, 2022, 8319-8324.

[6] Jinhui Wu, **Andong Liu**, Li Yu. Guaranteed cost control for visual servoing systems of wheeled mobile robots. *Proceedings of the 5th International Conference on Advanced Robotics and Mechatronics* (ICARM), Shenzhen, 2020, 166-171.

[7] Dongdong Qin, **Andong Liu**, You Teng, et al. Trajectory tracking control for mobile robots with abnormal data and external disturbances. *Proceedings of the 38th Chinese control Conference*, Guangzhou, 2019, 5439-5444.

[8] **Andong Liu**, Jia Li, Zhaohui Du. Distributed Robust Predictive Control for Multiple Mobile Robots Formation. *Proceedings of the 2017 Chinese Automation Congress*, Jinan, 2017, 1439-1444.

[9] Rongchao Zhang, **Andong Liu**, Li Yu, Wen-an Zhang. Distributed model predictive control based on Nash optimality for large scale irrigation systems. *Proceedings of the 9th*

International Symposium on Advanced Control of Chemical Processes, June, Whistler, 2015, 552-556.
[10] **Andong Liu**, Wen-an Zhang, Li Yu, Jie Chen. Moving horizon estimation for multi-rate systems. *Proceedings of the IEEE 54th Annual Conference on Decision and Control*, Osaka, Japan, 2015, 6850-6855.
[11] Rongchao Zhang, Li Yu, **Andong Liu**, Wen-an Zhang. Distributed model predictive control for large-scale systems with multi-rate sampling. *Proceedings of the 33rd Chinese Control Conference*, July, Nanjing, 2014, 1401-1406.
[12] **Andong Liu**, Li Yu, Wen-an Zhang. Switched model predictive control for networked control systems with time delays and packet disordering. *Proceedings of the 19th IFAC*, Cape Town, South Africa, Aug. 2014, 3764-3769.
[13] **Andong Liu**, Li Yu, Wen-an Zhang. Moving horizon estimation for networked systems with packet dropouts. *IEEE 51st Annual Conference on Decision and Control*, Maui, USA, Dec., 2012, 763-768.
[14] **Andong Liu**, Li Yu, Wen-an Zhang, Defeng He. Model predictive control for networked control systems with random delay and packet disordering. *Proceedings of the 8th Asian Control Conference*, May, Taiwan, 2011, 653-658.

Academic Activities

Community service ……

1. Member of the Professional Committee for Predictive Control and Intelligent Decision, Chinese Association of Automation — 04/2021-present
2. Member of the Robot Competition Working Committee, Chinese Association of Automation — 10/2023-present

Editorial board ……..

- **Junior Editor**

1. Complex Engineering Systems — 02/2024-present
2. Intelligence & Robotics — 02/2024-present

Conference TPC member …….

1. 4rd International Conference on Control Theory and Applications (ICoCTA) — 2024
2. 4rd Chinese Conference on Predictive Control and Intelligent Decision (CPCID) — 2024
3. 3rd International Conference on Control Theory and Applications (ICoCTA) — 2023
4. 5th International Conference on Robotics, Intelligent Control and Artificial Intelligence (RICAI) — 2023

Peer review …….....

- **Journal**: IEEE TRO, TAC, TIE, TII, TC, TNNLS, TSMCA, TIM, IEEE/CAA JAS, Automatica, Control Engineering Practice, ISA Transactions, Journal of Process Control, Journal of Franklin Institute, Robotics and Computer-Integrated Manufacturing, etc.
- **Conference**: ACC, CDC, IFAC, CCC, ASCC, CAC, ICCA, etc.