

Wenzheng Chi

Professor – Soochow University

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Education

1. **Ph.D., The Chinese University of Hong Kong** 08/2013 – 09/2017
Supervisor: Prof. Max Q.-H. Meng Dept. of Electronic Engineering
Research field: Social-Adaptive Motion Planning, Human Robot Interaction
2. **Visiting Student Researcher, Tokyo University** 09/2015 – 02/2016
Advisor: Prof. Hajime Asama Dept. of Precision Engineering
Research field: Human-friendly Robot Motion Planning
3. **B.Eng., Shandong University** 09/2009 – 06/2013
School of Control Science & Engineering Rank: 1/181

Work

1. **Professor, Soochow University** 07/2023 – present
School of Mechanical and Electric Engineering
Research field: Social-Adaptive Robot Motion Planning, Human-robot Interaction, Mobile Service Robot
2. **Associate Professor, Soochow University** 10/2018 – 06/2023
School of Mechanical and Electric Engineering
Research field: Social-Adaptive Robot Motion Planning, Human-robot Interaction, Mobile Service Robot
3. **Postdoc., The Chinese University of Hong Kong** 10/2017 – 09/2018
Advisor: Prof. Max Q.-H. Meng Dept. of Electronic Engineering
Research field: Path Planning, Motion Planning

Academic Appointments

1. **IEEE Senior Member**
2. Associate Editor, ICSR 2022
3. Associate Editor of Special Issue, CCC 2023
4. Senior Program Committee, IEEE ICRA 2021, IEEE ICIA 2018, IEEE ROBIO 2019, WCMEIM 2019
5. Technical Program Committee, IEEE ROBIO 2022

Honors and Awards

1. **Second Prize - Science and Technology Award of Jiangsu Automation Society (rank: 2/11)** 01/2022
Award for the outstanding achievements in human-robot interaction
2. **Best Student Paper Award of IEEE RCAR 2021 (corresponding author)** 07/2021
Paper Title: a prior information heuristic based robot exploration method in indoor environment
3. **Doctor of Entrepreneurship and Innovation in Jiangsu Province** 09/2019
Award for Outstanding academic research achievements
4. **Outstanding Young Scholars of Soochow University** 03/2019
Award for Outstanding academic development potential
5. **Hong Kong Ph.D. Fellowship Scheme** 2013 – 2017
Highest scholarship for Ph.D. students in Hong Kong
6. **Outstanding Tutor Award (top 3%)** 12/2017
Dept. of Electronic Engineering, The Chinese University of Hong Kong
7. **Best Student Paper Award of IEEE RCAR 2016 (first author)** 06/2016
Paper Title: a human-friendly robot navigation algorithm using the risk-RRT approach

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| 8. | Global Scholarship Programme for Research Excellence
<i>Award for Excellent exchange student</i> | 07/2015 |
| 9. | The President Scholarship of Shandong University (top 0.1%)
<i>Highest award for students in Shandong University</i> | 12/2012 |
| 10. | Top 10 Communist Youth League Members of Shandong University (top 0.025%)
<i>Excellent League Leader over 700 league branches</i> | 05/2012 |
| 11. | National Scholarship (top 2%)
<i>Highest national wide scholarship for undergraduate students in China</i> | 2010, 2011, 2012 |

Research Funding

- Principle Investigator** - National Key R&D Program of China (No. 2020YFB1313601), "Robot Social Knowledge Expression and Self-Learning based on Social Knowledge Base", 2020-2023, 1,080,000 RMB.
- Principle Investigator** - National Natural Science Foundation of China, General Program (No. 62273246), "A Recurrent Generative Method for Knowledge Transfer Learning in Mobile Service Robot Navigation based on Digital Mapping of Social Rules", 2023-2026, 540,000 RMB.
- Principle Investigator** - National Natural Science Foundation of China, Young Scientists Fund (No. 61903267), "Research on Social-Adaptive Robot Navigation Method in Indoor Human-Robot Integration Environment", 2020-2022, 240,000 RMB.
- Principle Investigator of Sub-Project** - National Key R&D Program of China (No. 2019YFB1310003), "Research on Efficient Robot Perception of Unknown Environment and Modularization of Map Construction Technology", 2019-2022, 370,000 RMB.
- Principle Investigator** - China Postdoctoral Science Foundation (No. 2020M681691), "Research on Robot Motion Interaction in Mobile Epidemic Prevention based on Environmental Prior Knowledge", 2020-2022, 80,000 RMB.
- Principle Investigator** - Jiangsu Province Postdoctoral Research Funding Program, "Research on Excavator Motion Planning Technology in Unstructured Environment based on Inverse-reinforcement Learning", 2020-2021, 20,000 RMB.
- Principle Investigator** - Suzhou Scientific and Technological Innovation Fund, 2022-2027, 239,800 RMB.
- Principle Investigator** - Startup Fund for Outstanding Young Scholars in Soochow University, 2018-2024, 400,000 RMB.

Journal Publications

† indicates equal contribution, and * indicates corresponding author.

- Yong Lv, Yu Zhou, Qing Chen, **Wenzheng Chi***, Lining Sun*, and Lei Yu, "YOLO_SrV2: An evolved version of YOLO_SR," *Engineering Applications of Artificial Intelligence*, 2024, Early Access.
- Xingrong Diao, **Wenzheng Chi***, and Jiankun Wang*, "Graph Neural Network based Method for Robot Path Planning Problem," *Biomimetic Intelligence and Robotics*, 2024, Early Access.
- Meiyuan Zou†, Jiajie Yu†, Yong Lv, Bo Lu*, **Wenzheng Chi***, and Lining Sun, "A Novel Day-to-Night Obstacle Detection Method for Excavators based on Image Enhancement and Multi-sensor Fusion," *IEEE Sensors Journal*, 2023, 23 (10): 10825-10835.
- Yang Hong, Zhiyu Ding, Yuan Yuan, **Wenzheng Chi***, and Lining Sun, "Obstacle Avoidance Learning for Robot Motion Planning in Human-Robot Integration Environments," *IEEE Transactions on Cognitive and Developmental Systems*, 2023, 15 (4): 2169-2178.
- Yuan Yuan, Jie Liu, **Wenzheng Chi***, Guodong Chen*, and Lining Sun*, "A Gaussian Mixture Model based Fast Motion Planning Method Through Online Environmental Feature Learning," *IEEE Transactions on Industrial Electronics*, 2023, 70(4): 3955-3965.
- Songlin Wei, Guodong Chen*, **Wenzheng Chi***, Zhenghua Wang, and Lining Sun, "Object Clustering with Dirichlet Process Mixture Model for Data Association in Monocular SLAM," *IEEE Transactions on Industrial Electronics*, 2023, 70(1): 594-603.
- Zhiyu Ding†, Jie Liu†, **Wenzheng Chi***, Jiankun Wang, Guodong Chen, Lining Sun, "PRTIRL Based Socially Adaptive Path Planning for Mobile Robots," *International Journal of Social Robotics*, 2023, 15(2): 129-142.

8. Jie Liu[†], Yong Lv[†], Yuan Yuan, **Wenzheng Chi***, Guodong Chen, and Lining Sun, "An Efficient Robot Exploration Method based on Heuristics Biased Sampling," *IEEE Transactions on Industrial Electronics*, 2023, 70 (7): 7102-7112.
9. Jiankun Wang[†], **Wenzheng Chi†**, Chenming Li, Max Q.-H. Meng*, "Efficient Robot Motion Planning Using Bidirectional-Unidirectional RRT Extend Function," *IEEE Transactions on Automation Science and Engineering*, 2022, 19(3): 1859 - 1868.
10. **Wenzheng Chi**, Zhiyu Ding, Jiankun Wang*, Guodong Chen*, and Lining Sun*, "A Generalized Voronoi Diagram based Efficient Heuristic Path Planning Method for RRTs in Mobile Robots," *IEEE Transactions on Industrial Electronics*, 2022, 69(5): 4926-4937. **(2022 ESI Highly Cited Papers)**
11. **Wenzheng Chi†**, Jiankun Wang[†], Zhiyu Ding, Guodong Chen*, and Lining Sun*, "A Reusable Generalized Voronoi Diagram Based Feature Tree for Fast Robot Motion Planning in Trapped Environments," *IEEE Sensors Journal*, 2022, 22(18): 17615 - 17624.
12. Yong Lv, Jie Liu, **Wenzheng Chi***, Guodong Chen, and Lining Sun, "An Inverted Residual based Lightweight Network for Object Detection in Sweeping Robots," *Applied Intelligence*, 2022, 52: 12206-12221.
13. Jie Liu, Chaoqun Wang, **Wenzheng Chi***, Guodong Chen, and Lining Sun, "Estimated Path Information Gain-based Robot Exploration under Perceptual Uncertainty," *Robotica*, 2022, 40(8): 2748-2764.
14. Jiankun Wang, Jianbang Liu, Weinan Chen, **Wenzheng Chi**, Max Q.-H. Meng*, "Robot Path Planning via Neural-Networks-Driven Prediction," *IEEE Transactions on Artificial Intelligence*, 2022, 3(3): 451 - 460.
15. Zheng Wang, Hui Xu, Na Lv, Wei Tao*, Guodong Chen, **Wenzheng Chi***, and Lining Sun, "Dynamic Obstacle Avoidance for Application of Human-Robot Cooperative Dispensing Medicines," *Journal of Shanghai Jiaotong University (Science)*, 2022, 27: 24-35.
16. Dong Li, Yulin Fan, Na Lv, Guodong Chen, Zheng Wang, and **Wenzheng Chi**, "Safety Protection Method of Rehabilitation Robot Based on fNIRS and RGB-D Information Fusion," *Journal of Shanghai Jiaotong University (Science)*, 2022, 27: 45-54.
17. Yong Lv, Yuemei Fang, **Wenzheng Chi***, Guodong Chen*, and Lining Sun*, "Object Detection for Sweeping Robots in Home Scenes (ODSR-IHS): a Novel Benchmark Dataset," *IEEE Access*, 2021, 9: 17820-17828.
18. Zixiang Wang, Shuxin Xie, Guodong Chen*, **Wenzheng Chi***, Zihao Ding, and Peng Wang, "An Online Flexible Sorting Model for Coal and Gangue Based on Multi-Information Fusion," *IEEE Access*, 2021, 9: 90816-90827.
19. Jiankun Wang, **Wenzheng Chi**, Chenming Li, Chaoqun Wang, Max Q.-H. Meng*, "Neural RRT*: Learning-based Optimal Path Planning," *IEEE Transactions on Automation Science and Engineering*, 2020, 17(4): 1748 - 1758. **(2021 ESI Highly Cited Papers)**
20. Peng Wang, Yulin Fan, Guodong Chen*, **Wenzheng Chi***, Zhenhua Wang, and Lining Sun, "Design and Analysis of Full-scale Scanning System for Curved Glass based on Motion and 3D Features," *Applied Optics*, 2020, 59(29): 9195-9205.
21. Zihao Ding, Guodong Chen*, Zheng Wang, **Wenzheng Chi***, Zhenhua Wang, and Yulin Fan, "A Real-Time Multilevel Fusion Recognition System for Coal and Gangue Based on Near-Infrared Sensing," *IEEE Access*, 2020, 8: 178722-178732.
22. Zihao Ding[†], Hui Xu[†], Guodong Chen, Zheng Wang*, **Wenzheng Chi***, Heng Zhang, Zhenhua Wang, Lining Sun, Guilin Yang, and Yifang Wen, "Three-dimensional Reconstruction Method based on Bionic Active Sensing in Precision Assembly," *Applied Optics*, 2020, 59(3): 846-856.
23. **Wenzheng Chi**, Chaoqun Wang, Jiankun Wang, and Max Q.-H. Meng*, "Risk-DTRRT-Based Optimal Motion Planning Algorithm for Mobile Robots," *IEEE Transactions on Automation Science and Engineering*, 2019, 16(3): 1271-1288.
24. Chaoqun Wang, Jiyu Cheng, **Wenzheng Chi**, Tingfang Yan*, and Max Q.-H. Meng*, "Autonomous Robotic Exploration by Incremental Road Map Construction," *IEEE Transactions on Automation Science and Engineering*, 2019, 16(4): 1720-1731.
25. Chaoqun Wang, **Wenzheng Chi**, Yuxiang Sun, and Max Q-H Meng*, "Semantic-aware Informative Path Planning for Efficient Object Search Using Mobile Robot," *IEEE Transactions on Automation Science and Engineering*, 2019, 51(8): 5230 - 5243.
26. Jiankun Wang, **Wenzheng Chi**, Mingjie Shao, and Max Q.-H. Meng*, "Finding a High-Quality Initial Solution for the RRTs Algorithms in 2D Environments," *Robotica*, 2019, 37(10): 1677-1694.
27. Renzheng Zhang[†], Guodong Chen[†], Zheng Wang*, **Wenzheng Chi***, Zhenhua Wang, Lining Sun, Guilin Yang, and Yifang Wen, "Multi-color Space Learning for Image Segmentation based on a Support Vector Machine," *OSA Continuum*, 2019, 2(11): 3050-3065.
28. **Wenzheng Chi**, Jiaole Wang, and Max Q.-H. Meng*, "A Gait Recognition Method for Human Following in Service

Conference Publications

1. Chenyang Cao, Xujun Xu, Xiaofei Gong, Bo Lu, **Wenzheng Chi***, and Lining Sun, **Wenzheng Chi***, and Lining Sun, "ANMIP: Adaptive Navigation based on Mutual Information Perception in Uncertain Environments," *2023 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2023, pp. 1-7.
2. Xiaofei Gong, Chenyang Cao, Xujun Xu, **Wenzheng Chi***, and Lining Sun, **Wenzheng Chi***, and Lining Sun, "A Knowledge-based Full-time Non-homotopy Path Optimization Method Through Online Environmental Learning Authors," *2023 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2023, pp. 1-7.
3. Xujun Xu, Xiaofei Gong, Chenyang Cao, Qingchuan Xu, Chengfeng Sun*, **Wenzheng Chi***, and Lining Sun, "Social Robot Navigation and Comfortable Following: A Novel Knowledge-Based Robot-Pedestrian Interaction Model with Self Learning Strategy," *2023 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2023, pp. 1-7.
4. Junyan Tian[†], Ning Ma[†], Yu Zhou, Yong Lv*, **Wenzheng Chi***, and Lining Sun, "An Efficient End-to-End Lightweight Object Detection Method Based on YOLOv5 for Intelligent Sweeping Robots," *IECON 2023- 49th Annual Conference of the IEEE Industrial Electronics Society*, 2023, pp. 1-8.
5. Maorong Zhang, Qingchuan Xu, Aijia Luo, Yuqi Kong, **Wenzheng Chi***, and Lining Sun, "An Intelligent Garbage Sorting Robot System Based on Machine Vision and Knowledge Base," *The 42nd Chinese Control Conference (CCC2023)*, 2023, pp. 4472-4477.
6. Songlin Wei, Guodong Chen*, **Wenzheng Chi***, Zhenhua Wang, and Lining Sun, "3D Object Aided Self-Supervised Monocular Depth Estimation," *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022, pp. 10635-10642.
7. Dingfeng Chen, Qingchuan Xu, Jie Liu, Meiyuan Zou, **Wenzheng Chi***, and Lining Sun, "A Generalized Voronoi Diagram based Robot Exploration Method for Mobile Robots," *2022 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2022, pp. 1029-1035.
8. Yuqi Kong, Yao Wang, Yang Hong, Rongguang Ye, **Wenzheng Chi***, and Lining Sun, "A Generative Adversarial Network Based Motion Planning Framework for Mobile Robots in Dynamic Human-Robot Integration Environments," *2022 14th International Conference on Social Robotics (ICSR)*, 2022, pp. 427-439.
9. Yao Wang, Yuqi Kong, Zhiyu Ding, **Wenzheng Chi***, and Lining Sun, "NRTIRL Based NN-RRT* Path Planner in Human-Robot Interaction Environment," *2022 14th International Conference on Social Robotics (ICSR)*, 2022, pp. 496-508.
10. Meiyuan Zou[†], Qingchuan Xu[†], Jianfeng Bian, Dingfeng Chen, **Wenzheng Chi***, and Lining Sun, "An Efficient Medicine Identification and Delivery System based on Mobile Manipulation Robot," *2022 14th International Conference on Social Robotics (ICSR)*, 2022, pp. 417-426.
11. Kang Song, Yueyuan Zhang*, Bo Lu, **Wenzheng Chi**, and Lining Sun, "UAV Forest Fire Detection based on RepVGG-YOLOv5," *2022 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2022, pp. 1277-1282.
12. Meiyuan Zou, Jiajie Yu, Bo Lu, **Wenzheng Chi***, and Lining Sun, "Active Pedestrian Detection for Excavator Robots based on Multi-Sensor Fusion," *2022 IEEE International Conference on Real-time Computing and Robotics (RCAR)*, 2022, pp. 255-260.
13. Qingchuan Xu, Yang Hong, Yueyuan Zhang, **Wenzheng Chi***, and Lining Sun, "Grounding Language to Natural Human-robot Interaction in Robot Navigation Tasks," *2021 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2021, pp. 352-357.
14. Rongguang Ye, Qingchuan Xu, Jie Liu, Yang Hong, Chengfeng Sun, **Wenzheng Chi***, and Lining Sun, "A Natural Language Instruction Disambiguation Method for Robot Grasping," *2021 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2021, pp. 601-606.
15. Jianbang Liu, Baopu Li, Tingguang Li, **Wenzheng Chi**, Jiankun Wang*, and Max Q.-H. Meng*, "Learning-based Fast Path Planning in Complex Environments," *2021 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2021, pp. 1351-1358.
16. Jie Liu, Yong Lv, Yuan Yuan, **Wenzheng Chi***, Guodong Chen*, and Lining Sun*, "A Prior Information Heuristic based Robot Exploration Method in Indoor Environment," *2021 IEEE International Conference on Real-time Computing and Robotics (RCAR)*, 2021, pp. 129-134. **(Best Student Paper Award)**
17. Yuan Yuan, Jie Liu, Jiankun Wang, **Wenzheng Chi***, Guodong Chen*, and Lining Sun*, "A Knowledge-based Fast Motion Planning Method through Online Environmental Feature Learning," *2021 IEEE International Conference on*

Robotics and Automation (ICRA), 2021, pp. 8309-8315.

18. Yi Zhan, Zihao Wang, Jiarui Xu, Guoyi Yu, Fengwei An, **Wenzheng Chi**, and Chao Wang, "Fast CORDIC based Generalized-Voronoi-Diagram Hardware Accelerator for Efficient Robotic Exploration," *2020 5th International Conference on Robotics and Automation Engineering (ICRAE)*, 2020, pp. 100-105.
19. Jiyu Cheng, Yuxiang Sun, **Wenzheng Chi**, Chaoqun Wang, Hu Cheng, and Max Q.-H. Meng*, "An Accurate Localization Scheme for Mobile Robots using Optical Flow in Dynamic Environments," *2018 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2018, pp. 723-728.
20. Kuanqi Cai, **Wenzheng Chi**, and Max Q.-H. Meng*, "A Vision-based Road Surface Slope Estimation Algorithm for Mobile Service Robots in Indoor Environments," *2018 IEEE International Conference on Information and Automation (ICIA)*, 2018, pp. 621-626.
21. Jiankun Wang, Xintong Li, **Wenzheng Chi**, and Max Q.-H. Meng*, "Tropistic RRT*: An Efficient Planning Algorithm via Adaptive Restricted Sampling Space," *2018 IEEE International Conference on Information and Automation (ICIA)*, 2018, pp. 1639-1646.
22. **Wenzheng Chi**, Jiankun Wang, and Max Q.-H. Meng*, "Risk-Informed-RRT*: A Sampling-based Human-friendly Motion Planning Algorithm for Mobile Service Robots in Indoor Environments," *2018 IEEE International Conference on Information and Automation (ICIA)*, 2018, pp. 1101-1106.
23. **Wenzheng Chi**, and Max Q.-H. Meng*, "Risk-RRT*: A Robot Motion Planning Algorithm for the Human Robot Coexisting Environment," *2017 18th International Conference on Advanced Robotics (ICAR)*, 2017, pp. 583-588.
24. **Wenzheng Chi**, and Max Q.-H. Meng*, "A Human-friendly Robot Navigation Algorithm using the Risk-RRT Approach," *2016 IEEE International Conference on Real-time Computing and Robotics (RCAR)*, 2016, pp. 227-232. **(Best Student Paper Award)**
25. **Wenzheng Chi**, Jiaole Wang, and Max Q.-H. Meng*, "Person Verification based on Skeleton Biometrics by RGB-D Camera," *2014 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2014, pp. 671-676.
26. **Wenzheng Chi**, Wei Zhang*, Jason Gu, and Hongliang Ren, "A Vision-based Mobile Robot Localization Method," *2013 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2013, pp. 2703-2708.
27. **Wenzheng Chi**, Max Q.-H. Meng*, and Xijun Chen, "Robot Aided Object Segmentation based on Kinect without Prior Knowledge," *2012 IEEE International Conference on Robotics and Biomimetics (ROBIO)*, 2012, pp. 1784-1788.

Selected Talks

1. **Indoor Mobile Service Robot Technology and System**
Soochow University-Anhui Leju Service Robot Research Institute Joint Laboratory Opening Ceremony and Service Robot Industry-University-Research Forum, Anhui Leju Service Robot Research Institute, 15/11/2022
2. **Robot Social-Adaptive Navigation for Human-Robot Natural Interaction**
Dept. of Electronic and Electrical Engineering, Southern University of Science and Technology, 28/09/2021
3. **Discussion on "Anthropomorphic" Social Interaction Theory for Service Robots**
Intelligent Service Robot Key Technology Innovation Forum, Wuhan University of Science and Technology, 02/11/2020
4. **Research on Motion Planning Method of Mobile Robot in Human-Robot Integration Environment**
Youth Scholars Forum on Robot Teleoperation and Motion Planning, Nankai University, 09/12/2019
5. **Risk-Informed-RRT*: A Sampling-based Human-friendly Motion Planning Algorithm for Mobile Service Robots in Indoor Environments**
at IEEE ICIA 2018, Wuyi Mountain, China
6. **Risk-RRT*: A Robot Motion Planning Algorithm for the Human Robot Coexisting Environment**
at IEEE ICAR 2017, HKSAR
7. **A Human-friendly Robot Navigation Algorithm using the Risk-RRT Approach**
at IEEE RCAR 2016, Angkor Wat, Cambodia

Professional Services

1. **Reviewer of Conferences**
- IEEE ICRA, IEEE/RSJ IROS, IEEE ROBIO, IEEE ICIA, IEEE ICAR, ICSR
2. **Reviewer of Journals**

- IEEE Transactions on Industrial Electronics
- IEEE Transactions on Automation Science and Engineering
- IEEE Transactions on Instrumentation and Measurement
- IEEE Transactions on Cognitive and Developmental Systems
- IEEE Robotics and Automation Letters
- International Journal of Social Robotics
- IEEE Sensors Journal
- Robotica

3. **Administrative Post**

- **Vice-Chairman**, Dept. of Robot Engineering
School of Mechanical and Electrical Engineering, Soochow University
- **Vice-Director**, Student Innovation and Entrepreneurship Education Center
School of Mechanical and Electrical Engineering, Soochow University

4. **Teaching at Soochow University**

- **Artificial Intelligence**, Undergraduate Course
Dept. of Robot Engineering & Dept. of Intelligent Manufacturing
- **Introduction to Artificial Intelligence**, Graduate Course
School of Mechanical and Electrical Engineering
- **Professional English**, Graduate Course
School of Mechanical and Electrical Engineering