

CURRICULUM VITAE

BIYUN XIE, Ph.D.

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Education

- BS** Sept. 2005 – July 2009
Mechanical Engineering and Automation
Beijing University of Technology, China
Thesis: Study on the Dexterity of Robot Manipulators
- PhD** Sept. 2009 – July 2015
Mechanical Engineering
Beijing University of Technology, China
Dissertation: Human-like Motion Planning Strategies of Humanoid Robotic Arms
- PhD** Aug. 2015 – July 2019
Electrical Engineering
Colorado State University, USA
Dissertation: Kinematic Design and Motion Planning of Fault Tolerant Robots

Professional Experience

- 8/2019 – present Assistant Professor, University of Kentucky, KY, USA
8/2018 – 5/2019 Teaching Assistant, Colorado State University, CO, USA
8/2015 – 7/2018 Research Assistant, Colorado State University, CO, USA
8/2011 – 7/2015 Research Assistant, Beijing University of Technology, Beijing, China

Honors and Awards

- 2021 Best Paper Award Finalist: 2021 IEEE International Conference on Mechatronics and Automation
2019 Young Author Award: 2019 International Workshop on Intelligentized Welding Manufacturing
2015 Excellent Doctor Degree Dissertation at Beijing University of Technology
2011 Best Student Paper Award Finalist: 2011 International Conference on Advanced Robotics

Awarded Research Grants

1. Biyun Xie, Jiangbiao He, Autonomous Fault-Tolerant Operation of Redundant Robotic Arms, National Science Foundation, 9/1/2022 - 8/31/2025, \$499,365. (PI: Biyun Xie)
2. Biyun Xie, Developing a Demonstration-Based Motion Planner for Space Telerobots, NASA EP-SCoR RIDG award, 4/1/2023 – 3/31/2024, \$34,998. (PI: Biyun Xie)
3. Biyun Xie, Teaching Humanoid Robots by Demonstration with Preserved Dynamics and Adaptability Skills, University of Kentucky College of Engineering Young Alumni Philanthropy Council Funding, 1/1/2022 – 12/31/2022, \$3,134. (PI: Biyun Xie)
4. Biyun Xie, Human-Like Motion Planning of Collaborative Robots based on Human Arm Motion Analysis, Southeastern Center for Electrical Engineering Education Development Fund, 8/1/2020 - 7/31/2021, \$27,500. (PI: Biyun Xie)
5. Biyun Xie, Fault-Tolerant Workspace Analysis for Redundant Space Robots Experiencing Locked Joint Failures, NASA EPSCoR RIDG award, 8/1/2020 – 7/31/2021, \$45,000. (PI: Biyun Xie)

Professional Society Activities

Organization: IEEE Robotics and Automation Society
Associate Vice President of Technical Activities Board: 2020 - present

Conference Organizing Committees

Conference: IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
E-Media Committee Chair, 2025

Editorial Positions

Conference: IEEE International Conference on Robotics and Automation (ICRA)
Associate Editor: 2021-2024

Conference: IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
Associate Editor: 2018-2021

Conference: IEEE International Conference on Systems, Man, and Cybernetics (SMC)
Associate Editor: 2021-2023

Activities as a Referee

Journals IEEE Transactions on Systems, Man and Cybernetics: Systems
IEEE Transactions on Control Systems Technology
IEEE Robotics and Automation Letters
IEEE Transactions on Robotics
IEEE Sensor
Robotics and Computer-Integrated Manufacturing
Journal of Intelligent & Robotic Systems
Mechanism and Machine Theory
Frontiers in Robotics and AI
Industrial Robot
Robotica

Conferences IEEE/RSJ International Conference on Intelligent Robots and Systems
IEEE International Conference on Robotics and Automation
International Conference on Informatics in Control, Automation and Robotics
IEEE International Conference on Consumer Electronics

Invited Talks

1. “Kinematically Redundant Robots: The Promise of Advanced Performance”, University of Louisville, J.B. School of Engineering, Louisville, KY, October, 2022
2. “Kinematically Redundant Robots toward Intelligent Manufacturing”, Intelligentized Welding Manufacturing Workshop, Lexington, KY, November, 2019

Conference Session Chairman

1. Session Chair, “Robotics,” 2023 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), Seattle, Washington, USA, June 27-July 1, 2023.
2. Session Chair, “Signal and Image Processing,” 2022 IEEE International Conference on Mechatronics and Automation, Guilin, Guangxi, China, August 7, 2022.
3. Session Chair, “Signal and Image Processing,” 2021 IEEE International Conference on Mechatronics and Automation, Takamatsu, Japan, August 8, 2021.
4. Session Chair, “Motion Planning: Manipulator,” 2021 IEEE International Conference on Robotics and Automation, Xi’an, China, May 30, 2021.

Publications

Book Chapters

1. A. A. Maciejewski and B. Xie, “Redundant robots,” in *Robotics Goes MOOC: Design*. Springer, 2023

Serial Journal Articles

1. J. Zhao, X. Wang, B. Xie, and Z. Zhang, "Human-robot kinematics mapping method based on dynamic equivalent points," *Industrial Robot: the international journal of robotics research and application*, vol. 50, no. 2, pp. 219–233, 2023
2. J. Zhao, C. Wang, and B. Xie, "Human-like motion planning of robotic arms based on human arm motion patterns," *Robotica*, vol. 41, no. 1, pp. 259–276, 2023
3. T. Wu, J. Zhao, and B. Xie, "A novel method for computing self-motion manifolds," *Mechanism and Machine Theory*, vol. 179, p. 105121, 2023
4. B. Xie and A. A. Maciejewski, "Maximizing the probability of task completion for redundant robots experiencing locked joint failures," *IEEE Transactions on Robotics*, vol. 38, no. 1, pp. 616–625, 2021
5. J. Zhao, Y. Duan, B. Xie, and Z. Zhang, "FSW robot system dimensional optimization and trajectory planning based on soft stiffness indices," *Journal of Manufacturing Processes*, vol. 63, pp. 88–97, 2021
6. J. Zhao, S. Gong, B. Xie, Y. Duan, and Z. Zhang, "Human arm motion prediction in human-robot interaction based on a modified minimum jerk model," *Advanced Robotics*, vol. 35, no. 3-4, pp. 205–218, 2021
7. S. Gong, J. Zhao, Z. Zhang, and B. Xie, "Task motion planning for anthropomorphic arms based on human arm movement primitives," *Industrial Robot: the international journal of robotics research and application*, 2020
8. B. Xie and A. A. Maciejewski, "Kinematic design of optimally fault tolerant robots for different joint failure probabilities," *IEEE Robotics and Automation Letters*, vol. 3, no. 2, pp. 827–834, 2018
9. B. Xie and A. A. Maciejewski, "Structure and performance analysis of the 7! robots generated from an optimally fault tolerant Jacobian," *IEEE Robotics and Automation Letters*, vol. 2, no. 4, pp. 1956–1963, 2017
10. B. Xie and J. Zhao, "Handing over objects to human in a friendly and comfortable manner," *International Journal of Humanoid Robotics*, vol. 12, no. 04, p. 1550012, 2015
11. J. Zhao, B. Xie, and C. Song, "Generating human-like movements for robotic arms," *Mechanism and Machine Theory*, vol. 81, pp. 107–128, 2014
12. B. Xie, J. Zhao, and Y. Liu, "Fault tolerant motion planning of robotic manipulators based on a nested RRT algorithm," *Industrial Robot: An International Journal*, vol. 39, no. 1, pp. 40–46, 2012
13. J. Zhao, B. Xie, and Y. Liu, "A unified formula of fault-tolerant algorithms considering joint velocity jump for redundant robots," *Journal of Mechanical Engineering Science (Proceedings of the Institution of Mechanical Engineers, Part C)*, vol. 226, no. 6, pp. 1663–1671, 2012
14. B. Xie, J. Zhao, and Y. Liu, "Motion planning of reaching point movements for 7R robotic manipulators in obstacle environment based on rapidly-exploring random tree algorithm," *Chinese Journal of Mechanical Engineering*, vol. 48, no. 3, pp. 63–69, 2012
15. B. Xie and J. Zhao, "Advances in robotic kinematic dexterity and indices," *Mechanical Science and Technology for Aerospace Engineering*, vol. 8, pp. 1386–1393, 2011
16. J. Zhao and B. Xie, "Directional manipulability constrained by the condition number," *Chinese Journal of Mechanical Engineering*, vol. 23, pp. 8–15, 2010
17. B. Xie and J. Zhao, "Study on dexterity of robot manipulators," *Chinese High Technology Letters*, vol. 8, pp. 856–862, 2010

Conference Proceedings and Presentations

1. M. Y. Metwly, L. Clark, B. Xie, and J. He, "Optimally designed bldc motor equipped with different winding layouts for robotic arms," in *2023 IEEE Energy Conversion Congress and Exposition (ECCE)*. IEEE, 2023, pp. 6093–6098
2. J. A. Ashley, D. J. Kennedy, and B. Xie, "Kinodynamic motion planning for robotic arms based on learned motion primitives from demonstrations," in *2023 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*. IEEE, 2023, pp. 221–227
3. J. Qin, R. Shen, R. Zhu, and B. Xie, "Robust dual-graph regularized moving object detection," in *2022 IEEE International Conference on Mechatronics and Automation (ICMA)*, 2022, pp. 487–492
4. S. Gong, J. Zhao, and B. Xie, "Robot motion planning with human-like motion patterns based on human arm movement primitive chains," in *2021 IEEE International Conference on Robotics and Automation (ICRA)*. IEEE, 2021, pp. 8373–8379
5. J. Qin, J. Ashley, and B. Xie, "Hand gesture recognition based on a nonconvex regularization," in *2021 IEEE International Conference on Mechatronics and Automation (ICMA)*, 2021, pp. 187–192
6. A. Nguyen and B. Xie, "Human arm motion prediction in reaching movements," in *2021 30th IEEE International Conference on Robot & Human Interactive Communication (RO-MAN)*. IEEE, 2021, pp. 1117–1123
7. B. Xie and J. Zhao, "A new criterion for redundancy resolution of human arm in reaching tasks," in *2013 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*. IEEE, 2013, pp. 1066–1071
8. B. Xie, J. Zhao, and Y. Liu, "Human-like motion planning for robotic arm system," in *2011 15th International Conference on Advanced Robotics (ICAR)*. IEEE, 2011, pp. 88–93
9. Y. Liu, J. Zhao, and B. Xie, "Obstacle avoidance for redundant manipulators based on a novel gradient projection method with a functional scalar," in *2010 IEEE International Conference on Robotics and Biomimetics*. IEEE, 2010, pp. 1704–1709