

BIYUN XIE

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EDUCATION

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

PROFESSIONAL EXPERIENCE

- Aug. 2011 – July 2015** Research Assistant, Beijing University of Technology, Beijing, China
- Aug. 2015 – July 2018** Research Assistant, Colorado State University, CO, USA
- Aug. 2018 – May 2019** Teaching Assistant, Colorado State University, CO, USA
- Aug. 2019 –** Assistant Professor, University of Kentucky, KY, USA

RESEARCH EXPERIENCE

- Fault Tolerant Design and Motion Planning of Redundant Robots** Aug. 2015 - July 2019
Colorado State University CO, USA
National Science Foundation, Contract No. IIS-0812437 PhD Researcher
- Analyzed the structure and performance of the 7! robots generated from an optimally fault tolerant Jacobian, and identified the optimal robot designs.
 - Developed a method to design optimally fault tolerant robots for different joint failure probabilities.
 - Proposed a motion planning algorithm to plan a trajectory that maximizes the probability that a robot will be able to complete a set of point-to-point tasks, after experiencing locked joint failures.
 - Published two journal papers in IEEE Robotics and Automation Letters, and one conference paper is under review.
 - Presented the research work at IROS 2017 and ICRA 2018.
- Human-like Motion Planning of Humanoid Robotic Arms** Sept. 2010 - July 2015
Beijing University of Technology Beijing, China
National Natural Science Foundation of China, Contract No. 51075005 PhD Researcher
- Developed a new inverse kinematic algorithm for more human-like motions in point to point tasks.
 - Constructed two new human performance measures to explain how humans resolve the kinematic redundancy of the arm in reaching and grasping tasks.

- Proposed two motion planning algorithms to generate human-like reaching and grasping movements of humanoid robotic arms.
- Developed a motion planning scheme to generate human-friendly collaborative robot motions both in obstacle-free and obstacle environments.
- Published two journal papers in *Mechanism and Machine Theory* and *International Journal of Humanoid Robotics*, and two conference papers.

Kinematic Control of Redundant Robots

Beijing University of Technology

National Natural Science Foundation of China, Contract No. 50775002

Sept. 2008 - July 2010

Beijing, China

PhD Researcher

- Constructed two new dexterity indices for robotic manipulators.
- Developed a new obstacle avoidance motion planning algorithm for 7R robots based on RRT algorithm.
- Developed a fault tolerant algorithm to minimize joint velocity discontinuity.
- Published two journal papers in *Journal of Mechanical Engineering Science* and *Industrial Robot*.

TEACHING EXPERIENCE

Teaching Assistant	Theory of Machines and Mechanisms ECE 455 Introduction to Robot Programming/Simulation
Tutor	ECE 555 Robot Motion Planning (INTO CSU Pathway students)

PROFESSIONAL ACTIVITIES

Associate Editor	2018 IEEE/RSJ International Conference on Intelligent Robots and Systems 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems
Reviewer	IEEE/RSJ International Conference on Intelligent Robots and Systems IEEE/RSJ International Conference on Robotics and Automation IEEE Transactions on Systems, Man and Cybernetics: Systems Mechanism and Machine Theory

HONORS AND AWARDS

2011	Best Student Paper Award Finalist: “2011 International Conference on Advanced Robotics”
2011	National Graduate Scholarship of China
2013	Doctoral Fund of Innovation of Beijing University of Technology (50,000CNY)
2015	Excellent Doctor Degree Dissertation at Beijing University of Technology

PUBLICATIONS

Serial Journal Articles

1. 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.
2. 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.
3. 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.
4. J. Zhao, B. Xie, and C. Song, “Generating human-like movements for robotic arms,” *Mechanism and Machine Theory*, vol. 81, pp. 107–128, 2014.

5. 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.
6. 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.
7. 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.
8. 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.
9. J. Zhao and B. Xie, "Directional manipulability constrained by the condition number," *Chinese Journal of Mechanical Engineering*, vol. 23, pp. 8–15, 2010.
10. 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. 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.
2. 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.