

## WHO AM I

A problem solver, a curious learner, a passionate educator and researcher, who is fascinated by robotics and reinforcement learning. Now, is on his third year teaching and serving at University of Central Arkansas.

## EDUCATION

PhD, Engineering, New Mexico State University	2010 - 2016
Graduate Student, Mechatronics, Beijing University of Posts and Telecommunications	2007 - 2010
BE, Automation, Harbin Institute of Technology	2003 - 2007

## EMPLOYMENT

<b>Assistant Professor</b> , Dept. of Physics & Astronomy, University of Central Arkansas	2021 - Present
<b>Sr. Research Associate</b> , Dept. of Aerospace Engineering & Engineering Mechanics, University of Cincinnati	2018 - 2021
<b>Post-Doctoral Research Assistant</b> , School of Engineering Technology, Purdue University	2017 - 2018
<b>College Assistant Professor</b> , Dept. of Mechanical & Aerospace Engineering, New Mexico State University	2016

## RESEARCH EXPERIENCE

<b>Intelligent Robotics and Autonomous Systems Lab, University of Cincinnati</b>	Dec 2018 - June 2021
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*Supervisor: Prof. Ou Ma*

- Cooperative multi-robot systems (MRS).
- Distributed deep reinforcement learning control strategies for robots.
- Human-robot teaming.

<b>Multidisciplinary Design Laboratory, Purdue University</b>	Jan 2017 - Dec 2018
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*Supervisor: Prof. Xiumin Diao*

- Human-Robot interaction.
- Intention prediction using convolutional neural networks.
- Deep reinforcement learning based cable-driven robot.

<b>Reduce Gravity &amp; Biomechanics Laboratory, New Mexico State University</b>	Aug 2010 - Dec 2016
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*Advisor/Supervisor: Prof. Ou Ma*

- Thesis: Posture and Gait Analysis for Research on Risk of Falling for Older Adults
- Machine learning based gait and biomechanics analysis.
- Motion capture data collection and processing.
- Bio-inspired grasping strategy for robotic manipulators.

## TEACHING EXPERIENCE

<b>ENGR 3321: Introduction to Deep Learning for Robotics, University of Central Arkansas</b>	Fall, 2023
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Instructor

<b>ENGR 3421: Robotics I, University of Central Arkansas</b>	Fall, 2021 - 2023
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Instructor

<b>ENGR 4421: Robotics II, University of Central Arkansas</b>	Spring, 2022 - 2024
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Instructor

<b>ENGR 4312: Senior Design II, University of Central Arkansas</b>	2022 - 2024
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Advisor

<b>ENGR 4311: Senior Design I, University of Central Arkansas</b>	2021 - 2024
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Advisor

<b>ENGR 4350: Applied Deep Learning, University of Central Arkansas</b>	Fall, 2022
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Instructor

<b>ME 6117: Intelligent Robotics, University of Cincinnati</b>	Spring, 2019 - 2020
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Guest Lecturer

<b>ME 511: Analytical Dynamics, New Mexico State University</b>	Fall, 2016
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Guest Lecturer

<b>Modern Control Systems, Beijing University of Posts &amp; Telecommunications</b>	Fall, 2008
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Teaching Assistant

# PUBLICATIONS

## Journal Publications

- [1] Ao Xiang, Lin **Zhang**, and Li Fan. "Design and analysis of an electro-adhesive hexapod robot with convertible limbs in microgravity". In: *Advances in Space Research* 73.3 (2024), pp. 1908–1924.
- [2] Huanhui Cao, Hao Xiong, Weifeng Zeng, Hantao Jiang, Zhiyuan Cai, Liang Hu, Lin **Zhang**, and Wenjie Lu. "Safe Reinforcement Learning-Based Motion Planning for Functional Mobile Robots Suffering Uncontrollable Mobile Robots". In: *IEEE Transactions on Intelligent Transportation Systems* (2023).
- [3] Yuming Liu, Zhihao Cao, Hao Xiong, Junfeng Du, Huanhui Cao, and Lin **Zhang**. "Dynamic Obstacle Avoidance for Cable-Driven Parallel Robots With Mobile Bases via Sim-to-Real Reinforcement Learning". In: *IEEE Robotics and Automation Letters* 8.3 (2023), pp. 1683–1690.
- [4] Yufeng Sun, Lin **Zhang**, and Ou Ma. "Force-Vision Sensor Fusion Improves Learning-Based Approach for Self-Closing Door Pulling". In: *IEEE Access* 9 (2021), pp. 137188–137197.
- [5] Andrew Barth, Yufeng Sun, Lin **Zhang**, and Ou Ma. "Genetic fuzzy-based method for training two independent robots to perform a cooperative task". In: *Intelligent Service Robotics* 14.4 (2021), pp. 535–548.
- [6] Lin **Zhang**, Yufeng Sun, Andrew Barth, and Ou Ma. "Decentralized Control of Multi-Robot System in Cooperative Object Transportation Using Deep Reinforcement Learning". In: *IEEE Access* 8 (2020), pp. 184109–184119.
- [7] Lingyun Gu, Lin **Zhang**, and Zhaokui Wang. "Hierarchical Attention-Based Astronaut Gesture Recognition: A Dataset and CNN Model". In: *IEEE Access* 8 (2020), pp. 68787–68798.
- [8] Qingyun Fang, Lin **Zhang**, and Zhaokui Wang. "An Efficient Feature Pyramid Network for Object Detection in Remote Sensing Imagery". In: *IEEE Access* 8 (2020), pp. 93058–93068.
- [9] Hao Xiong, Lin **Zhang**, and Xiumin Diao. "A learning-based control framework for cable-driven parallel robots with unknown Jacobians". In: *Proceedings of the Institution of Mechanical Engineers, Part I: Journal of Systems and Control Engineering* 234 (2020), pp. 1024–1036.
- [10] Lin **Zhang**, Shengchao Li, Hao Xiong, Xiumin Diao, and Ou Ma. "An Application of Convolutional Neural Networks on Human Intention Prediction". In: *International Journal of Artificial Intelligence & Applications (IJAIA)* 10.5 (2019), pp. 1–11.
- [11] Shengchao Li, Lin **Zhang**, and Xiumin Diao. "Deep-Learning-Based Human Intention Prediction Using RGB Images and Optical Flow". In: *Journal of Intelligent & Robotic Systems* 97.1 (2019), pp. 1–13.
- [12] Hao Xiong, Tianqi Ma, Lin **Zhang**, and Xiumin Diao. "Comparison of end-to-end and hybrid deep reinforcement learning strategies for controlling cable-driven parallel robots". In: *Neurocomputing* 377 (2019), pp. 73–84.
- [13] Angel Flores-Abad, Lin **Zhang**, Zheng Wei, and Ou Ma. "Optimal capture of a tumbling object in orbit using a space manipulator". In: *Journal of Intelligent & Robotic Systems* 86.2 (2017), pp. 199–211.
- [14] Wenwu Xiu, Lin **Zhang**, and Ou Ma. "Experimental study of a momentum-based method for identifying the inertia barycentric parameters of a human body". In: *Multibody System Dynamics* 36.3 (2016), pp. 237–255.
- [15] Lin **Zhang**, Ou Ma, Jennifer M Fabre, and Robert H Wood. "The Motion of Center of Mass: Walking Reveals Difference in Older Adults With and Without Fall History". In: *The International Journal of Aging and Society* 5.3 (2015), pp. 1–14.

## Conference Publications

- [1] Lin **Zhang**. "Introducing Deep Learning to Undergraduate Engineering Majors". In: *ASEE Midwest Section Conference 2023*. ASEE. 2023.
- [2] Hairuo Wei, Huanhui Cao, Qingbin Gao, Lin **Zhang**, and Hao Xiong. "On the Influence of Time-delay on a Pursuit-evasion Game of an Omnidirectional Robot Evader with Delayed Information and a Differential Drive Robot Pursuer". In: *2022 International Conference on Advanced Robotics and Mechatronics (ICARM)*. IEEE. 2022, pp. 1068–1075.
- [3] Lingyun Gu, Lin **Zhang**, and Zhaokui Wang. "A One-Shot Texture-Perceiving Generative Adversarial Network for Unsupervised Surface Inspection". In: *2021 IEEE International Conference on Image Processing (ICIP)*. 2021, pp. 1519–1523.
- [4] Yufeng Sun, Lin **Zhang**, and Ou Ma. "Robotics-Assisted 3D Scanning of Aircraft". In: *AIAA AVIATION 2020 FORUM*. 2020, p. 3224.

- [5] Tianqi Ma, Hao Xiong, Lin **Zhang**, and Xiumin Diao. "Control of a Cable-Driven Parallel Robot via Deep Reinforcement Learning". In: *2019 IEEE International Conference on Advanced Robotics and its Social Impacts (ARSO)*. IEEE, pp. 275–280.
- [6] Hao Xiong, Lin **Zhang**, and Xiumin Diao. "A Novel Control Strategy for Cable-Driven Parallel Robots with Unknown Jacobians". In: *2019 IEEE International Conference on Advanced Robotics and its Social Impacts (ARSO)*. IEEE, pp. 79–83.
- [7] Lin **Zhang**, Shengchao Li, Hao Xiong, Xiumin Diao, Ou Ma, and Zhaokui Wang. "Prediction of Intentions Behind a Single Human Action: An Application of Convolutional Neural Network". In: *2019 IEEE 9th Annual International Conference on CYBER Technology in Automation, Control, and Intelligent Systems (CYBER)*. IEEE. 2019, pp. 670–676.
- [8] Hao Xiong, Lin **Zhang**, Zhongyuan Liu, and Xiumin Diao. "Joint Force Analysis and Moment Efficiency Index of Cable-Driven Rehabilitation Devices". In: *2018 IEEE-RAS 18th International Conference on Humanoid Robots (Humanoids)*. IEEE. 2018, pp. 1–5.
- [9] Shengchao Li, Lin **Zhang**, and Xiumin Diao. "Improving Human Intention Prediction Using Data Augmentation". In: *2018 27th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)*. IEEE. 2018, pp. 559–564.
- [10] Lin **Zhang**, Xiumin Diao, and Ou Ma. "A Preliminary Study on a Robot's Prediction of Human Intention". In: *2017 IEEE 7th annual international conference on CYBER technology in automation, control, and intelligent systems (CYBER)*. IEEE. 2017, pp. 1446–1450.
- [11] Pu Xie, Ou Ma, Zhen Zhao, and Lin **Zhang**. "A bio-inspired UAV leg-foot mechanism for landing, grasping and perching tasks". In: *AIAA Atmospheric Flight Mechanics Conference*. 2015, p. 1689.
- [12] Lin **Zhang**, Ou Ma, Jennifer M Fabre, Robert H Wood, Stephanie U Garcia, Kayla M Ivey, and Evan D McCann. "Classification of older adults with/without a fall history using machine learning methods". In: *2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*. IEEE. 2015, pp. 6760–6763.
- [13] Lin **Zhang**, Ou Ma, and Robert Wood. "A Pilot Study of Dynamic Stability Indices for Potential Application of Identifying Older Adult Fallers". In: *ASME 2012 5th Annual Dynamic Systems and Control Conference joint with the JSME 2012 11th Motion and Vibration Conference*. American Society of Mechanical Engineers Digital Collection. 2012, pp. 1–9.

## WORK AND PROJECT EXPERIENCE

### Intelligent Robotics and Autonomous Systems Lab, University of Cincinnati

2018 - 2021

- Set up a Vicon™ motion capture system with a Bertec™ instrumented treadmill.
- Integrated a lab-level communication platform for multiple robots using ROS.
- Developed a robotic manipulation application using a Kuka™ LBR iiwa14 robot and a Intel™ Realsense D435 camera.
- Managed installation of a Fanuc™ CR-35ia robot.
- Advised several undergraduate/graduate students for their research projects.

### Multidisciplinary Design Laboratory, Purdue University

2017 - 2018

- Led a course project of building a toy-size autonomous car using ROS.
- Advised several undergraduate students for their research projects.

### Reduce Gravity & Biomechanics Laboratory, New Mexico State University

2010 - 2016

- Assisted other researchers to work on the motion capture system.
- Hosted numerous lab tours for all types of visitors from federal sponsors (NASA, AFRL, ARO), aerospace companies, university and government lab researchers and K-12 students.

## SKILLS AND CERTIFICATIONS

**Programming languages:** Python, C++, MATLAB, LaTeX

**Hardware:** Kuka™ LBR iiwa14, Fanuc™ CR-35ia, Vicon™ Vantage and T-series, Nvidia™ Jetson series, RaspberryPi, Arduino

**Software:** Ubuntu, Tensorflow, ROS, Gazebo, Microsoft Office

**Certificates:** Fanuc™ HandlingTool Operation and Programming, Fanuc™ CR-Series Collaborative Robot Operations and Programming, Fanuc™ Dual Check Safety V7.50 & Newer

## PROFESSIONAL ACTIVITIES

### Conference Organization

Session Co-Chair, IEEE/RSJ International Conference on Intelligent Robots and Systems

2023

Program Committee, IEEE International Conference on Robotics and Biomimetics

2018

### Conference Reviewer

International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS) · IEEE International Conference on

Robotics and Automation (ICRA) · IEEE International Conference on CYBER Technology in Automation (CYBER) · IEEE International Conference on Robotics and Biomimetics (ROBIO) · IEEE International Conference on Engineering in Medicine and Biology Society (EMBS) · ASME Dynamic Systems and Control Conference (DSCC) AIAA SciTech Forum (SciTech)

### **Journal Reviewer**

*IEEE*: Robotics and Automation Letters (RA-L) · *MDPI*: Drones · *MDPI*: Machines · *Springer*: Autonomous Robots (AURO) · *ScienceDirect*: Mechanical Systems and Signal Processing (MSSP) · *Springer*: Journal of Intelligent and Robotic Systems (JINT) · *ASME*: Journal of Dynamics Systems, Measurement and Control (J. Dyn. Sys., Meas., Control.)

### **Journal Editor**

*MDPI*: Drones · *MDPI*: Remote Sensing (Remote Sens.)

## **REFERENCES**

Available upon request.