Lin Zhang

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WHO AM I

A problem solver, a curious learner, a passionate educator and researcher, who is fascinated by robotics and deep reinforcement learning. Now, is on his first 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

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

RESEARCH EXPERIENCE

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

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

Multidisciplinary Design Laboratory, Purdue University Jan 2017 - Dec 2018
Supervisor: Prof. Xiumin Diao

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

Reduce Gravity & Biomechanics Laboratory, New Mexico State University Aug 2010 - Dec 2016
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

ENGR 4421: Robotics II, University of Central Arkansas Spring, 2022
Instructor
ENGR 4312: Senior Design II, University of Central Arkansas Spring, 2022
Advisor
ENGR 3421: Robotics I, University of Central Arkansas Fall, 2021
Instructor
ENGR 4311: Senior Design I, University of Central Arkansas Fall, 2021
Advisor
ME 6117: Intelligent Robotics, University of Cincinnati Spring, 2020
Guest Lecturer
ME 6117: Intelligent Robotics, University of Cincinnati Spring, 2019
Guest Lecturer
ME 511: Analytical Dynamics, New Mexico State University Fall, 2016
Guest Lecturer
Modern Control Systems, Beijing University of Posts & Telecommunications Fall, 2008
Teaching Assistant

PUBLICATIONS

Journal Publications

[1] Lin **Zhang** et al. "Decentralized Control of Multi-Robot System in Cooperative Object Transportation Using Deep Reinforcement Learning". In: *IEEE Access* 8 (2020), pp. 184109–184119.

[2] 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.

[3] 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.

[4] 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.

[5] Lin **Zhang** et al. "An Application of Convolutional Neural Networks on Human Intention Prediction". In: *International Journal of Artificial Intelligence & Applications (IJAIA)* 10.5 (2019), pp. 1–11.

[6] 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.

[7] Hao Xiong et al. "Comparison of end-to-end and hybrid deep reinforcement learning strategies for controlling cable-driven parallel robots". In: *Neurocomputing* 377 (2019), pp. 73–84.

[8] Angel Flores-Abad et al. "Optimal capture of a tumbling object in orbit using a space manipulator". In: *Journal of Intelligent & Robotic Systems* 86.2 (2017), pp. 199–211.

[9] 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.

[10] Lin **Zhang** et al. "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] 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.

[2] Yufeng Sun, Lin **Zhang**, and Ou Ma. "Robotics-Assisted 3D Scanning of Aircraft". In: *AIAA AVIATION 2020 FORUM*. 2020, p. 3224.

[3] Tianqi Ma et al. "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.

[4] 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.

[5] Lin **Zhang** et al. "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.

[6] Hao Xiong et al. "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.

[7] 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.

[8] 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.

[9] Pu Xie et al. "A bio-inspired UAV leg-foot mechanism for landing, grasping and perching tasks". In: *AIAA Atmospheric Flight Mechanics Conference*. 2015, p. 1689.

[10] Lin **Zhang** et al. "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.

[11] 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 laguages: 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

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

Autonomous Robots (AURO) · Mechanical Systems and Signal Processing (MSSP) · Journal of Intelligent and Robotic Systems (JINT) · Journal of Dynamics Systems, Measurement and Control

REFERENCES

Available upon request.