Qi Zou

E-mail: qizou7@gmail.com **Tel**: (+82) 010-2308-9411

Address: Robotics Engineering, College of Letters and Sciences, Columbus State University, 4225 University Avenue, Columbus, Georgia 31907 USA.

1. Education

Jan. 2019 – June 2023 PhD, Mechanical Engineering
York University (Canada)
QS ranking: 353
Dissertation: 'Type synthesis and modeling of a group of parallel manipulators'.
Supervisor: Dan Zhang

Sep. 2016 – June 2019 Master, Mechanical Design and Theory
Beijing Jiaotong University (China)
Thesis: 'Design and analysis of a reconfigurable hybrid mechanism'.
Supervisor: Dan Zhang

Sep. 2012 – June 2016 Bachelor, Mechanical Engineering and Automation
Beijing Jiaotong University (China)
Thesis: 'Design and analysis of machine tool platform based on reconfigurable parallel mechanism'
Supervisor: Sheng Guo

2. Employments

Aug. 2023– *present* Assistant professor (Tenure-Track)
Robotics Engineering, Columbus State University, USA.

Feb. 2023 – July 2023 Postdoctoral Fellow
HumanRobotics (HR) Lab (**'Brain Korea 21 (BK21)' lab**), Electrical and Electronic Engineering, Hanyang University (**Brain Korea 21 (BK21) university**), Republic of Korea.
QS ranking: 157

Jan. 2019 – Dec. 2022 Teaching Assistant
Mechanical Engineering, York University, Canada.

Jan. 2019 – Dec. 2022	Research Assistant Advanced Robotics and Mechatronics (ARM) Lab, Mechanical Engineering, York University, Canada.
Sep. 2017 – Feb. 2018	Teaching Assistant Mechanical Engineering, Beijing Jiaotong University, China.
Sep. 2016 – Jun. 2019	Research Assistant Robotics Research Center, Mechanical Engineering, Beijing Jiaotong University, China.

3. Research Projects (15)

[1] Artificial intelligence healthcare robot system based on (User experience) UX design for non-face-to-face treatment. National Research Foundation of Korea. 2023.02-2024.02.

[2] Research on the general synthesis of low-induction parallel robots. Hanyang University Erica Industry-Academia Cooperation Foundation. 2023.02-present.

[3] Type synthesis and modeling of a group of parallel manipulators. York University. 2019.01-2023.01.

[4] A shock absorber for multi-sided impact roller'. 2020 Minerva Canada James Ham Safe Design Awards, Canada (**one of the two recipients** in Canada-wide award). 2020.07-2020.11.

[5] Design and fabrication of a generalized parallel robot (GPR). York University. 2019.01-2019.09.

[6] Design and analysis of a reconfigurable hybrid mechanism. Beijing Jiaotong University. 2016.09-2019.06.

[7] Research on mechanical design and control approach of task-oriented full-pose flight simulator. National Natural Science Foundation of China. 2016.09-2018.06.

[8] Theoretical research of adaptive fault-tolerant parallel robot based on redundant structure. National Natural Science Foundation of China. 2016.09-2018.06.

[9] Intelligent logistics robot. Science and technology project for industry. Beijing Jiaotong University. 2017.04-2017.08.

[10] Configuration design of a vehicular heavy-duty erection mechanism for commercial dump truck. Beijing Jiaotong University. 2017.

[11] Analysis and avoidance solutions for new self-motion characteristics of rigid-flexible coupling parallel robot. Beijing Jiaotong University. 2017.01-2018.12.

[12] Design and analysis of machine tool platform based on reconfigurable parallel mechanism. Beijing Jiaotong University. 2015.09-2016.06.

[13] Design and assembly of a novel multi-output 3D printing robot. Beijing Jiaotong University. 2014.09-2015.06.

[14] [Robot vision]. Object tracking and detection of a planar parallel mechanism. York University. 2021.01-2021.06.

[15] [Artificial intelligence]. Dynamic model of a parallel mechanism based on feedforward neural network. York University. 2019.12-2020.05.

4. Journal Articles (18, top journals: 5)

[1] **Q. Zou**, B.J. Yi, D. Zhang, Y.C. Shi, G.Y. Huang, "Type synthesis and kinematics of a class of planar parallel mechanisms with pure translations," Mechanism and Machine Theory (**Top journal**, Under review).

[2] S. Zhang, D. Zhang, **Q. Zou**, "TGLC: Visual object tracking by fusion of global-local information and channel information," Neurocomputing (Under review).

[3] **Q. Zou**, D. Zhang and G.Y. Huang, "Kinematic models and performance level index of a picking-and-placing hybrid robot," Mechanism and Machine Theory (**Top journal**, Under review).

[4] **Q. Zou**, D. Zhang and G.Y. Huang, "Kinematic joint matrix for parallel manipulators," Robotica (2022): 1-23.

[5] G.Y. Huang, D. Zhang, **Q. Zou**, W. Ye and L.Y. Kong, Analysis and design method of a class of reconfigurable parallel mechanisms by using reconfigurable platform." Mechanism and Machine Theory 181 (2023): 105215. (**Top journal**)

[6] **Q. Zou**, D. Zhang and G.Y. Huang, "Dynamic performance evaluation of the parallel mechanism for a 3T2R hybrid robot," Mechanism and Machine Theory, 2022, 172, 104794. (**Top journal**)

[7] G.Y. Huang, D. Zhang, **Q. Zou** and L.Y. Kong, “Dynamic analysis and optimization of a novel reconfigurable parallel mechanism,” Research Square, 2022, https://doi.org/10.21203/rs.3.rs-1438927/v1(Preprint) .

[8] **Q. Zou**, D. Zhang, S. Zhang and X.L. Luo, “Kinematic and dynamic analysis of a 3-DOF parallel mechanism,” International Journal of Mechanics and Materials in Design, 2021, 17(3), 587–599.

[9] **Q. Zou**, D. Zhang, S. Zhang, X.L. Luo and G.Y. Huang, “Structural design and kinematic analysis of a group of translational parallel mechanisms,” International Journal of Robotics and Automation, 2021, 206-0726.

[10] **Q. Zou**, D. Zhang, X.L. Luo, G.Y. Huang, L.J. Li and H.Q. Zhang, “Enumeration and optimum design of a class of translational parallel mechanisms with prismatic and parallelogram joints,” Mechanism and Machine Theory, 2020, 103846. (**Top journal**)

[11] D. Zhang, **Q. Zou**, S. Guo and H.B. Qu, “Kinematics and performances analysis of a novel hybrid welding robot,” International Journal of Robotics and Automation, 2020, 35(4), 206-0101.

[12] H.Q. Zhang, H.R. Fang, **Q. Zou**, and D. Zhang. "Dynamic modeling and adaptive robust synchronous control of parallel robotic manipulator for industrial application." Complexity 2020 (2020), 5640246.

[13] G.Y. Huang, D. Zhang, and **Q. Zou**. "Neural network and performance analysis for a novel reconfigurable parallel manipulator based on the spatial multiloop overconstrained mechanism." International Journal of Aerospace Engineering 2020 (2020), 8878058.

[14] H.Q. Zhang, H.R. Fang, and **Q. Zou**. "Non-singular terminal sliding mode control for redundantly actuated parallel mechanism." International Journal of Advanced Robotic Systems 17, no. 2 (2020): 1729881420919548.

[15] H.Q. Zhang, H.R. Fang, D. Zhang, **Q. Zou** and X.L. Luo, "Trajectory tracking control study of a new parallel mechanism with redundant actuation", International Journal of Aerospace Engineering, 2020(2020), 7178103.

[16] H.Q. Zhang, H.R. Fang, D. Zhang, X.L. Luo and **Q. Zou**, "Adaptive fuzzy sliding mode control for a 3-DOF parallel manipulator with parameters uncertainties", Complexity, 2020(2020), 2565316.

[17] H.Q. Zhang, H.R. Fang, D. Zhang, X.L. Luo and **Q. Zou**, "Forward kinematics and workspace determination of a novel redundantly actuated parallel

manipulator", International Journal of Aerospace Engineering, 2019(2019),4769174.

[18] **Q. Zou**, H.B. Qu and S. Guo, “Optimal design and performance analysis of a 3-DOF reconfigurable parallel mechanism,” Chinese Journal of Mechanical Engineering, 2018, 29(10), 1172-1178.

5. Conference Articles (6)

[1] G.Y. Huang, D. Zhang, L.Y. Kong, and **Q. Zou**. "Kinematic and performance analysis of a novel reconfigurable parallel mechanism." In 2021 7th International Conference on Mechatronics and Robotics Engineering (ICMRE), IEEE, 2021, 180-184.

[2] **Q. Zou**, D. Zhang, S. Zhang and X.L. Luo. "Kinematic analysis of a fully-decoupled parallel manipulator with pure translations." In 2020 5th International Conference on Automation, Control and Robotics Engineering (CACRE), IEEE, 2020, 221-225.

[3] X.L. Luo, X.D. Jin, D. Zhang and **Q. Zou**, “Vision-based control approach for generalized planar parallel robots,” In 2020 5th International Conference on Automation, Control and Robotics Engineering (CACRE), IEEE, 2020, 216-220.

[4] **Q. Zou**, D. Zhang and X.L. Luo, “Type synthesis and application of a class of single DOF parallel mechanisms with one constraint couple,” IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), 2019, 295-300.

[5] H.Q. Zhang, H.R. Fang, **Q. Zou**, M. Song and T. Zhu, "Force-position hybrid control of a novel parallel manipulator with redundant actuation," 2019 WRC Symposium on Advanced Robotics and Automation (WRC SARA), 2019, pp. 128-133.

[6] H.Q. Zhang, H.R. Fang, D. Zhang, B.S. Jiang and **Q. Zou**, "Kinematic performance analysis of a novel redundantly actuated parallel mechanism," 2019 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), 2019, 301-306.

6. Patents (5)

[1] **Q. Zou**, D. Zhang and G.Y. Huang, “Dual-purpose wheel.” (In progress).

[2] **Q. Zou**, D. Zhang and H.B. Qu, “A novel crawler firefighting robot,” CN.201721334321.0.

[3] D. Zhang, **Q. Zou** and S. Guo, "A parallel fire monitor," CN.201721153766.9.

[4] H.B. Qu, **Q. Zou** and S. Guo, "Electric stair-climbing trolley," CN.201721244767.4.

[5] X.L. Zhang, L.Q. Wang and **Q. Zou**, "A rehabilitation training device for upper limb," CN.201520874512.0.

7. Oral Presentations (1)

[1] **Qi Zou**, Xueling Luo, Shuo Zhang. A shock absorber for multi-sided impact roller.

In Minerva Canada Webinar 'The evolving health and safety challenges associated with the Covid19 pandemic', November 05, 2020.

8. Honors and Awards (22)

[1] 2021 Mechanical Engineering Research Excellence Award, York University.

[2] 2021 Mechanical Engineering Conference Travel Award, York University.

[3] 2021 Ontario Graduate Scholarship (OGS), Province of Ontario, Canada.(**Top scholarship for international students**)

[4] 2020 2020 Minerva Canada James Ham Safe Design Awards, Canada.(**One of the two recipients across Canada**)

[5] 2020 Mechanical Engineering Conference Travel Award, York University.

[6] 2018 Full Scholarship for Doctoral Program, York University.

[7] 2018 Excellent Academic Scholarship, Beijing Jiaotong University.

[8] 2018 Railway Vehicle Self-reliance Star, Beijing Jiaotong University.

[9] 2018 China CITIC Bank Scholarship, China CITIC Bank.

[10] 2017 Railway Vehicle Scholarship, Beijing Jiaotong University.

[11] 2017 Excellent Academic Scholarship, Beijing Jiaotong University.

[12] 2017 National English Competition for College Students (NECCS), China.

[13] 2017 Third Prize of 'Hui-Guang Cup' Academic Study Competition for Graduate Students, Beijing Jiaotong University.

[14] 2016 Excellent Academic Scholarship, Beijing Jiaotong University.

[15] 2015 National Inspiration Scholarship, Beijing Jiaotong University.

[16] 2015 Excellent Academic Scholarship, Beijing Jiaotong University.

[17] 2015 'Challenge Cup' Extracurricular Science and Technology Competition, Beijing Municipal Committee.

[18] 2015 First prize of the 'Challenge Cup' Extracurricular Science and

Technology Competition, Beijing Jiaotong University.

[19] 2014 National Inspiration Scholarship, Beijing Jiaotong University.

[20] 2014 Excellent Academic Scholarship, Beijing Jiaotong University.

[21] 2014 National level of Innovation Training Program, Beijing Jiaotong University.

[22] 2013 Excellent Academic Scholarship, Beijing Jiaotong University.

9. Competitions

[1] **Qi Zou**, Shuo Zhang, Xueling Luo. 'A shock absorber for multi-sided impact roller'. 2020 Minerva Canada James Ham Safe Design Awards, Canada (**one of the two recipients** in Canada-wide award).

[2] **Qi Zou**, Xueling Luo, 'Hybrid surgical robot', 2020 Science Exposed Contest organized by National Sciences and Engineering Research Council (NSERC) of Canada, 2020, Canada. (Not awarded)

[3] **Qi Zou**, Wenzhe Wang, 'Mobile crane N1 based on hybrid mechanism', BICES China— the 4th International Design Contest of Construction Machinery & Specialized Vehicle, 2017, China. (Not awarded)

[4] Wenzhe Wang, Deying An, **Qi Zou**, 'A novel reconfigurable parallel robot for polishing operation', The 6th ABB University Student Innovation Competition, 2017, China. (Not awarded)

10. Teaching/Research Assistance

[1] 2019-2022, Teaching Assistant, York University, Canada.

My duty includes

- Deliver tutorials.
- Mark assignments/quizzes/mid-term/Final exam.

Undergraduate courses list (9)

Course titles & periods	Course contents
Renaissance Engineer Jan.– Apr. 2019	Engineering ethics, communication. Creative problem solving and renaissance engineering.
Thermofluids Laboratory Jan.– Apr. 2019	A series of experiments and demonstrations. Thermodynamics (e.g., power cycles, or heat pumps). Fluid mechanics (flow in the pipes and losses). Fluid machines (e.g., pumps or fans).

	Flow measurements techniques (e.g., from traditional to advanced optical systems e.g., PIV). Conduction/convective Radiation heat transfer Heat exchangers.
Engineering Graphics and CAD Modelling Sep.– Dec. 2019 Sep.– Dec. 2022	Technical drawing principles. 3D modelling of parts and assemblies in CAD software SolidWorks. Basic physical properties of part files. Tolerance information of assembly files. Project: a self-propelled bio-inspired walker. Project: nature-inspired mechanical hopper.
Mini Design Project-I Jan.– Apr. 2020	Mechanical workshop practices and safety procedures. Subtractive manufacturing methods (e.g., cutting, drilling, machining). Application of fundamental knowledge of design concepts through a hands-on mini-design group project. Project: a Go cart with electric motors.
Mini Design Project-II Jan.– Apr. 2020	Formulate engineering problems via communication with potential clients (e.g., industry partner, faculty member, etc.) and/or literature survey. Practice prototyping and fabrication techniques (e.g., advanced machining, laser or water jet cutting and additive manufacturing). Apply STEM methods to solve real-world engineering design problems. Project: a device that can crush an aluminum beverage can with renewable energy.
Dynamics Sep.– Dec. 2020	Linear/angular velocities and accelerations of a rigid body in 2D plane. Kinetic equations for genera planar motion for rigid body. Principles of work and energy. Conservation of energy and momentum.
Mechanisms for	Classifications of mechanisms.

Mechanical Systems Jan.– Apr. 2021 Jan.– Apr. 2022	Velocity, acceleration and force analysis (e.g. for linkages, cranks, sliders, and cams). Balancing of rotating and reciprocating machinery. Gears and gear-trains. Graphical and analytical methods of analysis for mechanisms. Applications of different mechanisms in mechanical systems (e.g., engines, manufacturing systems). Project: a planar linkage mechanism with specific functions and predefined conditions.
Macro and Micro Manufacturing Methods. Jan.– Apr. 2021 Jan.– Apr. 2022	Traditional and non-traditional manufacturing methods for metal, ceramics, polymers and composites. Project: a detailed manufacturing process for a component in an automobile.
Solid Mechanics and Materials Laboratory Sep.– Dec. 2021	Measurement and characterization methods used for macro- and micro-systems. Strain measurements Deflection measurements Hardness, impact Material characterization methods. Develop skills in data collection, analysis, and the presentation of findings.

[2] 2019-2022, Research Assistant, Advanced Robotics and Mechatronics (ARM) Lab, York University, Canada.

[3] 2017-2018, Teaching Assistant, Beijing Jiaotong University.

Graduate course list (1)

Course title & period	Robot types	Course contents
Robotic mechanisms Sep. 2017-Feb. 2018	Serial robot	Position analysis Jacobian analysis Dynamics Performance evaluations
	Parallel robot	

[4] 2016-2019, Research Assistant, Robotics Research Center, Beijing Jiaotong University.

11. Professional activities

Editorial board

[1] Assistant editor, International Journal of Mechanisms and Robotic Systems (IJMRS)

Journal reviewer

[1] International Journal of Robotics and Automation (IJRA)

[2] International Journal of Mechanisms and Robotic Systems (IJMRS)

[3] International Journal of Dynamical Systems and Differential Equations (IJDSDE)

[4] International Journal of Engineering Management and Economics (IJEME)

Conference reviewer

[1] The 1st International Electronic Conference on Machines and Applications (IECMA 2022), Sponsored by *MDPI* and journal *Machines*.

[2] The 5th International Conference on Mechanical, Electric and Industrial Engineering (MEIE2022), Sanya, China,

[3] The Third International Workshop on Materials Science and Mechanical Engineering (IWMSME2020), Hangzhou, China.

[4] The 4th International Conference on Computer Science and Application Engineering (CSAE2020), Sanya, China.

12. Membership

[1] Canadian Society for Mechanical Engineering (CSME), Canada.

[2] Society of Manufacturing Engineering (SME), York University, Canada.

13. Volunteering Work

[1] 30/03/2019 Spring Open House of York University.

[2] 10–11/10/2017 National Natural Science Foundation of China.

[3] 19/09/2017 Alumni activity of Beijing Jiaotong University.

[4] 08–11/09/2014 The 21st ISPE International Conference on Concurrent Engineering, CE2014, Beijing, China.