# Jiaxiang Zhu

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## Education

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|---|---|---|
| Oct 2020 - Jan 2025 | **PhD. Mechanical Engineering** | **University College Cork** |
| Sep 2018 - Dec 2019 | **M.S. Mechanical Engineering (Distinction)** | **University College Cork** |
| Sep 2014 - July 2018 | **B.S. Mechanical Design, Manufacturing, and Automation** | **Inner Mongolia University of Science and Technology** |
| Sep 2015 - Feb 2016 | **Mechatronics Engineering (Exchange Student)** | **National Changhua University of Education** |

## Research Interest

My research specializes in the design, nonlinear analysis, fabrication, and experimental validation of advanced compliant mechanisms that enable precise motions, including translation, rotation, and complex kinematic behaviors. These mechanisms are optimized for high-precision applications, meeting the rigorous demands of nano-positioning systems, surgical tools, and precision robotics.

## Honors / Awards

2024 Shortlisted in the Student Mechanism & Robot Design Competition, *ASME-IDETC Conference*

2023 Winner of the Publication of the Year Award, *School of Engineering and Architecture, UCC*

2023 Best Presentation Award, 2nd Forum for Chinese PhD Students in Ireland and Northern Ireland

2022 Winner of ASME Compliant Mechanisms Award, *ASME Mechanisms and Robotics Committee*

2023 Second place in the Student Mechanism & Robot Design Competition, *ASME-IDETC Conference*

2022 Second place in the Student Mechanism & Robot Design Competition, *ASME-IDETC Conference*

2021 Best Research Image, *School of Engineering and Architecture, UCC*

2019 First Class Honours (Distinction) in M.S. Mechanical Engineering, *UCC*

2017 Second and Third Prize in the *National Undergraduate Mechanical Innovation Competition*

2014 A member of the *Excellence Engineer Education and Training Program*

## Publications (Journal / Conference)

### Journal Papers

1. **Zhu, J.**, Li, S., & Hao, G. (2025). Nonlinear design of a general single-translation constraint and the resulting general spherical joint. *Journal of Mechanical Design*, 1-40. https://doi.org/10.1115/1.4068101
2. **Zhu, J.**, & Hao, G. (2024). Modelling of a general lumped-compliance beam for compliant mechanisms. *International Journal of Mechanical Sciences*, *263*, 108779. https://doi.org/10.1016/j.ijmecsci.2023.108779
3. **Zhu, J.**, Hao, G., Liu, T. and Li, H., (2023). Design of an over-constraint based nearly-constant amplification ratio compliant mechanism. *Mechanism and Machine Theory*, *186*, p.105347. https://doi.org/10.1016/j.mechmachtheory.2023.105347
4. **Zhu, J.**, Hao, G., Li, S. and Kong, X., (2022). A compact mirror-symmetrical XY compliant parallel manipulator for minimizing parasitic rotations. *Journal of Mechanical Design*, *144*(7), p.073303. https://doi.org/10.1115/1.4053818
5. **Zhu, J.**, & Hao, G. (2020). Design and test of a compact compliant gripper using the Scott–Russell mechanism. *Archives of Civil and Mechanical Engineering*, *20*, 1-12.
6. Hao, G., & **Zhu, J.** (2019). Design of a monolithic double-slider based compliant gripper with large displacement and anti-buckling ability. *Micromachines*, *10*(10), 665.

7. Liu, T., Hao, G., Zhu, J., Kuresangsai, P., Abdelaziz, S., & Wehrle, E. (2024). Modeling compliant bistable mechanisms: An energy method based on the high-order smooth curvature model. *International Journal of Mechanical Sciences*, *275*, 109315. https://doi.org/10.1016/j.ijmecsci.2024.109315
8. Li, S., Hao, G., Chen, Y., **Zhu, J**., & Berselli, G. (2022). Nonlinear analysis of a class of inversion-based compliant cross-spring pivots. *Journal of Mechanisms and Robotics*, *14*(3), 031007.
9. Li, K., He, X., Lv, L., **Zhu, J**., Hao, G., Li, H., & Song, X. (2023). A single-fidelity surrogate modeling method based on nonlinearity integrated multi-fidelity surrogate. *Journal of Mechanical Design*, *145*(9).
10. Hao, G., He, X., **Zhu, J**., & Li, H. (2024). Design and Analysis of Leaf Beam Single-Translation Constraint Compliant Modules and the Resulting Spherical Joints. *Journal of Mechanical Design*, *146*(8), 083301.
11. Mokhtari, M., Varedi-Koulaei, S. M., **Zhu, J**., & Hao, G. (2022). Topology optimization of the compliant mechanisms considering curved beam elements using metaheuristic algorithms. *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science*, *236*(13), 7197-7208.

### Conference Papers

1. **Zhu, J.**, Hao, G., Ye, S.,(2024, June). Nonlinear modelling of a novel general single-translation constraint and centre drift analysis of the resulting spherical joint .In *MMT Symposium 2024*. Universidade do Minho.
2. Song, X., Li, K., Wang, S., Kan, Z., Li, H., **Zhu, J.**, & Hao, G. (2022, August). Framework design of a digital twin of an Xy compliant parallel manipulator based on non-negative matrix factorization. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference* (Vol. 86212, p. V002T02A023). American Society of Mechanical Engineers.
3. **Zhu, J.**, Hao, G., Liu, T., & Li, H. (2022, August). Design and Nonlinear Analysis of an Overconstraint Based Constant Amplification Ratio Compliant Mechanism. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference* (Vol. 86281, p. V007T07A005). American Society of Mechanical Engineers.
4. **Zhu, J.**, Hao, G., & Tang, H. (2022, August). Design and modelling of a generic compliant mechanism with bi-stability and static balancing. In *2022 IEEE International Conference on Manipulation, Manufacturing and Measurement on the Nanoscale (3M-NANO)* (pp. 172-177). IEEE.
5. **Zhu, J.**, Hao, G., Li, S., Yu, S., & Kong, X. (2021, August). A mirror-symmetrical xy compliant parallel manipulator with improved performances without increasing the footprint. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference* (Vol. 85444, p. V08AT08A012
6. Li, S., Hao, G., Chen, Y., **Zhu, J.**, & Berselli, G. (2021, August). Nonlinear Analysis of a Class of Inversion-Based Compliant Cross-Spring Pivots. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference* (Vol. 85444, p. V08AT08A011).

## Teaching Experience

2021-2024 **Graduate Teaching Assistant** **University College Cork**

Course: CAD/CAM

Main Responsibilities: Assisting with Course Instruction, Grading and Assessment, Office Hours and Student Support, Preparing Course Materials

## Work Experience

2020-2021 **BIM Technician** **Dornan Engineering | Cork, Ireland**

Duties: 3D Modeling and Drafting, Clash Detection and Resolution, Documentation and Reporting

2017-2018 **Engineer Intern** **Shendong Tianlong Coal Machinery Maintenance Co., Ltd. | China**

Duties: Assisting in Hydraulic Support Design and Development, Testing and Analysis, Maintenance

## Professional Affiliations and Contributions

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| 2019-present | **Member of ASME** |
| 2020-present | **Reviewer** for Journal of Mechanical Design, Journal of Mechanism and Machine Theory, IEEE Robotics and Automation Letters, Journal of Mechanisms and Robotics |
| 2021-2024 | **Assistant in Conference Organization:** IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) and 15th World Congress on Structural and Multidisciplinary Optimization |

## Beyond Academia

**Sports and Music:**

- ☐ Basketball: Played for a local club in Cork and was a former member of the UCC Basketball team. Achieved championship and MVP honors during the undergraduate fresher's tournament.
- ☐ Gaelic Football: Represented the Asian team and had the privilege of playing in the national Croke Park.
- ☐ Swimming: Dedicated to regular swimming as part of personal fitness and recreation.
- ☐ Guitar: Played in a band during undergraduate studies, contributing to musical events and performances.

**Voluntary Work:**

- ☐ The Chinese Students and Scholars Association (UCC): Active volunteer since 2019, contributing to various cultural and community activities.
- ☐ 2nd Forum for Chinese PhD Students in Ireland and Northern Ireland (2023): Assisted in organizing this prestigious academic forum, fostering collaboration among PhD students.

## References

**Prof. Guangbo Hao**
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