Zhuonan Hao

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Profile Highlights

- Fourth-year Ph.D. student at University of California, Los Angeles, currently in good academic standing
- Expert on robotics control with 5+ year of academic research in system modeling and hardware integration
- Author of 12 top-tier peer-reviewed conferences and journals in the field of mechanics, control and robotics

Education

University of California, Los Angeles Aug. 2021 - Now
Doctor of Philosophy in Robotics and Control *Current GPA: 3.78/4.0*

University of California, San Diego Sep. 2019 - Jun. 2021
Master of Science in Engineering Sciences (Mechanical Engineering) *GPA: 3.97/4.0*

Beijing Institute of Technology Sep. 2015 - Jul. 2019
Bachelor of Science in Vehicle Engineering *GPA: 3.71/4.0*

University of Wollongong Jul. 2018 - Jul. 2019
Exchange in Mechatronics and Materials Engineering *GPA: 3.25/4.0*

Research Experience

Research And Development Section, BEHR Paint Company | *Researcher* Jul. 2024 - Now
- Observing and quantifying the painting procedure by humans
- Implementing human-mimetic painting procedure on a robot arm

Structures-Computer Interaction Lab, UC Los Angeles | *Researcher* Aug. 2021 - Now
- Develop physical-based computation tool (C++) that solutions to the simulation of soft robotics
- Model and prototype the bio-inspired underwater soft robot, featuring the sensing and actuation units
- Deploy the state-of-the-art perception and control algorithms to achieve agile motion via sim-to-real approach

Gravish Lab, UC San Diego | *Researcher* Mar. 2020 - Jun. 2021
- Creat multiphysics computation framework (python) to simulate the behavior of a collective group of robots
- Build a multi-joint undulatory robot equipped with proprioceptive sensing capabilities
- Design an algorithm for synchronization through contact-driven mechanisms

Dynamics and Vibration Control Lab, UOW | *Researcher* Dec. 2018 - Jul. 2019
- Developed and evaluated a semi-active vehicle suspension system with a self-powered MR damper.
- Created a mathematical model and implemented a controller for optimized stiffness control.

Teaching Experience

UC Los Angeles | *Teaching Instructor* July. 2024 - Now
- Program: California State Summer School for Mathematics and Science (COSMOS) - Cluster 5: From Mini Robot Cars to Rockets: Introductions to Mechanical and Aerospace Engineering through Mechatronics

UC Los Angeles | *Teaching Associate* Jan. - Mar. 2022, Apr. - Jun. 2023, Apr. - Jun. 2024
- Subject: MAE M20 - Introduction to Computer Programming with MATLAB

UC Los Angeles | *Tutor* Aug. - Sep. 2021, 2022, 2024
- Subject: MAE 101 - Statics and Strength of Materials

University of California, San Diego | *Teaching Assistant* Oct. - Dec. 2020
- Subject: MAE 150 - Computer-Aided Design

Journal Articles and Conference Proceedings

- D. Tong*, **Z. Hao***, J. Li*, B. Sun, M. Liu, L. Wang, W. Huang. Real-time simulation enabled navigation control of magnetic soft continuum robots in confined lumens. *Journal of the Mechanics and Physics of Solids.* 2025. (Under review)
- J. Li*, D. Tong*, **Z. Hao***, Y. Zhu, H. Wu, M. Liu, W. Huang. Harnessing discrete differential geometry: a virtual playground for the bilayer soft robotics. *Advanced Intelligent Systems.* 2025. (Under review)
- B. Ye*, **Z. Hao***, P. Shah, M. Khalid Jawed. Bio-inspired modular pneumatic actuator for peristaltic transport. *IEEE Robotics and Automation Letters.* 2025.
- D. Tong*, **Z. Hao***, Li, J., W. Huang. Inverse design of a two-Dimensional clamped-free elastic rods from noisy data. *International Journal for Numerical Methods in Engineering.* 2025.
- D. Tong, **Z. Hao**, M. Liu, W. Huang. Inverse design of snap-actuated jumping robots powered by mechanics-aided machine learning. *IEEE Robotics and Automation Letters.* 2024.
- **Z. Hao**, S. Zalavadia, M. Khalid Jawed. Bundling and tumbling in bacterial-inspired bi-flagellated soft robots for attitude adjustment. *IEEE 7th International Conference on Soft Robotics (RoboSoft).* 2024.
- **Z. Hao**, S. Lim, M. Khalid Jawed. Modeling, characterization, and control of bacteria-inspired bi-flagellated mechanism with tumbling. *IEEE/RSJ International Conference on Intelligent Robots (IROS).* 2023.
- **Z. Hao**, S. Lim, M. Khalid Jawed. Modeling and characterization of bacteria-inspired bi-flagellated mechanism with tumbling. *Southern California Robotics Symposium (SoCal Robotics).* 2023.
- W. Zhou, JD Peralta, **Z. Hao**, N. Gravish. Lateral contact yields longitudinal cohesion in active undulatory systems. *Physics Review E.* 2022.
- **Z. Hao**, W. Zhou, N. Gravish. Proprioceptive feedback design for gait synchronization in collective undulatory robots. *Advanced Robotics.* 2022.
- W. Zhou, **Z. Hao**, N. Gravish. Collective synchronization of undulatory movement through contact. *Physics Review X.* 2021.
- X. Zhu, D. Ning, **Z. Hao**, W. Li, et al. Modelling and experimental evaluation of a variable stiffness MR suspension with self-powering capability. *Journal of Intelligent Material Systems and Structures.* 2020.

Conference Abstracts

- **Z. Hao**, S. Lim, S. Zalavadia, D. Chin, S. Johri, V. Nagappala, M. Khalid Jawed. Mechanical characterization of bio-inspired flagella interaction. *APS March Meeting.* 2024.
- **Z. Hao**, S. Lim, M. Khalid Jawed. Modeling and characterization of bi-flagellated robot with tumbling. *APS March Meeting.* 2023.
- M. Khalid Jawed, **Z. Hao**, S. Lim. Bacteria-inspired bi-flagellated soft robot with bundling and tumbling behavior. *APS March Meeting.* 2022.
- **Z. Hao**, W. Zhou, N. Gravish. Synchronized swimming: adaptive gait synchronization through mechanical interactions instead of communication. *The 10th International Symposium on Adaptive Motion of Animals and Machines.* 2021.
- W. Zhou, J. Dezha-Peralta, **Z. Hao**, N. Gravish. Synchronized swimming: collisions drive gait compatibility in undulatory robots. *APS March Meeting.* 2021.

Grant Writing

- Collected preliminary data and wrote technical details for a **National Science Foundation Future Manufacturing (FM)** proposal, Winter 2024, PIs: M. Khalid Jawed (UCLA), M. Ravi Shankar (Pitt), Bashir Khoda (Umaine), Carmel Majidi (CMU), Lining Yao (Berkeley), Wei Wang (UCLA), Eitan Grinspun (U. Toronto)

Membership and Professional Service

- Paper reviewer in The IEEE Robotics and Automation Letters — Aug. 2024
- Paper reviewer in The 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) — Apr. 2024
- Paper reviewer in The 2024 IEEE International Conference on Soft Robotics (RoboSoft) — Dec. 2023
- Conference organizer in The Southern California Robotics Symposium (SoCal Robotics) — Sep. 2022
- Workshop organizer in The IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) — Oct. 2020
- Membership of Institute of Electrical and Electronics Engineers — 2023 - Now
- Membership of American Physical Society — 2022 - Now

Honors and Awards

University Fellowship (USD $14000) 2022
Graduate division award *University of California, Los Angeles*

Honorable Mention for Outstanding Poster in AMAM 2021 2021
Virtual poster competition winner *AMAM2021 Virtual Organizing Committee*

Outstanding Undergraduate 2019
Awarded for the exemplary student *Beijing Institute of Technology*

China Scholarship Council Scholarships (AUD $20,000) 2018 - 2019
National scholarship for studying abroad *China Scholarship Council*

Honorable Mention of Mathematical Contest in Modeling 2018
Top 25% team *Consortium for Mathematics and its Applications*

Annual Merit Undergraduate 2016, 2017
The best undergraduate student *Beijing Institute of Technology*

First Prize of the People's Scholarship (CNY ¥1,100) 2016, 2017, 2018
Top 5% in School of Mechanical Engineering *Beijing Institute of Technology*

Technical Skills

Languages: C/C++, Python, Matlab/Simulink, LaTeX, JavaScript
Tools: ROS, Arduino, PyTorch, PyBullet, CasADi, Eigen, CVX, Pandas, Numpy

Reference

Prof. M. Khalid Jawed
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University of California, Los Angeles
Los Angeles, CA, 90095, US
Email: khalidjm@seas.ucla.edu

Prof. Xiaonan Huang
Robotics Department
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Ann Arbor, MI, 48109, US
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Prof. Nicholas Gravish
Mechanical Engineering
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La Jolla, CA, 92093, US
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