

# Zechen XIONG

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## EDUCATION

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- 2018-Pres. **Columbia University, GSAS** | New York, NY  
Ph.D., Earth and Environmental Engineering, Soft Robotics, Compliant Mechanisms
- 2015-2018 **Tsinghua University, School of Civil Eng.** | Beijing, China  
Master's in Civil Engineering  
Thesis: "Analysis for Heat Transfer and Multi-field Coupling of Energy Geo-structures."
- 2012-2015 **Tsinghua University, School of Economics and Management** | Beijing, China  
Second Bachelor's in Economics
- 2010-2015 **Tsinghua University, School of Civil Engineering** | Beijing, China  
Bachelor's in Civil Engineering

## RESEARCHING

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- 2021-Pres **Columbia University** | New York, NY  
*Ph.D. Candidate, Soft Robotics, Advisor: Hod Lipson*
- ♦ Inventing novel compliant mechanism for soft robotics.
  - ♦ Leading, organizing, and managing.
- 2018-2021 **Columbia University Earth Engineering Center** | New York, NY  
*Ph.D. Candidate, Deployable Mechanisms, Advisor: Xi Chen*
- ♦ Beam structure analysis, deployable mechanisms, soft robotics
  - ♦ Leading, organizing, and managing.
- 2014-2018 **Tsinghua Univ. Institute for Underground Engineering** | Beijing, China  
*Master's student, Energy Geo-structure, Advisor: Hongxian Guo, Xiaohui Cheng*
- ♦ Duhamel's integral analysis, COMSOL 3D modelling
  - ♦ Leading, organizing, and managing.
- 2015.6-9 **Dong Fureng Economic and Social Development Institute** | Beijing, China  
*Researcher, Advisor: Sheng Hua*
- ♦ Macroeconomic researching, leading, and organizing.

## PUBLICATIONS

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- 2018.9-Pres **Zechen Xiong**, Liqi Chen, Hod Lipson. "Prestressed Bistable Hair Clip Mechanism for Faster Swimming Robots" (Nature Machine Intelligence, **Under Review**), [arxiv.org/abs/2206.14867](https://arxiv.org/abs/2206.14867)
- Zechen Xiong**, Zihan Guo, Hod Lipson. "CarbonFish: A Bistable Underactuated Compliant Fish Robot capable of High-Frequency Undulation" (npj Robotics, **Under Review**), [arxiv.org/abs/2311.03223](https://arxiv.org/abs/2311.03223)

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- Zechen Xiong**, Hod Lipson. “Designing a Hair-Clip Inspired Bistable Mechanism for Soft Fish Robots” (RoboSoft 2023, **Under Review**), [arxiv.org/abs/2311.03212](https://arxiv.org/abs/2311.03212)
- Zechen Xiong**, Jeong Hun Lee, Hod Lipson. “Accelerating Aquatic Soft Robots with Elastic Instability Effects” (ICRA 2024, **Under Review**), [arxiv.org/abs/2310.14119](https://arxiv.org/abs/2310.14119)
- McClintock Hayley, **Zechen Xiong**, Bruno Rergis, and Hod Lipson. “Design and Fabrication of Carbon Fiber Lattices Using 3D Weaving.” *Scientific Reports* 13, no. 1 (September 10, 2023): 14919. <https://doi.org/10.1038/s41598-023-40962-4>
- Zechen Xiong**, Zihan Guo, Li Yuan, Yufeng Su, Yitong Liu, and Hod Lipson. “Rapid Grasping of Fabric Using Bionic Soft Grippers with Elastic Instability.” arXiv, January 26, 2023. (IROS 2023, **Accepted**) [arXiv.2301.09688](https://arxiv.org/abs/2301.09688)
- Zechen Xiong**, Yufeng Su, and Hod Lipson. “Fast Untethered Soft Robotic Crawler with Elastic Instability.” IEEE International Conference on Robotics and Automation (ICRA), 2023 2606–12. Video: [youtube/2vxqgBPo9S8](https://www.youtube.com/watch?v=2vxqgBPo9S8)
- Tianwei Jin, Yirui Ma, **Zechen Xiong**, Xiaoyu Fan, Yu Luo, Zeyu Hui, Xi Chen, and Yuan Yang. “Bioinspired, Tree-Root-Like Interfacial Designs for Structural Batteries with Enhanced Mechanical Properties.” *Advanced Energy Materials* 11, no. 25 (2021): 2100997, DOI: [10.1002/aenm.202100997](https://doi.org/10.1002/aenm.202100997)
- Zechen Xiong**, Hang Xiao, and Xi Chen. “Fractal-Inspired Soft Deployable Structure: A Theoretical Study.” *Soft Matter* 17, no. 18 (May 12, 2021): 4834–41, DOI: [10.1039/D1SM00006C](https://doi.org/10.1039/D1SM00006C)
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- 2017-2018 **Zechen Xiong**, Tianlin Wang, and Hongxian Guo, and Xiaohui Cheng. “Feasibility Study of Insulation and Anti-Rreezing for Drainage Ditch in Cold Region Runnels Based on Shallow Geothermal Energy.” *Journal of Disaster Prevention and Mitigation Engineering* 4 (2019): 556-563. DOI: [10.13409/j.cnki.jdpme.2019.04.003](https://doi.org/10.13409/j.cnki.jdpme.2019.04.003)
- Zechen Xiong**, Hongxian Guo, Xiaohui Cheng, “Finite Element Analysis of Thermal-Hydraulic Coupled Centrifuge Test for Saturated Sand.” *Journal of Disaster Prevention and Mitigation Engineering* 4 (2017): 604-610+696. DOI: [10.13409/j.cnki.jdpme.2017.04.015](https://doi.org/10.13409/j.cnki.jdpme.2017.04.015)
- Zechen Xiong**, Hongxian Guo, Xiaohui Cheng, “A simplified analysis method for long-term stability of ground source heat exchanging pipes.” *Proceedings of the 26th National Conference on Structural Engineering* 3 (2017): 656-661. <https://cpfd.cnki.com.cn/Article/CPFDTOTAL-LXFY201710003103.htm>

## PATENT

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- 2022 **Zechen Xiong** and Hod Lipson. “Novel Deformable Mechanism for Robotic Propulsion, Manipulation and Other Devices.” United States Provisional Application No. 63/443,017

## TEACHING

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- 2022.7-8 **Columbia University Academic Success Program** | New York, NY  
*Physics Instructor*

2018.9-2021.9 **Columbia University Environmental Engineering Dept.** | New York, NY

*Teaching Assistant*

*EAAE3200 – Hydraulics*

*EAAE4257 – Environmental Data Analysis & Modeling*

*EAAE4001 – Industry Ecology-Earth Resources*

2011-2015.7 **Tsinghua University Red Cross** | Beijing, China

*First-aid Trainer*

## **MENTORING**

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### ***Master's Students***

2023 Jiong Lin, Mechanical Engineering, Columbia University

### ***Master's Students***

2022 Yitong Liu, Mechanical Engineering, Columbia University

2022 Zihan Guo, Mechanical Engineering, Columbia University

2021-2022 Yufeng Su, Mechanical Engineering, Columbia University

2021 Xiangyi Ren, Mechanical Engineering, Columbia University

2021 Liqi Chen, Mechanical Engineering, Columbia University

2021 Wenxiong Hao, Mechanical Engineering, Columbia University

2016-2018 Tianlin Wang, Civil Engineering, Tsinghua University

### ***Undergraduate Students***

2021 Nipun Poddar, Mechanical Engineering, Columbia University

2021 Sarah Li Wilkinson, Mechanical Engineering, Columbia University

2016-2018 Xingbang Wu, Civil Engineering, Tsinghua University