








Junliang “Julian” Tao

PhD, Associate Professor

Curriculum Vitae

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 School of Sustainable Engineering and the Built Environment
Arizona State University, AZ, 85286
 juliantao.github.io/big/
 julian.tao@asu.edu
 [juliantao](https://github.com/juliantao)
 [junliang-083ab050](https://www.linkedin.com/in/junliang-083ab050)
 [U5L3d1cAAAAJ](https://scholar.google.com/citations?user=U5L3d1cAAAAJ)
 0000-0002-3772-3099

Education

PhD	Civil Engineering	Case Western Reserve University	Cleveland, US	2013
MS	Civil Engineering	Tongji University	Shanghai, China	2009
BS	Civil Engineering	China University of Geosciences	Wuhan, China	2006

Experiences

2018–	Associate Professor	School of Sustainable Engineering and the Built Environment, Arizona State University
2022	Guest Professor	Institute of Geotechnical Engineering, University of Natural Resources and Life Sciences (BOKU)
2013–2018	Assistant Professor	Department of Civil Engineering, University of Akron

Honors and Awards

2020	The 10th Anniversary Excellent Paper Award, Journal of Rock Mechanics and Geotechnical Engineering
2017	CAREER Award, National Science Foundation
2017	Gary W. Johnson Young Civil Engineer of the Year Award, ASCE Akron-Canton Section
2017	Excellent Paper Award, The 2017 International Conference on Transportation Infrastructure and Materials
2016	Summer Faculty Fellowship, University of Akron
2015	Highlight paper, IFCEE 2015
2014	ExCEED 2014 Teaching Fellow, ASCE
2013	Geo-institute Travel Award, ASCE Geo-congress 2013
2013	Roy Harley Prize, Case Western Reserve University
2012	Highlight Paper Award, Smart Materials and Structures
2012	USUCGER Travel Award, 1st USUCGER Early Career Geotechnical Conference and NSF CMMI Research and Innovation Conference
2012	Craig J. Miller Memorial Award, Case Western Reserve University
2011	SGS-Graduate Student Travel Award, Case Western Reserve University

Mission Statement

I am leading the research group Bio-inspired Geotechnics (BiG) in the NSF Research Center for Bio-mediated and Bio-inspired Geotechnics at Arizona State University. Our mission is to discover the fundamental mechanisms of various interactions between living things and geological materials, to abstract these mechanisms to engineering design principles, and to translate the design principles to autonomous, efficient, sustainable and intelligent geotechnics. We seek the answers at the boundaries of biology, mechanics and engineering. We achieve the BiG goals and extend the impacts from research, teaching, outreach, entrepreneurship and collaboration. Our Current research topics include: bio-inspired self-burrowing robots, bio-inspired underground sensing and communication, bio-inspired sustainable countermeasures to natural hazards.

Professional Membership

Associate Member	American Society of Civil Engineers (ASCE) Geo-Institute
Member	International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)
Member	Society for Integrative and Comparative Biology (SICB)
Member	Institute of Electrical and Electronics Engineers (IEEE)
Member	International Society for Optical Engineering (SPIE)
Member	Transportation Research Board (TRB)

PUBLICATIONS, INTELLECTUAL PROPERTY AND INVITED TALKS

Since 2009, I have authored **115** research publications, including **44** journal papers, **66** conference papers, and **5** technical reports, co-edited **3** books, and filed **2** patents. I also have delivered **36** invited talks to universities, local, national and international conferences. As of **January 21, 2025**, my h-index is **19** and i10-index is **34**, with total citations of **1,714**.

Journal Articles

Symbols Bold: PhD student, Underline: MS student, #: undergrad student, ∞: visiting student, ×: PostDoc, *: corresponding

1. **X Li**, J Tao, and L van Paassen*. Reactive Transport Modeling of Microbial-Induced Calcite Precipitation Treatment through Shallow Underwater Injection. *Computers and Geotechnics* **174** (2024), 106601. DOI: 10.1016/j.compgeo.2024.106601.
2. **X Li**, L van Paassen, and J Tao*. Effects of Sediment Densification and Strengthening on Scour around Monopiles Using Mangrove-Inspired Skirt Piles. *Acta Geotechnica* (2024). DOI: 10.1007/s11440-023-02182-y.
3. A Martinez and J Tao. Editorial for Special Issue on Bio-Inspired Geotechnics. *Acta Geotechnica* (2024). DOI: 10.1007/s11440-024-02323-x.
4. **Y Tang**, **Y Zhong**, and J Tao*. Bio-Inspired Rotational Penetration and Horizontal Self-Burrowing Soft Robot. *Acta Geotechnica* (2024). DOI: 10.1007/s11440-023-02173-z.
5. H Bagheri, D Stockwell, B Bethke, NK Okwae, D Aukes, J Tao, and H Marvi*. A Bio-Inspired Helically Driven Self-Burrowing Robot. *Acta Geotechnica* (2023). DOI: 10.1007/s11440-023-01882-9.
6. **Y Zhong**, S Huang[×], and J Tao*. Minimalistic Horizontal Burrowing Robots. *Journal of Geotechnical and Geoenvironmental Engineering* **149**(4) (2023), 02823001. DOI: 10.1061/JGGEFK.GTENG-11468.
7. **X Li**, L van Paassen, and J Tao*. Investigation of Using Mangrove-Inspired Skirt Pile Group as a Scour Countermeasure. *Ocean Engineering* **266** (2022), 113133. DOI: 10.1016/j.oceaneng.2022.113133.
8. A Martinez*, J Dejong, I Akin, A Aleali, C Arson, J Atkinson, P Bandini, T Baser, R Borela, R Boulanger, M Burrall, Y Chen, C Collins, D Cortes, S Dai, T DeJong, E Del Dottore, K Dorgan, R Fragaszy, JD Frost, R Full, M Ghayoomi, DI Goldman, N Gravish, IL Guzman, J Hambleton, E Hawkes, M Helms, D Hu, L Huang, **S Huang**, C Hunt, D Irschick, HT Lin, B Lingwall, A Marr, B Mazzolai, B McInroe, T Murthy, K O'Hara, M Porter, S Sadek, M Sanchez, C Santamarina, L Shao, J Sharp, H Stuart, HH Stutz, A Summers, **J Tao**, M Tolley, L Treers, K Turnbull, R Valdes, L von Paassen, G Viggiani, D Wilson, W Wu, X Yu, and J Zheng. Bio-Inspired Geotechnical Engineering: Principles, Current Work, Opportunities and Challenges. *Géotechnique* **72**(8) (2022), 687–705. DOI: 10.1680/jgeot.20.P.170.
9. **Y Tang** and J Tao*. Multiscale Analysis of Rotational Penetration in Shallow Dry Sand and Implications for Self-Burrowing Robot Design. *Acta Geotechnica* **17** (2022), 4233–4252. DOI: 10.1007/s11440-022-01492-x.
10. C Wang, Y Yuan, F Liang*, and J Tao. Experimental Investigation of Local Scour around Cylindrical Pile Foundations in a Double-Layered Sediment under Current Flow. *Ocean Engineering* **251** (2022), 111084. DOI: 10.1016/j.oceaneng.2022.111084.
11. **Y Zhong** and J Tao*. Bio-Inspired Vibrational Wireless Underground Communication System. *Journal of Rock Mechanics and Geotechnical Engineering* **14** (2022). DOI: 10.1016/j.jrmge.2022.06.005.
12. D Li, **S Huang**, **Y Tang**, H Marvi, J Tao, and D Aukes*. Compliant Fins for Locomotion in Granular Media. *IEEE Robotics and Automation Letters* **6**(3) (2021), 5984–5991. DOI: 10.1109/LRA.2021.3084877.
13. J Tao. Burrowing Soft Robots Break New Ground. *Science Robotics* **6**(55) (2021). DOI: 10.1126/scirobotics.abj3615.
14. **S Huang**, **Y Tang**, H Bagheri, D Li, A Ardente#, D Aukes, H Marvi, and J Tao*. Effects of Friction Anisotropy on Upward Burrowing Behavior of Soft Robots in Granular Materials. *Advanced Intelligent Systems* **2**(6) (2020), 1900183. DOI: 10.1002/aisy.201900183.
15. **S Huang** and J Tao*. Modeling Clam-inspired Burrowing in Dry Sand Using Cavity Expansion Theory and DEM. *Acta Geotechnica* **15**(8) (2020), 2305–2326. DOI: 10.1007/s11440-020-00918-8.
16. H Li[∞], J Tao*, L Wei, and Y Liu. Explosive Compaction Technology for Loess Embankment Settlement Control: Numerical Simulation and Field Implementation. *Acta Geotechnica* **15**(4) (2020), 975–997. DOI: 10.1007/s11440-019-00777-y.
17. J Tao*, **S Huang**, and **Y Tang**. SBOR: A Minimalistic Soft Self-Burrowing-out Robot Inspired by Razor Clams. *Bioinspiration & Biomimetics* **15**(5) (2020), 055003. DOI: 10.1088/1748-3190/ab8754.
18. J Tao*, **S Huang**, and **Y Tang**. Bioinspired Self-Burrowing-Out Robot in Dry Sand. *Journal of Geotechnical and Geoenvironmental Engineering* **145**(12) (2019), 02819002. DOI: 10.1061/(ASCE)GT.1943-5606.0002177.

19. X Wang[∞] and J Tao^{*}. Polymer-Modified Microbially Induced Carbonate Precipitation for One-Shot Targeted and Localized Soil Improvement. *Acta Geotechnica* **14**(3) (2019), 657–671. DOI: 10.1007/s11440-018-0757-z.
20. B Zhang^{*}, Hx Wang, Yw Ye, JI Tao, Lz Zhang, and L Shi. Potential Hazards to a Tunnel Caused by Adjacent Reservoir Impoundment. *Bulletin of Engineering Geology and the Environment* **78**(1) (2019), 397–415. DOI: 10.1007/s10064-017-1110-8.
21. J Li and J Tao^{*}. CFD-DEM Two-Way Coupled Numerical Simulation of Bridge Local Scour Behavior under Clear-Water Conditions. *Transportation Research Record* **2672**(39) (2018), 107–117. DOI: 10.1177/0361198118783170.
22. J Tao^{*}, J Li, X Wang[∞], and R Bao. Nature-Inspired Bridge Scour Countermeasures: Streamlining and Biocementation. *Journal of Testing and Evaluation* **46**(4) (2018), 20170517. DOI: 10.1520/JTE20170517.
23. X Wang[∞], J Tao^{*}, R Bao, T Tran, and S Tucker-Kulesza. Surficial Soil Stabilization against Water-Induced Erosion Using Polymer-Modified Microbially Induced Carbonate Precipitation. *Journal of Materials in Civil Engineering* **30** (2018). DOI: 10.1061/(ASCE)MT.1943-5533.0002490.
24. R Bao, J Li, L Li, TJ Cutright, L Chen, J Zhu, and J Tao^{*}. Effect of Microbial-Induced Calcite Precipitation on Surface Erosion and Scour of Granular Soils: Proof of Concept. *Transportation Research Record* **2657**(1) (2017), 10–18. DOI: 10.3141/2657-02.
25. J Li, J Tao^{*}, and Y Liu. DES Modeling of Erosional Forces around Streamlined Piers and Implications for Scour Countermeasures. *International Journal of Geomechanics* **17**(6) (2017), 04016139. DOI: 10.1061/(ASCE)GM.1943-5622.0000839.
26. X Sun, J Tao, J Li, Q Dai^{*}, and X Yu. Aeroelastic-aerodynamic analysis and bio-inspired flow sensor design for boundary layer velocity profiles of wind turbine blades with active external flaps. *Smart Structures and Systems* **20**(3) (2017), 311–328. DOI: 10.12989/sss.2017.20.3.311.
27. H Tao and J Tao^{*}. Quantitative Analysis of Piping Erosion Micro-Mechanisms with Coupled CFD and DEM Method. *Acta Geotechnica* **12**(3) (2017), 573–592. DOI: 10.1007/s11440-016-0516-y.
28. J Tao^{*} and H Tao. Factors Affecting Piping Erosion Resistance: Revisited with a Numerical Modeling Approach. *International Journal of Geomechanics* **17**(11) (2017), 04017097. DOI: 10.1061/(ASCE)GM.1943-5622.0000999.
29. J Tao^{*} and J Hu. Energy Harvesting from Pavement via Polyvinylidene Fluoride: Hybrid Piezo-Pyroelectric Effects. *Journal of Zhejiang University-SCIENCE A* **17**(7) (2016), 502–511. DOI: 10.1631/jzus.A1600166.
30. J Tao and X Yu^{*}. Bio-Inspired Directional Sensor with Piezoelectric Microfiber and Helical Electrodes. *Journal of Intelligent Material Systems and Structures* **27**(13) (2016), 1755–1766. DOI: 10.1177/1045389X15610904.
31. Q Gao, J Tao, J Hu, and X Yu^{*}. Laboratory Study on the Mechanical Behaviors of an Anisotropic Shale Rock. *Journal of Rock Mechanics and Geotechnical Engineering* **7**(2) (2015), 213–219. DOI: 10.1016/j.jrmge.2015.03.003.
32. J Li and J Tao^{*}. Streamlining of Bridge Piers as Scour Countermeasures: Optimization of Cross Sections. *Transportation Research Record* **2521**(1) (2015), 162–171. DOI: 10.3141/2521-17.
33. J Tao^{*} and J Li. Streamlining of Bridge Piers as Scour Countermeasures: Effects of Curvature of Vertical Profiles. *Transportation Research Record* **2521**(1) (2015), 172–182. DOI: 10.3141/2521-18.
34. B Zhang^{*}, L Zhang, H Yang, Z Zhang, and J Tao. Subsidence Prediction and Susceptibility Zonation for Collapse above Goaf with Thick Alluvial Cover: A Case Study of the Yongcheng Coalfield, Henan Province, China. *Bulletin of Engineering Geology and the Environment* **75** (2015). DOI: 10.1007/s10064-015-0834-6.
35. R Wang^{*}, J Tao, B Yu, and L Dai. Characterization of Multiwalled Carbon Nanotube-Polymethyl Methacrylate Composite Resins as Denture Base Materials. *The Journal of Prosthetic Dentistry* **111**(4) (2014), 318–326. DOI: 10.1016/j.prosdent.2013.07.017.
36. JY Hu, BX Yu^{*}, and J Tao. Innovative Chromogenic Materials for Pavement Life Extension: Modeling Study of Surface Temperature of Sustainable Asphalt Pavement. *International Journal of Pavement Research and Technology* **6**(2) (2013). DOI: 10.6135/ijprt.org.tw/2013.6(2).141.
37. Z Liu, B Zhang, X Yu^{*}, J Tao, Y Sun, and Q Gao. Thermally Induced Water Flux in Soils. *Transportation Research Record* **2349**(1) (2013), 63–71. DOI: 10.3141/2349-08.
38. Y Sun, CY Chung, X Yu^{*}, Z Liu, and J Tao. Advanced Ultrasonic Technology for Air Void Distribution in Concrete. *Materials Evaluation* **71**(3) (2013).
39. Y Sun, X Yu^{*}, Z Liu, Y Liu, and J Tao. Advanced Ultrasonic Technology for Freezing Damage Prevention of Concrete Pavement. *International Journal of Pavement Research and Technology* **6**(2) (2013). DOI: 10.6135/ijprt.org.tw/2013.6(2).86.
40. J Tao, Y Sun, G Wu, and X Yu^{*}. Emulating the Directional Sensitivity of Fish Hair Cell Sensor. *Journal of Intelligent Material Systems and Structures* **24**(12) (2013), 1484–1493. DOI: 10.1177/1045389X12473378.

41. X Yu, B Zhang, J Tao, and X Yu^{*}. A New Time-Domain Reflectometry Bridge Scour Sensor. *Structural Health Monitoring* **12**(2) (2013), 99–113. DOI: 10.1177/1475921713476331.
42. Z Liu, XB Yu^{*}, JI Tao, and Y Sun. Multiphysics Extension to Physically Based Analyses of Pipes with Emphasis on Frost Actions. *Journal of Zhejiang University SCIENCE A* **13**(11) (2012), 877–887. DOI: 10.1631/jzus.A12ISGT2.
43. Z Liu, B Zhang, X Yu^{*}, and J Tao. A New Method for Soil Water Characteristic Curve Measurement Based on Similarities Between Soil Freezing and Drying. *Geotechnical Testing Journal* **35**(1) (2012), 2–10. DOI: 10.1520/GTJ103653.
44. J Tao and X Yu^{*}. Hair Flow Sensors: From Bio-Inspiration to Bio-Mimicking—a Review. *Smart Materials and Structures* **21**(11) (2012), 113001. DOI: 10.1088/0964-1726/21/11/113001.

Papers in Refereed Conference Proceedings

Symbol ~: presenter

1. Z Xue, C Zhao, and J Tao. Reducing Penetration Resistance through Bio-Inspired Head Oscillation. In: *IOP Conference Series: Earth and Environmental Science*. GeoShanghai 2024. Vol. 1337. Shanghai, China: IOP Publishing, 2024, pp.012040. DOI: 10.1088/1755-1315/1337/1/012040.
2. X Li~, J Tao^{*}, and L van Paassen. Effects of the Submerged Height of Mangrove-Inspired Skirt-Pile Group on Scour Mitigation around a Monopile Foundation. In: *Geo-Congress 2023*. Geo-Congress 2023. Los Angeles, California: ASCE, 2023, pp.442–450. DOI: 10.1061/9780784484708.041.
3. MR Shaharear~, Y Tang^{*}, X Li, and J Tao. Penetration Forces of a Rotating Helical Penetrator in Granular Media: Experiments and Insights into the Design of a Burrowing Robot. In: *Geo-Congress 2023*. Geo-Congress 2023. Los Angeles, California: ASCE, 2023, pp.230–238. DOI: 10.1061/9780784484708.021.
4. S Shahhosseini~, M Parekh[#], and J Tao^{*}. DEM-MBD Coupled Simulation of a Burrowing Robot in Dry Sand. In: *Geo-Congress 2023*. Geo-Congress 2023. Los Angeles, California: ASCE, 2023, pp.309–317. DOI: 10.1061/9780784484692.032.
5. Y Tang~ and J Tao^{*}. Experimental Study on Continuous and Oscillatory Rotational Penetration. In: *Geo-Congress 2023*. Geo-Congress 2023. Los Angeles, California: ASCE, 2023, pp.303–311. DOI: 10.1061/9780784484708.028.
6. Y Tang~ and J Tao^{*}. Penetration Effect of Penetrator Geometry and Interface Friction on Rotational Penetration Resistance. In: *Geo-Congress 2023*. Geo-Congress 2023. Los Angeles, California: ASCE, 2023, pp.257–265. DOI: 10.1061/9780784484708.024.
7. Y Zhong~ and J Tao^{*}. Comparative Analysis of Horizontal Self-Burrowing Strategies Using Full-Scale DEM-MBD Co-Simulations. In: *Geo-Congress 2023*. Geo-Congress 2023. Los Angeles, California: ASCE, 2023, pp.106–114. DOI: 10.1061/9780784484692.011.
8. S Huang~, N Mahabadi, and J Tao^{*}. Penetration and Relaxation in Dry Granular Materials: Insights from Photoelasticity. In: *Geo-Congress 2022*. Geo-Congress 2022. Charlotte, North Carolina: American Society of Civil Engineers, 2022, pp.130–139. DOI: 10.1061/9780784484043.013.
9. S Huang~ and J Tao^{*}. Bioinspired Horizontal Self-Burrowing Robot. In: *Geo-Congress 2022*. Geo-Congress 2022. Charlotte, North Carolina: American Society of Civil Engineers, 2022, pp.223–231. DOI: 10.1061/9780784484036.023.
10. X Li~, J Tao, and L van Paassen^{*}. Numerical Simulations of Mangrove-Inspired Sacrificial Pile Group for Scour Mitigation. In: *Geo-Congress 2022*. Geo-Congress 2022. Charlotte, North Carolina: American Society of Civil Engineers, 2022, pp.385–394. DOI: 10.1061/9780784484050.040.
11. Y Tang~ and J Tao^{*}. Effect of Rotational Cone on Penetration Resistance and Its Implication to the Design of a Bio-Inspired Self-Burrowing Robots. In: *Geo-Congress 2022*. Geo-Congress 2022. Charlotte, North Carolina: American Society of Civil Engineers, 2022, pp.214–222. DOI: 10.1061/9780784484036.022.
12. Y Zhong~ and J Tao^{*}. Bio-Inspired Vibrational Transmitters for Wireless Underground Communication. In: *Geo-Congress 2022*. Geo-Congress 2022. Charlotte, North Carolina: American Society of Civil Engineers, 2022, pp.43–52. DOI: 10.1061/9780784484067.005.
13. S Huang~, N Mahabadi, and J Tao^{*}. Visualization of a Model Razor Clam Interacting with Dry Granular Materials Using Photoelasticity. In: *American Physical Society March Meeting 2021*. American Physical Society March Meeting 2021. Zoom, 2021.
14. Y Tang~ and J Tao^{*}. Effect of Rotation on Penetration: Toward a Seed Awn-Inspired Self-Burrowing Probe. In: *IFCEE 2021*. The International Foundations Congress & Equipment Expo (IFCEE). Dallas, TX: American Society of Civil Engineers, 2021, pp.149–159. DOI: 10.1061/9780784483428.016.
15. Y Zhong~, Y Gao[∞], and J Tao^{*}. Bio-Inspired Underground Communication Using Seismic Waves. In: *IFCEE 2021*. The International Foundations Congress & Equipment Expo (IFCEE). Dallas, TX: American Society of Civil Engineers, 2021, pp.139–148. DOI: 10.1061/9780784483428.015.

16. **S Huang**[~], N Mahabadi, and J Tao^{*}. Impact of Shell Opening of a Model Razor Clam on the Evolution of Force Chains in Granular Media. In: *Geo-Congress 2021: Biogeotechnics*. Geo-Congress 2020. Minneapolis, Minnesota: ASCE, 2020, pp.272–281. DOI: 10.1061/9780784482834.030.
17. **S Huang**[~] and J Tao^{*}. Bio-Inspired Dual-Anchor Burrowing: Effect of Vertical Curvature of the Shell. In: *Geo-Congress 2020*. Geo-Congress 2020. Minneapolis, Minnesota: ASCE, 2020, pp.282–292. DOI: 10.1061/9780784482834.031.
18. **Y Tang**[~], **S Huang**[~], and J Tao^{*}. Effect of Rotation on Seeds' Self-Burial Process: Insights from DEM Simulations. In: *Geo-Congress 2020*. Geo-Congress 2020. Minneapolis, Minnesota: ASCE, 2020, pp.293–301. DOI: 10.1061/9780784482834.032.
19. **S Huang**[~] and J Tao^{*}. Modeling of the Burrowing Mechanism by Razor Clam: Role of Penetration Kinematics. In: *IFCEE 2018*. IFCEE 2018. Orlando, Florida: ASCE, 2018, pp.547–556. DOI: 10.1061/9780784481585.053.
20. **S Huang**[~] and J Tao^{*}. The Interplay between Shell Opening and Foot Penetration of a Model Razor Clam: Insights from DEM Simulation. In: *B2G Atlanta 2018 Bio-mediated and Bio-inspired Geotechnics*. B2G Atlanta 2018 Bio-mediated and Bio-inspired Geotechnics. Atlanta, GA, 2018. <https://par.nsf.gov/servlets/purl/10061092>.
21. **J Li**[~] and J Tao^{*}. Experimental Investigation of Granular Bulk Density Effect on Bridge Local Scour under Clear-Water Conditions. In: *IFCEE 2018*. IFCEE 2018. Orlando, Florida: ASCE, 2018, pp.735–745. DOI: 10.1061/9780784481578.070.
22. **Pandey, G** and J Tao^{*}. Moisture Sensitive Polymer-Modified Enzyme-Induced Carbonate Precipitation for Soil Improvement. In: *B2G Atlanta 2018 Bio-mediated and Bio-inspired Geotechnics*. B2G Atlanta 2018 Bio-mediated and Bio-inspired Geotechnics. Atlanta, GA, 2018.
23. **H Tao**[~] and J Tao^{*}. Conceptual Model of Critical Hydraulic Gradient for Piping Considering Friction Resistance. In: *IS-Atlanta2018: Geo-mechanics from Micro to Macro*. IS-Atlanta2018: Geo-mechanics from Micro to Macro. Atlanta, GA, 2018.
24. **H Tao**[~] and J Tao^{*}. Impact of Gradation Change on Mechanical Behavior of Soil: DEM and Community Detection. In: *Proceedings of GeoShanghai 2018 International Conference: Fundamentals of Soil Behaviours*. Proceedings of GeoShanghai 2018 International Conference. Ed. by A Zhou, J Tao, X Gu, and L Hu. Singapore: Springer, 2018, pp.959–966. DOI: 10.1007/978-981-13-0125-4_106.
25. **H Tao**[~] and J Tao^{*}. Quantifying the Effect of Suffusion on Strength of Soil Using Network-Science Based Community Detection Method. In: *Transportation Research Board 97th Annual Meeting*. Transportation Research Board 97th Annual Meeting. Washington DC, United States, 2018, pp.15p. <https://trid.trb.org/view/1496769>.
26. **X Wang**[∞] and J Tao^{*}. Polymer-Modified Microbially-Induced Carbonate Precipitation Treatment Method for Surface Erosion Prevention. In: *Transportation Research Board 97th Annual Meeting*. Transportation Research Board 97th Annual Meeting. Washington DC, United States, 2018, pp.16p. <https://trid.trb.org/view/1496755>.
27. **R Bao**, **J Li**, L Li, TJ Cutright, L Chen, J Zhu, and J Tao^{*}. Bio-Inspired Bridge Scour Countermeasures: Streamlining and Biocementation. In: *DEStech Transactions on Materials Science and Engineering*. The 2017 International Conference on Transportation Infrastructure and Materials (ICTIM). Shandong, China, 2017. DOI: 10.12783/dtmse/ictim2017/10180.
28. **S Huang**[~] and J Tao^{*}. A DEM Study of Penetrating in Granular Materials with Changing Shape. In: *TRB 96th Annual Meeting Compendium of Papers*. Transportation Research Board 96th Annual Meeting. Washington, DC, 2017, pp.14. <https://trid.trb.org/view/1439217>.
29. **S Huang**[~] and J Tao^{*}. Penetrating in Granular Materials: Effects of Penetrator Dynamics. In: *Geotechnical Frontiers 2017*. Geotechnical Frontiers 2017. Orlando, Florida: ASCE, 2017, pp.604–613. DOI: 10.1061/9780784480441.063.
30. **J Li**[~] and J Tao^{*}. Experimental Investigation of the Pier Streamlining Effect on Bridge Local Scour under Clear Water Conditions. In: *Geotechnical Frontiers 2017*. Geotechnical Frontiers 2017. Orlando, Florida: ASCE, 2017, pp.20–28. DOI: 10.1061/9780784480465.003.
31. **H Tao**[~] and J Tao^{*}. Numerical Modeling and Analysis of Suffusion Patterns for Granular Soils. In: *Geotechnical Frontiers 2017*. Geotechnical Frontiers 2017. Orlando, Florida: ASCE, 2017, pp.487–496. DOI: 10.1061/9780784480472.051.
32. **H Tao**[~] and J Tao^{*}. Suffusion Patterns for Granular Soils: Observations from Numerical Simulations. In: *TRB 96th Annual Meeting Compendium of Papers*. Transportation Research Board 96th Annual Meeting. Washington DC, United States, 2017, pp.19p. <https://trid.trb.org/view/1438519>.
33. **M Cymbal**[#], **H Tao**[~], and J Tao^{*}. Underwater Inspection with Remotely Controlled Robot and Image Based 3D Structure Reconstruction Techniques. In: *Transportation Research Board 95th Annual Meeting*. Transportation Research Board. Washington DC, United States, 2016, pp.15p. <https://trid.trb.org/view/1394427>.
34. **J Hu** and J Tao. Energy Harvesting from Pavement via PVDF: Hybrid Piezo-Pyroelectric Effects. In: *Geo-Chicago 2016*. Geo-Chicago 2016. Chicago, Illinois: ASCE, 2016, pp.556–566. DOI: 10.1061/9780784480137.053.

35. J Li[~], Y Liu, and J Tao^{*}. Streamlining of Bridge Piers as Scour Countermeasures: Insights from DES Modeling. In: *Fourth Geo-China International Conference*. Fourth Geo-China International Conference. Shandong, China: ASCE, 2016, pp.85–92. DOI: 10.1061/9780784480069.011.
36. J Li[~] and J Tao^{*}. Coherent Dynamics of a Turbulence Structure around Streamlined Piers. In: *Geo-Chicago 2016*. Geo-Chicago 2016. Chicago, Illinois: ASCE, 2016, pp.651–660. DOI: 10.1061/9780784480151.064.
37. J Li[~] and J Tao^{*}. DES Investigation of the Effect of Pier Streamlining on Coherent Dynamics of the Turbulence Structure Around Piers. In: *TRB 95th Annual Meeting Compendium of Papers*. Transportation Research Board 95th Annual Meeting. Washington DC, United States: TRB, 2016, pp.14p. <https://trid.trb.org/view/1393582>.
38. J Li[~] and J Tao^{*}. DES Investigation of the Effect of Pier Streamlining on Coherent Dynamics of the Turbulence Structure Around Piers. In: *2016 Geotechnical and Structural Engineering Congress*. 2016 Geotechnical and Structural Engineering Congress. Phoenix, Arizona, US: ASCE, 2016, pp.14p.
39. Y Liu, J Tao, X Yu, Z Liu, and X Yu^{*}. Characterization of Freezing Fresh Concrete by Multiple Non-Destructive Methods. In: *Fourth Geo-China International Conference*. Fourth Geo-China International Conference. Shandong, China: ASCE, 2016, pp.125–135. DOI: 10.1061/9780784480021.017.
40. Mopur, Gothem, J Tao[~], and Liang, Robert. Stabilization of Peat Subgrade for Existing Roadways Using Geosynthetics Encased Polyurethane Foam Columns: Laboratory Feasibility Study. In: *2016 Geotechnical and Structural Engineering Congress*. 2016 Geotechnical and Structural Engineering Congress. Phoenix, Arizona, US: ASCE, 2016, pp.14p.
41. H Tao[~] and J Tao^{*}. CFD-DEM Modeling of Piping Erosion Considering the Properties of Sands. In: *Geo-Chicago 2016*. Geo-Chicago 2016. Chicago, Illinois: ASCE, 2016, pp.641–650. DOI: 10.1061/9780784480151.063.
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55. J Tao, Q Gao, and X Yu*. Assessment of the Effects of Pier Configurations on the Flow Pattern and Scour: A CFD Modeling Approach. In: *TRB 92nd Annual Meeting Compendium of Papers DVD*. Transportation Research Board 92nd Annual Meeting. Washington DC, United States, 2013, pp.18p. <https://trid.trb.org/view/1241688>.
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59. Y Sun, X Yu*, Z Liu, Y Liu, and J Tao. Advanced Ultrasonic Technology for Measurement of Air Void Size Distribution in Concrete. In: *TRB 91st Annual Meeting Compendium of Papers DVD*. Transportation Research Board 91st Annual Meeting. Washington DC, United States, 2012, pp.17p. <https://trid.trb.org/view/1130349>.
60. X Yu~, J Tao*, and X Yu. Comparison Study on Computer Simulations for Bridge Scour Estimation. In: *Georisk 2011*. Georisk 2011. Atlanta, Georgia, United States: ASCE, 2012, pp.1125–1132. DOI: 10.1061/41183(418)123.
61. Z Liu, B Zhang, X Yu*, B Zhang, and J Tao. A New Freezing Method for Soil Water Characteristic Curve Measurement. In: *TRB 90th Annual Meeting Compendium of Papers DVD*. Transportation Research Board 90th Annual Meeting. Washington, DC United States, 2011, pp.14p. <https://trid.trb.org/view/1093119>.
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64. J Tao, X Yu~, and J Berrilla. Bio-Inspired Flow and Acoustic Sensor. In: *Proc. SPIE 8019, Sensors, and Command, Control, Communications, and Intelligence (C3I) Technologies for Homeland Security and Homeland Defense X*. Sensors, and Command, Control, Communications, and Intelligence (C3I) Technologies for Homeland Security and Homeland Defense X. Vol. 8019. Orlando, Florida, United States: International Society for Optics and Photonics, 2011, pp.80190R. DOI: 10.1117/12.886564.
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66. X Yu*, B Zhang, J Tao, and Z Liu. Smart Pavement Sensor Based on Thermoelectricity Power. In: *Proc. SPIE 7647, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2010*. Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2010. Vol. 7647. San Diego, California, United States: International Society for Optics and Photonics, 2010, pp.76470X. DOI: 10.1117/12.849227.

Patents

1. J Tao, S Huang, Y Tang, and Y Zhong. “Bioinspired Horizontal Self-Burrowing Device”. U.S. pat. req. 18409006. Individual. 2024. <https://patents.google.com/patent/US20240254839A1/en>. Pending.
2. J Tao and Y Zhong. “Bio-Inspired Underground Vibrational Communication”. U.S. pat. req. 18419899. Individual. 2024. <https://patents.google.com/patent/US20240250758A1/en>. Pending.

PhD Thesis

1. J. Tao. "Fusion of Numerical Modeling and Innovative Sensing to Advance Bridge Scour Research and Practice". PhD thesis. Cleveland, Ohio: Case Western Reserve University, 2013. 256 pp. https://etd.ohiolink.edu/apexprod/rws_olink/r/1501/10?clear=10&p10_accession_num=case1372710604.

Most Recent Invited Talks

- | | |
|---------|--|
| 2024-10 | Burrowing Robotics: Bio-inspirations, Mechanisms and Prototypes. UV Underground of Universal Village (UV) Society Conference 2024. Boston |
| 2024-04 | Bio-inspired Burrowing Mechanisms and Robots. Northwestern University Civil Engineering SPREE Seminar. Evanston, IL |
| 2023-12 | Simulation-inspired Theory on Reciprocating Burrowing Robot. 2023 Machine-Ground Interaction Consortium (MaGIC). Madison, Wisconsin |
| 2023-10 | Bio-inspired Burrowing Mechanisms and Robots. Forum on Interdisciplinary Research Frontiers at 14th Chinese National Conference on Soil Mechanics and Geotechnical Engineering. Wuhan, China |

PROFESSIONAL ACTIVITIES AND SERVICE

I served as an Editor or Guest Editor for **3** peer-reviewed journals or journal special issues and currently serving on an Editorial Board for **1** journal. I chaired **2** international/national conferences and **12** conference sessions, reviewed for **32** journals, numerous conferences and multiple funding agencies.

Externally, I served on **12** professional committees; and internally, I also served on **1** university-level committees, **3** Engineering School-level committees and **9** unit-level committees.

Most Recent Conference Organization

- | | | |
|------|--|-----------------|
| 2025 | Leading Member of Organizing Committee
@International Conference on Biomediated and Bioinspired Geotechnics | Tempe, USA |
| 2024 | Co-chair of Technical Committee
@GeoShanghai International Conference 2024 (GeoShanghai 2024) | Shanghai, China |
| 2023 | Session Chair of Session on Bioinspired Geotechnics
@Engineering Mechanics Institute Conference | Atlanta, GA |

Editorial Services

- | | | |
|-----------|------------------------|--|
| 2022- | Associate Editor | Biogeotechnics |
| 2022-2023 | Co-editor | Special Issue on "Bio-inspired Geotechnics" by Acta Geotechnica |
| 2022-2024 | Co-editor | Special Issue on "Bio-inspired Burrowing Robots" by Frontiers in Robotics and AI |
| 2017- | Editorial Board Member | Journal of Testing and Evaluation |

University Services

- | | | |
|-----------|------------------|---|
| 2023-2024 | Committee Member | Dean's Faculty Advisory Council @FSE, ASU |
| 2022- | Committee Member | Laboratory Committee @SSEBE, ASU |
| 2022 | Committee Member | Faculty Search Committee @SSEBE, ASU |
| 2022 | Panelist | NSF CAREER proposal workshop @SSEBE, ASU |

Professional Committee Service

- | | | |
|-----------|----------------------------------|--|
| 2017- | Committee Member | Committee on Strategic Planning of International Association of Chinese Infrastructure Professionals (IACIP) |
| 2017- | Chair for Award
Sub-committee | Committee on Geotechnics of Soil Erosion of ASCE Geo-Institute |
| 2017-2019 | Committee Chair | Committee on Slope Stability and Retaining Structures of World Transport Convention (China) |
| 2016-2019 | Committee Member | AFS40 Committee on Subsurface Soil-Structure Interaction of TRB |
| 2016-2019 | Committee Member | AFD35 Committee on Bridge Management of TRB |
| 2016-2019 | Committee Member | AFD20 Committee on Pavement Monitoring and Evaluation of TRB |
| 2015- | Committee Member | Committee on Engineering Geology and Site Characterization of ASCE Geo-Institute |
| 2015-2018 | Committee Member | AFS10 Standing Committee on Transportation Earthworks of TRB |

2014–2017	Young Committee Member	AFS60 Standing Committee on Hydrology of TRB
2014	Young Committee Member	AFS40 Committee on Subsurface Soil-Structure Interaction of TRB
2013–2016	Committee Member	AFD35 Committee on Bridge Management of TRB
2013–2016	Young Committee Member	AFD20 Committee on Pavement Monitoring and Evaluation of TRB

MENTORING AND TEACHING

As of **January, 2025**, I have mentored **2** PostDoc, **6** graduated PhDs, **1** ongoing PhD students, **14** MS students, **24** undergraduate research students, **7** high school researchers, and **2** high school teacher researchers.

I have taught **5** undergraduate-level courses with a mean score of **4.4/5**, and **4** graduate-level courses with a mean score of **4.7/5**.

Mentoring

PostDoc

2024–	Xiwei Li	ASU	Mangrove + Scour, <i>Co-advised with Professor Leon van Paassen</i> ,
2021	Sichuan Huang	ASU	Clam + Robot

Ph.D. Students

2021–	Sarina Shahhosseini	ASU	Burrowing Robots
2020–2024	Xiwei Li	ASU	Mangrove + Scour, <i>Co-advised with Professor Leon van Paassen</i>
2019–2023	Yi Zhong	ASU	Lizard/Mole +Underground Communication
2018–2023	Yong Tang	ASU	Seed Awn + Burrowing Mechanism
2018–2020	Sichuan Huang	ASU	Clam + Burrowing Mechanism
2014–2018	Junhong Li	UAkron	Bridge Scour
2014–2018	Hui Tao	UAkron	Internal Erosion

Teaching

At ASU

CEE-550 Soil Behavior	2024 Fall	15	4.36/5
CEE-452 Foundation Engineering	2024 Spring	30	4.38/5
CEE-598 Foundation Engineering	2024 Spring	3	4/5
CEE-550 Soil Behavior	2023 Fall	6	5/5
CEE-452 Foundation Engineering	2023 Spring	14	4.24/5
CEE-598 Foundation Engineering	2023 Spring	1	3.67/5
CEE-494 Bio-inspired Design	2023 Spring	14	4.78/5
CEE-598 Bio-inspired Design	2023 Spring	4	5/5
CEE-550 Soil Behavior	2022 Fall	6	4.5/5
CEE-452 Foundation Engineering	2022 Spring	29	4.25/5
CEE-598 Foundation Engineering	2022 Spring	2	4.5/5
CEE-550 Soil Behavior	2021 Fall	13	4.6/5
CEE-452 Foundation Engineering	2021 Spring	49	4.52/5
CEE-598 Foundation Engineering	2021 Spring	4	4.5/5
CEE-494 Bio-inspired Design	2021 Spring	14	4.8/5
CEE-598 Bio-inspired Design	2021 Spring	6	5/5
CEE-452 Foundation Engineering	2020 Spring	57	4.45/5
CEE-598 Foundation Engineering	2020 Spring	3	5/5
CEE-550 Soil Behavior	2019 Fall	13	4.82/5
CEE-494 Bio-inspired Design	2019 Spring	13	4.8/5
CEE-598 Bio-inspired Design	2019 Spring	8	4.78/5
CEE-550 Soil Behavior	2018 Fall	10	4.85/5

RESEARCH SUPPORT

The awards in which Dr. Tao served as an investigator total **\$18,762,247**; Dr. Tao's recognitions in all awards total **\$2,605,460**; the total amount of all awards in which Dr. Tao is the leading PI is **\$1,837,519**.

External Funding

2024–2024	PI: Julian Tao. “Soft Robot for Locomotion in Granular Seabed Media”. <i>US Department of Defense, Nou Systems, Inc.</i> . Share: 100%.	\$42,043
2020–2025	PI: Edward Kavazanjian; Co-PI: Zapata, C., Saenz, D., Garcia-Pichel, F., Shock, E., Allenby, B., Rittmann, B., Torres, C., Krajmalnik-Brown, R., Delgado, A., Vivoni, E., Neithalath, N., Cadillo-Quiroz, H., Boyer, T., van Paassen, L., Tao, J., Hamdan, N., Savenye, W., Larson, J.. “Engineering Research Center for Bio-Mediated and Bio-Inspired Geotechnics (CBBG)”. <i>National Science Foundation</i> . Share: 5%.	\$16,444,444
2019–2021	PI: Julian Tao; Co-PI: Daniel Aukes, Hamidreza Marvi. “EAGER SitS: Active Self-Boring Robots that Enable Next Generation Dynamic Underground Wireless Sensing Networks: Fusion of Fast Prototyping, Modeling and Learning”. <i>National Science Foundation</i> . Share: 34%.	\$316,000
2018–2023	PI: Julian Tao. “CAREER: Integrated Research and Education on Bio-Inspired Burrowing”. <i>National Science Foundation</i> . Share: 100%.	\$532,000
2018–2018	PI: Savas Kaya; Co-PI: Julian Tao, Munir Nazzal, Yilmaz Sozer and Ala Abbas. “Roadway Kinetic Energy Capture and Conversion”. <i>The Ohio Department of Transportation</i> . Share: 20%.	\$30,284
2017–2018	PI: Qindan Huang; Co-PI: Julian Tao. “Evaluation of Effective Bridge Deck Repair Maintenance Methods”. <i>The Ohio Department of Transportation</i> . Share: 50%.	\$50,000
2016–2018	PI: Julian Tao. “Use of Crushed Recycled Glass in the Construction of Local Roadways”. <i>The Ohio Department of Transportation</i> . Share: 100%.	\$144,160
2016–2017	PI: Julian Tao. “Evaluation of Post Flooding Shoulder Reconditioning”. <i>The Ohio Department of Transportation</i> . Share: 100%.	\$32,427
2014–2017	PI: Julian Tao; Co-PI: Robert Liang. “Performance Comparison of Abutment and Retaining Wall Drainage Systems”. <i>The Ohio Department of Transportation</i> . Share: 80%.	\$285,000
2014–2015	PI: Julian Tao; Co-PI: Robert Liang. “Stabilization of Peat Deposits for Roadway Construction and Remediation”. <i>The Ohio Department of Transportation</i> . Share: 80%.	\$65,889

Internal Funding

2019–	PI: Julian Tao. “Bio-inspired underground communication”. <i>NSF ERC Center for Bio-mediated and Bio-inspired Geotechnics</i> . Share: 100%.	\$400,000
2019–	PI: Leon van Paassen; Co-PI: Julian Tao. “Bio-based Scour Countermeasures”. <i>NSF ERC Center for Bio-mediated and Bio-inspired Geotechnics</i> . Share: 50%.	\$400,000
2016–2017	PI: Julian Tao. “Microbial Induced Calcite Precipitation as Erosion and Bridge Scour Countermeasure”. <i>Summer Faculty Fellowship at The University of Akron</i> . Share: 100%.	\$10,000
2014–2014	PI: Julian Tao; Co-PI: Jiahua Zhu, Gunjin Yun. “Bio-inspired Piezo-electrochromic Full-field Strain Sensing by Multilayered Nanocomposites”. <i>Biomimicry Research and Innovation Center Initiative Research Incentive Grant at The University of Akron</i> . Share: 34%.	\$10,000