

Tianrun Gao



Date of birth 15 Aug 2000

Nationality China

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Education

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| Dec. 2024 - Now | Westlake University, Hangzhou, China <ul style="list-style-type: none">• Internship of Department of AI, <i>AI for Scientific Simulation and Discovery Lab</i>• Supervised by Prof. Tailin Wu• Research Focus: Data-Driven Mechanics, AI4S |
| Sep. 2022 - Now | Tongji University, Shanghai, China <ul style="list-style-type: none">• Master Student of Civil Engineering• Supervised by Prof. Hongwei Huang• Anticipated Graduation: June 2026 |
| Jul. 2021 - Nov. 2021 | University of Toronto, Online Participation due to Covid-19 <ul style="list-style-type: none">• Research Internship of Mechanical Reliability Analysis• Funded by <i>Mitacs Globalink Program</i>, Canadian Government |
| Sep. 2018 - Jul. 2022 | Tianjin University, Tianjin, China <ul style="list-style-type: none">• Bachelor of Engineering, Civil Engineering• Ranking: 4/130, GPA: 3.86/4 |

Major professional courses

- Linear Algebra, Advanced Mathematics, Applied Statistics, Stochastic Process, Numerical Analysis, Theoretical Mechanics, Mechanics of Materials, Structural Mechanics and Dynamics, Elastic Mechanics and Finite Element Methods, Plastic Mechanics, Fluid Mechanics, Interdisciplinary Frontiers of AI and Physics, etc.

Research interests

- AI for physical simulation & design & control & discovery.
- Mechanics and AI empowered mechanics.
- Robotics and Generative AI for science.
- Automated numerical simulation of mechanical & engineering systems and uncertainty analysis.

Academic Contributions

Publications:

- [1] H. W. Huang, **T. R. Gao**, D. M. Zhang. A Hybrid Approach for Modifying Tunneling-Induced Response in Existing Multi-Tunnel Environment. *Computers and Geotechnics*, 2025, 179, 106921.
- [2] J. Z. Zhang, **T. R. Gao**. Compressibility of Abnormal Pressure Gas Reservoirs and its Effect on Reserves. *ACS omega*, 2021, 6(40): 26221-26230.
- [3] R. Jia, **T. R. Gao**, G. Yang. Analysis on the Influence of Construction Stress Release and Disturbance on Seismic Response of Tunnel. *Chinese Journal of Underground Space and Engineering*, 2022, 18(S2): 916-925.

Conferences (* represents equal contribution):

- [1] Qianyi Chen*, **Tianrun Gao***, Chenbo Jiang*, Tailin Wu. EqCollide: Equivariant and Collision-Aware Deformable Objects Neural Simulator. <https://arxiv.org/abs/2506.05797v1>. (Submitted to ICLR 2026).
- [2] **Tianrun Gao***, Haoren Zheng*, Wenhao Deng*, Haodong Feng, Tao Zhang, Ruiqi Feng, Qianyi Chen, Tailin Wu. GenCP: Towards Generative Modeling Paradigm of Coupled physics with Application to Fluid-Structure Interaction. (Submitted to ICLR 2026).
- [3] Tian Xia, **Tianrun Gao**, Wenhao Deng, Long Wei, Xiaowei Qian, Jiang Yixian, Chenglei Yu, Tailin Wu. BuildArena: A Physics-Aligned Interactive Benchmark of LLMs for Engineering Construction. (Submitted to ICLR 2026).
- [4] Peiyan Hu, Haodong Feng, Hongyuan Liu, Tongtong Yan, Wenhao Deng, **Tianrun Gao**, Rong Zheng, Haoren Zheng, Chenglei Yu, Chuanrui Wang, Kaiwen Li, Zhi-Ming Ma, Dezhi Zhou, Xingcai Lu, Dixia Fan, Tailin Wu. RealBench: A Benchmark for Complex Physical Systems with Real-World Data (Submitted to ICLR 2026).
- [5] **T. R. Gao**, D. M. Zhang, X. M. Liu, H. W. Huang. Data-based Risk Evaluation on 4 Overlapped Existing Subway Tunnels Undercrossed by Shield Tunneling. ITA WTC 2025, Stockholm, Sweden, 2025.
- [6] **T. R. Gao**, D. M. Zhang, H. W. Huang. Experimental Study on Tunneling-Induced Disturbance and Propagation in Complex Environment. 2025 PIARC, Chongqing, China, 2025.
- [7] **T. R. Gao**, D. M. Zhang, H. W. Huang. Study on Predicting Existing Tunnel Settlement Induced by Shield Tunneling Based on Machine Learning. The 2nd Workshop on Future of Machine Learning in Geotechnics and the 5th Machine Learning in Geotechnics Dialogue, Chengdu, China, 2024.
- [8] **T. R. Gao**, J. W. Jia, X. M. Liu, W. J. Zhang, H. W. Huang. 3D refined numerical simulation analysis of the impact of shield tunnel construction on adjacent pile foundation and soil. 2022 China Tunnel and Underground Engineering Conference (CTUC2022), Changsha, China, 2023.

Patents:

- [1] H. W. Huang, J. Z. Zhang, **T. R. Gao**, D. M. Zhang. Experimental Model for Full Cross-Section Deformation Monitoring of Longitudinal and Transverse Tunnels and Post-Processing Algorithm Based on GANs. Shanghai, China, 2024-10-31. (*Invention Patent Officially Accepted for Review*)
- [2] Z. X. Chang, X. S. Cheng, H. F. Cheng, **T. R. Gao**, D. Y. Li, R. Z. Wang. A 3D Printing Device for Underground Pipeline Structure Installation. Tianjin, China: CN20212 0691496.7, 2021-11-05. (*Granted*)
- [3] Z. X. Chang, X. S. Cheng, H. F. Cheng, **T. R. Gao**, D. Y. Li, R. Z. Wang. A 3D Printing Device for Underground Pipeline Structure Installation. Tianjin, China: CN202110 367402.5, 2021-07-09. (*Granted*)

Computer and English Skills

- Software:
 - Proficient with Abaqus (FEM), FLAC (FDM), Python (Pytorch & Jax), MS Office, Origin, AutoCAD.
 - Familiar with Matlab, PFC^{3D} (DEM), MPM, Rhino.
- English Skills:
 - TOEFL: 102 (Reading:28, Listening:27, Speaking:23, Writing:24) (Nov. 2020).
 - GRE: 324 (Verbal Reasoning:155, Quantitative Reasoning:169, Analytical Writing:3.5) (Aug. 2020).
 - Fluent in oral English, with fairly strong reading and writing ability.

Other information

- Self-motivated, with a passion for learning and the capability to efficiently master new knowledge.
- Physically fit and passionate about sports, served as a member of Tianjin University Rowing Team winning 1st prize in Tianjin, demonstrating strong sense of responsibility and team spirit.
- Quick-minded with strong communication skills, achieved the University Debate Championship as a member of debate team.
- Easy-going, optimistic, adaptable and resilient.