Zexing (Alfred) Zhao

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Education

Georgia Institute of Technology Atlanta, GA, USA
Computational Science and Engineering (Home Unit: Mechanical Engineering), M.S. Aug. 2026 – Present

Northwest A&F University(NWAFU, Project 985,211) Yangling, China
Agricultural Mechanization and Automation, BEng, GPA:3.48, Rank: 2/80 Sep. 2019 – Jun. 2023
Software Engineering, Second Degree, BEng Sep. 2023 – Jun. 2025

Research Interests

Scientific Machine Learning, Physics Informed Learning, Graph Machine Learning

Publications & Manuscripts

• **Pub lished: Zexing Zhao**, Guangsi Shi, et al. Graph Navier-Stokes Neural Networks. *ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2026.*

• **Published: Zexing Zhao**, Guangsi Shi, et al. DIG-Mol: A Contrastive Dual-Interaction Graph Neural Network for Molecular Property Prediction. *IEEE Journal of Biomedical and Health Informatics*, 2024.

• **Published:** Hongye Cheng, Tianyu Wang, Guangsi Shi, **Zexing Zhao**, et al. HOP: Heterogeneous Topology-based Multimodal Entanglement for Co-Speech Gesture Generation. *CVPR*, 2025.

• **Published:** Xiaopeng Wu, Guangsi Shi, **Zexing Zhao**, et al. DCCN: A Dual-Cross Contrastive Neural Network for 3D Point Cloud Representation Learning. *Expert Systems with Applications*, 2024.

• **Accepted: Zexing Zhao,** et al. Towards Automatic Evolution Tree Generation from Citation Graphs. Accepted by *ACL EMNLP 2026*.

Skills & Related Courses

Programming languages: Python, R, C, MATLAB
Deep Learning: GitHub, LaTeX, Linux, PyTorch, PyG, VS Code
Mechanical Engineering: AutoCAD, SolidWorks, ANSYS, COMSOL, Fluent, SQL
Related Courses : Calculus, Linear Algebra, Probability Theory, Machine Learning, Organic Chemistry, Bioinformatics, Molecular Biology, Atomic Physics and Quantum Mechanics, Theoretical Mechanics, Mechanics of Material, Hydromechanics, Fundamentals of Heat Engineering, Experimental Design

Selected Research Projects

Evolutionary Tree Generation from Taxonomy-Aware Citation Graphs
| *Graph Data Mining, Knowledge Evolution* Jun. 2025 – May. 2026
Supervised by Prof. Liang Zhao, Emory University, Atlanta
- Developing graph-based methods for evolutionary tree generation from citation graphs, effectively modeling the evolution and development of research fields by capturing hierarchical structures and temporal dynamics of research works. (This work may be the first attempt in this emerging research direction.)

Multimodal Representation Learning for Human Gesture Generation
| *Multimodal Learning, Embodied AI* Jun. 2025 – Present
Collaborated with Dr. Guangsi Shi, Midea Corporate Research Center, Shanghai
- Designing a multimodal learning framework that fuses text, audio, and motion signals into unified entangled representations, enabling virtual human skeleton generation synchronized with audio and exhibits natural realism.

Multi-Source Feature Learning for Predicting Disordered Protein Binding Modes
| *AI4Science, Protein Engineering* Feb. 2025 – Jun. 2025
Undergraduate Thesis |Supervised by Dr. Fuhao Zhang
- Integrated protein physicochemical properties with embeddings from protein language models (pLMs) to build hybrid representations, improving prediction of intrinsically disordered protein binding modes.
- Proposed a two-stage model that separately predicts disordered regions and binding modes, mitigating class imbalance and enhancing interpretability.

Graph Navier-Stokes Neural Networks

| *Graph Neural Networks, Physics Informed Learning* Feb. 2024 – Feb. 2025

Collaborated with Dr. Guangsi Shi, Midea Corporate Research Center, Shanghai

- Reformulated GNN message passing through the lens of the Navier-Stokes equations, decomposing it into a convection term for directed message transport and a diffusion term for local feature consistency, fundamentally mitigating the over-smoothing problem.
- Introduced the formal definition of a node-level velocity field on graphs, where node velocities govern the strength and direction of convective message passing, enabling adaptive, anisotropic information flow
- Derived and empirically validated a trade-off law between graph homophily ratio and node velocity, providing principled guidance for adapting GNN message passing across both homophilic and heterophilic graphs.
- Achieved 7% average improvement on 11 out of 12 public benchmarks; accepted as first-author paper at KDD 2026 (see Publications).

Molecular Property Prediction Based on Graph Contrastive Learning

| *AI4Science, Drug Discovery* Oct. 2022 – Dec. 2023

Collaborated with Dr.Guangsi Shi, Monash University, Australia

- Developed a novel graph contrastive learning framework for self-supervised learning on large-scale unlabeled datasets, outperforming most state-of-the-art baselines.
- Incorporated a dual-interaction framework and momentum distillation mechanism to extract effective representations from complex molecular graphs, significantly enhancing model performance.
- Implemented an advanced molecular graph augmentation strategy that preserves molecular structure.

Design of Agriculture Q&A System Based on Knowledge Graph

| *Knowledge Graph, Natural Language Processing* Dec. 2022 – Jun. 2023

Undergraduate Thesis | Supervised by Dr. Guangsi Shi , Monash University, Australia

- Developed a knowledge graph-based Q&A system for crop disease inquiries, achieving over 65% accuracy.
- Crawled web data and used a BERT-BiLSTM-CRF model to extract and store entities and relationships in Neo4j.
- Utilized the trained model to identify entities and relations in queries, linking them to the KG for answers.

Leadership Experiences & Activities

Small Animal Protection Association, NWAFU | *Member* 2019 – 2025

Intelligent Agriculture Equipment Association, NWAFU | *Student president* Jun. 2021 – Nov. 2021

Community COVID-19 Prevention and Control Volunteer Organization | *Volunteer* Oct. 2021

Honors & Awards

- Merit Graduate in NWAFU Jun. 2023
- Merit Student in NWAFU 2022
- First-class scholarship 2022
- Merit camper in summer camp of Xi'an Jiaotong University, School of Mechanical Engineering Jul. 2022
- Third-class scholarship 2020, 2021
- National first prize of 7th International College Students Intelligent Agricultural Equipment Innovation Competition | *Team leader* Jun. 2022

Hobbies

Basketball, Jigging, Fishing, Hiking, Gunpla