Xudong (Andrew) Fan, Ph.D.

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Department of Civil, Structural and Environmental Engineering
School of Engineering and Applied Sciences
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Professional Appointments

2024.8–Present	**Assistant Professor**, SUNY at Buffalo, NY
2023.8–2024.8	**Postdoctoral Research Associate**, Princeton University, NJ
2023.1–2023.8	**Postdoctoral Research Associate**, Case Western Reserve University, OH
2023.1–2023.8	**NSF-funded Research Intern**, Cleveland Water Department, OH

Education

2018–2023	**PhD**, Case Western Reserve University, OH.
2014–2017	**MSc**, Tianjin University, China.
2010–2014	**BSc**, Central South University, China.

Research Interests

- Urban Hydrograph
- Urban Water Systems
- Resilience and Sustainability
- Artificial Intelligence and Advanced Computing
- Complex Networked Infrastructure Systems

Professional Services

2024–Present	**Session Organizer**, AGU 2024, "Advancements in the Urban Water Systems for Resilient, Sustainable, and Equitable Communities"
2024–Present	**Proposal Reviewer**, NSF OIA; NSF ENG; NSF GEO.
2022–Present	**Secretary**, Younger Member Engagement Committee, ASCE
2019–Present	**Member**, Artificial Intelligence and Advanced Computing Applications (AED 50), Transportation Research Board (TRB)
2019–Present	**Member**, Risk Assessment and Management (RAM), ASCE Geo-Institute
2019–Present	**Member**, Committee on Engineering Geology and Site Characterization, ASCE Geo-Institute

Publication Highlights

2024 **Modeling of spatially embedded networks via regional spatial graph convolutional networks**.
Computer-Aided Civil and Infrastructure Engineering. DOI: 10.1111/mice.13286.
Xudong Fan, Jürgen Hackl

2023 **Machine learning-assisted optimal schedule of underground water pipe inspection**.
Journal of Infrastructure Preservation and Resilience. DOI: 10.1186/s43065-023-00086-5.
Xudong Fan, Xiong Yu

2023 **Uncertainty quantification of a deep learning model for failure rate prediction of water distribution networks**.
Reliability Engineering & System Safety. DOI: 10.1016/j.ress.2023.109088.
Xudong Fan, Xijin Zhang, Xiong Bill Yu.

2023 **Assessment of the impacts of climat change on water supply system pipe failures**.
Scientific Reports. DOI: 10.1038/s41598-023-33548-7.
Xudong Fan, Xijin Zhang, Allen Yu, Matthew Speitel, Xiong Yu.

2023 **A deep reinforcement learning model for resilient road network recovery under earthquake or flooding hazards**.
Journal of Infrastructure Preservation and Resilience. DOI: 10.1186/s43065-023-00072-x.
Xudong Fan, Xijin Zhang, Xiaowei Wang, Xiong Yu.

2022 **A graph convolution network□deep reinforcement learning model for resilient water distribution network repair decisions**.
Computer-Aided Civil and Infrastructure Engineering. DOI: 10.1111/mice.12813.
Xudong Fan, Xijin Zhang, Xiong (Bill) Yu

2022 **An innovative machine learning based framework for water distribution network leakage detection and localization**.
Structural Health Monitoring. DOI: 10.1177/14759217211040026.
Xudong Fan, Xiong (Bill) Yu

2022 **Machine learning based water pipe failure prediction: The effects of engineering, geology, climate and socio-economic factors**.
Reliability Engineering & System Safety. DOI: 10.1093/gji/ggw390.
Xudong Fan, Xiaowei Wang, Xijin Zhang, Xiong Bill Yu

2021 **Machine learning model and strategy for fast and accurate detection of leaks in water supply network**.
Journal of Infrastructure Preservation and Resilience. DOI: 10.1186/s43065-021-00021-6.
Xudong Fan, Xijin Zhang, Xiong (Bill) Yu

Collaborative Publications

2024 **Estimation of unfrozen water content in frozen soils based on data interpolation and constrained monotonic neural network**.
Cold Regions Science and Technology. DOI: 10.1016/j.coldregions.2023.104094.
Jiaxian Li, Junping Ren, Xudong Fan, Pengcheng Zhou, Yiqing Pu, Fanyu Zhang

2024 **Potentials of Mitigating Pavement Frost Heave with Fungi**.
Geo-Congress 2024. DOI: 10.1061/9780784485330.071.
Xijin Zhang, Yusheng Jiang, Xudong Fan, Xiong Yu

2023 **A novel method to improve the soil erosion resistance with fungi**.
Acta Geotechnica. DOI: 10.1007/s11440-022-01673-8.
Xijin Zhang, Xudong Fan, Chen Wang, Xiong Yu

2023 **Use of an artificial neural network model for estimation of unfrozen water content in frozen soils**.
Canadian Geotechnical Journal. DOI: 10.1139/cgj-2022-0035.
Junping Ren, Xudong Fan, Xiong Yu, Sai Vanapalli, Shoulong Zhang

2023 **Analyses of Frost Susceptible Flexible Pavement Adaption for Climate Change**.
Geo-Risk 2023. DOI: 10.1061/9780784484968.017.
Yusheng Jiang, Shafi Ullah, Xudong Fan, Claudia E Zapata, Xiong Yu

2022 **A topology-based evaluation of resilience on urban road networks against epidemic spread: Implications for COVID-19 responses**.
Frontiers in Public Health. DOI: 10.3389/fpubh.2022.1023176.
Junqing Tang, Huali Lin, Xudong Fan, Xiong Yu, Qiuchen Lu

2022 **Development and characterization of novelly grown fire-resistant fungal fibers**.
Scientific Reports. DOI: 10.1038/s41598-022-14806-6.
Xijin Zhang, Yanjun Li, Xudong Fan, Gary Wnek, Ya-Ting T Liao, Xiong Yu.

2022 **Naturally grown mycelium-composite as sustainable building insulation materials** .
Journal of Cleaner Production. DOI: 10.1016/j.jclepro.2022.130784.
Xijin Zhang, Jianying Hu, Xudong Fan, Xiong Yu

2021 **Novel strategies to grow natural fibers with improved thermal stability and fire resistance** .
Journal of Cleaner Production. DOI: 10.1016/j.jclepro.2021.128729.
Xijin Zhang, Xudong Fan, Chanjuan Han, Yanjun Li, Erik Price, Gary Wnek, Ya-Ting T Liao, Xiong Bill Yu

2021 **Study on the behaviors of fungi-concrete surface interactions and theoretical assessment of its potentials for durable concrete with fungal-mediated self-healing** .
Journal of Cleaner Production. DOI: 10.1016/j.jclepro.2021.125870.
Xijin Zhang, Xudong Fan, Min Li, Anna Samia, Xiong Bill Yu

2021 **PSO-SVM-based deep displacement prediction of Majiagou landslide considering the deformation hysteresis effect** .
Landslides. DOI: 10.1007/s10346-020-01426-2.
Lei Zhang, Bin Shi, Honghu Zhu, Xiong Bill Yu, Heming Han, Xudong Fan

2020 **Framework for seismic damage and renewal cost analysis of buried water pipelines** .
Journal of Pipeline Systems Engineering and Practice. DOI: 10.1061/(ASCE)PS.1949-1204.0000487.
Ram K Mazumder, Xudong Fan, Abdullahi M Salman, Yue Li, Xiong Yu

2020 **A generalized predictive model for TiO2–Catalyzed photo-degradation rate constants of water contaminants through artificial neural network** .
Environmental Research. DOI: 10.1016/j.envres.2020.109697.
Zhuoying Jiang, Jiajie Hu, Xijin Zhang, Yihang Zhao, Xudong Fan, Shifa Zhong, Huichun Zhang, Xiong Yu

2020 **A deep neural network combined with molecular fingerprints (DNN-MF) to develop predictive models for hydroxyl radical rate constants of water contaminants** .
Journal of hazardous materials. DOI: 10.1016/j.jhazmat.2019.121141.
Shifa Zhong, Jiajie Hu, Xudong Fan, Xiong Yu, Huichun Zhang

Presentation and Invited Speaking

2025 **Enhancing decision-making using advanced graph neural networks**
2025 ICOSSAR
Xudong Fan, Jürgen Hackl, Xiong (Bill) Yu

2024 **AI for Water Infrastructure Systems: Resilience-oriented Decision-making.**
2024 AGU
Xudong Fan, Jürgen Hackl, Xiong (Bill) Yu

2024 **AI for Complex Urban Systems: A Multimodal Graph Learning for Network Representation Learning**.
2024 INFORMS Annual Meeting
Xudong Fan, Jürgen Hackl

2024 **Geometric-based Deep Learning for Road Network Representation**.
AI in Motion
Xudong Fan, Jürgen Hackl

2023 **Resilience-oriented traffic system decision-making**.
Transportation Research Board (TRB) Annual Meeting
Xudong Fan, Jürgen Hackl, Xiong (Bill) Yu

2022 **Infrastructure management under a changing climate**.
UESI Pipelines 2022 Conference.
Xudong Fan, Xiong (Bill) Yu

2022 **Resilience of Water Distribution Network: Enhanced Recovery Assisted by Artificial Intelligence (AI)**.
ASCE Lifelines Conference 2021&2022.
Xudong Fan, Xiong (Bill) Yu

2019 **Optimal Inspection Plan of Underground Water Pipe from Machine Learning**.
TRB Annua Conference.
Xudong Fan, Xijin Zhang, Xiong (Bill) Yu.

2019 **Semi supervised learning for transportation applications.**.
AI primer for TRB Annua Conference
Xudong Fan

2022 **Lecturing advanced AI techniques in infrastructure systems and smart city**.
School of Urban Planning & Design, Peking University, Beijing, China
Guest lecturer

Professional Training

2025 **ASCE ExCEED**
Colorado State University

2024 **Open Hackathon**
Princeton University

2023 **NSF I-Corps Hub - Northeast Region**
Princeton University

2022 **FE Exam Licensed**
Ohio

2022 **Fundamentals of Accelerated Computing with CUDA C/C++**
NVIDIA

2021 **Short course: Introducing New Technologies for Geotechnical Infrastructure Sensing**
University of California, Berkeley

2021 **Short course: GIS Application and Training**
CWRU

2021 **Professional training: Faculty Research Webinar-Illinois Autonomous and Connected Track**
University of Illinois at Urbana-Champaign

Scholars and Awards

2025 **ASCE ExCEED, Scholarship Recipents**

2024 **ACS ES&T Water, Excellence in Review Awards**