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Department of Civil, Structural and Environmental Engineering
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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 Researc Intern , Cleveland Water Department, OH

Education

2017–2022	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 Infrastructure Systems
- Resilience and Sustainability - Water
- Complex Networks
- Artificial Intelligence

Professional Services

2024–Present	Proposal Reviewer , EPSCoR Research Fellows @ NASA Panel; NSF HDBE Panel
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](https://doi.org/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](https://doi.org/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.res.2023.109088](https://doi.org/10.1016/j.res.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](https://doi.org/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](https://doi.org/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](https://doi.org/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: [10.1177/1475921721104026](https://doi.org/10.1177/1475921721104026).
[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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.1038/s41598-022-14806-6).
[Xijin Zhang](#), [Yanjuan 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](https://doi.org/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](https://doi.org/10.1016/j.jclepro.2021.128729).
[Xijin Zhang](#), [Xudong Fan](#), [Chanjuan Han](#), [Yanjuan 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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.1016/j.jhazmat.2019.121141).
Shifa Zhong, Jiajie Hu, [Xudong Fan](#), Xiong Yu, Huichun Zhang

Presentation and Invited Speaking

- 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

- 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

- 2024 **ACS ES&T Water, Excellence in Review Awards**
- 2022 **ASCE Utility Engineering & Surveying Institute (UESI) Student Scholarship Award**
- 2021 **Underground Construction Association Scholarship**
- 2021 **Waheed Uddin Travel Grant, Washington State University**
- 2021 **Craig J. Miller Memorial Award**
- 2021 **Outstanding Graduate Student Organization Member**
- 2021 **Civil Engineering Student Leadership Award, CWRU**
- 2020 **The Roy Harley Prize, CWRU**