Arnold Yuxuan Xie, MESc.

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Education

Western University

Ontario, Canada

PhD candidate in Civil and Environmental Engineering (Smart Cities Program) — May 2023 – present

Research topic: Probabilistic back analysis of rock slope stability using remote sensing

Publications: ***12*** journal papers ***2*** conference papers,
(***12*** as first or corresponding author. Highest Impact factor (IF) = 13.7; Median IF=7.7).

Master of Engineering Science in Civil and Environmental Engineering — Jan 2022 – April 2023

Thesis topic: Multi-scale AI-driven microseismic waveform source mechanism identification

South China University of Technology — Jan 2022 – April 2023

(#43 in Civil Engineering by ARWU)

Guangzhou, P.R.C

Bachelor of Engineering in Civil Engineering (Excellent Engineer Class)

Research topic: Tunneling Boring Machine maintenance expert system using Machine Learning and Cloud Computing.

Awards & Honors

- Winter 2026 Graduate Teaching Assistant Excellence Award
- 2026 *Ross and Jean Clark Scholarship*, the *Milos Novak Memorial Award* and the *Graduate Student Award In Engineering*
- *Third prize* in 2025 Graduate Student Poster Competition of Canadian Geotechnical Society - Southern Ontario Section (CGS-SOS)
- 2025 *John Booker Award*
- *First prize* in 2024 Graduate Student Thesis Competition CGS-SOS
- 2024 Y.F. Eric and Ruby S. Chung Award
- 2023 R.M. Quigley Award

Experience

Rocscience Inc. and NSERC co-funded research student — Dec 2022 - present

Advisor: Grace (Zhanyu) Huang, Thamer Yacoub

Research: Automated back analysis of radar-tracked rockfall trajectories

[Remote sensing] Reconstructing digitial terrain model from LiDAR/Photogrammetry-measured point cloud data. Inverting of Doppler-radar measured rock position data, Canada Certified Drone Pilot, Observer of Drone survey

Civil Engineering Material Laboratory Student Research Group Leader

Research: Sustainable Ultra High Performance Concrete Aqueduct Design. — Jun 2018 – Jun 2020

[Team coordination and leadership] Distribute tasks for 10 group members.

[Laboratory experiments, trial and error] Optimal concrete mix ratio achieves C120 grade (4x stronger than regular C30 concrete)

[Intelligence properties, Innovative] 5 Patents Approved in high-strength concrete mix matrix, ultra-light rectangular cross-section long-span precast aqueducts, ultra-light circular cross-section long-span precast aqueducts, and super-large span arch bridge aqueduct, topology optimized aqueduct geometry, respectively.

[Full life cycle analysis] Estimate the economical and ecological performance according to market report at different stage of the construction project.

Journal Publications (*indicates corresponding author)

1) Madeleine Hooper, **Arnold Yuxuan Xie***, Bing Q. Li (2025) “Random Forest Forecasting of Time to Failure for Granite Hydraulic Fracturing Using Acoustic Emission Signals”, GeoEnergy Communications, https://doi.org/10.1007/s44421-025-00005-2

2) Linxuan Yuan, Xiaobin Ding, **Arnold Yuxuan Xie**; Weiran Huang (2025) “Data-driven disc cutter wear prediction for shield tunneling in complex strata: model comparison and interpretation”, Engineering Applications of Artificial Intelligence, (IF=8.0) https://doi.org/10.1016/j.engappai.2025.111041

3) **Arnold Yuxuan Xie***, Zhanyu Huang, Bing Q. Li (2025) “An automated framework for probabilistic back-analysis of rockfall catalogs using Bayesian optimization and radar tracking”, Rock Mechanics and Rock Engineering, (IF=7.4) https://doi.org/10.1007/s00603-025-04608-3

4) **Arnold Yuxuan Xie***, Xiaobin Ding, Rui Chen, and Bing Q. Li (2025) “Quantifying the effect of inter-granular interlock on pre-peak micro- and macro- fracture mechanisms in rock-like specimens using 3D discrete element method simulation”, Powder Technology,(IF=4.6) https://doi.org/10.1016/j.powtec.2025.121215

5) **Arnold Yuxuan Xie***, Zhanyu Huang, Thamer Yacoub, Bing Q. Li (2024) “Quantification of uncertainties in back-analysis of radar-tracked rockfall trajectories”, Journal of Rock Mechanics and Geotechnical Engineering, (IF=10.2) https://doi.org/10.1016/j.jrmge.2024.08.001

6) **Arnold Yuxuan Xie***, Bing Qiuyi Li (2023) “Transfer learning framework for multi-scale crack type classification with sparse microseismic networks”, International Journal of Mining Science and Technology, (IF=13.7) https://doi.org/10.1016/j.ijmst.2024.01.003

7) Xiaobin Ding, **Yuxuan Xie***, Haowen Xue, Rui Chen (2022) “A new approach for developing EPB-TBM disc cutter wear prediction equations in granite stratum using backpropagation neural network”. Tunnelling and Underground Space Technology, (IF=7.4) https://doi.org/10.1016/j.tust.2022.104654

8) Xiaobin Ding, Kang LI, **Yuxuan Xie**, Shuzhuo Liu (2022) “Face stability analysis of large shield-driven tunnel in rock-soil interface composite formations”. Underground Space, (IF=8.2) https://doi.org/10.1016/j.undsp.2022.01.007

9) Ding, Xiaobin, **Arnold Yuxuan Xie***, Huitai Yang, and Shijia Li (2023) "Quantifying Multifactor Effects on Mud Cake Formation Risk for a Tunnel Boring Machine with the Analytical Hierarchy Process" Buildings 13, no. 2: 355. (IF=3.1) https://doi.org/10.3390/buildings13020355

10) DING Xiaobin，**XIE Yuxuan***，SHI Yu (2023) “Crack propagation analysis of rock-like material using the improved contact model”, Journal of South China University of Technology (Natural Science Edition)

11) DING Xiaobin, XUE Haowen, **XIE Yuxuan***, LI Shijia (2022) “A method of disc cutter wear prediction based on neural network”. Journal of Zhengzhou University (Engineering Science) https://doi.org/10.13705/j.issn.1671-6833.2022.04.009

12) Ding Xiaobin, **Xie Yuxuan***, Xue Haowen, Huang Weiran (2023) “Investigation of Quantitative Prediction of TBM Disc Cutter Wear by ANN”. Chinese Journal of Underground Space and Engineering https://dxkjxb.cqu.edu.cn/EN/Y2023/V19/I2/560

Submitted **J**ournal **P**ublications

Mohammad Sabah, Meysam Hasannezhad, **Arnold Yuxuan Xie**, Yaser Arjmand, Bing Q Li (2025) “Assessing the Impact of Geological and Mechanical Parameters on Injection-Induced Seismicity: Insights from a Poroelastic Coupled DDM-FEM Model with Adaptive Time Stepping”. Rock Mechanics and Rock Engineering

Accepted **C**onference **P**ublications

13) Xiaobin Ding, Haowen Xue, **Arnold Yuxuan Xie*** (2022), “Quantitative estimation of Tunnel Boring Machine (TBM) disc cutter wear from in-situ parameters by optimization algorithm improved back-propagation neural network (BPNN)”. 2023 World Tunnel Congress, https://doi.org/10.1201/9781003348030-316

14) **Arnold Y. Xie***, Zhanyu Huang, Thamer Yacoub, Bing Q. Li, (2023) “A framework for back-analysis of 3D rockfall trajectories”, Rocscience International Conference 2023.

Extracurricular Activities

Student Rsearch Seminar Hosting Dec-25

Coordinate presentation time, peer grading, solving technical issues. Smoothly run a 4-hour presentation session including 14 presentations from 26 graduate students.

Department Fall Preview Day Nov-25

Introducing department highlights and recruiting students to join the Geotechnical and Smart Cities Programs. Giving lab tours to groups of over 20 parents and students. Showcasing research demos such as VR and drones.

2025 Western-ICLR Multihazard Risk and Resilience Workshop Nov-25

Speech Title: Automated Back Analysis of Rockfall Trajectories using Doppler Radar

American Geophysical Union Annual Meeting 2023 Dec-23

Posters Title:

a) Fracture Volume Change Polarity from Single-Sensor Microseismic Waveforms using Transfer Learning
b) Quantification of uncertainties in back-analysis of radar-tracked rockfall trajectories

Rocscience International Conference 2023 Apr-23

Speech Title: Uncertainties in Rockfall Back Analysis

Canadian Geothermal Students' Day Aug-22

Speech Title: Deep Learning in Acoustic Emission Waveforms

Skills and Areas of Knowledge

Statistical Data analysis	Since 2018, I have been seeking statistical patterns from multimodal data since 2018, including 30+ groups of concrete mix batch tabular data, 500GB+ of acoustic emission data, 4+ years of shield tunneling data from 5 different metro lines.
Machine Learning & Deep Learning	Joined the AI campaign before the LMM era in 2019 with a solid theory background. Witnessed the birth and flourish of the communities, e.g., Scikit-learn, TensorFlow, PyTorch, Hugging Face, Ollama, and the architectures, e.g., CNN, RNN, Transformer, KAN, PINN.
Optimization & Statistics	I am a neutral supporter of both Bayesian and Frequentist. Proficient implementor of Bayesian Optimization and Traditional Gradient-based methods (such as Gauss-Newton, Momentum), and Heuristic methods (Genetic Algorithms, Particle Swarms, Simulated Annealing). Familiar with Random field and Stochastic Process.
Geophysics, Geotechnics, and Geomechanics	Solid theory background proved by 90%+ scores in rock mechanics, geophysics forward and inverse modeling, geotechnical earthquake design, foundation engineering, and soil mechanics courses.
High Performance Computation	Being using Compute Canada (former SHARCNET) High Performance Computation Cluster (SLURM system) since 2022 to perform tensorial and parallel computing, including waveform source localization and moment tensor inversion, finite boundary methods numerical simulation, and deep learning model training.
Numerical Analysis	Familiar with mainstream Finite Element Method and Discrete Element Method software, such as Abaqus, Itasca PFC3D, FLAC 3D. Run simulations as supplements for physical experiments. Simulated models in different scales, from laboratory rock uniaxial compression test to site scale, 10-m span precast bridge sections and supporting pressure on tunnel face 30m deep
Programming	Proficient in most mainstream scientific programming languages (e.g., Python, MATLAB et.,) web design languages (e.g., C, JavaScript, PHP, HTML, etc.)
Advanced drone pilot	Licensed advanced drone pilot for small drones (250g~25kg) in Canada. Able to conduct commercial flights within restricted area, such as airport (Class C). Developed a robust two-phase scanning scheme to automate photogrammetry reconstruction survey flights for rock cuts in complex topography with dense vegetations and tourists.