BINYAO GUO

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EDUCATION

University of Minnesota Twin Cities   Minneapolis, US
PhD student in Civil Engineering   Sept. 2023-now

The University of Illinois at Urbana-Champaign   Urbana, US
Msc in Structural Engineering   Sept. 2021-May. 2023
- GPA 3.89/4
- Selected courses: *Deep Learning(ongoing), Scientific Machine Learning (ongoing), Finite Element Method, Machine learning for CEE, Earthquake Engineering, Structural Dynamics, Structural Mechanics*
- Master Thesis: *QUALITY ASSESSMENT OF 3D PRINTED CONCRETE THROUGH POINT CLOUD DATA ANALYSIS*

University of Leeds / South West Jiaotong University (Dual Degree)   Chengdu, China
BEng in Civil Engineering   Sept. 2017-Jun. 2021
- GPA at the University of Leeds: 70/100 (top student, first-class degree)
- GPA at Southwest Jiaotong University: 85/100
- Recipient of Scholarship in 2020 for academic excellence (top 10% of students)

PUBLICATIONS

- **UAS-based Infrastructure Inspection Path Planning Considering Visual Recognition Performance**
  Yuxiang Zhao, Binyao Guo, Mohamad Alipour,
  i3CE 2023. June. 2023
- **A data-driven planning framework for automated infrastructure inspection and information modeling**
  Binyao Guo, Yuxiang Zhao, Mohamad Alipour,
  SPIE 2023. March. 2023
- **Review of Research on Damage Identification of Reinforced Concrete Structures Based on Acoustic Emission Technology**
  Binyao Guo, Yixuan Li,
  IOP Conference Series: Earth and Environmental Science. Aug. 2020

RESEARCH EXPERIENCE

The University of Illinois Urbana-Champaign, Department of Civil Engineering   Urbana, US
Research Assistant; Supervised by Research Assistant Professor Mohamad Alipour   Sept. 2021-Aug. 2023
QUALITY ASSESSMENT OF 3D PRINTED CONCRETE THROUGH POINT CLOUD DATA ANALYSIS
- Developed a methodology for assessing the quality of the overall shape of printed structures by evaluating the similarity between the point cloud of 3DCP and its intended shape, utilizing distance error, normal angle difference, and curvature error as metrics.
- Established a technique for identifying surface defects in 3DCP and incorporating them into the 3D model by back-projecting the 2D pixels to 3D for intuitive visualization and analysis.
- Explored the potential for evaluating the uniformity and structural integrity of 3DCP by computing the consistency of layer dimensions in 3DCP.
- A paper is almost finished based on this work and going to be published.

The University of Illinois Urbana-Champaign, Department of Civil Engineering   Urbana, US
Research Assistant; Supervised by Research Assistant Professor Mohamad Alipour   Jun. 2022-now
A data-driven planning framework for automated infrastructure inspection and information modeling
- Proposed a hierarchical damage localization and quantification system combining object detection and semantic segmentation modeling
- Computed an array of several quantitative metrics to guide the optimization and planning of future real-world inspections

The University of Illinois Urbana-Champaign, Department of Civil Engineering   Urbana, US
Research Assistant; Supervised by Research Assistant Professor Mohamad Alipour   Feb. 2022-now
Digital Twins generation and 3d semantic segmentation based on Photogrammetry and Deep Learning: A cracked pile case study
- Detected the cracks in pixel level by training an Unet model
- Generated the point cloud model of the pile using the Structure From Motion technique
- Back projected the crack pixel to its corresponding 3d location using the Computer vision technique
- Proposed a noise-filtering method with no parameters input required based on DBSCAN

Southwest Jiaotong University, Department of Civil Engineering Chengdu, China
Undergraduate Researcher; Supervised by Research Assistant Professor Zhao Chen May. 2020-Apr. 2021
Undergraduate Thesis: Investigations on different curing methods of ultra-high-performance concrete using local materials
- Cast the UHPC using the local materials in Chengdu and optimized the mix proportion and curing method
- Studied the influence of the water-binder ratio, sand-binder ratio, gradation of aggregate, silica fume content, fly ash content, and curing method on the compressive strength and flexural strength of UHPC, and found the proper mix proportion and curing method which makes the two strengths become 127.5MPa and 24.5MPa respectively
- The thesis was evaluated as Excellent (top 10%)

Southwest Jiaotong University, Department of Civil Engineering Chengdu, China
Undergraduate Researcher; Supervised by Engineer Zhao Chen Sept. 2020-Jan. 2021
Mix design for Low Rebound Nano-fiber shotcrete
- Optimized the mix design for the shotcrete to reduce the Rebound rate
- Added nanomaterial (nano silica, nano calcium carbonate, carbon nanotube, and Nano-Al2O3) in shotcrete. Did raw material test, mortar-setting time test, concrete mix design adjustment, concrete stress test, and SEM test
- Established regression model by designing multiple variables (single variable such as silicon powder, Fly ash, magnetized water and mix variables such as simultaneous use of nano, fiber materials, and magnetized water)

Southwest Jiaotong University, Department of Civil Engineering Chengdu, China
Undergraduate Researcher; Supervised by Lead Engineer Qianqian Xu Oct. 2019-July 2020
Research on Damage Identification of Reinforced Concrete Structures based on Acoustic Emission Technology
- Reviewed the application of acoustic emission technology in the identification of damage to concrete structures, including the characterization of acoustic emission of concrete structure damage and the application of acoustic emission technology in research of concrete fatigue performance

Southwest Jiaotong University, Department of Civil Engineering Chengdu, China
Undergraduate Researcher; Supervised by Professor Song Xia Sept. 2018-June. 2019
An innovative study on the ethical impacts of construction projects
- Took full responsibility for organizing and leading a team of 4 students to conduct field research at Wuchazi Bridge, with a research focus on the environmental impacts on the surrounding area
- Completed four written pieces analyzing the ethical impacts of different engineering projects, to be published in a book on the topic of engineering ethics case studies shortly

WORK EXPERIENCE

Sichuan Railway Investment Group Co. Ltd. Chengdu, China
Headquarters Intern Dec. 2017-Jan. 2018
- Worked on bidding processes, reviewed tender documents, studied safety regulations, and conducted on-site safety inspections along with the team leader
- Participated in a team project to produce engineering drawings, using AutoCAD and Revit

EXCHANGE STUDY

University of Leeds Leeds, UK
Summer School Jul. 2018-Aug. 2018
- Investigated people's understanding of sustainability in civil engineering using self-made questionnaires, and gave a presentation in front of 200 people based on the results
- Led students from 3 different countries to make a film about sustainability in civil engineering to deepen our understanding of the topic and educate more people who were interested

University of California, Los Angeles Los Angeles, US
Business Innovation Management Programme July 2019-Aug. 2019
- Completed a course on Business Innovation and collected local people's views by interviewing them.
- Led the group and won 2nd place in the Business Innovation competition (out of 14 groups)

Skills

- **Programming language:** Python, MATLAB, Ruby
- **Tools/Software:** PyTorch, Open3d, OpenCV, Abaqus, Cloud Compare, Revit, Midas, SAP2000
- **Language Skills:** English, Mandarin