

Lei Huang

6250 Applied Science Lane, Vancouver, BC V6T 1Z4, CANADA

☎ (646)283-1299 • ✉ lei.huang@ubc.ca

Education

University of British Columbia

Ph.D. in Civil Engineering, GPA: 4.15/4.33

Advisor: Zhengbo Zou

Vancouver, BC, CA

2021 – present

Columbia University

M.Sc. in Civil Engineering, GPA: 3.83/4.0

CS@CU Bridge in Computer Science, GPA: 4.22/4.0

New York, NY, US

2018 – 2020

Central South University

B.E. in Civil Engineering, GPA: 3.4/4.0

Changsha, HN, CN

2013 – 2017

Publication

1. **Lei Huang**, Weijia Cai, Zihan Zhu, Zhengbo Zou. **Dexterous manipulation of construction tools using anthropomorphic robotic hand**, *Under Review*, 2023.
2. Weijia Cai, **Lei Huang**, Zhengbo Zou. **RoboAuditor: Goal-Oriented Robotic System for Assessing Energy-intensive Indoor Appliance via Visual Language Models**, *ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys '23)*, 2023.
3. Weijia Cai, **Lei Huang**, Zhengbo Zou. **Reinforcement Learning-Based Robotic Motion Planning for Conducting Multiple Tasks in Virtual Construction Environments**, *Automation in Construction toward Resilience: Robotics, Smart Materials, and Intelligent Systems*, CRC Press, 2023, pp.43-56.
4. Hao Xuan Zhang, **Lei Huang**, Weijia Cai, Zhengbo Zou. **Towards Automated Quality Assurance: Generating Synthetic Images of Building Components for Vision-Based Semantic Segmentation**, *Automation in Construction toward Resilience: Robotics, Smart Materials, and Intelligent Systems*, CRC Press, 2023, pp.139-156.
5. Weijia Cai, **Lei Huang**, Zhengbo Zou. **Actively-exploring thermography-enabled autonomous robotic system for detecting and registering HVAC thermal leaks**, *Automation in Construction*, 2023.
6. **Lei Huang**, Zihan Zhu, Zhengbo Zou. **To imitate or not to imitate: Boosting reinforcement learning-based construction robotic control for long-horizon tasks using virtual demonstrations**, *Automation in Construction*, 2023.
7. Weijia Cai, Le Zhang, **Lei Huang**, Xinran Yu, Zhengbo Zou. **TEA-bot: A Thermography Enabled Autonomous Robot for Detecting Thermal Leaks of HVAC Systems in Ceilings**, *ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys '22)*, 2022.
8. Kangkang Duan, Shuangyin Cao, Zhengbo Zou, **Lei Huang**, Zhili He. **Revealing the Nature of Concrete Materials Using Soft Computing Models**, *Journal of Building Engineering*, 2022.
9. **Lei Huang**, Zhengbo Zou. **Accelerating Training of Reinforcement Learning-Based Construction Robots in Simulation Using Demonstrations Collected in Virtual Reality**, *IEEE Winter Simulation Conference (WSC)*, 2022.
10. **Lei Huang**, Zhengbo Zou. **Deep Reinforcement Learning-Based Construction Robots Collaboration for Sequential Tasks**, *IEEE International Conference on Robotics and Automation (ICRA) Workshop on Future of Construction: Build Faster, Better, Safer - Together with Robots*, 2022.
11. **Lei Huang**, Weijia Cai, Zhengbo Zou. **Virtual Reality-Based Expert Demonstrations for Training Construction Robots via Imitation Learning**, *Canadian Society for Civil Engineering (CSCE) Annual*

Conference, 2022. (**Best Student Paper Award**).

12. Weijia Cai, **Lei Huang**, Zhengbo Zou. **An Integrated Approach Combining Virtual Environments and Reinforcement Learning to Train Construction Robots for Conducting Tasks Under Uncertainties**, *Canadian Society for Civil Engineering (CSCE) Annual Conference*, 2022.
13. Hao Xuan Zhang, **Lei Huang**, Weijia Cai, Zhengbo Zou. **Semantic Segmentation of Synthetic Images into Building Components for Automated Quality Assurance**, *Canadian Society for Civil Engineering (CSCE) Annual Conference*, 2022.

Academic Experience

Vision-based Markerless Pose Estimation of Construction Equipment, Rutgers University 2021

- o Conducted comprehensive literature review of pose estimations
- o Proposed models to estimate poses of construction equipment in RGB images

AI City Challenge - Vehicle Counts by Class at Multiple Intersections, New York University 2020

- o Applied CornerNet and CenterNet to do video-based-detections
- o Developed algorithms to track vehicles in the region of interest

New York City's Bike Collision Patterns, Columbia University 2019

- o Cleaned, pre-processed, and visualized large datasets using Pandas, Geopy, and Gmplot
- o Evaluated the correlation between counts of bike collisions and weather conditions
- o Predicted the number of cyclist-involved collisions by total bike trips using regression

Seismic Behavior of Steel-Concrete Composite Frame Structures, Central South University 2017

- o Analyzed constitutive relation for plastic hardening of steel under monotonic loading, plastic damage of concrete and hybrid model under cyclic loading
- o Designed composite frame structure models in Abaqus and optimized the simulation time by 60%
- o Collected and visualized the elastic-plastic seismic time-history data of models to study behaviors

Teaching Experience

Teaching Assistant, Columbia University

COMSW1004 Computer Science and Programming in Java

Fall 2020, Spring 2021

- o Held weekly office hours and review sessions
- o Graded assignments and coding projects

Professional Experience

China Construction Eighth Engineering Division. Corp. LTD

Hangzhou, ZJ, CN

BIM Engineer and Technical Engineer

2017.7 – 2018.1

- o Won the first prize in Building Information Modeling Competition (Ranked 2nd out of over 300)
- o Built BIM in Revit in biddings of Art Museum of Shanghai Pudong, Jinhua People's Hospital

Sinohydro Engineering Bureau Eight Co. LTD

Changsha, HN, CN

Civil Engineer Intern

2016.6 - 2016.8

- o Supervised 36 construction workers and made records to control construction quality
- o Examined perpendicularity and flatness of walls in two buildings to ensure that the qualities comply with regulatory standards

Selected Awards and Honours

Faculty of Applied Science Graduate Award (Third-year CIV-EX)

2023

J K Zee Memorial Fellowship

2022

President's Academic Excellence Initiative PhD Award

2021

International Tuition Award

2021

CS@CU Bridge Scholarship	2020
Global Leaders in Construction Management	2019
Best Thesis Honor	2017
Undergraduate Scholarship Award	2014

Technical Skills

Programming: Java, Python, Matlab, HTML, L^AT_EX

Software: AutoCAD, Abaqus, Autodesk Revit, Adobe Photoshop

Language: Mandarin (Native), English (Proficient), Spanish (Elementary)