# Lei Huang

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## Education

**University of British Columbia** — **Vancouver, BC, CA**
*Ph.D. in Civil Engineering, GPA: 4.15/4.33* — *2021 – present*
**Advisor:** Zhengbo Zou

**Columbia University** — **New York, NY, US**
*M.Sc. in Civil Engineering, GPA: 3.83/4.0* — *2018 – 2020*
*CS@CU Bridge in Computer Science, GPA: 4.22/4.0*

**Central South University** — **Changsha, HN, CN**
*B.E. in Civil Engineering, GPA: 3.4/4.0* — *2013 – 2017*

## Publication

1. 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.
2. Weijia Cai, **Lei Huang**, Zhengbo Zou. **Actively-exploring thermography-enabled autonomous robotic system for detecting and registering HVAC thermal leaks**, *Automation in Construction*, 2023.
3. **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.
4. 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.
5. 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.
6. **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.
7. **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.
8. **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**).
9. 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.
10. 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
- Conducted comprehensive literature review of pose estimations
- 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
- Applied CornerNet and CenterNet to do video-based-detections
- Developed algorithms to track vehicles in the region of interest

**New York City's Bike Collision Patterns**, Columbia University 2019
- Cleaned, pre-processed, and visualized large datasets using Pandas, Geopy, and Gmplot
- Evaluated the correlation between counts of bike collisions and weather conditions
- 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
- Analyzed constitutive relation for plastic hardening of steel under monotonic loading, plastic damage of concrete and hybrid model under cyclic loading
- Designed composite frame structure models in Abaqus and optimized the simulation time by 60%
- 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
- Held weekly office hours and review sessions
- 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*
- Won the first prize in Building Information Modeling Competition (Ranked 2nd out of over 300)
- 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*
- Supervised 36 construction workers and made records to control construction quality
- Examined perpendicularity and flatness of walls in two buildings to ensure that the qualities comply with regulatory standards

## Selected Awards and Honours

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| Faculty of Applied Science Graduate Award | 2023 |
| J K Zee Memorial Fellowship | 2022 |
| President's Academic Excellence Initiative PhD Award | 2021, 2022, 2023 |
| International Tuition Award | 2021, 2022, 2023 |
| 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, LaTeX
**Software**: AutoCAD, Abaqus, Autodesk Revit, Adobe Photoshop

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