Curriculum Vita

Cheng Zhang

IELTS: 6.0

D.O.B.: Aug. 16, 2001

Supervisor: Prof. Lu Deng

Tel: (+86) 15074464978

Email: zc23@hnu.edu.cn

Educational Background

Sep. 2023 – Present **Hunan University** Master of Structural Engineering

GPA:3.42 / 4.0

Sep.2019 – Jun. 2023 **Sichuan University** Bachelor of Civil Engineering

GPA:3.64 / 4.0 (Ranking: 8 / 95), Average Score:87.17

Graduate Research

My graduate research focuses on using UAV technology to assess the construction quality of prefabricated bridges, specifically including bridge alignment detection (Paper [1]) and UAV path planning (Patent [1]).

1. UAV-assisted bridge alignment measurement using enhanced small target detection and adaptive ellipse fitting

Supervisor: Prof. Lu Deng **Co-supervisor:** Prof. Jingjing Guo Sep. 2023 – Oct. 2024

- Proposed an efficient UAV-assisted bridge alignment measurement technique.
- Introduced a DAMSED algorithm to enhance the robustness of marker center localization.
- Successfully applied to the measurement of an under-construction prefabricated bridge, achieving a RMSE of 2.84 mm within a 30-meter range.
- **Achievements:** Generated one SCI paper and two patents.

2. UAV-based bridge geometry measurement system using a boustrophedon path planning algorithm

Supervisor: Prof. Lu Deng **Co-supervisor:** Prof. Jingjing Guo Nov. 2024 – Present

- Provided an innovative boustrophedon path planning algorithm, to generate efficient UAV bridge deck coverage paths.
- The UAV captured bridge deck images along the planned path, enhancing automation while generating more accurate 3D point cloud models.
- Applied to the measurement of bridge elevation, slope, dimensions, and other information.
- **Achievements:** Generated a research paper (Working Manuscript) and a patent.

Undergraduate Research

My undergraduate research focused on improving concrete performance (Paper [3]) and odor control in water (Patent [4]).

1. Electrochemical extraction method and effect of chloride ions in concrete mixtures

Supervisor: Prof. Jianghong Mao Principal member Mar. 2022 – Jan. 2023

- Assisted in testing concrete performance and used Origin and Photoshop to create related graphs and images
- Analyzed the data to evaluate technical effectiveness.
- **Achievement:** Generated one research paper.

2. A piezoelectric-based self-powered integrated device for odor treatment and detection

Supervisor: Prof. Ying Liang Principal member Sep. 2020 – May 2022

- Reviewed relevant literature to summarize the principles of piezoelectricity and carried out the fabrication of electrospun membranes.
- **Achievement:** Generated a patent.

Scholarship

- The Engineering Innovation Design Scholarship, awarded by Hunan University Jan. 2025
- The First Prize Scholarship, awarded by Hunan University Oct. 2023
- The First Prize Scholarship, awarded by Sichuan University Oct. 2022
- Outstanding Student of Sichuan University Oct. 2020

Publication

Patent

[1] Lu Deng (Supervisor), **Cheng Zhang**, Jingjing Guo (Co-supervisor), A bridge alignment measurement method, device, equipment, and medium based on virtual simulation and autonomous UAV flight [P], ZL 2025 1 0552690.X, 2025-07-04.

[2] Lu Deng (Supervisor), **Cheng Zhang**, Jingjing Guo (Co-supervisor), Ran Cao. A method, device, and medium for alignment management of prefabricated bridges [P], ZL 2024 1 1776051.3, 2025-03-14.

[3] Lu Deng (Supervisor), **Cheng Zhang**, Jingjing Guo (Co-supervisor), Ran Cao. An intelligent method, device, equipment, and medium for bridge alignment detection [P], ZL 2024 1 1089789.2, 2024-10-15.

[4] Ying Liang, Qinghao Zeng, Lijia Huang, **Cheng Zhang**, Shaojun Yuan, A piezoelectric-based self-powered integrated device for odor treatment and detection [P], ZL 2021 1 0956660.7, 2022-08-26.

Journal Paper

[1] Lu Deng (Supervisor), **Cheng Zhang**, Weiqi Mao, Feng Zhang, Jingjing Guo* (Co-supervisor). UAV-assisted bridge alignment measurement using enhanced small target detection and adaptive ellipse fitting [J]. Automation in Construction, 2025, 176: 106258.

[2] Feng Zhang, Jingjing Guo (Co-supervisor), **Cheng Zhang**, LuDeng* (Supervisor). Robotic Technology Adoption in Prefabricated and Modular Construction: Integrating TOE Factors and Stakeholder Interaction Quality. Engineering, Construction and Architectural Management. (Accept).

[3] Lizhi Long, Wenyao Liu, Shaopeng Xu, Peng Shi, **Cheng Zhang**, Lu Deng* (Supervisor). Automated alignment deviation measurement for precast concrete assembly using point cloud-image fusion [J]. Automation in Construction, 2025, 180: 106540.

[4] Jian Xu, Jianghong Mao, **Cheng Zhang**, Kun Fang, Baoying Zhu. Electrochemical extraction method and effect of chloride ions in concrete mixtures [J]. Cold Region Architectural Technology, 2022, 44 (03): 149 - 153 + 158.

[5] Yixiong Jing, **Cheng Zhang**, Brian Sheil, Haibing Wu*. InfraDiffusion: zero-shot depth map restoration with diffusion models and prompted segmentation from sparse infrastructure point clouds. Automation in Construction. (Under Review).

[6] Lizhi Long, Wenyao Liu, **Cheng Zhang**, Shaopeng Xu, Peng Shi, Lu Deng* (Supervisor). Enhanced binocular stereo vision-based localization measurements for prefabricated wall panels installation. Advanced Engineering Informatics. (Under Review).

Project experiences

1. National Key R&D Program: Intelligent inspection technology and robotics for installation quality of urban prefabricated bridges Dec. 2023 – Present

Outline: As the lead student, I independently managed the design, experiments, and writing of related research reports and papers for a sub-project, and participated in multiple project presentations.

2. National Undergraduate Innovation program: Research on improving concrete quality under low-pressure plateau conditions Mar. 2022 – Jan. 2023

Outline: As a key team member, I assisted in conducting concrete performance testing under different air pressures using hydraulic jacks, electronic testing machines, and pressure sensors. The project was designated as a national-level innovation and entrepreneurship project and selected for the 17th National Innovation and Entrepreneurship Training Program Annual Conference.

3. Competition: The 5th National College Students' Water Supply and Drainage Science and Technology Innovation Competition Apr. 2022

Outline: As the leader, I oversaw the design and implementation, leading research, design, and technical verification to meet high standards. I coordinated team tasks, resolved technical issues, and managed communication with experts, securing the national second prize.

4. Internship:

Hunan Fourth Engineering Co., Ltd. Jun. 2022 – Aug. 2022

Hunan University Design and Research Institute Co., Ltd Jun. 2023 – Aug. 2023

Outline: As a member of the structure design department, the main work content includes assisting in the completion of structural models, producing detailed drawings of stairs and walls, and participating in later-stage on-site construction support. I systematically learned design software like PKPM and CAD.

Skills

Programming:

Python, MATLAB, and **C++**.

Hardware:

DJI Matrice 300 RTK and **DJI Air 3**, holding a UAV pilot license. Extensive expertise in aerial surveying and data acquisition.

Software:

- Proficient in **ContextCapture Center** for generating high-precision 3D models from UAV imagery for digital twin and surveying;
- Skilled in **Unreal Engine** for virtual scene creation and path simulation;
- Experienced with **CloudCompare** for point cloud processing and accuracy evaluation;
- Knowledgeable in **ROS** for map-based path planning and autonomous UAV control integrated with Unreal Engine;
- Familiar with **PyTorch**, and able to implement innovative object detection and recognition applications using the **YOLO series** algorithms.