HAOTIAN LIU

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EDUCATION

Tongji University **Shanghai, China**
Master of Structural Engineering 2022 – Present
• Overall GPA: 4.47/5.0 Average Score: 89.32

Hefei University of Technology **Anhui, China**
Bachelor of Civil Engineerin 2018 - 2022
• Overall GPA: 3.9/4.3 Rank: **1st/247**

HONORS

Scholarships & Honorary Titles
• **National Scholarship (top1%, highest scholarship from Ministry of Education of China) (×3)** **2019-2021**
• Outstanding Student Scholarship, Golden award (top 3%) **(×3)** 2019-2021
• Outstanding Merit Student of Hefei University of Technology **(×3)** 2019-2021
• "Industrial and Civil Construction Scholarship for Class of 1977" Civil Engineering Excellence Award 2020
• Outstanding Graduate of Anhui Province 2022

Academic Competition Awards
• **3th International Engineering Mechanics Contest (Asian Region), First prize** **2022**
• 5th Anhui Undergraduate Building Information Modeling Application Competition, First prize 2022
• 13th Anhui Undergraduate Mechanics Competition, Second prize 2022

RESEARCH EXPERIENCE

1. Weld seam extraction for automatic welding robots based on deep learning on point cloud

Tongji University | Advisors: Prof. Xianzhong Zhao and Dr. Zhaoqi Huang Oct. 2023 - Present

- **Outline**: We established a new framework for end-to-end seam extraction based on deep learning on point cloud for welding robots. First, we proposed a method for automatically constructing large-scale, diverse simulated datasets of workpiece joints, which replaces the high-cost and inefficient process of joint point cloud collection. Then, the task of seam extraction is abstracted as a point cloud part segmentation task, which is accomplished through an improved state-of-the-art PointNext network for end-to-end extraction of seam feature points. Finally, the accuracy, efficiency and generalization of the proposed method are demonstrated based on experimental data.
- **Achievement**: Generated a research paper and a patent (In Preparation).

2. Adaptive seam detection for unmanned structural steel welding robots in unstructured environment

Tongji University | Advisors: Prof. Xianzhong Zhao and Dr. Zhaoqi Huang Oct. 2023 – Oct.2024

- **Outline:** We proposed a self-adaptive seam detection framework based on steel workpiece pose estimation. The framework leverages the reliable estimation of the target workpiece pose as guidance and enables automatic robot navigation for subsequent structured light sensor measurements, and ultimately achieves a fully autonomous seam detection for robotic welding. Real-world comparative experiments revealed that the proposed seam detection framework achieves a 76% improvement in efficiency compared to traditional frameworks and eliminates the need for manual assistance.
- **Achievement:** Generated a research paper and a patent (Under Review).

3. National Undergraduate Training Program for Innovation and Entrepreneurship & Student Research Training Program

Hefei University of Technology | Advisors: Prof. Yonggan Yang Jun.2020 – Mar.2022

Preparation of Lightweight and High Strength Foam Concrete

- **Outline:** Factors such as blowing agent concentration, foam density, admixture type and admixture amount were used as variables to investigate their effects on the strength of foam concrete. The early microstructural evolution of foam concrete was explored by ultrasonic instrumentation, revealing the nature of microstructural evolution.
- **Achievement:** Generated a research paper and a patent

PUBLICATIONS

[1] Yuzhen He, Zhaoqi Huang, **Haotian Liu**, Jingang Ye, Yujie Lu, Xianzhong Zhao, A Self-adaptive Seam Detection Framework for Unmanned Structural Steel Welding Robots in Unstructured Environments [J]. Automation In Construction (Under Review)
[2] Xianzhong Zhao, **Haotian Liu**, Yuzhen He, Jingang Ye, Zhaoqi Huang, An Intelligent end-to-end seam extraction approach enhanced by an effective synthetic data generation strategy (In Preparation)
[3] **Haotian Liu**, Xianzhong Zhao, Yuzhen He, Jingang Ye, A method for generating 3D point cloud dataset of workpiece based on co-simulation of Gazebo and MoveIt [P] (Under Review)
[4] Yonggan Yang, Zihao Kang, **Haotian Liu**, Jian Hua, A kind of lightweight, high specific strength foam concrete and its preparation method [P]. CN 114804916A. 2022-07-29.
[5] Guoqing Guo, Binggen Zhan, Yonggan Yang, Weiping Zhao, **Haotian Liu,** Jian Hua, Effect of pore level matching on the strength of foam concrete at high temperatures [J]. Journal of Hefei University of Technology (Natural Science), 2022-10

RESEARCH INTERESTS

Construction Automation; Robotics (Welding robot);
Deep Learning (3D Classification & Segmentation);

TEACHING ASSISTANT

Introduction to Intelligent Construction Sep.2022-Jan.2023

- Instructor: Prof. Xianzhong Zhao (Civil Engineering, Tongji University)
- Credit 1; Class: 30 juniors
- Assisted in preparing course materials, managing course-related activities, and grading assignments.

Chinese Proficiency Test (HSK) of Tongji University Mar..2023-Jul.2024

- Instructor: Prof. Ping Li (International Cultural Exchange, Tongji University)
- Assisted in administering the Chinese Proficiency test (HSK) for over 150 candidates.
- Supported exam preparation and logistics, including registration, scheduling, and materials preparation.
- Provided on-site assistance during exam sessions to ensure smooth execution.

EXTRACURRICULAR ACTIVITIES & INTERESTS

1. Voluntary activity

• **2nd National Academic Conference on Intelligent Construction** Dec. 2023
Outline: As a staff member of the conference, I introduced the participants to Tongji University's journals in the field of civil engineering

• **"Spring Breeze" Academic Counseling Activity** Dec. 2021
Outline: As a peer tutor, I fully communicated with the students and tutored them from the difficult points of the mechanics courses.

2. Academic conference

• **5th China Construction Robotics Conference** Oct. 2023
Outline: As a participant, I listened to the conference focus on the core issues: the demand and development of construction robots, robotics key technology research, industrialization development and thinking.

3. Internship

• **Shanghai Qi Zhi Institute** Feb. 2023 – Feb. 2024
Outline: As a researcher, I conducted a review of the current research progress on construction robots, studied ROS and Gazebo, and tested algorithms related to 3D point cloud processing

• **HFUT GongDa Engineer Inspection & Test Co., Ltd** Feb. 2021 - Aug.2021
Outline: As a member of the site supervision team, I was responsible for overseeing the construction quality, progress, and safety on-site. Additionally, I assisted in the testing and inspection of materials and components.

SKILLS

Programming: ROS,Gazebo, Python (Pytorch), MATLAB, Abaqus, Ansys, ArchiCAD

Hardware: Robotic arm (KUKA_KR6), Depth camera (Mech-Eye NANO, Realsense D435)