Xiaoyu Lin

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Address: Huazhong University of Science and Technology, Wuhan, Hubei, China

Education

Huazhong University of Science and Technology, Wuhan, China Sept 2022 – June 2025 (expected)

M.Eng. in Mechanical Engineering **GPA: 3.76/4.0**

Relevant Courses: Introduction to Robotics (93), Autonomous Mobile Robots (90), Industrial Photogrammetry Technology (88), Object Oriented Programming (94)

Huazhong University of Science and Technology, Wuhan, China Sept 2018 – June 2022

B.Eng. in Mechanical Design, Manufacturing and Automation **GPA: 3.89/4.0**

Relevant Courses: Engineering Measurement Technology (97), Computer Control System (94), Machine Design (91), Principle of Microcomputer (91), Mechanical and Electrical Transmission Control (93)

Research Interests

Robotic Measurement and Inspection, Large-scale Metrology, Graph-based Optimization Methodology

Skills & Languages

Programming language: Matlab, C++, Python, C (STM32)

Programming tools: OpenCV, g2o, Simulink, PyTorch, ROS, git

Software: Solidworks, QT, Cloud Compare, Polyworks, Jupyter

Languages: English (Fluent, **IELTS: 8.0**), Mandarin (Native), Spanish (Basic)

Academic Papers

[1] **Lin X.**, et al. "A Tracker Pose Optimization Method for Robotic Measuring System Based on Spatial Distance Constraints." ***Measurement***. (**R&R, now under review**)

[2] Wang Z, **Lin X.**, et al. "Geometry Distance Constrained Robust Registration Framework of Featureless Point Clouds." ***IEEE Transactions on Industrial Informatics***. (**R&R, now under review**)

[3] Wang Z, Yang Y, Yan S, **Lin X.**, et al. "High Accuracy and Robust Robotic Inspection by Constrained Pose Graph Optimization." ***IEEE Transactions on Industrial Electronics***. (**Minor revision**)

Research Experiences

Precise and Efficient Visual Inspection of Large-scale Components with Scarce 3D Features | *Current Project for Master's Thesis* May 2023 – Current

Advisor: *Prof. Xiaojian Zhang, State Key Laboratory of Intelligent Manufacturing Equipment and Technology, HUST*

- Built an **integrated robotic measuring system** comprising a 6-DOF robot, an AGV, a structured light scanner, and a photogrammetry tracker to achieve the **full-field scanner pose estimation** with robustness and accuracy.
- Introduced an **accurate hand-eye calibration algorithm** for large-scale tracking based visual measurement system, enabling the complete measurement and 3D reconstruction of complex and large profiles without using any point cloud registration method.
- Proposed a **tracker pose optimization algorithm based on spatial distance constraints** to tackle the tracker base frame transformation problems, and **reduced the tracker's spatial positioning error by more than 50%**, compared with the most commonly used method in tracking systems.

Robust Registration Framework of Featureless Point Clouds and Global Optimization Method Oct 2023 – Current

Cooperated with Ph.D. student Ziwei Wang, State Key Laboratory of Intelligent Manufacturing Equipment and

Technology, HUST

- Utilized the integrated robot measuring system to achieve point cloud acquisition, and conducted the **coarse registration of featureless point clouds** via the photogrammetry tracking system.
- Applied the fine registration methods for featureless point clouds, and conducted fine registration using the *Fast and Robust Iterative Closest Point* method to achieve comparisons with our proposed method.
- Investigated the global optimization method for multi-pose robotic scanning, and adopted the **pose graph optimization method using the g_2o framework** to obtain more accurate global poses of point clouds.

Automatic Robot Polishing Workstation for Thin-walled Workpiece Oct 2022 – Jun 2023

Advisor: *Prof. Xiaojian Zhang, State Key Laboratory of Intelligent Manufacturing Equipment and Technology, HUST*

- Designed an integrated robotic polishing system with a **radius-adaptive clamping device** and a **force-control grinding unit** to achieve automatic defect repair and burr removal.
- Investigated the simulation method for the polishing process using Robot Studio and implemented the designed system for actual polishing scenarios.

Design and Development of an Automatic Wheeled Robot Based on a 3-WIS Omnidirectional Mobile Platform | *Undergraduate Graduation Project* Jul 2021 – Jun 2022

Advisor: *Prof. Xiaojian Zhang, State Key Laboratory of Intelligent Manufacturing Equipment and Technology, HUST*

- Designed a novel **differential steering wheel** for the **omnidirectional mobile platform** by introducing bevel gears, removing the wire twining problem of traditional wheels and achieving fast and precise direction adjustment.
- Investigated **robot positioning schemes**, and developed a **multi-sensor fusion system** (odometer, gyroscope, laser range sensor, and depth camera) to achieve autonomous full-field robot positioning.

Leadership Experiences & Activities

China University Robot Competition, ABU Robocon 2020-2024

The largest and most competitive robot competition in China

- *Core member for robot design (2020-2021)*: investigated and designed an independent steering wheel system for the robot DR, and won the **National First Prize** (ranked top 8/83).
- *Team leader (2021-2022)*: designed the robot R1 (locomotion, actuators, positioning and sensing schemes), coordinated the multi-robot debugging for competition, and won the **National First Prize** (ranked 3/67).
- *Team supervisor (2022-2024)*: trained junior team members, guided the scheme formulation, facilitated the preparation process, and won the **National First Prize** (ranked top 16/68, 2023; ranked 2/86, 2024).

Teaching Assistant of Engineering Graphics for First-year College Students 2022

School of Mechanical Science and Engineering, Huazhong University of Science and Technology

- Assisted the teacher in designing course syllabus, making course slides, and grading homework and final papers.
- Guided students in after class tutorship and question answering, and provided help in lab sessions.

China National Model United Nations Conference 2019

- Represented the delegation of UK on the topic of "Enhancing the Implementation of Paris Agreement".
- *Team leader*, won the prize of "**Outstanding Delegation**" (ranked 2/32).

Honors & Awards

- **First-class Scholarship for Postgraduates (top 20%)**, Huazhong University of Science and Technology 2023,2024
- **Outstanding Graduate (top 20%)**, Huazhong University of Science and Technology 2022
- **National Scholarship (top 1%)**, Huazhong University of Science and Technology 2021
- **Merit Student (top 5%)**, Huazhong University of Science and Technology 2021