Zeqing Wang

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EDUCATION

B.E. in Electrical & Computer Engineering **Minor:** Computer Science
The University of Michigan-Shanghai Jiao Tong University Joint Institute (UM-SJTU JI) 2021 - 2025
Relevant Coursework: *Intro to Computers and Programming, Intro to Circuits, Data Structures and Algorithms, Applied Regression Analysis using R, Intro to Artificial Intelligence, Extended Reality (XR) Application Development, Discrete Mathematics, Probabilistic Methods in Eng., Intro to Cryptography, Electronic Circuits, Intro to Signals and Systems, Design of Microprocessor-Based Systems.*

RESEARCH PROJECTS

Towards Safe Motion Planning for Industrial Human-Robot Interaction: A Co-Evolution Approach Based on Human Digital Twin and Mixed Reality **Oct 2023 — Jun 2024**
Funded by Shanghai Jiao Tong University Undergraduate Innovation Practice Program (10,000 RMB)
Research Advisor: Youyi Bi *Data-informed Design and Intelligent Systems Laboratory*

- Proposed a novel co-evolution approach for safe motion planning of industrial human-robot interaction (HCI) by integrating human digital twin (HDT) and mixed reality (MR) technologies.
- Enabled robots to adapt dynamically to changes in human behavior and environment by refining deep reinforcement learning (DRL)-based motion planning.
- Provided intuitive gesture-based user interface to further improve the smoothness of human-robot interaction utilizing MR technologies.
- Validated the proposed approach's effectiveness with evaluations in realistic manufacturing scenarios, demonstrating its potential to advance HRI practice in smart manufacturing.
- Leveraged MR to overlay task and robot information in the physical environment, improving workers' understanding of robot actions and facilitating intuitive human-robot collaboration through gesture-based interfaces.
- Validated the approach in realistic manufacturing scenarios, demonstrating its potential to advance HRI practice in smart manufacturing.

Intraoperative 3D Reconstruction & Preoperative CT Image Registration Using Deep Learning **Oct 2023 — Apr 2024**
MiDIVI (MiDIVI develops intelligent medical technology solutions) *Shanghai, China*

- Developed a novel method that integrates NeRF-type algorithms with traditional point cloud processing techniques.
- Addressed the challenge of reconstructing human surgical sites before operations, enhancing preoperative planning.
- Introduced a two-layer noise filtering approach to significantly improve point cloud accuracy.
- Enabled precise registration of the point cloud with CT models through feature-based alignment.
- Successfully tackled key challenges encountered in the clinical stage, contributing to more accurate surgical modeling.

Exploring Soft Tissue Displacement with Depth Evaluation and Single-View 3D Reconstruction **Dec 2023 - Present**
Research Advisor: Yutong Ban

- Proposed a novel framework to accurately visualize the displacement of soft tissue in surgical video by incorporating evaluated depth information with a co-tracker algorithm.
- Improving the precision of tracking and monitoring tissue movements during surgery.
- Reconstructing a rough 3D point cloud from a single view of images by leveraging a well-trained deep learning model to improve the efficiency and accuracy of 3D reconstruction from limited visual data.

Advanced Proactive Human-Robot Collaboration Through Large Language Model Integration **June 2024 - Present**
Research Advisor: Youyi Bi *Data-informed Design and Intelligent Systems Laboratory*

- Developing a new methodology for combining segmenting real-time images with LLM, which enabling a Large Language Model (LLM) to accurately identify and distinguish current operational steps.
- Generating precise robotic commands to help workers grasp and transport tools based on LLM results.
- Implementing a well-trained reinforcement learning (RL) model that ensures that the robot successfully completes its tasks while prioritizing worker safety.
- Enhancing the efficiency and safety of human-robot collaboration in industrial environments through intelligent command generation and real-time image segmentation.

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Cost-Effective Handheld 3D Contour Scanner for Large-Scale Machinery. **Sept 2024 - Present**

- Developed a cost-effective handheld 3D scanner for large-scale outdoor machinery with real-time visualization.
- Defined engineering specifications and evaluation criteria based on sponsor requirements.
- Designed a prototype with industrial-grade components and balanced precision and cost utilizing Vision-LiDAR fusion SLAM algorithms.
- Specified lightweight, compact, and durable hardware for outdoor use and optimized device for affordability with a cost under 9,000 CNY.

INTERNSHIPS

Research Engineer **Dec 2023 – Apr 2024**
MiDIVI (MiDIVI develops intelligent medical technology solutions) *Shanghai, China*

- Developed and implemented a 3D reconstruction and registration framework using deep learning techniques for aligning intraoperative video with preoperative CT models.

AWARDS

"Liming Cup" Mechanical Vehicle Competition, Top 8 UM-SJTU JI, May 2023
VEX Freshman Mechanical Competition, Third Prize Shanghai Jiao Tong University, Nov 2021
John Wu & Jane Sun Sunshine Scholarship UM-SJTU JI, 2024
Awarded for academic excellence and comprehensive capabilities, amount: RMB 20,000-60,000

LEADERSHIP & EXTRACURRICULAR ACTIVITIES

President & Founder of JI XR Club 2023 – Present
• AR/VR development workshops Organizer • Club projects Director
Student Assistant of Tang Junyuan Student Innovation Center Spring 2023 & Spring 2024
• Equipment Maintenance • Events Organizer
Oxford Short-Term Exchange Program Winter 2023
• Attended seminars in nuclear physics, astrophysics, biology, and historical architecture preservation.
• Directed a short film [link].