

Wenhao Yang

 [Google Scholar]  [ResearchGate]  [LinkedIn]

Assistant Professor, Department of Industrial and Systems Engineering, Lamar University, Beaumont, TX 77710
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PROFESSIONAL SUMMARY

Engineering Ph.D. with experience in human-robot interaction, robotics, AR/VR/MR, and user experience design. Strong background in Robotics and AR/MR experience development.

EDUCATION

- ▶ **PhD** **Rochester Institute of Technology** **Aug. 2019 – Dec. 2023**
Engineering Ph.D. Program | Supervisor: [Dr. Yunbo Zhang](#)
- ▶ **MSc** **The Hong Kong University of Science and Technology** **Aug. 2018 - Jun. 2019**
Major: Mechanical Engineering | GPA 4.0/4.0 | Advisor: [Prof. Kai Tang](#)
- ▶ **BS** **Nanjing University of Aeronautics and Astronautics, P. R. China** **Sept. 2014 - Jun. 2018**
Major: Aircraft Design and Engineering | GPA 3.9/5.0 Rank 35/302

PROFESINAL EXPERIENCE

- ▶ **Assistant Professor** **Lamar University** **Jul. 2024 – Present**
Research Interests:
 - Human-robot Interaction, Robotics manipulation, Programming by Demonstration, Robotics System Design, Augmented & Virtual Reality, Human Factors, Tele-robots, Cobots, AGVs, Mobile Manipulators, Cyber-Physical Systems, Digital Twin, Industry 4.0, Smart Factory
- ▶ **Software Engineer** **Meta Reality Labs** **Jan. 2024 – Mar. 2024**
Research projects of next-generation MR HMD
 - Enhanced Meta Simulator's wide-FOV compatibility by testing canting camera functionality on UEVR and SteamVR.
 - Implemented and fine-tuned VRSDKs for various prototyping HMDs with wide-FOV, varifocal, and high-resolution.
 - Demonstrated wide-FOV practical applications by creating two immersive scenarios in Unreal Engine.
 - Designed a realistic Codec Avatar experience by developing a Unity application featuring multiple avatars for PCVR.
- ▶ **Research Assistant** **Rochester Institute of Technology** **Aug. 2019 – May. 2023**
Responsible for supporting and assisting [Dr. Yunbo Zhang](#) in various research activities and projects
 - Set up the research laboratory with robot manipulators (Aubo, UFactory) and VR HMDs (Oculus Rift, Quest 1/2/3/pro).
 - Conducted research in human-robot interaction, smart manufacturing, and AR/VR development.
- ▶ **Research Intern** **OPPO US Research Center (Innopeak Tech)** **Jun. 2022 – Sep. 2022**
Research of Mixed Reality robot remote control system
 - Designed and developed the innovative MR teleoperation system using an Automated Guided Vehicle (Rover Pro).
 - Implemented the teleoperation system on Microsoft HoloLens 2 with real-time video streaming capabilities.
 - Developed a 3D UI/UX design for an intuitive and user-friendly interface, enhancing three control modes.
 - Created and demonstrated a fitness instruction application within the Metaverse, showcasing the practical applications.
- ▶ **Engineering Intern** **Guangdong Bright Dream Robotics Co., Ltd.** **May. 2019 – Aug. 2019**
Tile-Laying Robot development project: a construction robot for indoor tile thin-laying
 - Established an autonomous movement system by developing an elevation positioning and movement control system.
 - Developed and tested the software of the 6-DOF robot for smooth movement and outstanding mechanical performance.

TEACHING EXPERIENCE

- ▶ **Assistant Professor** **Lamar University** **Jul. 2024 – Present**
Department of Industrial and Systems Engineering, taking online and face-to-face classes in graduate engineering levels:
 - Collaborative Robots Operation and Programming
 - Professional Seminar
- ▶ **Teaching Assistant** **3D Printing (ISEE-741)** **Aug. 2021 – May.2022**
Educated graduates in a hands-on lab session on creating a 3D design and printing a functional prototype with 3D printing technologies on various devices and tools, such as Original Prusa, Markforged, and Formlabs.

- ▶ **Teaching Assistant** **Materials Processing (ISEE-140)** **Aug. 2021 – Dec. 2021**
Guided undergraduates on a project with fabrication processes, including cutting, molding, casting, forming, milling, powder metallurgy, solid modeling, and engineering drawing.

SELECTED PUBLICATIONS

Journal Articles

- ▶ Chuhua Xian, Jun Zhang, Kun Qian, **Wenhao Yang**, and Yunbo Zhang. Depth Map Completion and Super-Resolution by Multi-Scale Progressive Fusion Strategy. *Journal of Intelligent Manufacturing*, 2024.
- ▶ **Yang, Wenhao**, and Yunbo Zhang. "A Global Correction Method for Camera Registration in Video See-Through Augmented Reality Systems". *Journal of Computing and Information Science in Engineering*, 2023.
- ▶ **Yang, Wenhao**, Xiwen Dengxiong, Xueting Wang, Yidan Hu, and Yunbo Zhang: "' I can see your password': A case study about cybersecurity risks in mid-air interactions of Mixed reality-based smart manufacturing applications". *Journal of Computing and Information Science in Engineering*, 2023.
- ▶ **Yang, Wenhao**, Qinqin Xiao, and Yunbo Zhang. "HAR²bot: System Design of a Human-centered Augmented Reality Robot Programming Interface with Cognition Awareness". *Journal of Intelligent Manufacturing*, 2023.
- ▶ **Yang, Wenhao**, and Yunbo Zhang. "DTHR-CoCo: A Digital Twin Framework for Human-Robot Collaboration and Cooperation". Manuscript submitted for publication.

Conference Proceedings

- ▶ **Yang, Wenhao**, Shi Bai, and Yunbo Zhang. "RADAR: Robotics Assembly by Demonstration via Augmented Reality without Real Demonstration". *International Conference on Intelligent Robots and Systems (IROS)*, 2025.
- ▶ **Yang, Wenhao**, and Yunbo Zhang. "A Global Correction Method for Camera Registration in Video See-Through Augmented Reality Systems." Short abstract accepted by ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE), 2023.
- ▶ **Yang, Wenhao**, Xiwen Dengxiong, Xueting Wang, Yidan Hu, and Yunbo Zhang: "' I can see your password': A case study about cybersecurity risks in mid-air interactions of Mixed reality-based smart manufacturing applications". Short abstract accepted by ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE), 2023.
- ▶ **Yang, Wenhao**, and Yunbo Zhang. "Visualization Error Analysis for Augmented Reality Stereo Video See-Through Head-Mounted Displays in Industry 4.0 Applications." *ASME International Manufacturing Science and Engineering Conference (MSEC)*. Vol. 85819. American Society of Mechanical Engineers, 2022.
- ▶ **Yang, Wenhao**, Qinqin Xiao, and Yunbo Zhang. "An Augmented-Reality Based Human-Robot Interface for Robotics Programming in the Complex Environment." *ASME International Manufacturing Science and Engineering Conference (MSEC)*. Vol. 85079. American Society of Mechanical Engineers, 2021.

RESEARCH ACTIVITIES

- ▶ **Experience design and research for next-generation MR head-mounted display** **Jan. 2024 – Mar. 2024**
Contributed to designing and developing VR/MR prototyping HMDs with innovative features for next-generation devices. Collaborated with software engineers to ensure PC SDK compatibility and tested various application scenarios and system integration.
- ▶ **AR-based human collaborative demonstration for robotics assembly tasks** **Jan. 2023 – Sep. 2023**
Built a system to demonstrate the task to the robot by virtually performing it on the AR interfaces. The system identifies the user's attention and integrates it into dual-level task planning. This approach improves the efficiency and success rate of long-horizon assembly tasks, which are evaluated on the RAMP benchmark.
- ▶ **A mobile manipulator for telepresence** **Sep. 2022 – Present**
Designed a mobile manipulator system capable of performing remote tasks through human interaction in a hazardous environment. This system enables the perception of the remote environment and control of the robot arm through an Augmented Reality system with promising telepresence and intuitiveness.
- ▶ **Cybersecurity risks in Mixed Reality-based smart manufacturing applications** **Sep. 2022 – Nov. 2022**
Led an exploration of potential cybersecurity risk in MR-based smart manufacturing applications where digital passwords can be deciphered through mid-air gestures by an RGB camera. The study develops a machine learning-based hand gesture recognition method with high accuracy (up to 97.03%) to estimate password input.
- ▶ **A telerobotic system with Mixed-Reality interaction for fitness instruction** **Jun. 2022 – Sep. 2022**

Engineered the development of a tele-robot control system that utilizes a Mixed Reality headset (HoloLens 2), to remotely control Automated Guided Vehicles (Rover Pro). The system features a user-friendly interface that offers three control methods: motion control, physical button control, and virtual button control.

- ▶ **A global calibration to solve the misregistration problems in the VST AR system** Oct. 2021 – Feb. 2023
Proposed a calibration method for the registration problem in a Video See-Through Augmented Reality (VSTAR) system. This study investigates 4 error sources and presents an efficient calibration procedure to reduce the misalignment accuracy via HMD-to-Camera transformation.
- ▶ **Augmented reality assisted smart factory management system development** Dec. 2021 – Feb. 2022
Developed an AR headset-based prototyping system to offer a clear and intuitive digital visualization, aiming to explore the potential applications in smart factories. This project presents a case study of a maintenance application in a CNC machine shop for technicians.
- ▶ **Augmented reality assisted maintenance and repair system development** Dec. 2021 – Feb. 2022
Created an Augmented Reality interface for maintenance procedures by utilizing digital twin technology. By presenting a demo of a repair process (PC memory card replacement), this work aims to highlight the benefits of using AR for instruction, resulting in improved accuracy and ease of operation for technicians.
- ▶ **An application of depth map completion and super-resolution in AR rendering** Sep. 2021 – Nov. 2021
Mediated in an experiment on an AR-based human-robot interaction scenario, aimed at demonstrating the effectiveness of a proposed method for addressing occlusion problems in the rendering of virtual objects. The method involves the use of depth completion and super-resolution techniques to enhance the visual quality.
- ▶ **Visualization error analysis for augmented reality stereo VST system** May. 2021 – Nov. 2021
In this research study, the sources of registration errors were identified in stereo video see-through systems and a mathematical model was established to describe the propagation of these errors in the display process.
- ▶ **System design of a human-centered AR HRI with cognition awareness** Nov. 2019 – Oct. 2021
Spearheaded and proposed a novel system, HAR²bot, for path-planning tasks in complex environments. The proposed system effectively balances and minimizes the cognitive burden associated with the design loop, leading to improved task efficiency and accuracy, which is evaluated by a 20-participant user study.
- ▶ **Augmented reality-based human-robot interaction system** Aug. 2019 – Nov. 2020
Launched an intuitive AR system framework and developed an immersive AR-based interface for cobot (AUBO i5) programming in complex environments. Users repeat the process of waypoints definition and editing, collision checking, and path feasibility verification, to obtain a satisfactory path in the proposed system.
- ▶ **Mathematic modeling for robotic polishing of complex models** Aug. 2018 – May. 2019
Drafted a mathematical model for robotic polishing and the proposal of a trajectory generation method. The proposed method was rigorously evaluated through motion simulations, which confirmed its effectiveness in producing optimal polishing trajectories.
- ▶ **Structure Design of Micro Multi-legged Robot Based on Piezoelectric Actuators** Mar. 2018 – Jun. 2018
Designed a piezoelectric micro multi-legged robot and improved the corresponding control programs to enable the robot to follow a planned path with open-loop control.

PROFESSIONAL SERVICE

Reviewer - peer-reviewed journals and conferences

- ▶ ASME Manufacturing Science and Engineering Conference (MSEC)
- ▶ ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC-CIE)
- ▶ ASME Journal of Computing and Information Science in Engineering (JCISE)
- ▶ Journal of Intelligent Manufacturing

Technical Committee

- ▶ ASME Computers and Information in Engineering Division (CIE) Virtual environments systems (VES)

AWARDS

- ▶ Journal of Computing and Information Science in Engineering (JCISE) Reviewers of the Year Award, 2023.
- ▶ NAMRC 49 / MSEC 2021 NSF Student Support Award, 2021.

- ▶ Excellent Student Scholarship, 2019.
- ▶ Outstanding Graduate in NUAA, 2018.
- ▶ Straight-A Student, NUAA, 2014-2015, 2015-2016, 2016-2017 & 2017-2018.
- ▶ Award of Pacemaker to Merit Student (Only one in each major), NUAA, 2014-2015.
- ▶ A-Level Scholarship (Only top 5% of students), NUAA, 2014-2015, 2015-2016 & 2017-2018.
- ▶ National Encouragement Scholarship, 2014-2015.
- ▶ Outstanding Student Cadre in NUAA, 2015-2016.
- ▶ 'SANHE CUP' National Network Contest for Helicopter, First Prize, 2016.