Ruisheng Zhang — Curriculum Vitae

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RESEARCH INTERESTS

Human-Computer Interaction, Virtual Reality, Ubiquitous Computing, Human Factors
Interactive Devices, Multi-modal Interface Design, Data-Driven Deep Learning, Text Input

EDUCATION

Southeast University, Nanjing, China **GPA: 3.86/4.00**
M.E. in Design, Supervised by Xiaozhou Zhou *September 2022 - June 2025 (expected)*

- Centesimal grade average: 90.55
- **Thesis:** Research on Hierarchical Human-Machine Interaction Intention Recognition and Prediction Methods Based on Flight Simulation Tasks
- **Selected Cources:** Digital Industrial Design (93), Ergonomics (89), Design Cognition & Computation (96), Method of Product System Design (90), The introduction to Neuro Design (97), Design of Experiments (93), The Technique of Visual Reality (94)

Southeast University, Nanjing, China **GPA: 3.72/4.00**
B.E. in Mechanical Engineering *September 2018 - June 2022*

- Centesimal grade average: 89.33 Ranking: 13/167
- **Thesis:** Design and Development of Desktop Gesture Interaction System based on Virtual Reality (**Awarded Excellent Bachelor Thesis in Southeast University**)
- **Selected Cources:** Advanced Mathematics A1 (90), Advanced Mathematics A2 (94), Geometry & Algebra B (90), Theory of Probability & Mathematical Statistics (92), Man-machine Engineering (96), Engineering of Manufacturing (90), Product Concept Design (96), Humanized Product Design (94)

PUBLICATIONS

- **BeyondDeskVR: An Extended Virtual Hand Interaction System in Virtual Reality**
  Ruisheng Zhang and Xiaozhou Zhou*
  Submitted to *Behaviour & Information Technology*, Major Revision.
- **A Hierarchical Intention Recognition Framework in Intelligent Human–Computer Interactions for Complex Tasks: The Case of Helicopter and Drone Collaborative Wildfire Rescue Missions**
  Ruisheng Zhang, Xuyi Qiu, Jichen Han, Hang Wu, Minglang Li and Xiaozhou Zhou*
  Submitted to *Engineering Applications of Artificial Intelligence* , Under Review.

RESEARCH EXPERIENCE

Hierarchical Human Intention Recognition (*Leader*) *2023.10 - Now*

- Conduct task analysis and collect operator behavioral datasets for complex flight tasks.
- Develop an 1DCNN+Bi-LSTM+Attention neural network for operator's interaction intention recognition.
- Develop a Dynamic Bayesian Network (DBN) for operator's task intention recognition.
- Achieve simultaneous recognition of dual-level intentions, serving as triggers for intelligent adaptive interfaces.

Desktop Gesture Interaction System in Virtual Reality (*Leader*) *2021.10 - 2023.10*

- Aim to ensure low fatigue, prolonged, and stable interaction input for a seated working scenario in VR.
- Propose an extended virtual hand interaction system, which integrates desktop and mid-air gesture interactions.
- Prototype a desktop gesture recognition hardware based on infrared laser projection sensing technology.
- Develop a desktop gesture recognition algorithm based on OpenCV, integrating the designed gestures into VR.

PROJECTS EXPERIENCE

Optimization For BeyondDeskVR (*Leader*) *2024.07 - 2024.08*

- Solve the Heisenberg effect caused by the confirming movement in BeyondDeskVR.
- Utilize PyTorch to train an LSTM deep learning model for recognizing user's intended pointing.
- Utilize ONNX and barracuda to deploy the optimized model into Unity application.

Intelligent Flight Cockpit with Multi-Modal Interactions (*Software Leader*) *2022.08 - 2023.08*

- Utilize the Unity3D engine to develop multi-modal interaction functions.
- Achieve gesture interaction, voice interaction,touch interaction, eye-tracking and flight control.
- Achieve seamless communication between Unity and DCS World (a flight simulation software) by TCP protocol.
- Achieve data-driven dynamic displays for HUD and POP interface information.

Mid-Air Gesture Interaction for VR Naval Command Systems (*Participant*) *2023.02 - 2023.06*

- Utilize the Unity3D engine and Oculus Intergration Package to develop mid-air gesture interaction function in VR.
- Achieve point, line, and area plotting functions based on mid-air gestures in virtual space.
- Utilize Bezier curves to display the trajectory of airborne targets.

Research Proposal for China Space Station Project (*Participant*) *2023.07 - 2023.08*

- Responsible for writing the technical approach section of the project proposal.
- The project was selected for inclusion in the space science experiments aboard the China Space Station.

PATENTS

- **A Multi-Level Human-Computer Interaction Intention Recognition Method for Complex Task Scenarios**
  Xiaozhou Zhou, **Ruisheng Zhang**, Xuyi Qiu, Jichen Han
  Invention patent. 202411181378.6, filed August 2024. Patent Pending.
- **Desktop Gesture Interaction System based on Virtual Reality**
  Ruisheng Zhang, Xiaozhou Zhou, Chenglong Zong, Chengqi Xue, Yafeng Niu
  Invention patent. CN114995634A, filed September 2022. Patent Pending.
- **Desktop Gesture Interaction Method based on Mixed Reality**
  Ruisheng Zhang, Xiaozhou Zhou, Chenglong Zong, Chengqi Xue, Yafeng Niu
  Invention patent. CN114995635A, filed September 2022. Patent Pending.

AWARDS & HONORS

- **The First Price Scholarship**, Southeast University, 2022-2024
- **Outstanding Undergraduate Students**, Southeast University, 2022
- **Southeast University Outstanding Undergraduate Thesis**, Southeast University, 2022
- **Provincial Second Award**, at the 8th China International College Students' "Internet+" Innovation and Entrepreneurship Competitior, 2022
- **Provincial First Award**, at the 6th National Undergraduate Engineering Training Integration Ability Competition, 2021

SKILLS

Programming Languages	C#, Python, C++, Lua
	Chinese, English
Software	Unity, Figma, Blender, Soildworks, SPSS, E-Prime
Tools	Machine Learning & Data Process (PyTorch, Scikit-learn, Pandas, Matplotlib, Numpy)
	XR Development (Oculus Intergration, SteamVR, MRTK)