Ruisheng Zhang — Curriculum Vitae

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RESEARCH INTERESTS

Human-Computer Interaction, Virtual Reality, Ubiquitous Computing, Human Factors, Ergonomics Interactive Devices, Multi-Modal Interface Design, Data-Driven Deep Learning, Intent-Driven Interactions

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 Complex Tasks
- **Selected Courses:** Digital Industrial Design (93), Ergonomics (89), Design Cognition & Computation (96), The introduction to Neuro Design (97), Design of Experiments (93), The Technique of Virtual Reality (94)

Southeast University, Nanjing, China **GPA: 3.72/4.00**
B.E. in Mechanical Engineering *August 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 Courses:** 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.
- **Hierarchical Intention Recognition Framework in Intelligent Human–Computer Interactions for 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*, Accept, 2025.
- **Hand or Eye? Exploring the Impact of Visual Feedback and Environmental Density on the Performance of Pointing Modality for Virtual Reality**
  Baijie Wang, **Ruisheng Zhang** and Xiaozhou Zhou*. Submitted to *Applied Ergonomics*, Under Review.

RESEARCH EXPERIENCE

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

- Conduct task analysis and collect user behavioral and contextual datasets for complex interaction tasks.
- Develop an 1DCNN+Bi-LSTM+Attention neural network for user's interaction intention recognition.
- Develop a Dynamic Bayesian Network (DBN) for user'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 Unity3D application.

Intelligent Future 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 vehicle control.
- Achieve seamless communication between Unity and a vehicle simulation software by TCP protocol.
- Achieve data-driven dynamic displays for vehicle interface information.

Mid-Air Gesture Interaction for VR Sandbox Systems (*Participant*) *2023.02 - 2023.08*

- Utilize the Unity3D engine and Oculus Integration 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 virtual objects.

Research Proposal for Perspective Taking 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 experiments on the design of multi-user collaborative interfaces.

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

- **Best Report Award**, The 2nd Human-Centric Smart Manufacturing Academic Conference, China, 2024
- **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 Competition, 2022
- **Provincial First Award**, at the 6th National Undergraduate Engineering Ability Competition, 2021

SKILLS

Programming Languages	C#, Python, C++, Lua, R
	Chinese, English (IELTS : 7.0)
Software Tools	Unity, Figma, Blender, Soildworks, SPSS, E-Prime, OpenCV
	Machine Learning & Data Process (PyTorch, Scikit-learn, Pandas, Matplotlib, Numpy)
	XR Development (Oculus Integration, SteamVR, MRTK, Varjo XR Plugin)

Southeast University Transcript of Academic Records for Bachelor Degree

Department：School of Mechanical Engineering　Major：Mechanical Engineering　Education System：4 Year

Initial ID：213181750 Student ID：02018325　Name：ZHANG RUISHENG　Print Time：2024-06-15 21:18:03

TITLES OF COURSES	Credit	Grade	TITLES OF COURSES	Credit	Grade	TITLES OF COURSES	Credit	Grade	TITLES OF COURSES	Credit	Grade
2018-2019 year 1-2 semester			College Physics (B1) II	3	92	ol I			Graduation Project	8	A
Introduction to Industrial Design (Seminar)	1	90	College Physics Experiment II	1	B	Heat Transfer	2	80	Situation and Policy (8)	0.25	92
Advanced Mathematics (A)I	4.5	90	Introduction to Fundamental Principles of Marxis-	3	94	Engineering Fluid Mechanics	2	91	----------The end of course list----------		
Geometry & Algebra (B)	3	90	m			Numerical Computing Methods	2	97			
Compendium of Chinese Modern History	3	95	Situation and Policy (3)	0.25	98.63	Situation and Policy (5)	0.25	96			
Situation and Policy (1)	0.25	94	College English Advanced Courses 2	2	83	Physical Education V	0.5	86			
College English IV	2	75	Physical Education III	0.5	80	2020-2021 year 3-4 semester					
Physical Education I	0.5	75	Practice of Manufacturing	1	B	Measurement and control technology for Mechanica-	2	93			
Engineering Chemistry A (Including Experiment)	2.5	89	Practice Course of Electrical & Electronics A (1-	0.5	B	l Engineering (2) (Bilingual)					
Introduction to Industrial System 1	0.5	P	)			Principles and Method of Design II	3	89			
Military Training	1	B	2019-2020 year 3-4 semester			Engineering of Manufacturing	4	90			
Fundamentals of College Computer	0	P	▲New Media and Contemporary Chinese Literature	2	97	Hydraulic and Pneumatic Technology	2	82			
Programming and Algorithmic Language I	2	80	Electronic Technology (Bilingual)	2.5	98	Man-machine Engineering	2	96			
2018-2019 year 3-4 semester			Engineering Materials & Forming (A)	3	84	Mechanical & Electronical Control Technique	2.5	90			
▲Psychology of Emotion of College Students	2	A	Methods for Modern Design I (1) (Bilingual)	4	74	Mechanical Manufacture Experiment	0.5	A			
Mechanical Drawing (A) (Seminar) I	3	84	Experiment of Design Principles and Method (1)	0.5	B	Experiment of Mechanical-electronic Control Tech-	0.5	85			
Advanced Mathematics (A) Ⅱ	5	94	Engineering Thermodynamics	2	94	nique					
College Physics (B1) I	3	84	Mechanics of Materials C	4.5	93	Experiment for Mechanical System Measure & Contr-	0.5	88			
College Physics Experiment I	1	B	Introduction to Mao Zedong Thought and Chinese-f-	5	90	ol II					
Ethics Cultivation and Basis of Law	3	88	eatured Socialism Theory			Production Practice	2	A			
Military Theory	2	87	Situation and Policy (4)	0.25	100	Integrated Course Design of Machinery Manufactur-	1.5	95			
Situation and Policy (2)	0.25	90.48	Physical Education IV	0.5	87	ing					
College English Advanced Courses 1	2	86	Practice Course of Electrical & Electronics A (2-	1	A	Situation and Policy (6)	0.25	96			
Physical Education II	0.5	94	)			Introduction to Employment	0.5	95			
Programming and Algorithmic Language II	1.5	81	2020-2021 year 1-2 semester			2021-2022 year 1-2 semester					
2019-2020 year 1-2 semester			▲Introduction to Finance & Economics	2	94	Product Concept Design (Seminar)	2	96			
▲Interpretation of Chinese Traditional Opera Cul-	2	89	Measurement and control technology for Mechanica-	3	86	Humanized Product Design (Seminar)	2	94			
ture			l Engineering (1) (Bilingual)			Synthetic Practice of Mechatronics (Seminar)	2	A			
Mechanical Drawing (A) (Seminar) Ⅱ	3	82	Methods for Modern Design I (2) (Bilingual)	3	90	Situation and Policy (7)	0.25	86			
Electrotechnics (Bilingual)	2	74	Microcomputer Principle and Application (1)	3	83	Physical Education VI	0.5	86			
Comprehensive Course Design of Computer Science	0.5	83	Experiment of Design Principles and Method (2)	0.5	B	2021-2022 year 3-4 semester					
Theoretical Mechanics B	3.5	90	Principles and Method of Design I:Synthetic Trai-	2	A	Social Practice	1	B			
Theory of Probability & Mathematical Statistics -	2.5	92	ning			Practice of Humanities and Social Sciences	1	P			
(A)			Experiment for Mechanical System Measure & Contr-	0.5	A	Student Research Training Program	2	A			

Legend:

1.Score & Grade Points

Score	100-85	84-75	74-60	<60
Grade Point	4.0	3.0	2.0	0

2. 1)Courses are listed by acquisition date of highest score of each course;
2)Hundred mark system: Pass(>=60). Five-grade mark system：A(97,90-100),B(87,80-89),C(77,70-79),D(67,60-69),F(<60);
3)Course types: ● Minor; ▲ General Quality Education;* courses - study abroad,☆ Non-major.All these courses are excluded in the calculation of GPA and Average Score.

3.Main Status Changes:
N/A

GPA：3.72　Average Score 89.33

CET-4：546

CET-6：522

东 南 大 学 研 究 生 成 绩 单

Southeast University Transcript of Academic Records

姓名 Name:	张瑞升ZHANG RUISHENG	学号 Student ID:	220426	培养层次 Degree:	硕士Master
学院 Department:	机械工程学院School of Mechanical Engineering	学制 Education System:	3years	入学时间 Admission Date:	2022-09
专业 Major:	设计学Design				

课程名称 Course	课程属性 Attribute*	学期 Semester	学时 Hours	学分 Credits	成绩 Scores
学位英语 Academic Degree English	必修课 C	1	32	0	85
学位英语 Academic Degree English	必修课 C	2	32	4	78
新时代中国特色社会主义理论与实践 The theory and Practice of Socialism with Chinese Characteristics for a New Era	必修课 C	1	36	2	89
产品系统设计方法 Method of Product System Design	必修课 C	2	32	2	90
人机工程学（全英文） Ergonomics	必修课 C	2	32	2	89
设计认知及计算 Design Cognition & Computation	必修课 C	1	32	2	96
神经设计学概论 The introduction to Neuro Design	必修课 C	1	32	2	97
数字化工业设计 Digital Industrial Design	必修课 C	2	32	2	93
创新创业与管理基础 Innovation, entrepreneurship and management foundation	选修课 E	1	32	2	99
自然辩证法概论 Introduction to dialectics of nature	选修课 E	1	18	1	92
工程伦理 Engineering Ethics	选修课 E	2	16	1	88
尊重学术道德，遵守学术规范 Respect academic ethics and abide by academic norms	选修课 E	1	16	1	100
产品设计表达与交流 Expression and Communication of Product Design	选修课 E	1	32	2	90
设计符号与语义 Design symbolic and semantic	选修课 E	2	32	2	92
试验设计 Design of Experiments	选修课 E	2	32	2	93
虚拟现实技术 The Technique of Visual Reality	选修课 E	1	32	2	94
综合素养环节Comprehensive Literacy Courses					
参加学术活动及学术论文撰写Academic Activities and Papers	必修环节 C				
实践环节训练Practical Training	必修环节 C				
选听人文与科学素养系列讲座Humanities and Science Lecture Series	必修环节 C				
【以下空白Blank below】					

应修总学分 Total Credit Required: 26　　已修总学分 Total Credit Obtained: 29

REMARKS:

1.*C:compulsory course　E:elective course　RC：Relearned Course　SE：Supplemental Exam　P:pass　N/A:not applicable

东南大学研究生院(盖成绩专用章)

Graduate School of Southeast University

Tel：86-025-83792529、52090206

Date：2024/06/15