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 Vehicle 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 user behavioral 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 Vehicle 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 - 2023.06*

- 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 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

- **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 (IELTS : 6.5)
Software Tools	Unity, Figma, Blender, Soildworks, SPSS, E-Prime, OpenCV
	Machine Learning & Data Process (PyTorch, Scikit-learn, Pandas, Matplotlib, Numpy)
	XR Development (Oculus Intergration, SteamVR, MRTK)

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

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