Rongkai Shi

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SUMMARY

My research interests fall broadly into Human-Computer Interaction (HCI) and Interaction Design (IxD). During my PhD studies, I focused on researching, designing, and evaluating interaction techniques, especially those involving multiple input modalities, for complex interaction scenarios in eXtended Reality (XR) systems. Outside my thesis work, I am particularly interested in using quantitative and qualitative methodologies to research novel interactions.

EDUCATION

University of Liverpool (UoL) 2020–24
Ph.D. in Computer Science (Fully-Funded)
Thesis: Improving Multi-Object Selection and Manipulation in Extended Reality Head-Mounted Displays
Supervisors: Hai-Ning Liang (primary), Yong Yue, and Shan Luo

Xi'an Jiaotong-Liverpool University (XJTLU) 2015–19
University of Liverpool
B.Man. & B.Sc. in Information Management and Information Systems
First Class (Honours), Overall GPA: 3.85, Overall Performance: 80/100, Rank 2 of 52

RESEARCH EXPERIENCE

The Hong Kong University of Science and Technology (Guangzhou) **HKUST (GZ)** 2024–present
Guangzhou University (GZHU)
Postdoctoral Researcher

The Hong Kong University of Science and Technology (Guangzhou) 2024
Research Assistant at the Computational Media and Arts (CMA) thrust.

Xi'an Jiaotong-Liverpool University 2023, 2019–20
Research Assistant at the X-CHI Lab and the Department of Computing.

PUBLICATIONS

Journals

[J14] **R. Shi**, Y. Wei, X. Hu, Y. Liu, Y. Yue, L. Yu, and H.-N. Liang. Experimental Analysis of Freehand Multi-Object Selection Techniques in Virtual Reality Head-Mounted Displays. *Proceedings of the ACM on Human-Computer Interaction (PACMHCI)*. no. ISS. 2024. DOI: 10.1145/3698129.

[J13] Y. Wei, **R. Shi**, A. U. Batmaz, Y. Li, M. Huang, R. Yang, and H.-N. Liang. Evaluating and Modeling the Effect of Frame Rate on Steering Performance in Virtual Reality. *IEEE Transactions on Visualization and Computer Graphics (TVCG)*. Early Access. DOI: 10.1109/TVCG.2024.3451491.

[J12] L. Chen, J. Long, **R. Shi**, Z. Li, Y. Yue, L. Yu, and H.-N. Liang. Exploration of exocentric perspective interfaces for virtual reality collaborative tasks. *Displays*, vol. 84, pp. 102781, July 2024. DOI: 10.1016/j.displa.2024.102781

[J11] J. Wang, **R. Shi**, X. Li, Y. Wei, and H.-N. Liang. Omnidirectional Virtual Visual Acuity: A User-centric Visual Clarity Metric for Virtual Reality Head-mounted Displays and Environments. *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, vol. 30, no. 5, pp. 2033-2043, May 2024. DOI: 10.1109/TVCG.2024.3372127

[J10] T. Wan, Y. Wei, **R. Shi**, J. Shen, P. O. Kristensson, K. Atkinson, and H.-N. Liang. Design and Evaluation of Controller-based Raycasting Methods for Efficient Alphanumeric and Special Character Entry in Virtual Reality. *IEEE Transactions on Visualization and Computer Graphics*. 2024. DOI: 10.1109/TVCG.2024.3349428

[J9] T. Wan, **R. Shi**, W. Xu, Y. Li, K. Atkinson, L. Yu, and H.-N. Liang. Hands-free Multi-Type Character Text Entry in Virtual Reality. *Virtual Reality*, vol. 28, no. 8, 19 pages, January 2024. DOI: 10.1007/s10055-023-00902-z

[J8] **R. Shi**, Y. Wei, X. Qin, P. Hui, and H.-N. Liang. Exploring Gaze-assisted and Hand-based Region Selection in Augmented Reality. *Proceedings of the ACM on Human-Computer Interaction (PACMHCI)*, vol. 7, no. ETRA:160, 18 pages, May 2023. DOI: 10.1145/3591129

[J7] J. Wang, **R. Shi**, W. Zheng, W. Xie, D. Kao, and H.-N. Liang. Effect of Frame Rate on User Experience, Performance, and Simulator Sickness in Virtual Reality. *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, vol. 29, no. 5, pp. 2478-2488, May 2023. DOI: 10.1109/TVCG.2023.3247057

[J6] Z. Wu, **R. Shi**, Z. Li, M. Jiang, Y. Li, L. Yu, and H.-N. Liang. Examining Cross-Modal Correspondence between Ambient Color and Taste Perception in Virtual Reality. *Frontiers in Virtual Reality*, vol. 3, 19 pages, December 2022. DOI: 10.3389/frvir.2022.1056782

[J5] J. Wang, **R. Shi**, Z. Xiao, X. Qin, and H.-N. Liang. Effect of Render Resolution on Gameplay Experience, Performance, and Simulator Sickness in Virtual Reality Games. *Proceedings of the ACM in Computer Graphics and Interactive Techniques (PACMCGIT)*, vol. 5, no. 1:7, 15 pages, May 2022. DOI: 10.1145/3522610

[J4] Y. Luo, J. Wang, **R. Shi**, H.-N. Liang, and S. Luo. In-Device Feedback in Immersive Head-Mounted Displays for Distance Perception During Teleoperation of Unmanned Ground Vehicles. *IEEE Transactions on Haptics (ToH)*, vol. 15, no. 1, pp. 79-84, January-March 2022. DOI: 10.1109/TOH.2021.3138590

[J3] **R. Shi**, H.-N. Liang, Y. Wu, D. Yu, and W. Xu. Virtual Reality Sickness Mitigation Methods: A Comparative Study in a Racing Game. *Proceedings of the ACM in Computer Graphics and Interactive Techniques (PACMCGIT)*, vol. 4, no. 1:8, 16 pages, May 2021. DOI: 10.1145/3451255

[J2] V. Nanjappan, **R. Shi**, H.-N. Liang, H. Xiao, K.K.-T. Lau, and K. Hasan. Design of Interactions for Handheld Augmented Reality Devices Using Wearable Smart Textiles: Findings from a User Elicitation Study. *Applied Science*, vol. 9, no. 15:3177, 21 pages, August 2019. DOI: 10.3390/app9153177

[J1] V. Nanjappan, **R. Shi**, H.-N. Liang, K.K-T. Lau, Y. Yue, and K. Atkinson. Towards a Taxonomy for In-Vehicle Interactions Using Wearable Smart Textiles: Insights from a User-Elicitation Study. *Multimodal Technologies and Interaction*, vol. 3, no. 2:33, 20 pages, May 2019. DOI: 10.3390/mti3020033

Conferences

[C9] Y. Zhang, **R. Shi**, and H.-N. Liang. Stick-To-XR: Understanding Stick-Based User Interface Design for Extended Reality. In *ACM Conference on Designing Interactive Systems (DIS) 2024*, Copenhagen, DK, ACM. DOI: 10.1145/3643834.3661627.

[C8] J. Song*, **R. Shi***, Y. Li, B. Gao, and H.-N. Liang. Exploring Controller-based Techniques for Precise and Rapid Text Selection in Virtual Reality. In *2024 IEEE Conference Virtual Reality and 3D User Interfaces (VR)*, Orlando, FL, USA, 10 pages, IEEE, March 2024. *Equal Contribution. DOI: 10.1109/VR58804.2024.00047

[C7] Y. Wei, **R. Shi**, D. Yu, Y. Wang, Y. Li, L. Yu, and H.-N. Liang. Predicting Gaze-based Target Selection in Augmented Reality Headsets based on Eye and Head Endpoint Distributions. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23)*, Hamburg, German, 14 pages, ACM, April 2023. DOI: 10.1145/3544548.3581042

[C6] C. Liu, **R. Shi**, N. Xiang, J. Ma, and H.-N. Liang. A Low-cost Efficient Approach to Synchronize Real-world and Virtual-world Objects in VR via In-built Cameras. In *The 18th ACM SIGGRAPH International Conference on Virtual-Reality Continuum and its Applications in Industry (VRCAI '22)*, Guangzhou, China, 8 pages, ACM, December 2022. DOI: 10.1145/3574131.3574439

[C5] **R. Shi**, J. Zhang, W. Stuerzlinger, and H.-N. Liang. Group-based Object Alignment in Virtual Reality Environments. In *Proceedings of the 2022 ACM Symposium on Spatial User Interaction (SUI '22)*, Virtual Event, 11 pages, ACM, December 2022. DOI: 10.1145/3565970.3567682

[C4] H. Chen, **R. Shi**, D. Monteiro, N. Baghaei, and H.-N. Liang. VRCockpit: Mitigating Simulator Sickness in VR Games Using Multiple Egocentric 2D View Frames. In *2022 IEEE Conference of Games (CoG '22)*, Virtual Event, 8 pages, IEEE, August 2022. DOI: 10.1109/CoG51982.2022.9893678

[C3] **R. Shi**, N. Zhu, H.-N. Liang, and S. Zhao. Exploring Head-based Mode-Switching in Virtual Reality. In *2021 IEEE International Symposium on Mixed and Augmented Reality (ISMAR '21)*, Virtual Event, 8 pages,

IEEE, October 2021. DOI: 10.1109/ISMAR52148.2021.00026

[C2] D. Yu, X. Lu, **R. Shi**, H.-N. Liang, T. Dingler, E. Velloso, and J. Goncalves. Gaze-Supported 3D Object Manipulation in Virtual Reality. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21)*, Yokohama, Japan, 13 pages, ACM, May 2021. DOI: 10.1145/3411764.3445343

[C1] **R. Shi**, V. Nanjappan, H.-N. Liang, S. Zhang, J. Ma, and K.-H. Wong. Student's Access Patterns of a Moodle-based Course Management System: A Case Study of a Large Entry Level Programming Class. In *2019 IEEE International Conference on Engineering, Technology and Education (TALE '19)*, Yogyakarta, Indonesia, 7 pages, IEEE, December 2019. DOI: 10.1109/TALE48000.2019.9225914

Posters, Demos, and Other Extended Abstracts

[P5] Y. Zhang, **R. Shi**, and H.-N. Liang. Designing Stick-Based Extended Reality Controllers: A Participatory Approach. In *Extended Abstracts of the 2024 CHI Conference on Human Factors in Computing Systems (CHI EA '24)*, Honolulu, USA, 6 pages, ACM, May 2024. DOI: 10.1145/3613905.3650925

[P4] **R. Shi**, Y. Wei, Y. Li, L. Yu, and H.-N. Liang. Expanding Targets in Virtual Reality Environments: A Fitts' Law Study. In *2023 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct)*, Sydney, Australia, pp. 615-618, IEEE, October 2023. DOI: 10.1109/ISMAR-Adjunct60411.2023.00132

[P3] **R. Shi***, J. Zhang*, Y. Yue, L. Yu, and H.-N. Liang. Exploration of Bare-Hand Mid-Air Pointing Selection Techniques for Dense Virtual Reality Environments. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems (CHI EA '23)*, Hamburg, German, 7 pages, ACM, April 2023. *Equal Contributions. DOI: 10.1145/3544549.3585615

[P2] J. Wang, **R. Shi**, Z. Xiao, X. Qin, and H.-N. Liang. Resolution Tradeoff in Gameplay Experience, Performance, and Simulator Sickness in Virtual Reality Games. In *2022 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW '22)*, Virtual Event, 2 pages, IEEE, March 2022. DOI: 10.1109/VRW55335.2022.00122

[P1] Y. Liu, Y. Lin, **R. Shi**, Y. Luo, and H.-N. Liang. RelicVR: A Virtual Reality Game for Active Exploration of Archaeological Relics. In *Extended Abstracts of the 2021 Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '21)*, Virtual Event, 7 pages, ACM, October 2021. DOI: 10.1145/3450337.3483507

PATENTS

A Method and Apparatus for Target Selection Prediction. CN 202310013399.6 (submitted).
A Method and Apparatus for Measuring the Visual Acuity of Head-mounted Displays. CN 202410291212.3 (submitted).

SELECTED MENTORSHIP EXPERIENCE

Jianbin Song, Master Thesis, Text Selection in VR [C8].	2023
Yushi Wei, Master Thesis, Modeling Eye-based Selection in AR [C7].	2022
Jialin Zhang, Master Thesis, Freehand Selection in VR Dense Environment [P3].	2022
Yilin Liu & Yiming Lin, Competition, VR Educational Game [P1].	2021

TEACHING ASSISTANT

SAT006, UG-Y1, Foundations of Computer Science and Engineering. (developed from CSE003, UG-Y1, Fundamentals of Computer Programming and SAT001, UG-Y1, Explore Advanced Technology)	2019–24
CPT306, UG-Y4, Principles of Computer Games Design.	2020–23
CPT408, PG-Y1, Game Design and Development.	2021–23

*UG = Undergraduate, PG = Postgraduate.

HONOURS AND AWARDS

Honorable Mention Award at ACM ISS 2024 Conference. 2024
Best Oral Presentation Award in XJTLU Postgraduate Research Symposium, XJTLU. 2022
ACM CHI PLAY Student Game Design Competition Finalist. 2021
Excellent Poster Award in XJTLU Postgraduate Research Symposium, XJTLU. 2021
XJTLU Doctoral Scholarship, XJTLU. 2020
Excellent Final Year Project Award 2nd Prize, Jiangsu Provincial Department of Education. 2019
Best Performance in Final Year Projects, IBSS, XJTLU. 2019
Summer Undergraduate Research Fellowships, Department of CSSE, XJTLU. 2018

ACADEMIC ACTIVITIES AND SERVICES

Associate Chair: CHI'24 LBW.
External Reviewer:

- Conferences: CHI'25, 24, 23; ISS'24, 23; CHI PLAY'24, 23; VRST'24, SUI'22; ISMAR'24, 23, 22; VR'25, 21.
- Journals: TVCG; IJHCI; Vis. Comput.; JMUI.

Presenter: ISS'24; ETRA'23; CHI'23; SUI'22; CoG'22; XJTLU PGRS'22, 21; ISMAR'23, 21; I3D'21; TALE'19.
Student Volunteer: ISMAR'23, 22, 21; AIVR'22 (Virtual Setup Assistant).

OTHER SELECTED EXPERIENCE

Invited Speaker, *Group-based Object Alignment in Virtual Reality Environments: A Reflection* 2023
In CPT411 Evaluation Methods and Statistics, Department of Computing, XJTLU.
Innovation and Entrepreneurship Program, NUS School of Computing. 2018
Undergraduate Research Intern, Department of CSSE, XJTLU. 2018
Interaction Design Specialization by UC San Diego, Coursera. 2018
Summer Programme @ NUS, NUS School of Computing. 2017