

Xuning Hu

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Education

Xi'an Jiaotong-Liverpool University (XJTLU)	2022/09 – 2026/06 (Expected)
BSc in Information and Computing Science	Suzhou, China
• Major GPA: 3.78/4.00	

Publications

[IEEE VR' 25] **Xuning Hu**, Xu, W., Wei, Y., Zhang, H., Huang, J., & Liang, H.-N. "Optimizing Moving Target Selection in VR by Integrating Proximity-Based Feedback Types and Modalities." The 32nd IEEE Conference on Virtual Reality and 3D User Interfaces. **Accepted**

[ISMAR' 24] **Xuning Hu**, Yan, X., Wei, Y., Xu, W., Yue, L., Liu, Y., & Liang, H.-N. "Exploring the Effects of Spatial Constraints and Curvature for 3D Piloting in Virtual Environments." 2024 IEEE International Symposium on Mixed and Augmented Reality. **Accepted**

[IEEE VR' 25] Xu, W., Wei, Y., **Xuning Hu**, Stuerzlinger, W., Wang, Y., & Liang, H.-N. "Predicting Ray Pointer Landing Poses in VR Using Multimodal LSTM-Based Neural Networks." The 32nd IEEE Conference on Virtual Reality and 3D User Interfaces. **Accepted**

[SUI' 24] Darbar, R., **Xuning Hu**, Yan, X., Wei, Y., Liang, H.-N., Xu, W., & Sarcar, S. "OnBodyQWERTY: An Empirical Evaluation of On-Body Tap Typing for AR HMDs." ACM Symposium on Spatial User Interaction. DOI: <https://dl.acm.org/doi/10.1145/3677386.3682084> [10.1145/3677386.3682084] **Accepted**

[SI3D' 24] Chen, B., Yan, X., **Xuning Hu**, Kao, D., & Liang, H.-N. "Impact of Tutorial Modes with Different Time Flow Rates in Virtual Reality Games." ACM Symposium on Interactive 3D Graphics. DOI: [10.1145/3651296](https://doi.org/10.1145/3651296) **Accepted**

[PACMHCI' 24] Shi, R., Wei, Y., **Xuning Hu**, Liu, Y., Yue, Y., Yu, L., & Liang, H.-N. "Experimental Analysis of Freehand Multi-Object Selection Techniques in Virtual Reality Head-Mounted Displays." ACM Interactive Surfaces and Spaces. DOI: [10.1145/3698129](https://doi.org/10.1145/3698129) **Accepted**

PATENTS

Interactive control methods, devices, equipment, and storage media for VR game tutorials. CN118416465A (Published)

Research Experience

The Hong Kong University of Science and Technology Computational Media Lab	2024/02 – present
Advisor: Prof. Hai-Ning Liang	
Remote Research Assistant	
Chinese Academy of Sciences The Institute of Software	2024/06 – 2024/10
Advisor: Prof. Jin Huang	
Research Assistant	
Xi'an Jiaotong-Liverpool University X-CHI Lab	2023/05 – 2024/02
Advisor: Prof. Hai-Ning Liang	
Research Assistant	

Projects

Modeling User Behaviors For Steering Law in Virtual Reality	2024/01 – 2024/04
Advisor: Prof. Hai-Ning Liang	
- Developed a virtual drone control system in Unity using Oculus and XBOX controllers. The system employed Mesh computation to create paths, incorporating specific constraints on width, height, and curvature. - Inspired by the paper Modeling steering within above-the-surface interaction layers (CHI'07), we tested the adaptability of both the original Steering Law and the weighted Euclidean version under dual-axis width constraints in a 3D environment (Steering Law: $R^2 = 0.923$; weighted Euclidean version: $R^2 = 0.968$). - To investigate the effect of the weight coefficient η in the weighted Euclidean model under complex scenarios, we introduced seven curvature-constrained paths. Our findings indicated that the change in the weight coefficient followed a normal distribution curve relative to the curvature radius (η: $R^2 = 0.84$). By combining the weighted Euclidean model	

with the curvature model and replacing the constant term with a normal distribution function influenced by curvature, **our new model demonstrated a 52.6% improvement in AIC and a 60.6% improvement in R² compared to the baseline Euclidean model.**

Exploring Keyboard Input at Different Body Positions During Passthrough

2023/10 – 2024/01

Advisor: Prof. Sayan Sarcar

- Utilized a high-precision **VICON** motion capture camera and reflective markers to accurately capture hand and arm movements (**3D coordinates and rotation**) with real-time communication to the Oculus headset.
- Developed a 3D keyboard in Unity to enable **precise prediction, error correction, and swipe** functionality to improve users' Words Per Minute (WPM) typing speed.
- Compared the performance of keyboards located on the Palm, Back of the hand, Forearm (anterior), Forearm (posterior), and Mid-Air based on three metrics: Text Entry Speed, Word Suggestion Usage, and Error Rates (UER, CER). Using RM-ANOVA for statistical analysis, **we found that the Palm keyboard performed the best with a Words Per Minute (WPM) rate of 20.18.**

Explored the effectiveness of different types of game tutorials in Virtual Reality

2023/08 – 2024/10

Advisor: Prof. Domic Kao and Prof. Hai-Ning Liang

- Developed two types of games in Unity using C# (**a rhythm game and a parkour game**). Four distinct tutorial modes—bullet time, scene pause, filter application, and UI enhancements—were implemented to explore the effectiveness of various teaching methods in helping users master unfamiliar techniques.
- A between-subjects experiment** was conducted with 59 participants, using learnability, player performance, experience, cognitive Load, and player feedback as evaluation metrics. **Analysis using one-way ANOVA revealed that bullet time significantly enhanced control learnability and reduced cognitive load.**

Investigated techniques for multi-object selection in mid-air using hand gestures

2023/05 – 2024/08

Advisor: Prof. Hai-Ning Liang

- Based on VR **hand gesture tracking**, we treated pinching motions of different fingers as independent events. These independent events were used to control various techniques, allowing us to explore the effectiveness of gesture-based switching between techniques.
- Inspired by the paper Fully-Occluded Target Selection in Virtual Reality (TVCG'20), we designed **cone-casting and cross-selection techniques**. We conducted experiments in environments with varying complexity (**target density and number of distractor objects**), using selection time and error rate as evaluation metrics.

Technical Skills

Programming Languages: C#, C, , C++, Java, SQL, Python

Tools and Frameworks: Unity, Motion Capture, OpenGL, MySQL, Oculus SDK, Hololens, Git, SPSS, Eye-Tracking

Extra-Curriculum Experience

Oral Presentation 24nd IEEE International Symposium on Mixed and Augmented Reality (ISMAR) 2024/10

Student Volunteer 23nd IEEE International Symposium on Mixed and Augmented Reality (ISMAR) 2023/10

China Undergraduate Mathematical Contest in Modelling 2023/09

RoboMaster Robotics Competition : National Second prize in RoboMaster 2023 2023/03