Bowen Yuan (Bourne)

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Academic Profile

Human-Computer Interaction and Extended Reality researcher specialising in adaptive, human-centred intelligent systems. My research develops mixed reality guidance, virtual agents, and multimodal interaction techniques that support task performance, attention management, procedural learning, collaboration, and user independence. I design and evaluate interactive systems using gaze, spatial tracking, speech-to-text, LLM-driven interaction, and behavioural data analysis. My background in Electrical and Electronic Engineering and Computer Science enables me to bridge HCI, XR, AI-augmented systems, and robotics-relevant interaction research.

Relevant Highlights for Research Fellow Position

- Strong background in HCI/XR, multimodal interaction, controlled user studies, behavioural data analysis, and peer-reviewed publication.
- Technical experience with Unity-based prototyping, gaze and spatial tracking, virtual agents, speech interaction, and LLM-integrated systems.
- Engineering foundation in Electrical and Electronic Engineering, including C++ software programming and robotics-relevant system concepts.
- Research interests aligned with HRI, assistive technology, ageing-related support systems, procedural independence, mobility, and social connectedness.

Academic Appointments

Post-Doc Researcher

Adelaide University | Adelaide, March 2026 - Present

Research Areas: Human-Computer Interaction; Extended Reality; Virtual Agents; Immersive Collaboration; AR/MR Task Guidance; Human-Centred Intelligent Systems.

- Conduct research on XR-based task guidance, immersive virtual meetings, virtual agents, and human-centred intelligent interaction systems.
- Develop AR/VR prototypes integrating speech-to-text, LLM-driven interaction, gaze tracking, spatial tracking, virtual agents, and multimodal user data.
- Investigate moderators' verbal and non-verbal behaviours in VR meetings to support natural, timely, and less disruptive group facilitation.
- Design and evaluate user studies measuring task performance, usability, workload, collaboration quality, attention, and user experience in immersive environments.
- Analyse behavioural, spatial, and multimodal interaction data using statistical methods and task-performance metrics.
- Contribute to manuscript preparation, research planning, ethics-related documentation, and collaborative project development.

Sessional Academic (Tutor & Practical Supervisor)

Adelaide University | Adelaide, Apr 2022 - Present

Courses: Data Structures Essentials; Cloud and Concurrent Programming; Introduction to Programming (Python).

- Delivered tutorials and laboratory sessions for classes of 20+ students.
- Explained advanced algorithmic concepts using visual modelling and live coding.
- Marked assessments and examinations with detailed technical feedback.

Lecturer (Design Thinking, HCI) (Sessional)

Adelaide University | Adelaide & Xi'an, Feb 2024 - Jul 2024

- Delivered studio-based Design Thinking curriculum and led transnational teaching delivery in Xi'an.
- Designed workshops focused on user-centred design and spatial interaction systems.
- Provided curriculum alignment and assessment moderation.

Education

PhD in Computer Science

Adelaide University / University of South Australia, Apr 2022 - Expected July 2026

Thesis: Dependency-Aware Mixed Reality Guidance | Supervisors: Assoc. Prof. Gun Lee; Prof. Mark Billinghurst

Research focused on mixed reality task guidance, adaptive instruction playback, multimodal sensing, gaze and spatial tracking, task-performance analysis, and user-centred evaluation of immersive systems. Developed and evaluated AR/MR systems that support procedural learning, task recovery, flexible task execution, and human-centred decision-making in spatial environments.

Visiting Researcher (Diminished Reality)

City University of Hong Kong, May 2025 - Sep 2025

Conducted research on gaze-adaptive Diminished Reality for managing visual attention in AR, exploring binary visibility and multi-level transparency to suppress irrelevant visual information while preserving scene context.

Master of Information Technology

University of Queensland, Feb 2018 - Dec 2019

Master's project investigated facial-expression and controller-based interaction in VR, analysing effects on presence, usability, affect, and neurophysiological responses. This work contributed to an IJHCS publication on immersive interaction design and EEG cognitive evaluation.

Bachelor of Electrical and Electronic Engineering

University of Liverpool, UK, Sep 2015 - Jul 2017

Developed an engineering foundation in electrical and electronic systems, C++ software programming, system-level problem solving, and robotics-relevant technical concepts, providing a basis for engaging with sensor-based, interactive, and human-robot interaction research.

Research Contributions

- Developed STAGE, a dependency-aware AR guidance framework that transforms expert demonstrations into structured, replayable task guidance using segmentation and task-dependency modelling.
- Designed and evaluated focus-aware MR guidance systems using gaze and location tracking to support attention recovery, task performance, and reduced cognitive workload.
- Demonstrated that gaze- and location-aware adaptive playback can support task recovery and reduce cognitive workload in AR instruction.
- Developed immersive virtual agent systems for supporting communication, moderation, and social interaction in VR meetings.
- Conducted controlled user studies involving task performance, usability, workload, behavioural data, and multimodal interaction analysis.
- Built Unity-based XR prototypes integrating spatial tracking, speech interaction, LLM-driven agents, gaze-based interaction, and sensor-informed user modelling.

Industry Experience

Software Developer

ByAsia Food Import Ltd. | Sydney, Aug 2020 - Aug 2021

- Designed and implemented a Warehouse Management System (WMS).
- Developed a React Native logistics tracking application.
- Managed SQL databases and enterprise data integration.

Technical Skills

Programming	C#, C++, Python, Java, JavaScript, HTML/CSS
XR & Interactive Systems	Unity3D, MRTK, OpenXR, AR/MR prototyping, virtual agents, gaze interaction, spatial tracking
AI & Intelligent Systems	LLM API integration, speech-to-text interaction, Python Torch, multimodal interaction pipelines
Research Methods	Experimental design, user studies, usability evaluation, workload assessment, behavioural data analysis, statistical modelling
Engineering Foundation	C++ programming, sensing-oriented system thinking, interactive system prototyping, EEE background

Academic Service & Engagement

- Peer reviewer for XR and HCI venues.
- International research collaboration with City University of Hong Kong and XR/HCI research groups.

Selected Publications

Yuan, B., Xiao, Z., Cho, H., Teo, T., Lee, G. A., & Billinghurst, M. Dependency-Aware AR Guidance for Replaying Non-Linear Work. Extended Abstracts of the CHI Conference on Human Factors in Computing Systems 2026 (Poster), Barcelona, Spain, 2026.

Yuan, B., Xiao, Z., Cho, H., Teo, T., Lee, G. A., & Billinghurst, M. Location-Based Non-Linear Playback of AR Task Recording. XRMemory, held in conjunction with IEEE VR 2026, Daejeon, South Korea, 2026.

Lee, G. A., Yuan, B., Hart, J. D., et al. Facilitating Discussions in Immersive Virtual Meetings with Virtual Agents. IEEE Conference on Virtual Reality and 3D User Interfaces 2026 (Poster), Daejeon, South Korea, 2026.

Yuan, B., Cho, H., Teo, T., Lee, G. A., & Billinghurst, M. Focus-Aware Task Guidance: Adaptive AR Instruction Playback Via Gaze and Location Tracking. IEEE International Symposium on Mixed and Augmented Reality (ISMAR), 2025, pp. 954-964. DOI: 10.1109/ISMAR67309.2025.00103.

Yuan, B., et al. Augmented Reality Spatial Guidance Cues for Flexible Multi-Objective Task Environments. Proceedings of the 19th ACM SIGGRAPH International Conference on Virtual-Reality Continuum and its Applications in Industry, 2024. DOI: 10.1145/3703619.3706047.

Yuan, B., et al. The Fusion Nexus: Exploring the Confluence of Virtual and Real Worlds through Biocognitive Audio-Verbal Interface in Immersive XR Environments. SIGGRAPH Asia 2023 XR, 2023. DOI: 10.1145/3610549.3614594.

Dey, A., Barde, A., Yuan, B., et al. Effects of interacting with facial expressions and controllers in different virtual environments on presence, usability, affect, and neurophysiological signals. International Journal of Human-Computer Studies, 160, 102762, 2022. DOI: 10.1016/j.ijhcs.2021.102762.

Cho, H., Yuan, B., et al. An Asynchronous Hybrid Cross Reality Collaborative System. IEEE ISMAR-Adjunct, Sydney, Australia, 2023, pp. 70-73. DOI: 10.1109/ISMAR-Adjunct60411.2023.00022.

Cho, H., Yuan, B., et al. Time Travellers: An Asynchronous Cross Reality Collaborative System. IEEE ISMAR-Adjunct, Sydney, Australia, 2023, pp. 848-853. DOI: 10.1109/ISMAR-Adjunct60411.2023.00186.