Yu Liu

Interaction Designer | HCI / XR Researcher | Spatial Computing

Germany | yu.liu.design@outlook.com | yuliu.design | LinkedIn | ORCID

PROFILE

Interdisciplinary interaction designer and HCI/XR researcher with a background in industrial design, digital media, interaction design, and applied computer science. My work focuses on translating emerging technologies into usable, deployable, and empirically evaluated interactive systems in real-world settings. Doctoral research centers on head-mounted AR for museums and cultural heritage, combining spatial interaction, rapid prototyping, field deployment, user studies, and reusable design knowledge.

RESEARCH & DESIGN FOCUS

Interactive systems and spatial computing: Design and implementation of XR interfaces and real-time interactive prototypes for HoloLens 2 and Meta Quest 3.

Human-centered evaluation: Field studies, structured observation, questionnaires, interviews, behavioral logs, and mixed-method evaluation.

Reusable design knowledge: Parameterized interaction patterns and reusable design structures derived from iterative prototypes and empirical studies.

Real-world deployment: Museum and cultural heritage deployments across collaborative research projects and partner institutions.

RESEARCH & PROFESSIONAL EXPERIENCE

2020-present

Hochschule RheinMain, Wiesbaden, Germany

Research Associate

- Research on HMD-AR, mixed reality, spatial interaction, user experience, and interaction design patterns for public and first-time-user contexts.
- Design and implementation of interactive prototypes using HoloLens 2 and Meta Quest 3; planning and conducting in-situ user studies and empirical evaluations.
- Development of a reusable, parameterized HMD-AR interaction pattern system and cross-context deployment strategies.
- Supervision and support of student XR projects, research dissemination, and cross-institution collaboration.

2023-2026

LoGaCulture - Locative Games for Cultural Heritage

Researcher

- European collaborative project exploring next-generation locative and mixed-reality experiences for cultural heritage.
- Connected interaction design, Unity prototyping, real-world deployment, evaluation, and cross-partner knowledge transfer.

2020-2023

presentXR - BMBF-funded research project

Researcher

- Research on HMD and handheld AR interaction, UI/UX, modular AR prototypes, and

museum-oriented spatial interfaces.

2019-2020

Music Tribe, Willich, Germany

UI/UX Designer

- Interaction and interface design for digital instruments, mixing systems, and professional audio products.

2018-2019

ZEISS / tooz, Aalen, Germany

UI/UX Designer / Master Thesis Intern

- Smart-glasses and smartphone concepts for location-based exploration, including user analysis, interaction prototyping, and concept demonstrations.

2018

Bosch, Renningen, Germany

UI/UX Design Intern

- Interaction, layout, wireframing, and visual concepts for automotive and motorcycle display systems.

EDUCATION

2022-present

PhD Candidate, Applied Computer Science

Cross-University Doctoral Center for Applied Computer Science (PZAI), Germany

Dissertation: Human-Computer Interaction Patterns for Head-Mounted-Device-based Augmented Reality in the Exhibition Domain

2016-2019

M.A. Digital Media

Hochschule Rhein-Waal, Germany

Master thesis on smart-glasses interaction for leisure-time exploration.

2009-2013

B.A. Art & Design (Industrial Design)

Bohai University, China

Exchange study in Industrial Design at Beijing Institute of Technology, 2011-2013.

METHODS & TOOLS

XR & spatial interaction: Unity 3D, Microsoft HoloLens 2, Meta Quest 3, MRTK, spatial UI, hand interaction, semantic/exhibit anchoring, location-based interaction.

User research: Questionnaires, structured observation, interviews, behavioral logging, expert evaluation, mixed methods, usability, workload, presence, immersion, and engagement evaluation.

Design research: Research through Design (RtD), Design Science Research (DSR), interaction design patterns, parameterized design knowledge, cross-context reconfiguration.

Design & prototyping: Adobe Creative Cloud, Sketch, Rhino, Blender, 3ds Max, KeyShot, Arduino, Processing.

SELECTED PUBLICATIONS

Full publication list: yuliu.design/ar-interaction-patterns/literature.html

2026 Liu, Y., Spierling, U. *A Pattern Language for Head-Mounted AR in Museums: Parameterized, Composable, and Reproducible.* ACM IMX 2026 DOI

2025 Liu, Y., Feller, M., Spierling, U. *Design Patterns for Playful Augmented Reality: Enhancing Cultural Heritage Engagement with Game Mechanics.* ACM DIS 2025 DOI

2026 Galvao-Ferreira, P., Ferreira, M., Liu, Y., et al. *Toward Relational Interactivity: Investigating More-than-Human Engagement in Hybrid Museological Spaces.* International Journal of Human-Computer Interaction DOI

2026 Liu, Y., Lurz, M., Spierling, U. *Comparing Flow, Narrative, and Spatial Immersion in an HMD-AR Serious Game for Museum Learning.* ECGBL 2026

2025 Liu, Y., Feller, M., Spierling, U. *Playful Locative Interaction in Museums and Exhibitions with Immersive Augmented Reality.* JCSG / LNCS 2025 DOI

2024 Liu, Y., Spierling, U. *Considerations for Cross-device Augmented Reality Interaction Patterns in the Field of Cultural Heritage Mediation.* INFORMATIK 2024 DOI

2023 Liu, Y., Bitter, J. L., Spierling, U. *Evaluating Interaction Challenges of Head-Mounted Device-based Augmented Reality Applications for First-time Users at Museums and Exhibitions.* HCII 2023 DOI

2021 Liu, Y., Spierling, U., Rau, L., Dörner, R. *Handheld vs. Head-Mounted AR Interaction Patterns for Museums or Guided Tours.* INTETAIN / Springer DOI

SELECTED AWARDS & LANGUAGES

- Deutschlandstipendium, Hochschule Rhein-Waal, 2016-2017.
- ERASMUS+ Science Communication Summer School, 2016.
- Languages: Chinese (native), English (professional/academic), German (professional working proficiency).