

Shano Liang Teaching Statement

Human-Computer Interaction || Data Visualization || Interactive Media & Game Studies || Human-centered Design

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I am a human-computer interaction (HCI) researcher and educator whose work spans games, interactive media, and interactive data visualization, with a particular focus on **how interactive systems shape human experience**. Across these areas, the cost of making an interactive system has decreased fast. A student today with a code assistant can have a runnable prototype in a week, and generative tools and artificial intelligence (AI) keep pushing the threshold even lower. What has not gotten easier, however, is knowing what that prototype will do to the person who uses it, what it will make its users feel.

We are situated in an evolving environment where emerging technologies continuously reshape tools, while learning the context about humans carries increasing weight in defining the meaning of creating interactive systems more and more. Across both conventional interactive systems and emerging human-AI systems, I see the "human" side becoming the hardest part for students to learn, while it is also often the part least (and hardest to) taught as an independent skill in its own right -- and that is what I focus on in teaching. To be specific, students should master and be able to foresee and picture what an interactive system they designed and built would make a user experience, judge whether that is the intended feeling they want for their users, as well as knowing which elements of the system will affect the targeted user experience and if the design intention will survive into the finished work. And, this is exactly the topic I have and carried from a BFA in video game art, throughout an MS in interactive media development, and a PhD in computational media.

Teaching Experience

My teaching background and skills span a variety of hands-on experiences that across disciplinary boundaries. To talk about human experience in HCI, and/or to create an interactive system, may take knowledge of various areas of design, art, building and programming, and finally evaluation methods. These work sections are often divided among different instructors or departments, but I can cover the span: At the craft end, 2D and 3D art, modeling, animation, audiovisual art, film and post-production; At the design end, game design and development, interaction design, and user experience; At the method end, courses around human-computer interaction, qualitative and quantitative methods, and interactive data visualization. At Worcester Polytechnic Institute (WPI), I served as a **teaching assistant (TA)** for three courses over five semesters in all three abovementioned areas (IMGD-2500 Design of Tabletop Games, IMGD-2740 3D Environmental Modeling, and IMGD-4099 Ethics of Creative AI, in classes of 20 to 35), and for WPI Academic & Research Computing (ARC) in providing faculty and student researchers one-to-one in augmented reality (AR) and virtual reality (VR) **training and technical consultation**. I have also distilled my years of interdisciplinary training and research experience into a coherent study methodology for HCI research and taught it to students as a **guest lecturer** in WPI CS 3041 Human-Computer Interaction.

When designing a course, I follow the goal of **identifying what students should be able to transfer beyond its in-class examples**. As someone experienced in working across different disciplines, I deeply know a situation that a worked example can show how one case was solved, but may not make it clear which parts of the solution can be carried into a new one; Students may reproduce the in-class example successfully but still struggle when the setting, materials, or topics change. Therefore, my teaching always aims to make the transferable logic explicit. For each case or exercise, I separate the decisions and reasoning that generalize from the details specific to that example, distill and form that knowledge structure for students to learn, then ask them to apply the same structure to a new variation. Such design aims to give students a method for approaching unfamiliar cases that remains useful even after the course ends. I first saw the consequences of leaving that transferable logic implicit in 2017, when I taught a weekly class for the computer graphics society at the No. 1 High School Affiliated to Central China Normal University (CCNU); I demonstrated a complete factory interior scene in 3ds Max, and asked each student to model a 3D scene on a theme of their own. Yet, most of the submissions reproduced my factory. I believe the students were not short of ideas; They were short of a knowledge structure about what this room should make an audience feel when they walk in. The class session I later added addressed this structure on design for environmental modeling, around which few objects make an empty room feel like a particular scenario or place, how the doors, floor, and/or lighting confirm that feeling, and closed with one extreme case: What can make a room be read as an underground catacomb? This session trains students in the ability to picture a target feeling before even building toward it, and it succeeds.

In teaching a course, I take timely feedback as the central strategy, which provides students with a sense of progress and accomplishment. A loading screen without a progress indicator soon makes the waiting feel directionless; Similarly, **a course can feel equally static when students cannot tell whether their work is improving or what would move it forward**. I have seen many cases before where students were demotivated and not engaging. To cope with it, I use feedback and events to show what has changed, clarify what remain unresolved, and identify a concrete next step. That visible forward movement sustains engagement and also help student connect course concepts to their own work. In spring 2023, serving as a teaching assistant for the WPI IMGD-2500, I reviewed weekly submissions from 20 to 25 undergraduates who designed and playtested board games in teams. One team's proposal came back twice unchanged; They could neither turn the design strategies taught from lecture into design decisions nor explain the playtester's reactions. After noticed it, I reskinned their game rules into a different theme, built a

new paper prototype, and asked them to play my version at the cross-team test session. After a round that they as players, they then could describe the experience their game was producing, see how it differed from their design intention, and identify what to change. In the following weeks, they took a more active role in reflection and iteration, as well as the overall engagement of the class; what's more, they also began applying the same method to later versions, deliberately testing their work as in another player's perspective before revising it.

Advising Experience

My advising approach draws on substantial own practice experience in both building HCI systems and carrying the resulting research through publication. I have built or led the development of **over 18 interactive systems and research prototypes**, led a team to **found a 10-person startup game company** -- Wuhan KBOOM Network Tech Co. Ltd. (Wuhan, China) -- for game entrepreneurship, and authored or co-authored **more than 17 papers published at top-tier peer-reviewed conferences and journals** during my doctoral program. Working across games, interactive media, and data visualization has taken me through the full project development and research cycle, from framing a question and implementing a system to conducting user studies and developing the findings into a publication. In advising, I use this experience to anticipate where a project may encounter difficulty, identify the decisions that matter most to its research contribution, and adapt my guidance to each student's background, responsibilities, and goals.

In advising, I pay particular focus on a recurring difficulty of translating design guidance in theory into concrete implementation development decisions. A targeted experience that holds in the design document does not automatically survive into the finished work, as every detail of implementation has a chance to bend it, and **this stretch between design and implementation is the one in interactive media education that hardest to teach and for students to master**. Yet I have experience taking students through this process. For instance, I have taken four graduate students from a psychological construct and target experience all the way to a playable work and, finally, an academic publication. It starts with the concept of "Euphoria," a mental experience state from positive psychology. My earlier research brought this concept into the HCI and game studies fields, and decomposed it into a set of principles of the "Design-Dynamics-Experience" (DDE) framework that a designer can operate; From that theory, I initiated and led a project that implemented those principles as a full game, with a team across design, writing, programming, and analysis. Four graduate students on the team were advised by me, and their task was to make every scene, line of dialogue, and mechanic traceable to the principle it was intended to serve. Later evaluation of the finished game with 56 players from the intended audience group showed that, although target experiences were achieved in most cases, three new unexpected dynamics emerged and were observed, while each difference was traced to a detail of the implementation. This collaboration has resulted in a top-tier conference publication. Throughout the advising, I ask students to reflect on the design and development; each week they write down where their judgment may have drifted from the target experience, and we then hold seminar sessions to discuss and analyze these judgments.

Proposed Courses

I am prepared to teach introductory-level courses in (but not limited to) **human-computer interaction, interactive media, user experience and interface design (UX & UI), game studies, and interactive visualization**. I would also welcome the opportunity to develop new offerings in response to departmental needs. Within this range, my primary teaching interests lie in **human-centered computing**, where I can draw directly on my research experience and methods. Topics may include designing and evaluating intended user experiences, examining how design decisions shape human experience, accessibility in interactive systems and computing, methods and tools for building interactive systems, and project-based research that uses system building as a mode of inquiry. I am also interested in developing (or co-developing) **interdisciplinary seminars** on visual computing, digital art, visualization, and humanities in new media. These seminars would introduce students who seek further exploration to emerging perspectives and involve them directly in conducting research and building their early-career academic portfolio. While my teaching experience to date has centered on courses of fewer than 30 students, I would preserve the same emphasis for **larger enrollments** on development and feedback through staged milestones, structured peer review and iteration, and clear evaluation criteria.

Looking forward to the next decade, emerging technologies and tools for making interactive systems will keep improving; That is good news for teaching for sure. A student can build and iterate their work faster and faster, while the learning barrier for tools themselves will become lower. Yet the easier the tools become, the more a work stands or falls on what it makes the user feel, and that question does not change when the engine or the tool does. **I want my students to graduate with the habit of asking and foreseeing the outcomes of a design before they build and the craft to keep the answer alive into the finished work**. Whether human-computer/AI interaction turns faster making into better experiences for people, depends on how many builders ask that question about people's feeling.