Play to Preserve the Past: Design Considerations for the Transmission of Intangible Heritage through Augmented Reality

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Abstract

Intangible heritage, globally, is under threat from aggressive urbanisation and globalisation, particularly in developing nations like Vietnam. To safeguard Vietnamese oral traditions, social practices, festive events and childhood play, the project *Play to Preserve the Past* uses augmented reality (AR) to undertake a nuanced exploration of creative practice methodologies and considerations for crafting immersive AR experiences. Central to this pursuit, the research endeavours to respond to a pivotal inquiry: "How can creative practitioners *harness* the potentials of AR for seamless transmission of intangible cultural heritage?" This pursuit has yielded a set of tailored AR game design considerations, including updating heritage aesthetics, physically involving the body in ritual movements, reconfiguring home space into ritual space, and embodying the evolving nature of knowledge and value systems. These considerations aim to provide nuance and contribute to the discourse by illustrating design steps and reflecting on them. Overall, the intention is to assist future creative practitioners in the field of cultural heritage preservation.

Keywords

Intangible Cultural Heritage (ICH), Augmented Reality, Vietnamese cultural heritage, Digital Heritage, Creative Practice, Critical Play

Introduction

To answer the research question "How can creative practitioners *harness* the potentials of AR for seamless transmission of intangible cultural heritage?", we have embarked on a journey of crafting a series of progressive augmented reality mobile applications called: "Play to preserve the past" (figure 1). This research employs a problem-led practice-based research method combined with reflective practice, and cultural context analysis based on the lead researcher's Vietnamese background.

The first project, *Banh Chung AR,* involves the tradition and social practice of making "Banh Chung", Vietnamese sticky rice cake, the traditional Lunar New Year's staple that brings family members together. This endeavour seeks to unveil the lesser-known facets of Vietnamese culture and present a contemporary image of Vietnamese tradition, concurrently reclaiming the country's narratives. Banh
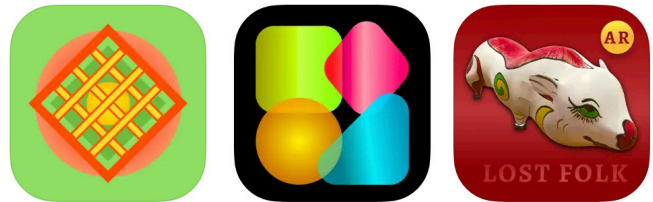
Figure 1. *Play to Preserve the Past* Series on Appstore: Banh Chung AR, Moonlight AR, Lost Folk AR. (left to right)

Chung AR, born out of the researcher's deep longing for home, worsened by the pandemic's physical distance, revealed AR's power to evoke a sense of belonging and bridge physical boundaries, drawing players nearer to their roots.

The second project, *Moonlight AR*, revives the social rituals of parading with lanterns while hearing the Moon Tale as part of Mid-Autumn Festival celebration. This application is a tribute to urban childhood nostalgia, where crafting traditional animal lanterns and parading with them during the annual festival shaped many generations of Vietnamese's early years. The moon tale, a core folk legend told during the festival, transcends generations, and finds a new life within the app's engaging physical gameplay. In its essence, Moonlight AR is an effort to safeguard these cherished social rituals and oral traditions that have left an important mark on the lead researcher's identity.

The last project, *Lost Folk AR*, introduces the Folk Wisdom value system embedded in Vietnamese Dong Ho Folk Paintings. Traditional Vietnamese folk art is at risk of fading due to a lack of interest and appreciation. These artworks are embedded with traditional Vietnamese value systems and hold their importance in modern societal discourse, where old and new values can collide and contradict each other. Lost Folk AR utilises augmented reality along with gamification to create an interactive and engaging way to learn about the cultural significance of folk wisdom and traditional values embedded in folk paintings.

Through the iterative design cycle, development processes, playtesting and play evaluation of each app, a set of key design considerations have emerged for the seamless transmission of intangible cultural heritage through augmented reality creative practice. Moreover, a pressing need has come to light for innovative solutions that

harmonise with the essence of cultural values, while prudently avoiding technological overreach. By immersing in this challenge and thoroughly exploring AR's application within the framework of Vietnamese culture, the research aims contribute to the broader discourse regarding AR's role in the preservation and transmission of cultural heritage.

Background

Defining Key Terms: "Intangible Cultural Heritage", "Augmented Reality" and "Digital Heritage"

Intangible cultural heritage (ICH) has a wide range of expressions and can be identified as oral traditions (storytelling); social practices, rituals, and festive events (festivals); knowledge and skills used to produce traditional crafts (making lanterns); and other variants worth acknowledging like childhood play and food-making traditions (special cakes). [3] [4] [5]

"Cultural transmission" is the process that entails the acquisition and transference of knowledge to subsequent generations. [6] In the context of this project, the term encapsulates how cultural values, standards, and norms are passed on to succeeding generations via Augmented Reality.

Augmented Reality (AR) superimposes digital and computer-generated objects onto the real world. [7] It can be considered a new medium for creative expression. [8] Other 3D techniques such as 3D scanning, modelling, visualisation can be combined with AR to generate better and compelling representation of the cultural artefacts. [9]

The term "digital heritage" describes the digital data a society would protect and transmit for future generations. [10] This encapsulates both *digitally born* heritage, for example social media posts, and *digitisation* or *digital surrogates*, when a pre-existing work is made digital, such as 3D photogrammetry and AR. [11] This project engages a digitisation process that examines facets of intangible heritage, rather than any existing physical work, and creates AR experiences that capture and transmit the essence of those ICH practices. In doing so, the project creates digital heritage for the future.

Evolving Cultural Heritage

The concept of "evolving cultural heritage" emerged through the examination of modern art in Southeast Asia, detailing how throughout Southeast Asian history, artists have resisted colonisation by constantly adopting new painting materials and Western-inspired aesthetics. [12][13] Both the artists then and researchers now have a common goal: preserving traditions and heritage. However, both commitments exist within the context of unstoppable technological progress, hence sharing an inherent "evolving" nature.

The insights gleaned from this historical analysis bolster the core direction of this research, mirroring a similar evolutionary process in the past. Central to this exploration is the concept of "evolving cultural heritage," wherein the researcher and practitioner undergo a transformative journey akin to artists adapting to historical, environmental, and social contexts. This study is thus not a detached academic pursuit, but an introspective voyage reflecting human advancement in an era dominated by technology.

AR as a Tool to Transform Engagement with Cultural Heritage

It is imperative to view AR not as an end in itself, but as a means to unlock new dimensions of cultural heritage representation. [14] To capture the profound impact of AR as a medium, we turn to McLuhan's notion that *"the medium"* is the *"message"*. [15] When looking at AR as one potential solution to safeguarding intangible cultural heritage, it is pertinent to acknowledge how new media can reshape, transform, and oppose the original message and values that facet of culture stood for. [16] [17] [18]

Related Works

In this context, this related work section delves into contemporary practices that harness AR to breathe life into cultural heritage, transcending traditional boundaries and creating innovative narratives.

One of the most prominent examples is Pokémon Go. Emerged in 2016, the app turned real-world locations into virtual Pokémon playgrounds, captivating a diverse audience. Whilst it received criticism regarding having Japan's cultural odour (sic) purposefully removed to produce a globally digestible product, not all of us know that the game's origin reveals a history of Japanese seasonal play practices. [19][20] Satoshi Tajiri's childhood experience collecting insects in Japan inspired the concept of capturing creatures in Pokémon, bringing a piece of Japanese tradition to the virtual world. This surfaces how the evolution and contemporary re-contextualisation of embedded cultural practices, alongside the evolution of technology, might be the formula for a massively successful and widely adopted technology case.

Huang et al. have developed a prototype that facilitates a seamless and organic interaction between humans and the realm of folk intangible cultural heritage. [21] Meanwhile, Shih et al. have astutely harnessed the power of augmented reality and photogrammetry to meticulously reconstruct the Taiwanese Lantern Festival. [2] In a similar vein, Tong and Kim offer a visionary roadmap for both the preservation and advancement of intangible cultural heritage, with a specific focus on the timeless art of traditional shadow play. [1]

For marginalized communities, AR serves as a platform for cultural resurgence. The *Yalinguth App* stands as a testament to this, reviving Aboriginal and Torres Strait Islander oral traditions through location-based storytelling and interactive sound design. [22] This AR application bridges the past and present, fostering empathy, respect, and community connection while encouraging contemplation of historical narratives and identities.

These contemporary practices in the field collectively exemplify the innovative potential of augmented reality in

redefining our interactions with intangible cultural heritage, signifying a growing interest for contributions in the field.

Considerations in AR Game Design for Transmitting Intangible Cultural Heritage

In *Play to Preserve the Past*, gameplay interactions are designed through a speculative design process that involves the examination of intangible cultural heritage and ritual practices. Hugh Davies explores this design tradition by examining Japanese Seasonal Play and corresponding bug collection rituals in relation to the AR game design of Pokémon Go. [19] Rather than rituals simply informing design, the explicit aim in Play to Preserve the Past is to preserve and transmit heritage rituals. Through the pursuit of this goal a tailored set of AR game design considerations emerged:

- **Updating heritage aesthetics for contemporary audiences**
- **Physically engaging the body in ritual movements**
- **Reconfiguring home space into ritual space**
- **Value-based game mechanics**

This set of considerations does not promote a new holistic framework for game design. Rather through the illustration-of and reflection-on these considerations, we hope to offer nuance to future AR game designers and creative practitioners in the field of cultural heritage preservation. [23]

Updating heritage aesthetics for contemporary audiences

To authentically capture the essence of heritage, the overarching design system necessitates the establishment of conceptual design guidance. This style guide serves as the cornerstone for shaping the user interface (UI), 3D modelling, texturing, and 3D animation processes.

In the realm of UI design, the conventional graphic design methodology unfolds, commencing with the mood-boarding phase. This involves the curation of diverse visual elements, such as images, textures, and illustrations, which collectively embody the intangible heritage subject. With visual insights drawn from the mood board, designers then embark on a journey of crafting "look and feel", making strategic decisions regarding UI elements, encompassing colour palettes, fonts, and typefaces. This creative process involves iterative cycles, integrating layout experimentation, readability assessments, and the animated synthesis of UI elements.

For 3D asset digitisation, various modelling methods are considered based on the project's aesthetics aspiration. In the case of *Banh Chung AR*, the objective is to contemporise the look of culinary objects, initiating the 3D assets modelling by sketching 2D graphics and icons in Illustrator. Subsequently, these 2D illustrations undergo extrusion in

3D software, transforming into a modern, simplistic aesthetic while retaining the core visuals of the digitised subject. The previously generated colour palette is then applied to the textures, radiating a celebratory atmosphere through vibrant hues (figure 2).

Figure 2. *Banh Chung AR* 3D assets and user interface design.

Moonlight AR, on the other hand, pursues a more realistic feel to evoke nostalgia. The modelling and texturing of lantern assets meticulously mirror their real-life counterparts, employing the extrusion method for precise replication of the original lantern structure. Textures are drawn from images of real-life lanterns, establishing a connection with users familiar with the authentic design (figure 3,4).

Figure 3. *Moonlight AR*: From real-life lanterns to 3D lanterns to 2D graphic design inspired by shapes of the lanterns.

Figure 4. *Moonlight AR*: Realistic-look 3D assets.

In *Lost Folk AR*, the focal point of the digitisation process is the 3D texturing phase. Here, a unique approach emerges, utilising on tablet hand-drawn painting technology in Procreate for real-time application of drawings onto the subject's 3D model (figure 5). This unconventional, "evolving" texturing process signifies a departure from the conventional sleek and clean aesthetic, embracing imperfection and embodying a genuinely authentic look reminiscent of hand-crafted folk art (figure 6). The act of digitisation through hand-drawn techniques serves as a homage to the original hand-drawn process of folk-painting, seamlessly integrating traditional craftsmanship with modern technology, similar to the resistance movement within Southeast Asian art in the 20th century.

Figure 5. *Lost Folk AR*: original Dong Ho painting (left) and 3D modelled, textured pig inspire by the painting.

Figure 6. *Lost Folk AR*: hand-painted textures on 3D animals.

Physically engaging the body in ritual movements

In *Moonlight AR,* ritual practices and folk storytelling relating to the Vietnamese Mid-Autumn Festival are examined for preservation. A defining characteristic of the festival is parading with handmade lanterns, and we contemplated how to involve the physical sensation of holding and swinging a lantern with AR gameplay.

The first iteration (figure 7) involved a real physical lantern, which the mobile phone would be attached to. The AR system would track the lantern through object recognition, so that it might interact with Augmented objects in the game world. In the testing of this iteration, we found the tracking was not reliable which was frustrating on a usability level, and that requiring a physical lantern limited play to exhibition contexts.

Figure 7. Phone attached to lantern stick (left), and tracking of fiducial marker for lantern recognition (right)

The second iteration (figure 8) focused on play with a purely digital *ghost lantern*, where the phone, instead of a physical apparatus, became the *handle* of the lantern stick. Gameplay interactions were iteratively developed in relation to this player input system of pointing and swinging. The player was demanded to look through the smartphone in search of creatures from Mid-Autumn festival mythology, which they could then *catch* by raising and swinging the lantern in front of them. In the final release of the app, both physical lantern and virtual lantern modes were created to support the exhibition of the game.

Figure 8. Side by side of game screen and recording of player whilst they search for a creature with the ghost lantern.

Both local and international participants who engaged with physical-based lantern-play game mechanics observed a flood of nostalgia and a rekindling of childhood playfulness. Dr Alan Nguyen shared his thoughts:

"After playing the game (Moonlight AR) I was reminded of a childhood memory of playing with the lanterns in the same festival. I grew up in Canberra and my parents brought me to a local Vietnamese community event so we could still celebrate, I remember joining a parade with other children and marching on stage for all of our parents. I spoke with my mum about it recently and apparently, I was swinging the lantern out in front of me and sort of... wiggling on stage to make my parents laugh."

Reconfiguring home space into ritual space

Important to *intangible* cultural practices and rituals is the *tangible* places they are performed. This design consideration asks, "How do we preserve and transmit cultural practices for people that are globally displaced from physical ritual spaces?".

Banh Chung AR examines the culinary ritual of making Banh Chung cakes in Vietnamese homes during Tết (Vietnamese Lunar New Year). This investigation was provoked by the lead researchers personal experience as an international student unable to access the ingredients and place, the traditional Vietnamese home, necessary to engage in the Banh Chung making ritual (figure 9). Responding to this experience we set out to design a game that would be shaped and reconfigured by the player's home, and ultimately re-configure their home into a ritual Banh-Chung making space. [24]
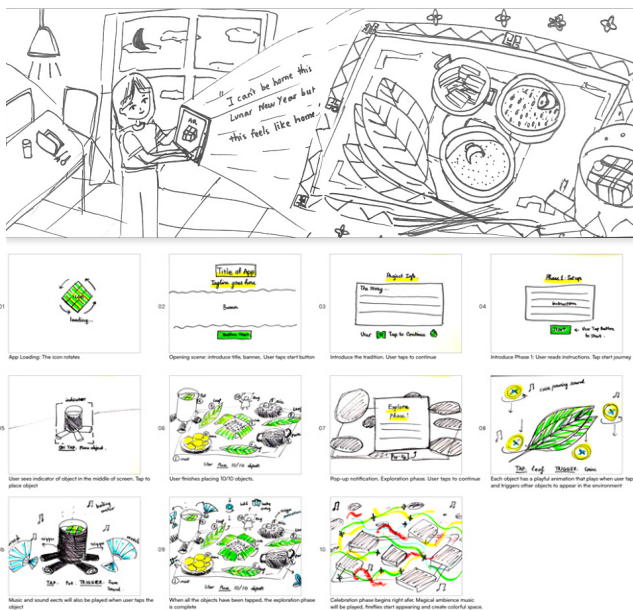

Figure 9. Initial sketches and storyboards for the design of Banh Chung AR (inspired by the designer's personal experiences).

To deal with the complexity of different physical environments, AR experiences often take one of two approaches: the user is allowed to place a single virtual 3D object or scene origin in *any* physical space; or the user is allowed to view the 3D scene in *alignment* with a *specific* physical space. [25] [26] Popular AR development packages such as Unity's AR Foundation and Niantic's Lightship are designed with one of these two standard approaches in mind, however this did not marry with our design goals. [27] [28]

In traditional Banh Chung making, every available surface of the Vietnamese home is taken over for cooking: mats are spread out on the floor for leaf wrapping; cooking pots and fires are erected on the threshold of the home and street. For *Banh Chung AR,* a custom AR placement system was developed on top of Unity's, that allowed the individual to choose the placement of individual elements that constructed the interactive scene.

Figure 10. Two unique home compositions of Banh Chung AR

The player begins by placing the largest objects, the decorative ground mat and cooking pot, they then lay out the smaller cooking ingredients, such as banana leaves and a bowl of rice grains. The virtual game space is assembled differently with each instance of play, depending on available physical and the inclinations of the player. In playtesting of the game, some players ran out of room to fit objects on the floor, resulting in the placement of ingredients on tables, couches, and other pieces of furniture (shaped by the home). In another case, physical obstructions in the players space were moved to make room for the virtual (shaped the home). The placement mechanic was programmed to promote these situations, by limiting players from layering or overlapping objects, and only allowing placement on large horizontal surfaces (figure 10).

Figure 11. Players placing banyan trees in their spaces and decorating trees with lanterns.

Moonlight AR also shaped the home, asking the player to place a virtual Banyan tree which they would decorate with lanterns by tapping on their smartphones' screen (figure 11). After decorating the tree, it would suddenly grow to fill the players room, stretching through the ceiling. Rather than only listening to folktales, which is a common childhood ritual of the mid-autumn festival, by reconfiguring the domestic physical space of the home as ritual space through AR, the world of Vietnamese folktales is suddenly made tangible and explorable.

Value-based game mechanics

A major challenge for cultural heritage conservationists is determining the cultural significance of a heritage object by examining the value they held to society at the time of their creation, and the value they present to contemporary society, in their ability to reflect the past. [29] Games share this ability, allowing us to deeply understand how societal values have been reshaped by interacting with the rules and worlds of games from our past. [30] Reversing the relationship between historic cultural values and game mechanics allows designers to provoke explicit moments of value-reflection in the player, creating opportunities for the transmission of values of the past to the now.

Lost Folk AR examines Vietnamese 'Đông Hồ' folk paintings. While the paintings themselves are tangible cultural facets, they have an aura of intangible facets surrounding them, including: the painting practices of Vietnamese folk, the stories, and Confucian cultural values the paintings represent, and the practice of keeping paintings in the home to embed those values into their household beliefs.

In *Lost Folk AR,* the player first enters their year of birth through an introductory UI (figure 12a). Their Vietnamese zodiac sign is calculated and the corresponding 'Đông Hồ 'painting is presented to them, the player might reflect on contrasting zodiac knowledge systems, for example instead of a Rabbit in Chinese zodiac in the Vietnamese zodiac we would see a Cat. Entering the Augmented Reality scene, the player places a painting on a wall of their choice in the home, this provokes the player to consider the values in a new context, as Vietnamese folk did (figure 12b).
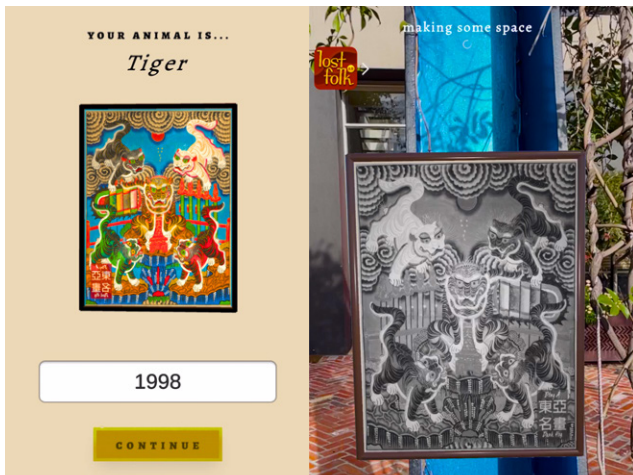

Figure 12a. Entering birth year (left) – UI design.
Figure 12b. Placing the painting (right) – UI design.

The painting begins to quickly fade, and suddenly the room is teeming with creatures escaped from the 'Đông Hồ' paintings (figure 13). Here the player is required to consider a narrated story, traditional imagery, and translated creature aesthetics (as described earlier) to identify and reunite the runaway creature with its' painting home. In successfully completing or failing each challenge the player earns a set of badges, each representing a cultural value (figure 14a).
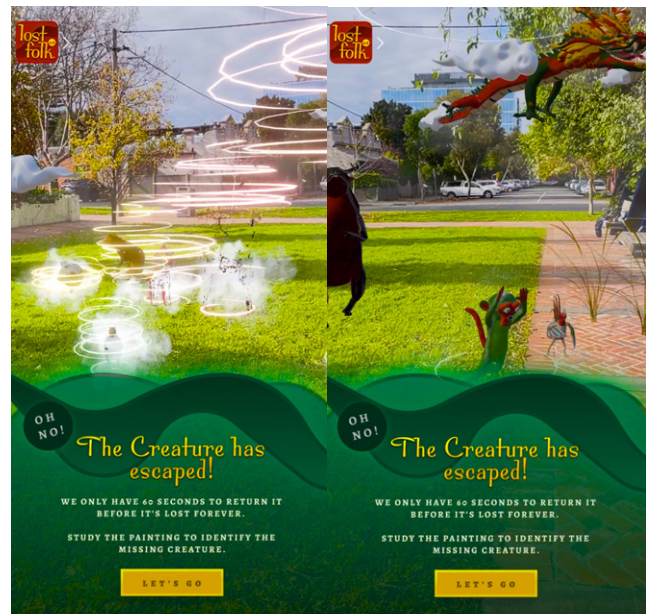

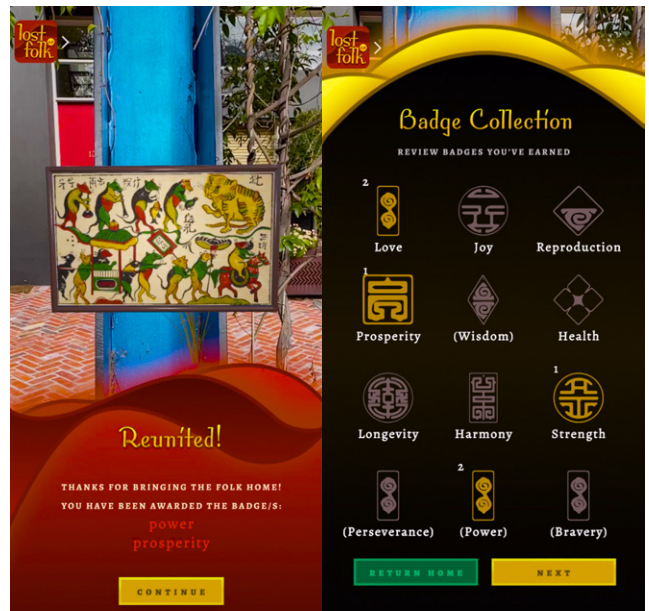Figure 13. Creatures appear in the player's space.

Figure 14a. The cultural value(s) acquired after each success.
Figure 14b. The player's collection of earned badges.

The collection of badges creates an opportunity for the player to develop a concrete understanding of the relationship between the tangible artwork and its' cultural significance (figure 14b). Additionally, after returning every creature the player is asked to reflect on the value that they collected the most of, considering if they still identified with the value, or if the value belongs in the past.

Designing value-oriented game mechanics affords the transmission of intangible cultural heritage by materialising connections between tangible and intangible cultural heritage. In doing so we create an opportunity to examine the values of the past and consider if they should be carried with us to the future.

Play to Preserve the Past: The Future

The results of this practice-based research journey are reflected in the development of a critical set of AR design considerations for the transmission of intangible cultural heritage. Heritage aesthetics can be considered for transmission to contemporary audiences by capturing heritage imagery in new mediums, and through the generation of speculative practices that preserve folk artistry. Physical rituals actions can form the basis for game interactions, involving the body in gameplay, and rekindling childhood playfulness. AR can reconfigure the space of the home or gallery as physical ritual space, enabling cultural transmission potentials across global material boundaries. Through interaction with value-based game mechanics, we can provoke reflection on which aspects of our culture deserve preservation, and which are outdated. As technology races forward, we must consider those facets that encapsulate our identity, and conversations about the shifting value system becomes an urgent need.

Figure 15. Snapshots of the *Play to Preserve the Past* prototypes.

This journey, evident through these prototypes (figure 15), has made it clear that a deeper investigation is needed to understand the complexities of cultural authenticity and technology usage in interaction and game design. These results lay the foundation for further in-depth practice and inquiry about AR's role in heritage preservation. By designing new experiences with these considerations in mind, we get closer to understanding if AR can become a medium in which heritage can be viewed and celebrated in the future, without losing the meaning of its original context.

Conclusion

In response to the global challenge of protecting cultural heritage, the *Play to Preserve the Past* project utilises augmented reality (AR) to intricately explore creative practice methods and design considerations for the seamless transmission of intangible cultural heritage (figure 16). Gameplay interactions are designed through a speculative design process that involves the examination of the distinct facets of Vietnamese cultures, including ritual practices, childhood play, oral traditions, and folk value systems.

Addressing the pivotal question, *"How can creative practitioners harness the potentials of AR for the preservation of intangible cultural heritage?",* the research unfolds a tailored set of AR game design considerations. These include the updating of heritage aesthetics, the incorporation of physical engagement through ritual movements, the reconfiguration of home space into ritual space, and value-based game mechanics. While these considerations don't propose a new overarching framework for game design, their purpose is to contribute nuance and depth to the ongoing discourse by illustrating the design considerations in the context of each *Play to Preserve the Past* game.

In conclusion, the primary goal of this research is to extend assistance to future creative practitioners involved in the field of cultural heritage preservation, offering insights and considerations for the crafting of immersive AR experiences that safeguard and transmit intangible cultural heritage in the face of contemporary challenges.
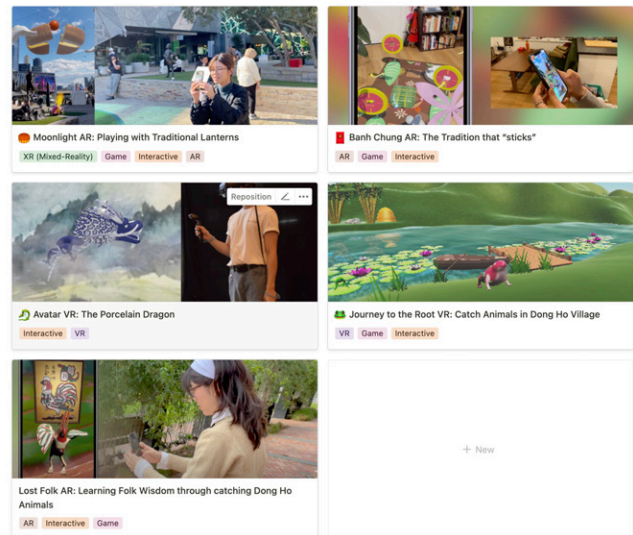

Figure 16. *Play to Preserve the Past* series.

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