Augmented Reality Game Design for Cultural Heritage

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INTRODUCTION
In the thousands of years of the history of human society, many cultural heritages disappeared due to different reasons, such as wars, natural disasters, and even the progress of urban development. Multiple actions have been taken to preserve cultural heritage, out of which, digital technology has been increasingly explored.

A growing number of museums and cultural heritage sites have been using digital immersive technology such as augmented reality (AR). Examples of such explorations are The Louvre at the Louvre Museum in France (Miyashita et al., 2008), reconstruction of the lost parts of a Buddha statue of Gandhāra at the Museum of Oriental Art in Italy (Spallone et al., 2022), and regeneration of Liangzhu Culture in China (Liu, 2023). Although these virtual museum applications enrich visitor experiences, they lack a mechanism to engage the public in actively learning and creating their own knowledge rather than receiving information passively (Motara et al., 2013). Given this, gamification can offer engaging mechanisms and fill the gap.

This work sits at the interstation of cultural heritage storytelling, AR, and gamification. The advantage of combining these domains is as follows:

The stories behind cultural heritage are good materials for the narratives in game design. Many epic games have the nature of appealing narratives which are a good match to cultural heritage since history is a combination of a series of significant stories. In the state-of-the-art review of serious games for cultural heritage by Anderson et al. in 2010, a series of games have been provided as examples of history being used for game narratives. The rich cultural content and stories heritages carry provide materials for game designers to create a virtual world to engage the audience and spark creativity.

AR technology provides an immersive experience and a solution to the conflicts of physical space. Cultural heritage that no longer physically exists, especially those that disappeared during urban development progress, can be challenging or even impossible to rebuild at its original location. AR technology allows the past stories to co-exist with the physical presence.

Gamification mechanisms transform users from passively receiving information to actively learning and creating their own knowledge through interaction (Motara et al., 2013). In Yukai Chou's book Actionable Gamification (2019), he listed 8 core drives of gamification also known as the Octalysis framework. The 8 core drives are: epic meaning and calling, development and accomplishment, empowerment of creativity and feedback,

ownership and possession, social influence and relatedness, scarcity and impatience, unpredictability and curiosity, and loss and avoidance (Chou, 2019). Designing with the application of these core drives will help achieve the goal of increasing engagement from the audience.

Though there are extensive literature on cultural heritage and AR, and some literature review on cultural heritage games, the research on AR cultural heritage games is still lacking. A notable detail is that researchers analysed papers published in high-impact journals from 2015-2018 and only 2 of the 15 video games in museums are still active, a potential reason as the market is small (Camps-Ortueta, 2021). How can we design AR games for cultural heritage to maximise the aforementioned advantages?

As the first step to exploring this question, I designed a concept of an AR game called Chinatown Time Machine that focuses on the stories of Toronto's Chinatown (Kong, 2022). This is a place-based AR game in a public place that adapts the way of playing from Pokémon Go and targets everyone who uses the public space as users. Toronto's first Chinatown, originally located at Toronto's city hall and the famous Nathan Phillips Square today, two-thirds of which was demolished for the construction of Toronto City Hall and lucrative buildings. On Instagram, under the #nathanphillipssquare, there are approximately 104,000 posts (as of 3 November 2023) from the residents to tourists all over the world celebrating their life moments at the square; however, few of them showed the connection to the no-longer-existed Toronto's first Chinatown. With the motivation of resuscitating these neglected stories, I designed the game Chinatown Time Machine, using the framework of Octalysis and incorporated the 52 gamification elements (Marczewski, 2022).

In my Ph.D. research, I intend to further develop the game, conduct archival research, expert interviews, and user testing, and analyse the data to measure the effectiveness of delivering cultural heritage stories through AR games. Furthermore, through the research findings, the design process can be refined or improved. Subsequently, I can generate a "template" for similar projects in the future, encompassing not only technical guidelines but also recommendations about the design process.

BIO
Yifan Kong is a PhD student at the Design Lab, the University of Sydney. She holds a master's degree in digital media from Toronto Metropolitan University, specializing in the intersection of culture, history, and interactive experiences. Her MA project, "Chinatown Time Machine," demonstrates expertise in game design and cultural heritage. With a passion for storytelling and technology, Yifan pushes boundaries in digital media and narrative exploration as a game designer.

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