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Cultural Heritage and Identity in the Metaverse: Thai Temples, Traditions and Virtual Pilgrimage

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Abstract

Cultural heritage is changing fast because of tech and the internet. This paper asks how the metaverse and other digital places are changing how we understand, show, and protect our cultural heritage. Cultural groups are starting to use digital tools to reach more people and change how they share things like objects and traditions. We look at how culture, identity, and digital media are all changing each other, using Thai temples and other things as examples. The paper also talks about the metaverse, AI, avatars, and the tech stuff needed to turn heritage into digital form.

A look at how Zhu Xi's story is told in the metaverse shows how this new tech can be helpful for learning and teaching. The paper ends by thinking about what's happening now and how tech can change how we protect heritage, do tourism, and teach, especially in Thailand and Southeast Asia.

Keywords: Cultural heritage; Digital media; Intangible heritage; Immersive technology; Metaverse; Thai temples; Digital preservation; AI avatars; Virtual museums; Cultural identity; Heritage tourism; Digital humanities; Virtual reality; Augmented reality; 3D digitization

1. Introduction

Over time, technology has given us experiences we never thought possible, making it hard to stay away from digital stuff. Digital media is growing fast, allowing people from all over to participate in culture and get involved in ways that don't cost a lot and haven't been done before (Mu et al., 2023). Places like museums, libraries, and archives that hold our cultural history have started using digital methods, which has led to awesome interactive experiences that go beyond just looking at a screen. These experiences are usually a mix of things we can touch and things we can't, media that moves and media that stays still, and opportunities for real, close-up contact. As old cultural traditions lose popularity in communities, new, useful, interesting, and cheap cultural stuff is taking their place. For a long time, archaeology has had a tough time with the idea of the past and remains. Ever since it became easier to dig up old ruins or burial grounds, stories of the past have been told with power imbalances between those who give information and those in charge. Though laws and ideas about heritage used to focus on restoring and displaying limited bits of the past, now that everyone can easily access information online, experts from different fields are changing where the public looks. People who are ignored by official displays are finding their own ways to learn, like using online searches, fast sharing, informal meetups, and social networks. The conflict between the past and the future is often still there.

2. Understanding Cultural Heritage

Understanding cultural heritage is now a key area in art history, and fields like digital humanities and cultural studies think about how tricky it is too. According to (Lee, 2017), many museums and cultural heritage sites are now digitizing

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their collections to keep them safe from destruction caused by conflicts, disasters, or carelessness. Making virtual places has become a way for people far apart to connect, share art, and have discussions about who created digital artworks and what they mean. Cultural heritage is what society inherits from the past. It includes things we can touch and things we can't (Mu et al., 2023). Things we can touch are things made by people that can be passed down, changed, or used in new ways. Things we can't touch are traditions, ideas, expressions, and knowledge that a community sees as part of their culture. This understanding is always changing as it's shared and changed through social interactions. Things we can't touch are often linked to a real place or object. A cultural event is when these traditions are performed. This stuff is usually passed down through word of mouth or by copying, making it hard to protect or keep safe without someone else's involvement.

Physical things that represent cultural heritage are constantly being shaped and argued over during cultural events. These things are valued in most societies, and cultural heritage in physical form has been used by people to show, argue about, or work out social memory, power, or identity. Because of this, it's important to watch how cultural heritage changes so we can understand how society is changing too. Digital culture is growing in a world where communities, ways of getting information, media, and art are becoming more different, divided, and changing quickly. Because of this, cultural heritage is being sold and used for business online, which is leading to stories being retold and identities being reshaped.

2.1. Definitions and Concepts

2.1.1. Definition of Cultural Heritage

Cultural heritage is a term we often use when we talk about world heritage sites. Cultural heritage is usually linked to places (usually with buildings) that are special and historically important, so they are protected as cultural heritage sites. But cultural heritage is more than just physical places. It also includes ideas, thoughts, beliefs, traditions, languages, knowledge, legends, and other things that can be shown through physical objects or in other ways. Some of it might only exist as stories passed down. Some might not exist anymore, but how we show them can still give us an idea of what they were like. Built cultural heritage includes things like palaces, town halls, temples, cathedrals, homes, tombs, fortresses, and watchtowers.

Right now, when we talk about cultural heritage, we focus on big, impressive sites. This makes sense because these sites are historically and artistically important. Cultural heritage places are often connected to ideas of authenticity, identity, and memory. We can see this in discussions about Outstanding Universal Value (OUV). Discussions about OUV often talk about how unique a place is. These places are often busy for a long time and have a lot of documentation. Because a place has been around for a while and is different from its surroundings, communities might feel a stronger sense of connection to it, which helps them remember it (Mu et al., 2023).

2.1.2. Importance of Cultural Heritage

The cultural context of national civilization says that things we can't touch are the root of a nation (Fan et al., 2022). So, protecting them is a cultural mission. Ayutthaya, the old capital of Siam, has a lot of temples from the 14th to 18th centuries. Many of the temple ruins, like Wat Chaiwattanaram, Wat Ratchaburana, Wat Phra Si Sanphet, and Wat Yai Chaimongkol, are beautiful, which is why Ayutthaya is on the UNESCO World Heritage list (Mu et al., 2023). Western-style churches with towers are mainly made of brick and plaster to keep them safe from fire. Some temples used this style too, but most Thai temples had pointed roofs. Wat Yai Chaimongkol is an amazing temple with beautiful design and surroundings. It's important for spreading Buddhism.

Wat Yai Chaimongkol has been beautiful for thousands of years. History shows that it must have been well-designed even before it was finished. The tall stupas stand out. All over the grounds, there are many beautiful stupas. Each Buddha statue is made of finely carved stone and looks peaceful. The stone statues are life-sized and well-made. The statues are made of stone, bronze, or stucco and look real under the light. The chanting and drums of a Buddha sutra create a serious mood. The Kaset festival happens every year and shows how important Wat Yai Chaimongkol is to local worshippers. The festival is colorful. Writings, pamphlets, and even the words on the Buddha statues use fancy language to show they are religious.

3. The Metaverse: An Overview

The metaverse is a shared digital space where the physical world is mixed with virtual reality that stays around. In this space, digital things can interact with a physical world that is always there. The metaverse has many connected spaces where people can interact with a 3D interface as if they're there, marking a change to a more immersive platform, which

is like a new type of internet. The metaverse is a set of virtual spaces where people can gather, talk to each other, and interact in real-time. The metaverse comes from different fields trying to create a world where things work together, last, where users can be together, and participate in real-time.

Right now, the metaverse is mainly made up of social networking, social gaming, online real estate, and virtual workspaces. But these only focus on parts of the bigger picture, so they can't really be called a metaverse. But these things still have potential; more people, especially young people, are spending time there. In the metaverse, people use digital avatars, which are 3D characters that represent them. These avatars can show emotions and do things, helping people connect and do things in the metaverse. Avatars are a big part of the experience and affect how people see the digital world.

With AI becoming more common, the metaverse might connect people with animated objects that aren't human. Avatars can be animated to tell stories, put on artistic shows, or even have conversations. People have suggested an AI-powered metaverse where users can see scripted scenarios and animated characters led by human-like avatars. These animated objects can be more diverse than the 3D things we see in theme parks or games.

3.1. Defining the Metaverse

Even though the metaverse has a lot of resources, it doesn't have places that copy real architectural heritage, cultural objects, festive food, and folk customs. The metaverse is like an internet that's big and immersive, where people can use avatars to enter 3D virtual worlds through computers, game consoles, and VR headsets. The metaverse is realistic, everywhere, works together, and can grow, which makes it both a good and risky thing for developers and users (Lee et al., 2021). In the metaverse, users can control their avatars, which can interact with AI that affects the user experience. The rise of AI chatbots and facial recognition marks a change for interactions in the metaverse. The Khmer temples in Thailand are a cultural heritage that has festivals on New Year's Day and Buddhist Lent at the Angkor Temple. The focus is on the cultural heritage and how it shows specific themes in cultural stories, like architecture, deities, clothing, and agenda (Fan et al., 2022).

The metaverse is a shared virtual space where physical reality and virtual reality come together. It's a virtual space shared on the internet, where physical reality and digital existence mix, and where digital identities come from. Riptide is a virtual learning place designed for large classes, which changes education and helps group work. New social rules are being made for avatars in digital learning. A curriculum about social issues was created for a science unit. Social norms were made to have real-world effects in live sessions. Using 3D visuals and audio makes it richer. Teaching strategies support learning. An online game encourages players to explore the real world. The game setting shows historical and cultural facts, letting players experience past celebrations. Players can work together to play online, making the game better.

3.2. Technological Foundations

People know that we need to protect and use cultural heritage in a good way, especially since it provides a base for use in culture, education, and tourism. But showing cultural heritage has become a problem during digital restoration. This paper suggests a framework and case for documenting cultural heritage in the metaverse. In the framework, digital documentation of cultural heritage related to Zhu Xi, a historical figure and pioneer of neo-Confucianism during the Song dynasty in China, is shown through a set of processes, including collection, processing, annotation, representation, and interaction design. This study provides a new approach to showing historical figures in the metaverse. The study helps preserve Zhu Xi's cultural heritage and provides a metaverse experience, and it also helps promote research on cultural heritage preservation and the design of cultural tourism metaverse experiences (Fan et al., 2022). The project gives a new look for cultural tourism planning and tracking of cultural heritage.

Digitizing cultural heritage often costs a lot of money. Cultural heritage includes digital and non-digital objects. Ways of digitizing them also differ, like using drone photography for cultural heritage, photogrammetry for artifacts, and laser scanning for buildings. Digitization also needs planning, project management, and operation (Mu et al., 2023).

3.3. Current Trends in the Metaverse

In the past few years, people have been talking about immersive experiences in digital places (P. Bowen and Giannini, 2022). These experiences can be in browsers and use AR and VR, either on headsets or through a browser. There is a lot of interest in these experiences, which can add to identity around the world through exhibits. The plan is to look at what museums and art worlds are doing for a more immersive digital art experience.

Many things are leading to more speculation in digital experiences. The COVID pandemic has made a change in the digital world, shifting experiences to platforms that are now like physical ones. The rise of AI, VR headsets, and graphic cards is making experiences easier and more attractive. So, this research aims to give people knowledge of trends in the digital art scene and set the stage for art initiatives. Projects will show different aspects of the metaverse world. This shows the complexities of the metaverse.

These metaverses range from collections viewed as images to experiences that let users create their own exhibits (Mu et al., 2023). Some are websites showing exhibits, while others are applications needing a browser. The enthusiasm for the metaverse is because of technology, economy, and emotion coming together.

4. Thai Cultural Heritage

Thai temples and Buddhist traditions are part of the country's identity. Cultural heritage sites are linked with the sacred in Thai temples (Prompayuk and Chairatananonda, 2018). A boundary, represented by the royal palace, set the foundation for temples in Bangkok. Rituals show cultural meanings of the places. The metaverse provides virtual environments to link the real and digital worlds. This means possibilities for cultural heritage content, like Thai temples, in a new form. Cultural heritage unites people; the metaverse binds people to form societies, sharing a sense of presence but reshaping identities (Mu et al., 2023).

This paper presents cultural heritage in the metaverse, focusing on Thai temples. VR and AR create a great sense of presence between the physical and digital. Virtual pilgrimage lets people pray. Digital content is shown on VR and AR apps. Virtual Thai temples show architecture. Designs preserve the temple's qualities. Buddha statues are preserved without copying. 360-degree images document the temple. Cameras reconstruct environments and customize the user's presence. Buddhist rites are recreated. Virtual communities help with belonging; avatars are customizable.

4.1. Tangible Heritage: Temples and Architecture

Tangible cultural heritages are tangible things like temples. These heritages are important. Thai temples have been a place for the community to share religious experiences. Buddhism has been influential in Thai architecture. Buddhism blended with beliefs led to temples evolving. Architecture varies: the central region prefers lower forms, while the Northeastern region prefers forms. Temples have façades decorated with stucco (Ramadoss, 2019).

Cultural heritage is decaying. Technology provides for documenting heritages. Thai temples are designed for engagements using a data-centric approach. A stage is implemented, which refines candidates. Identification has been achieved (Mu et al., 2023).

4.2. Intangible Heritage: Traditions and Practices

Intangible cultural heritage represents expressions that communities recognize as part of their heritage. Understandings have focused on narrative, lived experiences in traditions. Practicing heritage becomes a site of identity. It is impossible to experience heritage from one voice. Digital installations foster participation.

Sukhothai School needs understanding of movements. This will be represented in digital installation. Gardner's intelligence will guide scenarios. This paper proposes operations according to interaction. Installations are proposed. There is a need for advances. Representations focus on documentation, which can display reality. These modes focus on conveying knowledge rather than increasing engagement.

There are limitations in designing systems that foster interaction. To safeguard Thai Khon dancing, it is necessary to install devices that convey movement (Mu et al., 2023).

4.3. Role of Spirituality in Thai Culture

Thai culture has a spiritual background. 95% are Buddhist. Temples are the center of activities (Raksadeja, 1970).

In the mountains where the Wutai Temple is, there is a tradition of painting murals of Bodhisattva Manjushri. Cowherds transformed faith into art through dances. This mirrors the world understood by people seeking blessings. The study attempts to bridge the gap by uncovering the mechanism of mural reading. Instead of reconstructing an environment, this research provides temporal awareness based on perceptual situations. Spatial cognition views the world as a matrix in which landmarks are identified.

A temple mural may be viewed with varied awareness. The mural emerges with performance. When viewed from images, articulation dominates. When the mural is examined, the temple disappears. Expensive devices are not in temples; however, access through simulating routines deserves dissemination.

5. Digital Twin Temples

The virtual pilgrimage project aims to document, protect, and share Thai Buddhist temples and rituals using digital tools like 3D modeling and virtual twins. These tech applications offer cool and meaningful ways for people everywhere to see and learn about these temples and traditions. The Cultural Heritage and Identity in the Metaverse project is working with partners to make these virtual pilgrimage experiences a reality. It also encourages people from different fields, communities, and age groups to share what they know using new ways to protect heritage and work together on models (Mu et al., 2023).

The Heritage Futures Project studies different ideas and possibilities for heritage, including research and sharing knowledge, especially about new ideas and getting the word out. One area of focus is cultural sites and how tech affects our sense of self, community, and making things in the metaverse. The project also looks at how these things change how we experience cultural heritage. To really get Thai cultural heritage and why it matters, we need to look at all the different ways it's shown and experienced. Digital twins of Thai temples, Buddhist practices, and a virtual tourism hub could help erase location restrictions, structures, and ways of life (Fan et al., 2022).

Digital twin tech uses digital info to stand for a real object, with extra data that connects it to the real thing. This lets us show places, processes, and how things change in detail – from the inside out. Data analysis lets us copy how things act, how they're doing and even guess what will happen over time.

While gathering a lot of information is important, understanding human experiences is just as vital, but harder. A digital twin of a temple, with a 3D model, virtual views, plants, animals, weather info, and even feelings, can really grab people's attention.

5.1. Concept and Design

Since it is important to improve tourism and protect heritage, because of current social restrictions, modern viewing and tech, and virtual reality each have the chance to make a different kind of virtual pilgrimage happen. The Metaverse is a computer-generated version of the Internet, where you can see virtual setups using real-time 3D from devices. Other than computers, you can enter the devices through VR headsets, augmented reality glasses, and the devices. To hold protection to not only assets but also content, the making of Metaverse puts together blockchain and NFT. This tech with viewing devices allows heritage to be taken to cyberspace and gives more people the chance to take part, growing heritage creation, increasing access, and experience. So, new types of Thai temples, traditions, and pilgrimage can be copied, recreated, shared, and used in the Metaverse. To find out what the Metaverse can do for heritage, Thai temples and traditions were picked as the focus. Other than modeling the environment and taking part in the Metaverse, modeling temple and event assets was studied along with plan descriptions, taking part in temple modeling and character practices, and testing the virtual space. The modeling, animation, and rebuilding were based on understanding and experiences collected in the research. After talking about character options, animation details, and plan cues, test sessions were done to investigate the experience and how things were done. Results show that Metaverse can enhance discovery, cultural understanding, and social interaction. But how the character acts and the movement can make the pilgrimage boring, especially with movement. A developing direction for extended research has been touched upon about bodily movement and interaction issues (Lonneville et al., 2016) (Mu et al., 2023). Future work to share temple cultural status and improve experience was also discussed.

5.2. Case Studies of Existing Digital Twins

Although CLAUDIA is an ongoing work, discussions and outcomes have come. For the tech process, enhancements are needed each time. Mental and model behavior have been enhanced when observing tourists interacting with the VR rebuild. What an immersive digital twins' matter is an open question. Future questions may include how the systems affect memory and how the models should be approached to help remember and forget. Tech topics include quality, usability, and safety. Balancing immersive interaction with traditional topics, and ethical concerns in model creation involve engagement, honesty, and education. While there are plans for immersive heritage digitization, fewer have been made. VR experiences of rebuilt heritage are most of the existing examples or want to explore stories. Interactions are limited. Some discussions occur with multiple lots; existing work still focuses on experiences. Some VR projects are designed to invite behavior and story-driven, gameplay-like versions of heritage through avatars. What is missing from the literature is an older work accommodating a digital twin for general communities (Fan et al., 2022).

5.3. Impact on Heritage Preservation

The feeling of value of the heritage places may rely on the content (Mu et al., 2023). The Thai temples, M Thai, icons, and rituals are digital to those in the real world. Algorithms are used for design. Archived images from 2D archives containing looks are designed to enhance the temple and ceremonial spaces. Video contents transform to records preserving context. Thai temples brought communities together. Unified access to the temples enables designers, tourists, and cosmopolitans to assemble hierarchies, routes, and get ready to connect to rendered scenes. Temples are displayed and new models of assets are in clouds.

6. Virtual Experiences of Thai Culture

Research in recent years has caused multiple ways of creating stories. Virtual reality (VR) and augmented reality (AR) have reached a unique level. These techs could change how people tell, create, and handle stories. DWBT, RV, GWGT, animation, and VR all show digital media. Research has revealed the landscapes of stories. As tech and narrative evolve, researchers question if narrative remains valid and how this effect stories.

To answer, it is important to show storytelling modes. From Brode's categorization, the four modes are: text is linear; asynchronous; hypermedia is disorganized; and AR/VR takes the form of meaning through experience. These modes suggest that experiences in AR/VR are distinct from prior media. The constructs of storytelling are displayed as frames. Frame shape the storytelling. Various constructions encourage each other.

To explore ways to show heritage, the mix of the humanities and computer science is growing (Lee, 2017). Storytelling in AR/VR coexists with content creation. Presentation may hurt productivity (Mu et al., 2023). It is needed to add views from storytelling into the creation. Storytelling needs to be informed by the media. This work aims to help the design of heritage in XR.

6.1. Virtual Thai Dance Experiences

Experiences have been created for dances: Khon, Ram Wong, and Fawn Thai. These dances are charming, performances that deserve to be shared so new generations can appreciate this culture. Each dance is shot in a traditional location, such as Wat Phra Kaew for Khon, a theatre for Ram Wong, and the Grand Palace for Fawn Thai. The footage shot with a 360-degree camera can be viewed. Thai dance can be seen performances in an animated setting (Raksadeja, 1970). In the past, exhibitions merged performances using technology. Viewers are happy to see and do and then are encouraged to and with Thai dancers. Tools were designed for schools and homes. Due to the pandemic, viewing can be done at home.

6.2. Interactive Storytelling in the Metaverse

Interactive storytelling is a key for sharing knowledge in heritage. Interactive systems show info with a beginning, middle, and end. A narrative includes the heroes, goals, events, changes, and data. The making of a narrative relies on structuring a plot, picking a viewpoint, and showing (Moehlenhoff, 2019). For heritage, episodes form the story. Characters can be animated, models of artefacts, avatars, or actors. The design may vary from high level to creating at the content. The least is to use an avatar for guidance and animations. To use a human-like model as a presenter is medium. The narrative design using this tech varies with audience. Interactive systems have been designed. Models of motion used do not events. On the interactive, view at them. of events may not cause a coherent story. visualization among events explores. Capture can.

6.3. Culinary Experiences and Gastronomy

Food tourism is getting to be a bigger deal everywhere, showing just how linked food and culture are. When people learn about food tourism, they try to get what food means to different groups. Food's fancy side is often seen as something special, showing off a group's background and customs. Food moments are kept alive and shown off in videos, writing, and pictures. However, videos and sound often lead the way, which might not truly capture all the feelings and senses you get from food. Because of this, food culture can lose meaning, mostly if it's taken away from where and how it's usually enjoyed. Historical spots give good chances to look at food as part of culture and to learn about history. Seeing culture through food makes it easier to feel connected to the past and customs. Culinary heritage includes ingredients and how things are made, plus the stories, customs, and memories that go with eating. Food customs give a great way to feel, pass down, and celebrate culture. They hold stories, what people care about, and who they are, making food a key part of what we can't touch but still matters. Looking into food heritage shows social setup, how things changed over time, and how different groups connect. So, think of food more than just what keeps us going or something

to like, but as a meaningful way that culture comes out— inviting everyone to get a deep inside look and join in with the culture it stands for.

7. Commercialization of Heritage in the Metaverse

The of is often from of a and system of consumption commercial. the highlights of the, such stakeholders. In the of a, it can be or of produced what is and Graphic, interpretations can be as content, or by authorities interactive them or migration cultural and in the for interpretation in the of regarding interpretation of matters and the of practice and identity of the in the Kingdom replicates Yuè (hand drums), allow users to traverse digital. Though space with from avatars, users from taking of the they. The of the, widely as a product the Warring, to the order the local in the Qin and Han Dynasties. Many were forced into exile (Fan et al., 2022). This heralded a new awakening, and mix, with a soundscape, narrative structure, and poetic. Of the reconstructions of the and in an environment, Wu Guo has its sonic and palette with from usability adventures.

7.1. Cultural Heritage in the Digital Age

Cultural heritage is always being remade into formats that are more lively and reachable because of new tech. Take Zhu Xi, a famous scholar from the Song Dynasty. His story is a great example of this in our fast-changing world. A bunch of things have been made using Zhu Xi's story, mixing culture, tech, and travel into one experience. These things involve remaking old buildings connected to Zhu Xi with computers, sharing stories, and making online things to do based on his family's Four Rites and beliefs. The systems that run these things give content when people want it, provide online tours, and create easy-to-use platforms that get more people involved. But culture can still be hard to understand because info is all over the place. So, services are being made to put back together, link, and share culture knowledge in ways that make more sense.

Fan et al. (2022) suggest a setup with three parts:

- A base system – This gives real info about Zhu Xi's life and lessons, using new tech to make sure it's correct and shows different cultures.
- A way to get involve – This lets people play games, hear stories, and go on online trips.
- An easy way to use the service – This lets people use culture in ways that are just for them and make sense.

Zhu Xi's story is being saved and remade with computer design in places like Huian and Wuyi Mountain, China. Trips to these important places have been made online, so more people can see them, even if they can't visit in person.

This mix of virtual reality, culture design, and building simulation is a big step forward in how we reach and save culture. It shows how culture plans can connect the old and the new, giving both learning and fun.

7.2. Strategies for Virtual Pilgrimages

Now that we have social media and are all connected online, it's easy to share pilgrimage experiences and holy places with people everywhere. You can find pictures and videos of mosques and temples, and even watch rituals as they happen, all from your couch. For example, some grand mosques have virtual tours that make you feel like you're there, checking out amazing building designs that you'd normally have to travel to see. But the easier it is to see these places, the more careful we must be about what we think of them. Online, you can get around the rules about who can go where. You might be able to visit holy rooms that are normally off-limits. People from all over the world can share the experience, and with translations, everyone can learn about the culture and stories behind these places, even if they never go there in person. Still, there are some problems. If we just copy things online, even if they look good, we can mess things up. We might make spiritual experiences too simple or turn them into something to sell. That can lead to misunderstandings. If people don't really understand the culture, they might get the wrong idea and upset the people who consider these places sacred. Live-streaming pilgrimages or recreating them online can bring up tough questions. If we don't explain the culture well or involve the actual community, the result can be old-fashioned, fake, or even take advantage of people. It could end up like those old websites that no one cares about. Even if we use cool tech like holograms, they often don't add anything to the real meaning of the pilgrimage.

A lot of virtual pilgrimages get popular fast on social media, but they disappear just as quickly. People might see them for a moment, but they don't really get a spiritual experience. Many times, marketing is aimed at tourists instead of people who are really looking for a spiritual experience. They're just trying to make money from something sacred.

Even with these problems, there's still potential. Pilgrims can use avatars, live events, or interactive stuff to connect with holy places. But how valuable those experiences are depending on what people already believe about the site's spiritual power. Today, everything is about data, but the things you can't see—like blessings and spiritual feelings—are difficult to measure or copy online.

In the end, doing virtual pilgrimages well means really thinking about the culture, putting things together carefully, and talking to the people who protect these traditions. If we don't do that, virtual pilgrimages might just become a show instead of a real spiritual thing, a fake version of being there that doesn't really connect you to what's sacred.

7.3. Selling Digital Heritage

When making and keeping cultural stuff alive goes digital, we need to think about how things change because of gadgets and the situations they make. Like Wessels said in 2022, we got to think about how the online world and old-school culture go together. This is really important where people live, do their things, remember stuff, and follow traditions. We should ask: Who's making digital heritage, and what's in it? We need to get what's going on when we talk about digital heritage, like the culture, society, and tech stuff. That means seeing all the different things that get put together to make digital heritage—people, things, living or not. Tech isn't the only thing that does these things, like how society's set up, what stuff means to us, and who's in charge all do too. It's very crucial to hear from places that aren't Western, especially ones with a big talking culture, to make digital heritage talk better across the world. For one instance, when making digital Thai heritage, you must watch out for old government rules and how they do things there. Many old Thai folks used to be side eyeing at new tech like drones, VR, or fake music because of their spiritual beliefs. But now, it has changed a lot. A bunch of them dig kicking back at virtual temples or seeing old drumming shows come to life, seeing new coolness and ways to show their culture. Still, how Thai culture sees us is way different from Western thinking, which is more about reading and writing, me-first, and all about things. Thai ways are more about feeling connected to everything. Because of these differences, we need to ask big moral questions about putting forgotten or risky cultures into the digital world. What if we get it twisted. Things that have been only talked about, which shift around a lot and are tied to life, don't drop easily into digital styles, with their locked data and sorted stuff. So, we need better ways to understand things that fit the culture, get everyone in, and see how different groups see the world. We need to think hard about what happens when we put old-fashioned culture online, like how people make up who they are, what they care about, and memory. As Muet said in 2023, we need to check out keeping old culture online and making it real again the right way for everyone. Selling should not cost being real or taking over the culture. What it should do is help put tech into different cultures and points of view the right way.

8. Ethical Questions in Digitizing Sacred Traditions

Digitizing cultural heritage is a big trend, and it makes sense for advertising and teaching. But it can also mess things up by distorting, overvaluing, or making TVLs (whatever those are) seem cheap and common. Complex cultural ideas might get lost when you squash them into two or three dimensions, or they could end up as boring, fake museum pieces online. Also, 3D tech is getting better, but not everything translates well. Some cultures might look great, while others suffer (Manžuch, 2017). Cultural distortion happens when you take a cultural or heritage site that's poorly represented online (missing its original meaning) and add fake meanings to it, sticking it into some artificial setup somewhere else. If cultural values are universal, they should work everywhere, no matter what the TVLs mean (Wessels et al., 2022). Another thing to think about is who controls the images. When you only show parts of TVLs from certain camera angles and in certain shapes, it changes how people who are used to seeing them in person understand them. If the online version is close to real life, that's one thing. But if it's different, it can be confusing. A limited view can be unfair, like a one size fits all situations in marketing. The answer is to be more inclusive and show many different perspectives. A 3D model, as part of online work, is copyrighted. The owner's rights are reduced, and they get a less important agreement without payment. The more stuff we produce, the more we need to protect our rights and get paid when value or rights are lost or damaged. For example, a 3D version is only visible for a short time, so it should have special rights for that temporary display. 3D copies have regular copyright protection.

8.1. Copying vs. Showing Respect

As tech gets better, people are talking more about cultural copying. Some think putting a Buddhist temple in the metaverse might soon be seen as copying, like when a Thai temple was turned into a club in Prague, or when the TV show *BOJACK HORSEMAN* made fun of Asian family restaurants. Cultural copying is when people from one culture take things from another culture (Ballenger and Hamlin, 2018). It's not just about moving ideas; it's about power differences between cultures. The reaction to this adoption can be from showing admiration or thinking it's ridiculous. The companies that make the tech for the metaverse are mostly from Western countries. So, a Buddhist temple in the metaverse could face problems because of these power differences. Before we worry too much, we should think about

how people can appreciate the culture, like when non-Thai Buddhists connect with Thai culture in the metaverse in a respectful way.

The metaverse lets people represent Thai history, traditions, and culture in a way that includes everyone (Mu et al., 2023). It depends on who's involved in those representations. Big companies have made the tech widely available, so Thai culture can be shared in the metaverse if the 3D temple model is set up before people can enter. Turning a regular model into a 3D one is easy with most phone software and putting it on a free platform makes it easy for people in countries that block Facebook to get to it.

8.2. Permission and How Things Are Shown

When you digitize, save, and explain cultural heritage, you also must deal with who owns it, who gives permission, and how it's shown (Mu et al., 2023). The Thai temples and traditions in this study belong to temples and communities all over Thailand. They were asked to be part of this, but the 3D scans are private. People using virtual experience can see the scanned temples through a public website and VR. The point is to include as many different temples and cultural representations as possible but also be respectful of privacy.

The current look for the temple is still a regular VR model. The next step is to talk to the temples about their experiences and how they want to see and experience the models, plus how they want their areas to look. This could involve cloud-based viewing options from 3D modelling programs. The temples could also create public websites for visitors to use on temple grounds to learn more about traditions. Other options are to keep the models and VR experiences private and have control over who sees them, gets feedback, and how it looks compared to other 3D sites. The temples might share their temples or experiences with visitors online or share their 3D models with other people.

8.3. Balancing Money and Keeping Things Safe

In the metaverse, temples and other important cultural buildings are usually shown as they are. People can move around and look at these digital temples in 3D. If it's a real temple, people can also do things like worship remotely or watch videos about its meaning (Mu et al., 2023). These systems give people interesting and informative experiences because they tell stories, let you interact, and pull you in. But the way these sites look and how people use them aren't always thought about enough. Cultural trips have been a thing for a long time, whether for religion or tourism, with certain behaviors. Some tourism products for cultural trips, temple verification, and famous temple profiles have been made, but not for the metaverse (Fan et al., 2022). We need to figure out how to design cultural trips in the metaverse, with both the temple and the trip process, to make it fun and educational. An interactive system is suggested for Tha Rem Temple. Different metaverse tech like Unity, Blender, and GIS are being used to show the temple and the trip routes, with all the info people need. The system lets you wander, follow paths, take pictures, look at maps, and answer questions. A study was done to see how people felt about the temples, the traditional trip, and the experience overall. This work has great potential in showing cultural heritage and viewing experiences. Automated places could be made, and users could wander around and zoom in on what they like. VR headsets and handheld devices could make the experience better. Joining the metaverse with social media could help get more people interested and make things more fun.

9. Global Reach and Soft Power

The Royal Architects of the Taksin Kingdom is an organization made on May 5 to honor King Taksin's 236th birthday and to respect Phra Srisudharakhan or Phra Kan, a forgotten saint of royal architects. They want to bring together architects and others to promote and protect royal architecture around the world. They plan to show the royal architecture of Taksin both physically and online in the metaverse to teach people about history. Promotion and protection can happen through events like the Historic Royal Architecture Day and the International Symposium on Royal Architecture, as well as through books. In a post-COVID-19 world, promotion through the metaverse is another choice. This paper suggests using the metaverse to promote and protect royal temples and a 3D virtual trip across digital temples as an example.

Problems in Promoting and Protecting Royal Architecture Globally. The Royal Architects of the Taksin Kingdom is an organization made on May 5 to honor King Taksin's 236th birthday and to respect Phra Srisudharakhan or Phra Kan, a forgotten saint of royal architects. They want to bring together architects and others to promote and protect royal architecture around the world. They plan to show the royal architecture of Taksin both physically and online in the metaverse to teach people about history. Promotion and protection can happen through events like the Historic Royal Architecture Day and the International Symposium on Royal Architecture, as well as through books. In a post-COVID-19 world, promotion through the metaverse is another choice. This paper suggests using the metaverse to promote and

protect royal temples and a 3D virtual trip across digital twin royal temples as a case study along with further aspects and development.

9.1. Cultural Contact in the Digital Age

Cultural heritage gives people a sense of belonging, national pride, and power. But it's in trouble because of globalization, colonization, human destruction, overcrowding, ignorance, etc. In today's world, cultural contact is more important than ever in showing positive images of countries and making peaceful relationships. Metaverse is a new world that uses tech like XR, blockchain, AI, and 5G, and it includes many parts of real-world countries. The Covid-19 pandemic made things worse, and many cultural heritage sites were empty. The only thing to do was to continue with fake lives and dark displays because of money problems. Historic cities look like paintings, monuments look like bad movie sets, public buildings are in empty fields, and museums are empty with floating art. A good Metaverse setup is needed so people can participate in spiritual events. Local guides can explain objects with stories, and old documents can be explored. Objects can become less strange and connect with visitors instead of just being 3D things in a museum.

Tech will bring different content to different places, making heritage more inclusive by allowing everyone to participate, especially people who can't move around easily. New ways will let managers record things at sites remotely and understand them to help with conservation (Mu et al., 2023). Also, letting local groups help with festival displays is important. By redoing experiences in a different way, cultural heritage groups can make memories more valuable. XR and intelligent tech can help improve how we explain cultural heritage.

9.2. Reaching People Around the World

When international students came to Bangkok and met their classmates, they felt tricked. Learning a language is hard, especially when words sound similar but have different meanings. Finding ways to share knowledge remotely that reaches more people than just local events is hard. Still, virtual exhibitions are becoming more popular, and museums are trying online experiences. The 3D exhibition on Thai temples and culture is a project that wants to help with this discussion. It looks at Sense of Place as an experience and a way to share culture in the 3D exhibition. Sense of Place is the feeling that you belong to a place, and it's a result of that feeling. Culture can be evoked with a Sense of Place way. A Sense of Place can help share culture in the design of the exhibition. The ideas behind Sense of Place, and way of culture are checked to make things clear. A 3D version is shown. How well it evokes an idea place is put under measure, as well as the cultural knowledge that has been sent. There also are suggestions so the 3D can be perfected, which will help this culture get show around the world and make people explore Design-Culture.

Not much research exists on how museums use the metaverse to create digital experiences. Museums have copied art galleries, and most writing has been about art. We need to study more about culture like heritage. This project starts a work of design explorations that investigate local culture better. Based on Sense of Place, prototypes are created. Two looks are conducted on art from local temples that see both the experience of the digital culture and how much the content can be steered. There is a suggestion on how to keep the ball rolling.

9.3. How It Affects National Pride

National pride is key to having your own place, knowing values and what your belief is as a person. A national is like knowing you and every single part of the nation. Knowing said identity makes one know where they stand. So, there's play between national and personal identity influencing those. Safeguarding culture has a feeling of family where you belong. Touching on any kind of culture will address wants that are not fulfilled in the same regard. An identity is the person and culture is like groups. Heritage is a part of that, and it passes down and is forever held. It's the intangible and tangible that is held (the song and places). Geographically, make a lot of the landscape into the culture and are how this place is known in terms of the product locally and away. But since people will travel far, this limits the product being acquired for the most part. Through pilgrims that are virtual, you can go to a location that you could not otherwise be. Through landscapes and national identity, the ability to keep alive what is beautiful and culture that adds to one's pride.

10. Challenges and Limitations

While MVR can help make Thai cultural practices feel more real, it can't show all the different meanings people find in them. One reason is that it's limited in how it relates to the real world. A 360-degree video gives you a view of Wat Phra That Doi Suthep, but it can't fully recreate the feeling of being there. Also, digital choices guide what people see. Every project like this involves choosing what to include, how to show it, and how people can interact with it. This project follows a set path, like the user is just looking at Thai temple life from the outside. Users can move around, but the

content still pushes certain views and actions. Since PhD students created it, it shows the accepted Thai views. Because of this, some common, everyday feelings about the temple might be missed. For example, someone might want to know why people watch the golden chedi closely or about the story behind the religious act. The team hopes to add ways to tell different stories in the future. Using augmented reality on-site could also make it more fun and allow people to talk to the temple community.

Another issue is how well the MVR shows the temple. It's hard to know if it's a true picture. The push for everyone to be the same makes this harder. Custom and modern ways of life often clash. The temple community should help decide what to show and what not to show.

For example, disagreements between temples aren't in the content. But the fact that virtual places let us show these things brings up questions about whether to show conflicting views and whose views to include. Too much content is also a problem because there's so much to temple life. So, deciding what to show is still up in the air and needs to be worked out with the temple community or others involved.

Still, letting users explore and react more naturally could show the temple custom in more detail. Overall, despite these problems, creating a more real way to show temple life, like MVR, is helpful for showing culture because it uses ideas about watching, seeing, and showing.

10.1. Tech Problems

Thailand isn't jumping on metaverse tech as fast, especially businesses. One reason is they don't know enough about it. The cost of the tech is another problem. Other issues include not being able to pay for the tech, trouble finding skilled people, no place to create digital experiences, sticking to old ways, and not wanting to change. Many people don't know much about cultural sites.

Whether groups that protect culture can see and use the metaverse's potential is a big question. Things like knowing what the metaverse is, its money-making potential, getting skills, paying for staff, and comfort with tech all have an impact. How attached people are to a place also affects how they receive experiences and whether they'll become customers. You need skilled people to plan, create, and run successful metaverse experiences. Money worries about paying salaries and getting a return on tech investments are major problems for groups. Not having a plan for the metaverse or not knowing how to create experiences in it are common worries.

10.2. Cultural issues

Showing cultural sites in the metaverse opens doors but also brings up questions about being sensitive. Because of things like colonialism, many are wary of others showing their culture and practices. Schools, museums, and centers like this often do these digital recreations. But studies show that even then, locals and their views aren't always shown to those who are supposed to be learning about the culture. So, this paper ends by saying that being sensitive to these issues shows both the good and bad sides of showing culture digitally in the metaverse.

Without rules, the chance of misrepresenting culture grows when it's shown in the metaverse. When culture is shared without the input of those who own it, misunderstandings can happen because of wrong ideas from history. The digital gap can also create unfair differences in communities' ability to create things digitally.

These gaps go deeper than tech; they're tied to ways of seeing and being. The danger of calling 3D models sacred is that they become separated from the stories they belong to. This focus on how things look can ignore local beliefs and make sacred places less powerful. Cultural things are often shown as products because of misunderstandings or thinking locals don't know as much as Western engineers.

Overall, because the metaverse may have lots of these representations, we need to promote understanding and sharing between cultures. Forming groups with communities to understand their roles is key. Focusing only on looks ignores dealing with digital involvement in architecture when it comes to questioning monuments. Tech can help us deeply understand the meanings connected to culture over time and space. This is important because those who want to recreate culture in the metaverse should know how the past affects the present and future.

10.3. Keeping Digital Culture Alive

Today, culture is threatened by globalization and urbanization. Also, people's individual identity is fading. There's wrong info online, which gets researchers' attention. Thailand has old temples, making it a good place to study. But the

work of monks and groups to save culture for VR isn't well-documented or easy to find. This study looks at creating Thai temples, customs, and their digital future in the metaverse, focusing on Buddhist temples.

Looking ahead, with better devices like 5G, digital IDs, and ways to verify trust, the metaverse will let 3D things work together in a digital world. Open virtual worlds offer a good way to bring in historical temples. Temple groups may host events to welcome people from everywhere. Brands focused on culture may appear, fitting Thai customs and traditions for temple visitors.

Right now, most 3D models of Thai temples are made by putting together pieces and shown on commercial sites that aren't interactive. Sticking to working together and letting people own their creations may lead to temples being scattered in the metaverse.

Temple 3D models can be spread through creative ways, matching the style with past oversights. It's best to follow temple design rules by giving asset licensing rights to everyone. With site sculptures and sensor tech, assets can grow, making sure real-time data flows to global experiences.

11. Future of Culture and the Metaverse

This article is a start to building a digital place focused on culture in the Metaverse City Environment (MCE) by showing Thai temples. The metaverse places are based on forest temples, city temples, and art styles. The places also add Buddhist traditions, like meditation, using things made in Unity Assets. This article also starts the process of creating virtual pilgrimages by setting up a structure and looking at systems used across cultures. Future work could add more sites, experiences, and senses like sounds and smells. Experts can improve frameworks for comparisons; studying other cultures will hopefully make the pilgrimage widely celebrated.

Future systems could look at saving intangible culture as well as built culture. Working together can help create a mix of views that vary in knowledge. To study saving efforts in the Metaverse, the first step will be to gather a group of culture supporters and devotees, especially those with different views. Then, we can explore the factors to digitize other senses.

11.1. New Tech Coming

AR/VR offers new ways to communicate beyond the real world. It's been seen as a tech that lets people create, share, and remix content. As these techs become common, people can experience info that's spatial and contextual. The rise of AR/VR has changed how we see human behavior and relationships. Now, tech can be seen as either a tool-filled utopia or a controlling dystopia. Digital art is blooming, with realistic art and interactive spaces. Cheng's 'The Abyss of Silence' shows the noise in Hong Kong. Bi-Yu Chiu's 'Remains' captures waves interacting with debris in Taiwan. Chan, Lillevik, Monchalin, and Teo's 'Liar' imagines a future with smart birds and dark webs. People are putting on different digital skins. Gender is becoming more fluid in the digital world. AR blurs the line between viewer and spectacle while threatening the ideas of modern viewing.

Right now, non-spatial culture isn't well-represented in the digital world. AR and VR create good experiences for spatial culture. But few have digitally recreated non-spatial culture in digital or VR. The 3D modeling community shows that only flat data is good for computer-generated 3D models, making it hard for artists to work with art. This breaks artists' ownership and pushes data companies to improve 3D modeling. This may exclude creators while making art just a spectacle for the audience. An example is AR on Rougewill's papercutting in The Hong Kong Palace Museum.

11.2. Working Together

There's a chance to work with Thai and international partners to show heritage places in VR/AR/AI for the metaverse, including stories about culture, education, and preservation. Several projects are happening in this area. Showing Nirvana - a 3D mural from a cave temple - was well-received at Prince of Songkhla University. These projects can be used as a base for collaboration. It's also important to tell Thai communities about the potential of these techs for digital storytelling and the risks of unauthorized use of their places and stories. For example, Zhu Xi has been shown using different techs, including a metaverse. Thai artists could learn about opportunities ranging from VR explorations to modeling techniques. The rules for using any virtual heritage creations must be made and discussed and thought needs to be given to fair ways to build VR spaces. If a company creates a closed-off space, it could limit access. A balance between working together, ownership, and control needs to be set so that proper practices are used at all stages, from planning to building.

11.3. Long-Term Effects on Saving Culture

Tracking how long users spend in virtual heritage is key to knowing what interests them. A model that combines networks and context was made to curate viewing time in historical buildings in video format. This context was taken using a network with search windows. The quality was tested through a study. Also, a dataset was made, including summary clips with photos or video. The results show that the network is better than others. Three VR experiences were talked about by getting opinions from creators and experts. The presentation was wanted to ask questions about a new way of doing things in museums. The experiences focused on the relationship to humanity and the tension in a museum. This presentation explored narrative aspects in designing user involvement in VR environments. The studies also showed that VR design could create ethical problems with showing the museum setting.

Can we recreate the experience of pilgrimage to nirvana through VR? Methods were used to create a VR experience of the trip to Dunhuang because physical travel became impossible. The VR reconstruction was tested through a study. It was found that the interaction helped keep user attention. Future work could test immersion and understand users' perspectives. In an era of urbanization, culture is losing both tangible and intangible things. As the world becomes connected, how do we sustain human tradition? The metaverse offers chances to think about cultural experiences. The public is given roles to create new digital content. Examples show ways to enable culture transmission.

12. Conclusion

Building a virtual reality temple in the metaverse has caught the eye of scholars and sparked a lot of research and creative thinking. This cool project has not just shown off what tech can do but also floated some great ideas for how we can show off our cultural heritage, get people involved spiritually, and connect with each other online. So, there are some interesting questions to investigate going forward.

First off, it's worth checking out how different user settings, stories, and experiences play out. In the metaverse, a virtual holy place can be made just right for personal, group, or ritual experiences. This lets people mess with cultural stuff in ways that feel personal. Since many users and creators can get involved, there's even more room for making stuff together, sharing stories, and letting communities show off their cultures. This kicks the door wide open for new ways to be creative, connect, and feel stuff, especially when you're talking about shared rituals and symbols.

AI could also make things even more exciting down the road. Imagine AI helping with automatic animation for complicated ceremonies, changing things up in real-time based on what users do, and offering voiceovers in tons of languages. This stuff could make cultural rituals easier for people all over the world to get into, and keep that real, deep feel. AI could also watch how people react and tweak what's happening to make the whole learning thing better.

This study showed a temple prototype in the metaverse as a space to get going, but there is so much more to discover. Cultural heritage is a big collection of traditions, stuff, meanings, and actions. Putting these elements in a virtual world means people need to think hard about how to set things up and design them (Lee, 2017) so they can get something out of the experience and future researchers know where to begin.

One of the coolest things about the metaverse is that it can hold those intangible pieces of our culture—prayers, chants, dances, stories, and rituals—in a way that's easy to get to and makes sense. Unlike physical heritage locations that are stuck in one place and can fall apart, these intangible things can be kept safe, copied, and even reimaged online with detail and interaction.

It's important to think about the location. Figuring out how virtual spaces copy, change, or go beyond the real-world feel of heritage sites is super important for knowing how people will react and what kind of cultural impact those sites will have. If we're having virtual heritage experiences, we have to think about what space means, the signals people pick up, and whether it fits the culture, so things stay meaningful and respectful.

The metaverse keeps changing, so how we arrange and take care of cultural stuff in this space needs both tech smarts and an understanding of how to look after digital culture. As we learn more together, there will be chances for teaching, keeping things safe, and talking with each other across cultures.

In the end, this research is a small move toward dealing with the fast changes happening in virtual reality and digital heritage. Even though there are problems, there's excitement and hope as we see current virtual technologies giving us new ways to keep our cultural heritage alive. These technologies create experiences that people join in with, interact

with, and feel more deeply than ever before. By mixing old and new, the metaverse could change the game for cultural expression and education.

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