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The Application and Innovation of Digital Projection Art in Cultural Tourism Projects: A Regional Study of Jiangsu Province

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Abstract: ***Against the backdrop of deep integration between culture and technology, digital projection art has emerged as a vital force driving innovation in cultural tourism. This study focuses on Jiangsu Province, examining the current applications and development trends of digital projection art across various cultural tourism scenarios, including museums, digital art galleries, and nighttime attractions. Through analysis of representative cases such as the China Grand Canal Museum in Yangzhou, the Suzhou Bay Digital Art Museum, and the night tour at Nianhuawan in Wuxi, the research highlights the multifaceted role of digital projection art in cultural heritage preservation, technological innovation, and immersive experience design. The findings indicate that digital projection art not only enhances multi-sensory immersive experiences for tourists but also fosters innovation in the form and expression of cultural tourism projects, extending their cultural value. This paper summarises Jiangsu's practical experiences in integrating digital projection art with cultural tourism and offers recommendations for future optimisation in the direction of smart tourism and sustainable development.***

Keywords: Digital Projection Art; Cultural Tourism; Immersive Experience; Technological Aesthetics; Jiangsu Province; Smart Tourism.

1. INTRODUCTION

In the context of rapid advances in information technology, the cultural tourism industry is undergoing a new phase of digital transformation. As an emerging display and interactive technology, digital projection art integrates traditional culture with modern technology through the medium of light and shadow, bringing significant changes to the presentation and experience of cultural tourism projects (花建 & 陈清荷, 2019). With the rising demand for cultural experiences, digital projection art has become a key component in areas such as theme parks, museums, and the nighttime economy.

Jiangsu Province, known for its rich cultural resources, has actively promoted the application of digital projection art. This not only enhances the cultural experience of visitors but also injects new vitality into the cultural tourism industry. However, its development still faces several challenges, including high technological costs, complex maintenance, and insufficient integration with traditional culture (Khosravi & Lim, 2013).

This paper aims to analyse the current application of digital projection art in cultural tourism projects in Jiangsu Province, and to explore its role in promoting industry diversification, innovation in forms, and the expansion of cultural connotations. By examining representative case studies, the paper identifies the successes and shortcomings of such initiatives, providing both theoretical grounding and practical guidance for the design and implementation of digital cultural tourism projects.

The significance of this research lies in summarising the value of digital projection art in cultural communication and offering references for the digital transformation of the cultural tourism industry in Jiangsu and across China. It seeks to facilitate cultural innovation and heritage revitalisation empowered by technology.

This study adopts a combined approach of literature review and case analysis to map out the research progress of digital projection art in the cultural tourism field, both domestically and internationally, thus establishing a clear theoretical foundation. Representative projects in Jiangsu Province are selected for analysis, constructing a research framework based on three dimensions: "technological application – experiential outcome – cultural value." This framework is used to evaluate the practical effects of digital projection art and to propose recommendations for improvement. The research approach focuses on regional and typological analysis, using exemplary cases to uncover common patterns and innovative pathways, thereby contributing to the sustainable

development of digital projection art within cultural tourism.

2. CURRENT DEVELOPMENT AND EXISTING CHALLENGES OF DIGITAL PROJECTION ART IN CULTURAL TOURISM PROJECTS

2.1 Current Development of Digital Projection Art in Cultural Tourism Destinations

In recent years, with the growing demand for cultural experiences among tourists, digital projection art has gradually become an integral component of cultural tourism destinations. By integrating digital projection technologies with the natural environment, historical sites, and cultural elements of scenic areas, many destinations are now able to offer richer and more immersive visual experiences. Projection mapping technologies are used to create dynamic visual effects, enabling the presentation of cultural scenes and the conveyance of significant information within exhibition spaces, thereby enhancing audience immersion and emotional engagement (Nikolakopoulou et al., 2022).

In Jiangsu Province, for instance, digital projection technology has been widely adopted in renowned destinations such as the Nanjing Museum and the classical gardens of Suzhou. It is extensively applied in nighttime light shows and live-action performances, enhancing the cultural atmosphere of the sites, prolonging visitor stays, and increasing the overall appeal of the attractions. Digital projection art not only conveys the cultural richness of a destination but also enables the virtual recreation of historical scenes, allowing visitors to experience the vitality and continuity of cultural heritage.

Despite these notable benefits, the practical application of digital projection art in tourism destinations still faces multiple challenges. Firstly, the high costs associated with digital projection equipment and technology pose financial burdens on many scenic areas, especially in terms of implementation and ongoing maintenance. Secondly, the complexity of digital projection systems demands a relatively high level of technical operation and management capabilities from destination operators, thereby increasing operational difficulties.

Moreover, effectively integrating digital technology with existing cultural elements remains a critical concern. When used thoughtfully, digital interventions can enhance audience interaction and engagement, revitalising traditional art forms and making them more accessible (Peng, 2023). In addition, the use of immersive technologies such as virtual reality (VR) and augmented reality (AR) can transcend the limitations of traditional exhibitions, offering captivating experiences that allow for deeper exploration of cultural narratives (Lin & He, 2023). However, it is essential to ensure that such digital interventions do not overshadow the intrinsic values of the cultural heritage they seek to represent. A cautious balance must be maintained between innovation and tradition (Boh & Adoka, 2023).

Therefore, a deliberate and considered approach to digital projection art can foster cultural preservation while embracing technological advancement.

2.2 Current Development of Digital Projection Art in Theme Parks

As a vital sector within the cultural tourism industry, theme parks have long attracted large numbers of visitors with their rich entertainment offerings and distinctive cultural themes. In recent years, continuous advancements in digital technology have led to the integration of digital projection art into theme parks, significantly enhancing the immersive experience for visitors.

The combination of digital projection and immersive technologies in theme parks has markedly elevated visitor engagement. Research indicates that projection-based quasi-holographic technologies are transforming traditional attractions into more compelling environments, allowing stories to be told in a non-linear fashion and enabling visitors to participate actively, rather than passively observe (Choe, 2023). This shift is exemplified by immersive experiences such as Disney's Star Wars: Galactic Starcruiser, where guests assume protagonist roles, thereby deepening their involvement in the narrative (Gröppel-Wegener, A., 2024).

Additionally, studies on Legoland Malaysia demonstrate that the application of virtual reality (VR) technology can enhance visitor satisfaction and increase the likelihood of return visits (Azmin et al., 2023). The design of digital platforms in parks, guided by the principles of immersive experience, is also crucial for maximising user engagement while ensuring safety and sustainability (Liu, L., 2023). However, it is important to maintain balance

in the application of digital technologies, as inconsistent or poorly integrated implementations can undermine immersion and reduce the overall quality of the experience (김정환 et al., 2024).

Thus, digital projection art is increasingly becoming a key element in enriching immersive experiences within theme parks. In the context of Jiangsu Province, while the Suzhou Bay Digital Art Museum is not a theme park in the traditional sense, it has adopted a "digital art playground" model through the use of XR/AR and holographic projection technologies. Immersive exhibitions such as A Thousand Miles of Rivers and Mountains and the family-oriented science education show Lingmou demonstrate a composite narrative framework combining "technological aesthetics + science education + interactive entertainment." This approach exhibits immersive mechanisms and operational models comparable to those found in theme parks, offering valuable methodological insights for the digital upgrading of regional theme parks.

2.3 Current Development of Digital Projection Art in Museums

As vital institutions for cultural dissemination and education, museums have long held the responsibility of preserving and transmitting cultural heritage. With the advancement of digital technologies, digital projection art has increasingly become an essential tool for museum displays, bringing renewed vitality to the presentation of artefacts and the communication of cultural narratives. The integration of projection mapping, sound interaction, and artificial intelligence into media art has significantly enhanced the immersive and interactive dimensions of exhibitions, promoting a deep synergy between technology and art while offering visitors novel experiences within museum spaces (Song & Evans, 2024).

One illustrative example is the Grão Vasco National Museum project, which demonstrates the potential of digital storytelling to foster meaningful engagement between audiences and cultural heritage. This indicates that digital projection art is evolving in a promising direction (Paiva & Cardoso, 2023).

In Jiangsu Province, institutions such as the Nanjing Museum and the Suzhou Museum have widely adopted digital projection technologies. Through the use of light and shadow, these museums reconstruct historical scenes and cultural narratives, effectively "bringing static artefacts to life." Visitors can more intuitively grasp the historical context behind the exhibits amidst dynamic imagery and ambient audiovisual effects, thereby enhancing both engagement and cultural resonance. For example, the Nanjing Museum employs immersive visuals to recreate scenes of ancient court life, allowing visitors to experience the depth and warmth of history alongside the artefacts themselves.

Nonetheless, museums face several challenges in employing digital projection: balancing traditional curation with digital presentation without allowing technology to overshadow content; managing the high costs of equipment and maintenance; and ensuring optimal display conditions while safeguarding the integrity of the artefacts. Going forward, digital exhibitions must place greater emphasis on deep integration with cultural storytelling, maintaining a careful balance between educational value and authenticity, and avoiding superficial visual spectacle.

A leading example in regional practice is the China Grand Canal Museum in Yangzhou, which employs a combination of "full-domain projection + real-time rendering + interactive theatre" to construct 540°/720° immersive environments and AR-reconstructed street scenes. In exhibition areas such as *Boats on the Canal* and *Love of the River*, the museum establishes a dynamic interaction mechanism based on "visitor behaviour – projection feedback – emotional presence." While preserving cultural heritage, the museum utilises digital media to reconstruct historical experiences, making it a model for immersive heritage-focused exhibitions.

2.4 Current Development of Digital Projection Art in Night-Time Cultural Tourism

As an emerging model within the cultural tourism industry, the night-time economy has rapidly expanded across China in recent years, with digital projection art playing a central role in its growth. The widespread application of projection mapping (PJM) technology and digital storytelling has significantly enriched the diversity of night-time cultural experiences. PJM enhances the appeal of cultural heritage sites through captivating visual effects and interactive features, becoming a key tool for improving visitor engagement (Li & Ito, 2023). However, some studies have noted that certain projects overly emphasise visual aesthetics at the expense of conveying historical and cultural meaning (Li & Hiromu, 2021).

In addition, digital platforms based on virtual routes and augmented reality are gaining traction. These platforms not only highlight intangible cultural heritage and local distinctiveness—thereby strengthening visitors' connections with regional cultures—but also contribute positively to sustainability and ecological balance (Gonçalves et al., 2022). Overall, digital projection is injecting innovative momentum into the night-time tourism economy, but its cultural relevance and educational value still require deeper development.

In Jiangsu Province, cities such as Nanjing, Suzhou, and Wuxi have actively embraced the "night tourism + smart cultural tourism" trend, launching a range of diverse digital night-tour projects. In Nanjing, the Confucius Temple "Qinhuai Lantern Festival" combines digital projection with traditional lantern art, presenting a visually spectacular fusion of festive culture and modern technology. The Suzhou Bay Digital Art Museum offers an "indoor extension" of night-time cultural consumption through XR and immersive exhibitions. Meanwhile, Nianhuawan in Wuxi integrates 3D water screen projections, mountain and architectural mapping, and MR metaverse interactions to create a unified "sound-light-electricity-form-colour-sensation" experience system. Through Zen-inspired storytelling, the site fosters emotional progression and spiritual resonance.

These initiatives have significantly enhanced the nocturnal image of cities and increased visitor dwell time, promoting a shift in night-time tourism from mere "light shows" to meaningful "cultural experiences." However, challenges such as high equipment maintenance costs, limited environmental adaptability, and increasing project homogeneity have begun to surface.

Looking ahead, the development of night tourism in Jiangsu should focus on deepening the cultural richness and local specificity of digital projection content. Emphasis should also be placed on the adoption of low-carbon technologies, such as green lighting and energy-efficient projection, to build a digital night tourism system that balances aesthetic, educational, and sustainable values—thus achieving a harmonious coexistence of technological innovation and cultural preservation.

3. THE ROLE AND IMPACT OF DIGITAL PROJECTION ART IN CULTURAL TOURISM PROJECTS

3.1 Promoting the Diversified Development of Cultural Tourism Projects

Digital technology is playing an increasingly significant role in cultural tourism, reshaping how visitors interact with cultural sites (Ponsignon & Derbaix, 2020). The introduction of digital projection art has greatly accelerated the diversification of cultural tourism projects. Traditionally, such projects have relied heavily on physical landscapes and static cultural content. However, digital projection technologies introduce a new dimension of presentation, enabling richer and more varied forms of cultural expression.

Through digital projection, cultural tourism projects can present complex cultural narratives in innovative formats, transcending the limitations of time and space. For instance, historical and cultural sites can use projection to recreate long-lost scenes from the past, allowing visitors to "travel through time" and experience ancient ways of life. Moreover, digital projection can seamlessly integrate diverse cultural elements within a single space, facilitating the convergence and interaction of multiple cultural themes.

This technological breakthrough enables cultural tourism projects to move beyond the confines of traditional physical displays, establishing hybrid platforms that combine both virtual and in-person experiences. As a result, project content becomes more engaging and inclusive, attracting a wider range of visitor demographics and stimulating the overall diversification of the cultural tourism industry.

In addition, when combined with other technologies such as virtual reality (VR) and augmented reality (AR), digital projection art can further expand the expressive possibilities of cultural tourism. These integrations provide more diverse and personalised cultural experiences, catering to the evolving interests and expectations of modern tourists.

In summary, digital projection art, as a novel technological medium, plays a crucial role in promoting the diversification of cultural tourism projects. It not only enhances the depth and breadth of cultural presentation but also opens up new pathways for the continued evolution of the cultural tourism sector.

3.2 Driving Innovation in the Forms of Cultural Tourism Projects

The application of digital projection art in cultural tourism projects has led to significant innovations in presentation formats. Traditional cultural tourism experiences have often relied on static displays and guided narration. However, the integration of digital projection technology has greatly enriched and diversified these formats. By overlaying virtual imagery onto physical environments, digital projection creates dynamic and interactive displays that transform the way culture is experienced.

For example, at historical sites, projection technology can be used to "re-enact" major historical events directly in front of visitors, allowing them to witness the past as if they were present, fostering a powerful sense of realism and emotional engagement. This type of format innovation not only enhances the visual appeal and participatory nature of cultural tourism projects but also strengthens the sense of immersion and overall visitor experience.

Moreover, digital projection art encourages cross-disciplinary integration within cultural tourism, merging elements such as music, dance, and theatre with cultural heritage displays to create inventive and expressive performances. These creative formats make cultural tourism more engaging—particularly for younger audiences and families—by offering rich interactive experiences that blend entertainment with education.

At the same time, these innovative forms open new possibilities for the operation and promotion of cultural tourism projects. For instance, the visual appeal and uniqueness of digital projection installations are well-suited for social media sharing, while the digital content itself can be repurposed for secondary uses, thus expanding the project's influence and reach.

In summary, by driving innovation in the forms of cultural tourism projects, digital projection art not only enhances visitor engagement and experience but also injects new vitality and momentum into the development of the cultural tourism industry.

3.3 Expanding the Cultural Connotations of Cultural Tourism Projects

Digital projection art not only brings innovation in terms of presentation formats but also profoundly enriches the cultural content of cultural tourism projects. Traditional cultural tourism offerings often revolve around historical sites, natural landscapes, or local customs, with relatively linear and static modes of storytelling. The integration of digital projection technology has facilitated a shift from "static viewing" to "dynamic experience," enabling a deeper and more layered exploration of cultural meaning.

Through the reconstruction of light and shadow and the incorporation of interactive design, digital projection allows for the integration of extensive historical information and cultural symbols into exhibitions, creating multi-dimensional narrative spaces. For example, in museum contexts, digital projection can go beyond merely showcasing artefacts—it can dynamically illustrate the craftsmanship behind them, their historical background, and the legends associated with them, offering audiences a more holistic and emotionally resonant understanding of cultural heritage.

More than just a visual medium, digital projection art serves as a vital tool for the preservation and revitalisation of cultural heritage. With its vivid imagery, it allows traditional cultures and historical narratives to reach broader audiences and gain wider recognition (Chen & Zhou, 2024). Furthermore, digital technologies facilitate the fusion of cross-cultural elements, leading to the creation of new cultural imaginaries and forms of storytelling, thus fostering cultural innovation and extending the value of heritage.

In night tourism projects, projection art reinterprets traditional culture through modern festive aesthetics, breathing new life into heritage and evoking emotional resonance among audiences. This helps promote cultural continuity and contemporary relevance.

Three representative cases in Jiangsu illustrate this transformative impact:

– The China Grand Canal Museum in Yangzhou uses immersive projection to recreate ancient markets and river life, enhancing historical realism and reinforcing cultural identity.

– The Suzhou Bay Digital Art Museum reimagines the classical painting A Thousand Miles of Rivers and Mountains as a dynamic digital scroll, allowing visitors to "travel through the painting," and bringing traditional aesthetics into the present.

– The Nianhuawan night tour in Wuxi integrates Zen-inspired storytelling with water projections, landscape lighting, and folk performances, creating a unified "sensation–emotion–culture" experience.

Overall, digital projection art has enabled the regeneration of cultural narratives through technological innovation. It not only deepens the content of cultural tourism projects but also offers new pathways for the modern communication of cultural heritage and the sustainable development of the cultural tourism industry.

4. REGIONAL CHARACTERISTICS AND CASE STUDIES OF DIGITAL PROJECTION ART IN JIANGSU PROVINCE

As a province rich in cultural heritage, economically dynamic, and highly capable in technological innovation, Jiangsu is at the forefront of integrating digital projection art into cultural tourism under the national strategies of "Digital China" and "Smart Cultural Tourism." A new model of cultural tourism is gradually taking shape in the region—centred on cultural inheritance, technological innovation, and immersive experience.

Through a systematic analysis of three representative cases—the China Grand Canal Museum in Yangzhou, the Suzhou Bay Digital Art Museum, and the night tour project in Nianhuawan, Wuxi—this paper explores the regional development characteristics and innovation mechanisms of digital projection art in Jiangsu from three dimensions: culture, technology, and user experience.

4.1 Regional Analysis of Cultural Tourism Projects in Jiangsu Province

1) Policy and Environmental Foundations for Cultural Tourism Integration

The high-quality development of Jiangsu's cultural tourism industry is supported by both government policy and technological innovation. The provincial government has introduced key documents such as the 14th Five-Year Plan for the Development of Culture and Tourism in Jiangsu Province and the Implementation Opinions on Promoting the High-Quality Development of Smart Tourism. These explicitly call for the construction of "immersive, technology-driven, and digitally empowered" cultural tourism projects, identifying immersive technologies such as digital projection, augmented reality (AR), and virtual reality (VR) as priority areas for industry support. Furthermore, Jiangsu benefits from its strategic position within the Yangtze River Delta integration initiative, which has fostered an innovation ecosystem combining research and development, creative industries, and cultural consumption. This provides both technical and market foundations for the wide application of digital projection art in the cultural tourism sector.

From a regional perspective, Jiangsu's cultural tourism industry is transitioning from a "resource-driven" model to an "experience-driven" paradigm. As a key medium for integrating technology and culture, digital projection art has become a vital tool for advancing high-quality development in the sector. Its application in museums, art galleries, and night-time attractions is not only transforming traditional methods of presentation but also reshaping how visitors engage with and experience cultural spaces.

2) Regional Cultural Characteristics and the Direction of Digital Cultural Tourism Development

Jiangsu's digital cultural tourism demonstrates a synthesis of profound cultural heritage, active technological innovation, and mature experience design. As a province where culture and economy are deeply intertwined, Jiangsu's use of digital projection art in tourism has evolved into a multi-dimensional and synergistic development pattern that balances tradition with innovation.

From the perspective of cultural resources, Jiangsu possesses a wealth of historical legacies and cultural themes, such as the Grand Canal culture, Jiangnan garden culture, and Zen culture. These provide a deep reservoir of content and visual narratives for digital projection art. For instance, the China Grand Canal Museum in Yangzhou leverages the legacy of canal civilisation, using immersive projection to reconstruct historical scenes and create narrative experiences—serving as a model for the digital transformation of cultural heritage exhibitions.

On the technological front, Jiangsu demonstrates strong capabilities in digital media, display technologies, and creative design. The Suzhou Bay Digital Art Museum integrates cutting-edge 8K glasses-free 3D, XR, and MR projection technologies to construct a hybrid digital art space. This transition from static display to dynamic participation reflects a growing trend toward the aesthetic application of technology in cultural tourism.

In terms of experience design, Jiangsu's projects focus on constructing immersive, interactive, and narrative-driven environments. The Nianhuawan night tour in Wuxi combines 3D water screen projection, AR drone performances, and MR metaverse interactions to merge Zen-inspired storytelling with natural landscapes. This results in a holistic "sound-light-electricity-form-colour-sensation" experience system, achieving both atmospheric immersion and emotional resonance.

In summary, the development of digital projection art in Jiangsu follows an evolutionary trajectory—from "cultural narrative-driven" approaches to "technological integration and innovation," and ultimately to "deepened experiential enhancement." This trend unites culture as the soul, technology as the foundation, and experience as the core, realising the simultaneous goals of cultural dissemination, emotional interaction, and aesthetic innovation. It is this convergence that defines Jiangsu's distinctive digital innovation ecosystem within cultural tourism.

4.2 Representative Cases of Digital Projection Art in Cultural Tourism Projects in Jiangsu Province

Driven by the region's rich cultural heritage and robust technological innovation environment, Jiangsu has gradually developed a multi-layered application system for digital projection art within its cultural tourism sector. To better illustrate its regional characteristics and development model, this paper analyses three representative cases, each exemplifying a distinct model of integration: heritage-based, tech-art-based, and experiential fusion-based applications. Together, these form a comprehensive "museum – digital art museum – night-time scenic attraction" sample structure.

1) China Grand Canal Museum, Yangzhou – Immersive Heritage Exhibition Model

The China Grand Canal Museum in Yangzhou, completed and opened to the public in 2021, is a core component of the national cultural initiative—the Grand Canal National Cultural Park. Recognised as one of China's first "demonstration cases for immersive cultural tourism," the museum is designed to revitalise cultural heritage and recreate historical experiences. It achieves this by integrating projection mapping, real-time rendering, interactive theatre, and sound-light control technologies to revive the millennia-old memory and social landscape of the Grand Canal.

A key exhibition space, Born of the Canal: Impressions of Street Life, employs AR reconstruction and multi-surface projection to simulate an ancient market street. Interactive devices allow visitors to "walk through" the street, creating a multi-sensory experience. The Boats on the Canal section features a full-scale replica of a traditional "shafei" barge, brought to life through 360-degree panoramic projection and dynamic sound effects, recreating the vibrant scene of "a thousand sails racing." Meanwhile, the Love of the River gallery uses 14 projectors and a floor-based interactive system to generate real-time feedback to visitors' footsteps via infrared sensors, producing rippling light effects on the ground—thereby transforming the space into a participatory immersive environment (see Figure 1).

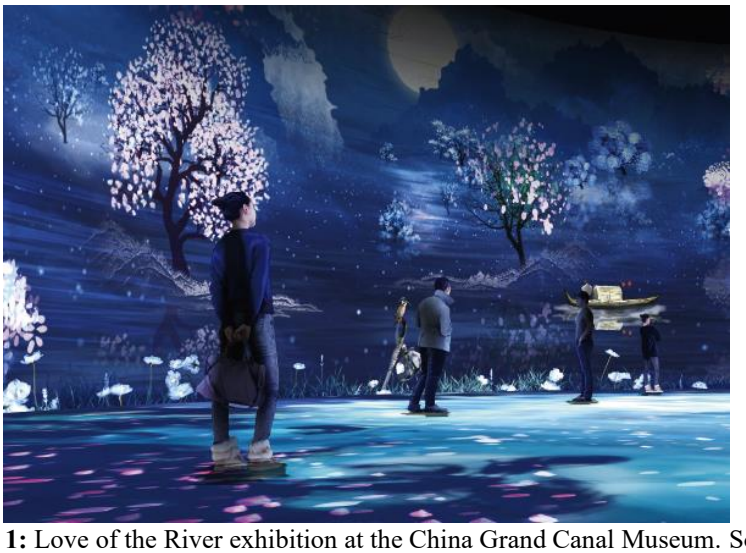

Figure 1: Love of the River exhibition at the China Grand Canal Museum. Source: https://canalmuseum.net/zhuantizhanlan

This project reconstructs cultural contexts through narrative-driven digital media displays, allowing visitors to experience the flow of history and the warmth of culture within an immersive environment of light and sound. It not only expands the functional scope of museum exhibitions but also deepens public understanding and appreciation of Grand Canal culture. As such, it serves as a representative example of the integration between traditional culture and digital technology.

2) Suzhou Bay Digital Art Museum – Integration of Smart Tourism and Technological Aesthetics

The Suzhou Bay Digital Art Museum is the first project in Suzhou to be selected as a national pilot for "immersive experience spaces in smart tourism," marking a significant step in the technological and industrial development of digital art spaces in Jiangsu. Guided by the core concept of "virtual-reality integration and technology-empowered art," the museum applies a range of cutting-edge technologies—such as 8K ultra-high-definition displays, XR interactive imaging, glasses-free 3D, and holographic projection—to create an interactive, perceptive, and multidimensional artistic experience space.

The flagship exhibition, A Journey Through a Thousand Miles of Rivers and Mountains: An Immersive Art Exhibition by the Palace Museum, features a 26-metre by 5-metre dynamic scroll. Using digital rendering and a sophisticated sound-light system, the museum transforms a classic Song dynasty landscape painting into a walkable visual environment. In the Lingjing – World of Future Inspiration zone, brainwave sensors and motion-based projections enable "emotional visualisation interactions" (see Figure 2). Another exhibition, Lingmou – A World Through the Eyes, merges visual art with public education on eye health, achieving a meaningful integration of art, technology, and education.

The museum embodies the concept of "technological aesthetics," breaking traditional boundaries of art appreciation by combining digital technologies with visual arts. It allows audiences to experience the symbiotic relationship between technology and art through multisensory engagement. The project not only introduces a new mode of exhibition for cultural tourism spaces but also drives innovation in the application of digital art for cultural communication and public education.

Figure 2: Lingjing – World of Future Inspiration exhibition at Suzhou Bay Digital Art Museum. Source: https://www.edcc.cn/exhibition

3) Nianhuawan Night Tour, Wuxi – Zen-Inspired Immersive Night-Time Experience

Lingshan Town's Nianhuawan, themed around "Tang-Song aesthetics and Zen philosophy," is a leading example of integrating night-time cultural tourism with immersive performance in Wuxi. Through the use of 3D water-screen projections, laser holography, dynamic sculptures, and synchronised light-sound technologies, the project blends natural landscapes with humanistic narratives, forming a new intelligent night-tour model that unites culture, technology, and emotion.

The core programme, A Smile at the Flower, adopts a walk-through immersive theatre format, projecting light and

imagery onto buildings and natural backdrops. Visitors progress through the story step by step, experiencing an emotional crescendo. In Realm of Clarity, 3D light projections and a positional sound system create an immersive "sound follows scene" environment as visitors travel by boat. Meanwhile, Zen Walk features an 8-metre-tall dynamic sculpture paired with water-screen laser projections to narrate a Zen-inspired tale of "love and enlightenment," showcasing the profound integration of technological art and spiritual themes (see Figure 3).

Figure 3: Zen Walk performance at Nianhuawan. Source: https://www.nianhuawanwenlv.com/scenic1.html

By analysing the China Grand Canal Museum in Yangzhou, the Suzhou Bay Digital Art Museum, and the Nianhuawan Night Tour in Wuxi, it becomes evident that digital projection art in Jiangsu presents distinct regional characteristics and multidimensional advantages. First, strong cultural inheritance: each project centres on local culture and historical heritage, achieving the digitisation and experiential expression of cultural narratives. Second, prominent technological innovation: by integrating AR, VR, XR, and MR technologies, these projects transition from "static viewing" to "dynamic participation." Third, notable experiential integration: using immersive interaction and narrative-driven spatial design, they construct multidimensional experience systems across sensory, cognitive, and emotional layers.

Overall, digital projection art in Jiangsu's cultural tourism sector has formed a diversified development framework—anchored in cultural heritage (Yangzhou), driven by technological innovation (Suzhou), and directed towards experiential fusion (Wuxi). This reflects a region-specific pathway for the deep integration of culture and technology.

5. APPLICATION AND INNOVATION OF DIGITAL PROJECTION ART IN JIANGSU'S CULTURAL TOURISM PROJECTS

5.1 Analysis of Innovative Application Models

In Jiangsu's cultural tourism sector, innovative applications of digital projection art have achieved notable success by combining regional cultural characteristics with modern technology. This fusion not only revitalises traditional culture through new expressive forms but also enhances integration and interaction within cultural tourism projects. The province has developed a distinctive innovation system centred around "heritage presentation – digital art experience – immersive night-time performance," as exemplified by three flagship projects: the China Grand Canal Museum in Yangzhou, the Suzhou Bay Digital Art Museum, and the Nianhuawan night tour in Wuxi.

The Grand Canal Museum utilises a 720° immersive theatre and AR-reconstructed street scenes to digitally revitalise cultural heritage and offer interactive educational experiences. The Suzhou Bay Digital Art Museum integrates 8K glasses-free 3D, XR, and MR technologies to create a "smart tourism + artistic performance" space, embodying a fusion of technological aesthetics, education, and entertainment. Meanwhile, Nianhuawan's night tour combines 3D water-screen projection, AR drones, and Zen-inspired storytelling to develop an immersive paradigm for night-time cultural performance. These projection-driven models not only enhance interactivity but

also deepen visitor immersion and emotional resonance.

Furthermore, innovation in Jiangsu's projects is evident in a three-dimensional operational model combining "content – technology – environment." By integrating cultural IP, digital imagery, and spatial storytelling, these projects shift from static displays to dynamic narratives. For example, the Grand Canal Museum's "Boat Voyage" scenario fosters a closed loop of interaction between viewer, image, and space, while the "Zen Walk" programme in Nianhuawan creates sensory synergy between art, spirituality, and technology through dynamic sculptures and choreographed projection. These models effectively support the diversification and personalisation of cultural tourism, marking Jiangsu's entry into a new stage of the "immersive experience economy."

5.2 Strategies for Upgrading the Cultural Tourism Industry through Digital Projection Art

The widespread application of digital projection art has become a strategic driver for upgrading Jiangsu's cultural tourism industry. By enhancing visitor experience and interactivity, digital projection injects new vitality into tourism offerings. Specifically, projects in Jiangsu have developed a dual-engine model of "technology empowerment + cultural storytelling," using content innovation to drive industrial restructuring. For example, the "night tourism + immersive performance" model in Nianhuawan significantly increases visitor stay duration and stimulates multi-sector consumption—across dining, lodging, and entertainment. Similarly, the high-tech exhibitions at the Suzhou Bay Digital Art Museum attract families and science-education audiences, creating a new industry model that integrates tourism with public education.

Moreover, digital projection art adds cultural value to tourism projects, extending industry chains and promoting brand development. The Grand Canal Museum, for instance, transforms cultural heritage into a civic identity through "digital storytelling + heritage IP," with derivative digital cultural products, immersive guides, and educational programmes broadening the cultural tourism value chain.

The visual appeal of digital projection also plays a key role in tourism branding. Many projects in Jiangsu leverage short videos, panoramic livestreams, and virtual tours to broadcast their experiences on social media and digital platforms, creating a "digital engagement – physical conversion" marketing cycle. This enhances project visibility and provides sustainable momentum for regional tourism growth.

In essence, digital projection art supports the upgrade of Jiangsu's cultural tourism industry not only in terms of display, but also through a holistic value chain of "content innovation – brand development – industry extension." It is emerging as a pivotal force in transitioning from experience-based tourism to intelligent, technology-enabled tourism.

5.3 Future Trends and Recommendations

Looking forward, the application of digital projection art in Jiangsu's cultural tourism is expected to expand and deepen. With continuous technological advancement and increasing demand for personalised cultural experiences, digital projection will further drive customised content and immersive environments.

Firstly, Jiangsu should continue to integrate digital projection with artificial intelligence (AI), virtual reality (VR), and mixed reality (MR), creating multimodal, fully immersive environments that support "multi-sensory – all-scenario – full-time" smart tourism systems.

Secondly, a content-driven local innovation mechanism should be established. Universities, design studios, and tech enterprises should be encouraged to co-develop "digital cultural tourism innovation labs," promoting the digital recreation and dissemination of original cultural IP. To ensure long-term sustainability, the province should also prioritise eco-friendly technologies and energy-efficient projection equipment, aligning with green tourism and low-carbon development goals.

Finally, at the industry level, a standardised system for digital cultural tourism should be implemented. This includes enhanced regulation on content copyright, immersive technology standards, and operational safety, providing a robust institutional framework for the healthy development of digital projection art.

Through these efforts, Jiangsu is well-positioned to maintain its leadership in digital cultural tourism innovation. By centring development on "cultural narrative – technological empowerment – experience design," the province

can further refine its digital projection art model and offer valuable insights for the high-quality transformation of China's cultural tourism industry.

6. CONCLUSION

This study has systematically examined the application status, innovative models, and development trends of digital projection art in cultural tourism projects, using Jiangsu Province as a representative case. Through the analysis of three flagship projects—the China Grand Canal Museum in Yangzhou, the Suzhou Bay Digital Art Museum, and the Nianhuawan night tour in Wuxi—it is evident that digital projection art has become a key driver of cultural-tourism integration in Jiangsu. It demonstrates multifaceted value in cultural heritage preservation, technological innovation, and immersive experience design.

The findings highlight that digital projection serves not merely as a technological display tool, but as a medium that connects cultural narratives with emotional engagement, facilitating a shift in the tourism industry from "visual presentation" to "experiential resonance." This paper proposes an analytical framework centred on "cultural content – technological medium – immersive experience" and puts forward the "Jiangsu Model," which is characterised by culture-driven storytelling, technology empowerment, and deepened experiential design. This model provides both theoretical insights and practical guidance for the development of digital cultural tourism.

Looking ahead, with the continued integration of technologies such as AI, VR, and MR, digital projection art is expected to expand further across fields such as cultural tourism, public art, and urban regeneration. It will continue to drive the deep integration of culture and technology, supporting the high-quality and sustainable development of the cultural tourism industry.

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