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Design Framework for Interactive and Digital Spaces for the Documentation Experience of Traditional Iranian Architecture (Case Study: Tekyeh Dowlat, Tehran)

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ABSTRACT

With the advancement of digital technologies, their use in preserving, representing, and re-experiencing architectural heritage has gained increasing importance. Many valuable buildings of traditional Iranian architecture have disappeared due to urban transformations, the erosion of time, natural disasters, and a lack of effective planning. This study aims to develop a conceptual framework for utilizing digital technologies in designing interactive spaces for the purpose of documenting, representing, and enhancing the identity of traditional Iranian architecture. The main objective is to revive collective memory, strengthen cultural awareness, and redefine the role of architecture by leveraging new digital capabilities. The research adopts a meta-synthesis approach combined with a case study of Tekyeh Dowlat, a Qajar-era structure, and demonstrates that digital technologies, by creating interactive spaces, can enhance users' perception and experience of historical heritage. The findings indicate that historical works, when supported by modern technologies, can be reimagined not as static objects but as dynamic and living environments that are revived in contemporary memory and experience. The resulting framework integrates the tripartite model of place with various types of data, representation methods, and material characteristics within the digital space of Tekyeh Dowlat in the Tehran Arg district. Data is organized into six main categories: physical, historical-cultural, sensory-experiential, social-behavioral, climatic-environmental, and educational.

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Introduction

Designing Interactive Spaces Based on Digital Architecture Principles has created a significant transformation in users' experience of urban and historical environments [1]. Interactive architecture can be considered as a fusion of architectural design and digital technology, which from a philosophical perspective allows for the redefinition of the designer's role. In this approach, the designer's role is not limited to creating a final design but includes analytical processes related to buildings and environments designed to respond, adapt, change, and support life. Currently, the concept of interaction has expanded beyond the relationship between humans and objects or physical environments and has become part of a broader ecosystem in which objects, spaces, and buildings communicate and interact independently and simultaneously with each other [2].

Among these, traditional Iranian architecture, as an important part of the country's cultural and historical identity, possesses diverse and unique artistic, technical, and indigenous values that necessitate preservation and transmission to future generations [3]. However, this valuable heritage faces threats such as natural erosion, inappropriate urban interventions, climate change, and a lack of effective protective plans. Advances in digital technologies have enabled precise documentation and interactive representation of traditional architecture. These technologies not only assist in comprehensive recording of architectural information but also create a novel, interactive, and multisensory experience for users, researchers, and the general public [4].

The main aim of this research is to design a framework for employing digital technologies in creating interactive spaces for documentation, enhancement of identity, and representation of traditional Iranian architecture. To achieve this goal, the present study focuses on three fundamental axes: first, examining and analyzing how digital interactive spaces improve a more effective and deeper user experience of traditional architecture; second, analyzing the capabilities and limitations of new technologies in the documentation process; and third, exploring the role of these spaces in establishing a meaningful connection between the new generation and indigenous architectural heritage.

Moreover, modern technologies in the field of documenting historical buildings have caused a fundamental transformation in the conservation and restoration processes. These tools combine high accuracy, appropriate speed, and the ability to produce 3D data, enabling more comprehensive and precise documentation. Utilizing these technologies not only reduces time and cost but also provides accurate digital models that allow for advanced simulations and analyses, which were not achievable through traditional methods. Additionally, modern technologies play an essential role in strengthening protection of historical monuments against destructive factors and facilitate digital data storage, paving the way for future research and educational applications. This trend represents a crucial step towards preserving and continuing cultural heritage.

One of the case studies in this project is the digital recreation of Tekyeh Dowlat — a magnificent and symbolic building from the Qajar era that no longer physically exists today. This structure, once one of the most prominent ceremonial and theatrical spaces in Tehran, can now only be traced through historical documents and collective memory. By using historical records, old photographs, maps, and 3D modeling, an interactive space can be designed that enables users to virtually walk through Tekyeh Dowlat, observe its architectural details, watch reconstructed scenes of Ta'zieh (traditional passion plays), and become acquainted with the cultural-social history and functions of the building. This experience exemplifies how technology can revive historical spaces into the cultural life of society and demonstrates how digital tools can play a role in architectural heritage documentation and education.

Background Research

Marcus Novak (1991) is one of the pioneers in theorizing interactive architecture and its relationship with digital technologies. He introduced new concepts to architecture based on dynamic and living interactions between humans and spaces. One of Novak's prominent concepts is "Liquid Architecture." In this theory, Novak suggests that architecture should be flexible and dynamically respond to human needs. This concept specifically refers to characteristics of architectural spaces that possess the ability to change and transform, similar to how digital and computer technologies interact with users. In Liquid Architecture, spaces change not only through physical alterations but also through informational and digital changes [5].

Mark Wigley (1993), emphasizing the complex interconnection between architecture and new digital media, analyzed how electronic technologies influence spatial structures and perceptual experience of architecture. He considers architecture not merely as a design tool but as a media platform for redefining human relationships with space in the digital age. He examined the impact of digital technologies on shaping architectural spaces and argued that digital architecture acts not only as a design instrument but also as a medium shaping human experience [6].

Digital technologies influence all stages of design, analysis, simulation, construction, and operation of spaces. This approach transforms design processes from linear and traditional to interactive and dynamic. Dr. Golabchi emphasizes that digital design does not mean removing the designer or architect from the design process, but rather helping the designer use the computer's high processing speed and extensive memory to apply more precise inferential processes to achieve suitable and optimized designs [7].

Information and Communication Technology (ICT), beyond its instrumental function in recording and producing digital documentation, can play an influential role in the flourishing and vitality of urban historic sites. This technology supports humans in three fundamental dimensions of place: functionally, by improving security, nighttime vitality, and social connections; perceptually, by enhancing the sense of identity and belonging to place; and physically, by recreating and organizing urban spaces [8].

The Concept of Interactive Architecture

With the entry of digital technology into the field of architecture and the placement of space in the context of the communication era, a new type of design has emerged, known as "interactive space." This space results from the combination of characteristics of digital architecture and virtual space [25]. Although the concept of interactive architecture may seem novel at first glance, human use of tools and materials for shelter construction has always involved a form of interaction with the environment throughout history [26].

From a comprehensive perspective, interactive architecture refers to a type of architecture that, utilizing modern technologies, smart materials, and design within digital and virtual contexts, provides a space that enables mutual interaction among humans, space, place, and the surrounding environment [27]. Many researchers in communication and computer sciences believe that interactivity is rooted in the technical features of technology; these capabilities allow the user to interact with the system. Factors such as response speed, variety of options to manipulate the media environment, and the system's ability to anticipate or coordinate with user behaviors are all indicators of an interactive technological environment. According to Steuer (1992), environments like virtual space, electronic messaging systems, and similar platforms inherently possess interactive capacities. In these environments, user control and influence over content, especially in the form of two-way message exchange, are key elements of interaction [28].

From this perspective, researchers analyzing interactivity within the framework of technology focus on the degree of control and authority technology provides to the audience. Generally, most theorists emphasize that interactivity depends on technological capabilities; meaning that if technology lacks features such as control, choice, two-way communication, and quick responsiveness, true interaction between user and system will not occur [29].

Architecture and Design of Digital Technologies

Digital architecture is a type of design and spatial creation that leverages modern computer technologies and advanced graphic tools, enabling architects to visualize and simulate complex spaces without the need for physical models or traditional mock-ups. This design approach significantly enhances the mental visualization of space and facilitates the understanding of its visual and conceptual dimensions. In this approach, the computer serves as a creative tool for architects to digitally design and examine unconventional forms and volumes [7].

Digital design specifically refers to the process of producing architecture through computer software based on logical and mathematical relationships, known as algorithms. These algorithms enable architects to accurately represent and analyze virtual phenomena in real-time. Common techniques in digital design include chain deformation algorithms, geometric interpolation, stochastic processes, Voronoi algorithms, attractor algorithms, and the use of logical operators on volumes. In digital architecture, space is not defined solely by geometry but also incorporates qualitative dimensions, so that spatial perception can be expressed as intensity, quantity, or tonality and is programmable and transferable through specific codes [26].

Research Methodology

This study employs a meta-synthesis approach, with analyses conducted within the interpretive paradigm and using a case study strategy. In the first step, the research problem, its necessity, and the research questions and objectives were identified. In the second step, the case study strategy was applied to the lost building of Takieh Dolat, reviewing its architectural background and features, and introducing related tools for digital architectural design in the revitalization of Takieh Dolat, including tables and a conceptual framework for interactive digital space for traditional Iranian architecture. In the third step, a comprehensive literature review was conducted, focusing on key concepts in interactive architecture, digital technology design, and documentation of traditional Iranian architecture. Additionally, the impact of digital interactive spaces on enhancing a deeper and more effective experience of traditional architecture, as well as the capabilities and limitations of new technologies in the documentation process, were analyzed. Another focus was the role of these digital spaces in strengthening the connection between the new generation and the traditional architectural heritage.

Case Study (History of Takieh Dolat)

During the reign of Naser al-Din Shah Qajar, the influence of Western architecture peaked, especially in the construction of performance halls similar to European amphitheaters. Takieh Dolat, one of the most prominent examples, was built in 1286 AH (1869 AD) and became a venue for Ta'zieh (religious passion plays) and social and cultural gatherings. With a capacity of about twenty thousand people, it became a central hub for social interactions in Tehran and even hosted significant political events such as the funeral of Mozaffar ad-Din Shah. With the onset of Reza Shah Pahlavi's rule and restrictions on religious ceremonies, Takieh Dolat was abandoned and

eventually demolished in 1325 SH (1946 AD). Today, this historic site has lost its identity due to urban development and lack of preservation [9].

Takieh Dolat is an example of a "place of memory" that encompassed the collective past and experiences of society. Recognizing and reviving such spaces is important for maintaining historical and cultural memory. This building, which contributed to the flourishing of Ta'zieh ceremonies during the Qajar era, possesses prominent architectural features that, in addition to technical importance, can shed light on the methods of staging these performances. Takieh Dolat had a circular structure with a height of 24 meters, consisting of three floors and a four-level basement. Structural problems in the early years caused partial destruction, and during the Mozaffar ad-Din Shah period, the third floor and roof were demolished and limited to two rows of niches. The building had three main entrances, each with its own characteristics. Today, only written documents, historical photographs, and paintings remain as memories of this Qajar-era architecture and its religious ceremonies [10].

Figure 1. Image of Takieh Dolat

Documentation in Traditional Iranian Architecture

Documentation can be defined as the process of systematically gathering, organizing, and recording information related to a phenomenon or structure—information that encompasses both internal and external factors influencing its formation or transformation. These data may include written, audio, visual records, maps, photographs, sketches, and other forms of documentation, typically preserved in print or digital formats. Ultimately, such information may be compiled and presented in a format known as a "building dossier."

However, in many cases—especially within urban fabrics of developing countries like Iran—a significant number of historical buildings are demolished under the pretext of renovation or redevelopment by individuals lacking adequate awareness of their value. This issue becomes more critical in the context of rapid urban transformations and when development programs drift away from conservation goals. In such conditions, documentation becomes not only a tool for preserving historical records for future generations but also a platform for recognizing cultural identity and reinterpreting architectural history.

Additionally, documentation reports can serve as credible references for specialists and practitioners aiming to intervene in or conserve such structures. While documentation may also cover intangible aspects—such as social and cultural factors influencing historical houses—it predominantly focuses on recording visual and physical data such as photographs, sketches, and architectural drawings. These records play a crucial role in deepening our understanding of historic structures and enhancing our appreciation of architectural heritage.

The Impact of Interactive Digital Spaces on Enhancing the Experience of Traditional Iranian Architecture

With the advancement of digital technologies and the emergence of computers, new forms of human interaction have evolved, leaving profound impacts across various fields—especially in architecture. These transformations have fundamentally altered the architectural design process, guiding architects toward a deeper understanding of human needs and alignment with technological capacities. Within this transformed context, **interactive architecture** has emerged as an innovative approach that, through the integration of modern technologies, enables the creation of dynamic and responsive designs. This type of architecture reflects a creative connection between humans and technology—an interaction built on reciprocity and fostering innovation in design.

Digital technologies, through advanced tools, not only facilitate the communication of concepts but also provide multisensory experiences for users. Interactive digital environments can offer a multisensory reproduction of traditional spaces, including visual, auditory, tactile, and even narrative dimensions. These environments simulate light, sound, surface textures, airflow, and human interaction, offering an immersive and realistic experience that makes the user feel physically present in a traditional space. Every digital product—from video games to physical forms, user interfaces, and graphic effects—shapes part of the user's experience. The digital industry, beyond facilitating communication and meaning-making, also enables the indirect recreation of the creator’s experience for the audience.

Thus, digital technologies have equipped architects with tools that shift the user from a passive observer to an active, engaged participant. Information technology not only plays a role in digital documentation but also holds potential to enhance the quality of historic urban spaces. These technologies can contribute to urban revitalization by enhancing the sense of safety, encouraging nighttime activity, and fostering social interaction. However, none of these technologies are inherently positive or negative—their impact is determined by how they are utilized. The main challenge lies in the intelligent integration of information technologies into the complex urban structure in a way that aligns with sustainable development.

Furthermore, interactive digital spaces offer valuable opportunities for historical and cultural storytelling. For instance, users can virtually experience the construction narrative of a Qajar-era performance space like *Tekyeh Dowlat* or participate in traditional ceremonies held within it—experiences conveyed through a blend of image, sound, and motion. These spaces also play a vital role in educating new generations about traditional architecture. By providing a vivid and tangible experience of historical monuments, they contribute significantly to documentation, digital preservation, and even the cultural revival of these buildings. In essence, interactive digital spaces act as bridges between the past and the future—preserving cultural memory while enabling active learning, creative experience, and public engagement in architectural heritage conservation.

Capabilities and Limitations of Emerging Technologies in the Documentation of Traditional Architecture

The documentation of traditional architecture is one of the primary tools for the preservation and understanding of architectural heritage. This process, in addition to recording the physical and spatial features of structures, plays a crucial role in preserving their cultural, historical, and social values. Traditional documentation methods—such as hand-drawing, photography, and limited field surveys—despite their advantages, often lacked the precision and comprehensiveness required for the complete reconstruction of historic buildings.

With the advancement of modern technologies, traditional documentation techniques have been integrated with digital tools, enabling faster and more accurate data collection and analysis. The development of technologies such as 3D scanning, digital photogrammetry, drones, virtual reality (VR), and augmented reality (AR) has brought about a fundamental transformation in architectural documentation. These technologies enable precise and multidimensional observation, analysis, and digital reconstruction of architecture, allowing even the smallest decorative or structural elements to be recorded and examined.

These advancements have not only influenced documentation practices but have also impacted architectural education, conservation planning, and public engagement with cultural heritage. However, utilizing these technologies is not merely a technical process; it requires a deep understanding of the cultural, social, and technical contexts of traditional architecture. Challenges such as the cultural interpretation of digital data, infrastructural limitations, high implementation costs, and a shortage of skilled professionals remain major obstacles to the effective application of these technologies—especially in traditional urban contexts within developing countries.

Therefore, a comprehensive examination of the capabilities and limitations of such technologies in documenting traditional architecture is a pressing research necessity—one that can lead to effective strategies for their optimal use. Technological advancements have played a significant role in cultural heritage preservation and in the development of integrated management tools for land use and heritage oversight. Digital technologies have significantly increased the efficiency of these processes by accelerating the processing and delivery of heritage-related data.

Moreover, social media platforms, by analyzing the behaviors and attitudes of local residents, offer deeper insights into community perspectives and preferences. These tools have also addressed some of the limitations inherent in traditional survey methods, providing a more dynamic and responsive means of engaging with public opinion and cultural values.

The Impact of Digital Interactive Spaces in Strengthening the Connection Between the New Generation and Traditional Architectural Heritage

Today's generation, having grown up in a digital environment reliant on modern technologies, requires innovative approaches to connect with history and cultural identity. In this context, digital interactive spaces serve as creative and flexible platforms that offer unparalleled opportunities to rethink the presentation and experience of traditional architecture [23]. These spaces include tools such as Augmented Reality (AR), Virtual Reality (VR), 3D virtual tours, online exhibitions, educational games, and multimedia experiences that enable users to enter the past architectural environment through their smart devices, explore details, listen to historical narratives, and participate in the reconstruction of collective memories [24].

Urban environments are spaces where a diverse spectrum of people continuously converge in an ever-changing combination. Each generation and community adds a new layer to the tangible and intangible heritage of the city by creating buildings, narratives, poetry, traditions, and stories passed down to future generations, enriching this heritage. This rich urban heritage serves as a valuable source for fostering a sense of belonging, pride, and continuity of identity among people. Emotional bonds with the urban environment encourage individuals to participate in collective heritage projects, whether as digital volunteers or as specialists and enthusiasts in the field [37].

However, gaining an accurate understanding of how users perceive the concept of heritage and the diverse cultural values they attribute to historic urban landscapes remains a significant challenge. Often, difficulties in recognizing and integrating these diverse perspectives lead to overlooking important values during conservation and development processes. For example, designing an

augmented reality application to represent Qajar-era historical buildings in the old fabric of Tehran could allow users to see layers of historical, architectural, symbolic, and functional information as interactive content while moving through the real environment [21].
Furthermore, analyses of successful international projects indicate that technology serves as the common language of today's generation. Therefore, if the goal is to transmit cultural heritage, the tools of this transmission must align with the tastes, needs, and lifestyles of the audience. Digital interactive spaces transform passive audiences into active users, creating a bridge between the past and the future — a bridge where traditional architecture shifts from a static object to a lively and dynamic experience [22].

Conceptual Framework in Digital Interactive Spaces for Traditional Iranian Architecture
In line with designing digital interactive spaces for documenting and representing traditional Iranian architecture, an integrated and multi-layered framework has been developed, combining two complementary analytical systems: first, the triadic place model including functional, perceptual, and physical dimensions [19], and second, a framework based on data types, representation methods, and material characteristics in the digital space [20-22]. This integration provides a theoretical-practical model that employs modern digital technologies to enhance spatial, identity, and functional experiences of architectural heritage, especially in contexts such as Tekyeh Dolat in Arg Tehran.
In this framework, data are organized into six main axes: physical, historical-cultural, sensory-experiential, social-behavioral, climatic-environmental, and educational.

- In the physical data axis, information is collected through techniques such as 3D scanning, digital photogrammetry, and precise field surveys and represented via interactive 3D modeling, 3D printing, and augmented reality. These data form the basis for spatial redesign and physical analysis and, considering material characteristics such as texture, human scale, and formal details, enable accurate recreation of historic spaces.
- In the historical-cultural data axis, the focus is on analyzing documents, narrative texts, and oral history sources. Utilizing technologies such as digital publishing, interactive storytelling, and virtual reconstruction of historical events, this data strengthens the perceptual dimension of place and revives users' collective memory regarding vanished spaces like Tekyeh Dolat [21, 23]. To enhance the sense of historicity, digital materials in this section are designed to evoke temporality, antiquity, and memory-centeredness.
- Sensory-experiential data such as light, sound, and airflow are collected to recreate multisensory experiences in virtual spaces. These data enable user immersion through visual, auditory, and sometimes tactile perception, transforming space into a living, dynamic experience for the audience [22].
- Alongside, social-behavioral data are derived from user behavior analysis, interactive surveys, and digital interaction data mining, and used in designing dynamic and responsive spaces with personalization and adaptive learning capabilities.
- Climatic and environmental data such as natural light, humidity, airflow, and native materials are analyzed to create harmony between the digital space and the actual traditional architectural context. Representing these data through bioclimatic simulations (light analysis, ventilation, structure) plays a crucial role in the physical dimension and sustainability of digital re-creation [24].
- Finally, educational and interactive data are produced using serious games, augmented reality, and digital education platforms, especially aimed at activating youth participation

in experiencing and preserving traditional heritage. The material characteristics of these spaces are designed to enhance user agency, interactivity, and visual learning.

The combination of these data and technologies not only enables physical reproduction and digital documentation of traditional architecture but also creates a multidimensional platform for sensory, social, and cultural experience of the space. In the case study of Tekyeh Dolat, a disappeared but deeply rooted structure in urban memory, this framework can facilitate the revival of the space in the minds and digital environments of audiences, and represent its ritual, identity, and social functions in a novel way.

Effective Digital Tools in the Revitalization of Tekyeh Dolat

1. **Photogrammetry (RealityCapture)**

   Photogrammetry refers to a set of measurement methods that enable the creation of 3D models solely from 2D images. This technology can reconstruct and analyze the position, dimensions, form, and orientation of objects based on photographs without direct contact. Since this process relies on non-contact data, it is part of the broader field of remote sensing and can accurately be called "the science of measurement through photographs" [12].

2. **3D Printing**

   3D printing in the field of historical artifacts refers to the physical reconstruction of objects, sculptures, or historical architectures using additive manufacturing technology. Utilizing 3D scanning and digital modeling, it enables the production of accurate and tangible replicas of historical artifacts, useful in conservation, education, documentation, restoration, and interactive display. It greatly aids in preserving and transmitting cultural knowledge, reconstructing lost or damaged parts, increasing public access, and enhancing museum and heritage site experiences [13].

3. **Augmented Reality (AR)**

   Augmented reality is a novel branch of digital technologies that adds virtual elements to the real world, providing an interactive and hybrid user experience. Unlike virtual reality, which immerses the user completely in a non-real environment, AR maintains reality and supplements it with digital data. It has widespread applications in archaeology, medicine, education, and tourism. AR is characterized by three main features: merging real and virtual worlds, simultaneous interaction, and 3D recognition. Design trends focus on lighter devices without headsets to make user experience more natural and comfortable [14].

4. **High-Fidelity 3D Models**

   In the digital transformation of contemporary architecture, high-fidelity 3D models have become essential tools for design, analysis, and communication in architectural projects. These models provide precise representations of geometric properties, materials, textures, lighting, and physical features, allowing designers to comprehensively review and optimize spatial behavior, aesthetics, and functionality before construction [15].

5. **Interactive Holograms**

   Interactive holograms are a type of digital 3D image offering a novel interaction method with 3D displays, where users can directly engage with realistic 3D graphics without auxiliary devices. Using flexible optical diffusers, this technology allows users to insert their hands into the rendered space, providing a more natural and efficient experience

compared to conventional methods like 3D mice. Experiments show this approach reduces task time and cognitive load, enabling users not only to see but also to interact via touching, moving, altering, or eliciting responses through gestures, voice, or touch [16].

6. **Parametric (Algorithmic) Design**
In parametric design, architectural form is not predetermined; instead, various shapes can be generated by adjusting parameters. This approach requires programming knowledge. Software such as Maya and Rhino are primary tools in this method. Maya is advanced software for 3D modeling and animation used widely in architecture and filmmaking. Rhino, utilizing the NURBS system, enables precise modeling and converting digital forms into physical prototypes, effectively creating complex forms with simple commands [17].
7. **Digital Fabrication**
Digital fabrication in architecture goes beyond a simple tool, representing a comprehensive approach that enhances effective communication throughout all design stages. Along with recent advancements, architectural research horizons have expanded toward novel approaches, including using augmented reality for interactive previews and training in real environments, and employing computational design for sustainable reconstruction of existing infrastructures. Digital fabrication tools enable unprecedented levels of complexity and customization in design and construction. Computer-aided design (CAD) and computer-aided manufacturing (CAM) tools form the foundation of digital fabrication, empowering architects to create complex geometries and convert them into physical objects [18].

Table 1 . Recommended Application of Each Tool in the Research Sample

Case studies conducted in this field	Suggested Application at Tekieh Dowlat (Arg Tehran)	Functions and Features	Digital Tools
IDA ،CyArk ،Iconem , MIT Media Lab	Structural and historical analysis of Tekyeh Dowlat using historical documents, archival images, and architectural reports.	Accurate identification of historical layers and heritage components of the building; a foundation for	Documentation
CyArk, ICOMOS, Factum Foundation, Historic England	Reconstruction of the original form of the entrance portal of Tekyeh Dowlat based on historical images.	Preparation of accurate, non-contact, and textured 3D models	Photogrammetry
R&Sie(n), UN Studio	Production of an accurate scale model of the interior and exterior spaces of Tekyeh Dowlat for specialized or educational exhibitions related to Qajar architecture.	Conversion of digital models to physical scale models for historical form reconstruction and research presentation	3D Printing

FOA, Reiser + Umemoto, BMW Research	Complete and accurate reconstruction of Tekyeh Dowlat (including the movable roof, platforms, domed chamber, and exterior facade) for digital representation of Qajar-era architecture.	Creating parametric models for precise reinterpretation of historical architecture and converting them into analyzable data for redesign.	High-Precision 3D Modeling
Google Arts & Culture, CyArk	Designing an augmented reality experience for visitors at the current site (Tekyeh Dowlat) to digitally relive the lost space.	Displaying historical layers and past events in the real environment through mobile devices or AR headsets	Augmented Reality
Zaha Hadid Architects, Patrik Schumacher	Utilizing the moving dome form of Tekyeh as a model for designing temporary or digital cultural structures with parametric architecture in restoration projects.	Generation of innovative forms based on historical geometry through the use of design algorithms	Algorithm and Script Design (Digital Fabrication)
Gehry Technologies, Digital Fabrication Studios	Revitalization of the exterior facade or interior surfaces of Tekyeh using custom modular panels manufacturable through industrial production for creating a memorial structure or digital representation.	Converting complex historical structures into modern manufacturable systems through digital fabrication tools	Manufacturable Geometric Complexities
-	Educational and interactive presentation of Tekyeh Dowlat for the public, fostering public participation in the preservation process	Users can control digital elements through touch, motion, or gestures, enabling a natural and efficient experience in visual environments.	Interactive Hologram

Conclusion

The present research aims to develop a conceptual framework for utilizing digital technologies in the design of interactive spaces to document, represent, and enhance the identity of traditional Iranian architecture. It has examined the impact of these technologies in recording, reconstructing, and reviving these historic structures. To this end, the study evaluated and analyzed the application of technologies such as 3D scanning, augmented reality, virtual reality, multisensory simulation, and digital interactive platforms in preserving and reproducing traditional architectural spaces.

The findings indicate that modern digital technologies not only document the physical and spatial dimensions of buildings with high precision but also provide interactive tools that enable multidimensional and participatory representation and re-experience of historical spaces. This approach is effective not only in recording and maintaining information related to traditional Iranian architecture but also in revitalizing historical experiences and strengthening the emotional connection of new generations to this heritage, thus contributing to enhancing the cultural and historical identity of traditional buildings.

In particular, the design of digital interactive spaces, as a key component of this conceptual framework, improves user experience and transfers emotional experiences from historical spaces to diverse audiences. These spaces simulate the visual, auditory, and sensory features of traditional environments, allowing for deeper understanding and greater impact on users, thereby raising cultural and social awareness and fostering active participation in preserving architectural heritage.

However, this research identified challenges such as infrastructure limitations and cultural interpretation of digital data, which must be carefully addressed to optimize the use of these technologies in developing countries, especially Iran. These challenges can be mitigated through the development of technological infrastructure and training of specialized personnel in this field.

Ultimately, the proposed conceptual framework can serve as a practical basis for designing and implementing digital technologies in documentation, representation, and enhancement of the identity of traditional Iranian architecture, creating new foundations for education, research, and public participation in the digital preservation process of architectural heritage.

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