



DEVELOPMENT OF 3D PROJECTS FOR THE PRESERVATION AND RESTORATION OF THE ISHAN FORTRESS MONUMENT

Imamov Kuralbay Turganbaevich

Tashkent University of Architecture and Construction, Doctor of Philosophy (PhD).

<https://doi.org/10.5281/zenodo.17141657>

Abstract. The use of modern technologies in the preservation and transmission of the Ishan Kala monument in Karakalpakstan to future generations is of particular importance. In recent years, significant progress has been achieved in 3D modeling, digital reconstruction, restoration of historical monuments through virtual museums, and their scientific and public presentation. This article highlights the scientific, practical, and architectural aspects of developing 3D projects for the preservation and restoration of the Ishan Kala monument.

Keywords: Ishan Kala, historical monument, 3D modeling, digital reconstruction, cultural heritage, architecture, restoration.

Introduction. Historical and cultural monuments are important sources expressing the identity of the people, embodying their centuries-old historical memory. In the context of today's globalization, the issue of preserving such monuments and passing them on to future generations has been defined as a priority task at the state and public level. In this regard, the ancient monuments existing in the territory of Uzbekistan, in particular, in the Republic of Karakalpakstan, possess unique historical, cultural, and spiritual values. Among them, the Ishan Kala complex occupies a special place. This monument, built in the 18th-19th centuries, was a religious and educational center of its time and played an important role in the development of Sufi teachings.

In recent years, the widespread use of modern technologies in the process of restoring historical heritage, in particular, the use of 3D modeling and digital reconstruction methods, has become increasingly relevant. World experience shows that with the help of 3D technologies, it is possible to restore destroyed or seriously damaged monuments on a scientific basis. For example, the city of Palmyra in Syria or the Buddhas of Bamiyan in Afghanistan have been digitally reconstructed by international scientific centers and their virtual models have been developed.

This article is aimed at studying the theoretical and practical aspects of using 3D projects in the preservation and restoration of the Ishan Kala monument. The goal is to scientifically restore the architectural appearance of the monument based on modern digital technologies, to use it in restoration





processes, and to highlight the possibilities of promoting cultural heritage in the fields of tourism and education.

In recent years, a large-scale state policy on the preservation of cultural heritage has been implemented in our country. On the basis of legislation, the legal framework for the preservation, restoration, and restoration of the historical appearance of monuments has been strengthened. However, in practice, there are cases of damage to the historical and artistic value of monuments as a result of improper restoration work. Therefore, the application of modern technologies, in particular, the 3D modeling approach, is recognized as one of the most effective means of preserving cultural heritage.

3D modeling technology allows for high-precision digitization of the real state of monuments, the creation of their virtual models, and scientific analysis. The Ishan Kala monument is also unique in historical and architectural terms, and with the help of 3D technologies, it is possible to reconstruct all its structural elements, the thickness of the walls, the shape of the towers, and other details. Such models serve as the main direction not only in scientific research, but also in the process of repair and restoration. At the same time, 3D reconstruction has great cultural and educational significance for the general public. Virtual models allow the display of monuments on Internet platforms and in digital museums, the development of the tourism industry, and the popularization of cultural heritage.

World experience shows that even destroyed or completely lost monuments can be restored in a digital environment using 3D technologies. For example, the ruins of the city of Palmyra in Syria or the Buddhas of Bamiyan in Afghanistan were virtually modeled within the framework of an international project. Similarly, in Uzbekistan, within the framework of the "Silk Road in 3D Format" project, monuments in Samarkand, Bukhara, and Khorezm were digitized. It is necessary to apply this experience to monuments of Karakalpakstan, such as the Ishan Kala.

The Ishan Kala monument, as a religious and educational complex built in the 18th-19th centuries, is closely connected with Sufi traditions. Its architecture reflects the unique characteristics of the local architectural school. Therefore, the restoration of the monument requires not only physical strengthening, but also a complete restoration of its historical image. With the help of 3D modeling, it is possible to restore the original architectural appearance of the complex, to make scientifically based proposals in the development of restoration projects. This process, in turn, allows the monument





to be widely used for tourism and educational purposes while preserving its original appearance.

In conclusion, it can be said that the use of 3D projects in the preservation and restoration of the Ishan Kala monument is important not only for the architectural sphere, but also as a modern approach to the preservation of cultural heritage. With the help of these technologies, it is possible to preserve historical monuments for future generations, study them on a scientific basis, and present them to the world community.



Top view of the Ishon-Kala complex. Photo by K. Imamov, 2019

References:

1. Paynoyerg B.I. Turkmen Settlements along the Liku River // journal, Nukus, 1957.
2. Usenov E. Ishan Kala // Karakalpaks in a Foreign Land. Nukus 1992,
3. Field research of the Khorezm expedition in 1957





4. Nayimov Q., G. Xo'janiyazov The Imam is a great scholar and enlightener of the Karakalpak people. Nukus, 2005.
 5. Togayev Jasur Erkinovich. Issues of historical reconstruction of the Bronze and Early Iron Age (on the example of Southern Uzbekistan) [Text]: monograph/ Jasur Erkinovich Tog'ayev.-Tashkent: Shafoat Nur Fayz, 2020.-29p.
 6. Khojaniyazov G., Hakimniyazov J., Payzullayeva Sh. Fortress-fortresses of the Berdakh era. - Тошкент, 2015. - P. 22.
 7. Richard B., Denard H. The Pompey Project: Digital Research and Virtual Reconstruction of Rome's First Theatre // Journal of Computers and the Humanities. 2003.Vol.37 (1).-P.129-140.
 8. Yusupov O.J. Zhana-kala Herald of KKFANUzSSR Nøkis, 1983, -P. 80.
 9. Karlibaev M.A. "Old Documents Found Among the People." Bulletin of KKFANUzSSR Nøkis, 1997, - P. 100.
- Kovalchenko I.D. Methods of Historical Research. 2nd ed., Assoc.M.,2003.486 p.
11. Usenov S. The Siege of Eshon Kala. // Teacher and Continuous Education. Scientific-methodical journal. Nukus, 2013
 12. Khodzhaeva M. Creation of 3D models of historical monuments using digital technologies//.ACADEMICIA: An International Multidisciplinary Research Journal. Year:2021, Volume:11, Issue:10.-P.1260-1268.
<https://www.indianjournals.com.>...>
 13. Reilly, P., & Rahtz, S. *Archaeology and the Information Age: A Global Perspective*.
 14. Vote E.I. A Nev Methodology for Archaeological Analysis: Using Visualization and Interaction to Explore Spatial Links in Excavation Data//A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Special Studies.
<https://lex.uz/acts/-25461>
<https://www.gazeta.uz/oz/2022/06/01/museums/>
<https://yuz.uz/uz/news/madaniy-meros-obektlari-muhofazasi-kuchaytirilad>

