# THE ROLE OF DIGITAL TECHNOLOGIES IN PRESERVING THE ISLAMIC CULTURAL HERITAGE OF BUKHARA

**Karimov Suxrobbek Yusupovich,**

teacher of the Department of Foreign Languages and Humanities

at the Asia International University (Bukhara).

+998914399759

**Abstract:** This article examines modern methods for digitalizing tangible and intangible Islamic heritage sites in Bukhara. Projects for 2021–2026 aimed at 3D modeling of architectural monuments, the creation of virtual libraries, and interactive maps are analyzed. Particular attention is paid to the media project "Bukhara – Center of Science and Culture" and the role of the Center for Islamic Civilization in Uzbekistan.

**Keywords:** Bukhara, Islamic heritage, digitalization, 3D scanning, cultural capital, UNESCO, Samanids.

**Annotatsiya:** Ushbu maqolada Buxorodagi moddiy va nomoddiy islom merosi obyektlarini raqamlashtirishning zamonaviy usullari ko'rib chiqiladi. 2021–2026 yillarga mo'ljallangan me'moriy yodgorliklarni 3D modellashtirish, virtual kutubxonalar va interaktiv xaritalarni yaratishga qaratilgan loyihalar tahlil qilinadi. "Buxoro – Fan va madaniyat markazi" media-loyihasiga va O'zbekistondagi Islom sivilizatsiyasi markazining roliga alohida e'tibor qaratiladi.

**Kalit so'zlar:** Buxoro, Islom merosi, raqamlashtirish, 3D skanerlash, madaniy poytaxt, YuNESKO, Somoniylar.

**Аннотация:** В статье рассматриваются современные методы цифровизации объектов материального и нематериального исламского наследия Бухары. Анализируются проекты 2021–2026 гг., направленные на 3D-моделирование архитектурных памятников, создание виртуальных библиотек и интерактивных карт. Особое внимание уделяется медиапроекту «Бухара – центр науки и культуры» и роли Центра исламской цивилизации в Узбекистане.

**Ключевые слова:** Бухара, исламское наследие, цифровизация, 3D-сканирование, культурная столица, ЮНЕСКО, Саманиды.

## Introduction

Bukhara, with a history spanning over 2,500 years, is traditionally called the "Dome of Islam" (Qubbatul Islam). In 1993, the city's historic center was inscribed on the UNESCO World Heritage List, and in 2020, Bukhara was officially recognized as the Capital of Islamic Culture. Against the backdrop of rapid technological progress, integrating IT solutions into the restoration and conservation of monuments has acquired strategic importance for the Republic of Uzbekistan in 2024–2026.

The digitalization of heritage is based on Resolution No. 846 of the Cabinet of Ministers of the Republic of Uzbekistan (2019), which approved the National List of Tangible Cultural Heritage Properties. By early 2026, the Agency for Cultural Heritage under the Ministry of Tourism and Culture of the Republic of Uzbekistan completed the creation of a unified digital database, including over 800 sites in the Bukhara region.

Firstly, Legislative Framework and Administrative Reforms. The foundation is the draft law "On the Powers of the Cultural Heritage Agency," updated in its first reading by the Legislative Chamber of the Oliy Majlis (February 2026). This document clearly delineated the functions of the Ministry of Culture and the Cultural Heritage Agency, securing the latter's exclusive right to:

• Maintain the state cadastre and electronic passports of objects.

• Coordinate research and development on 3D scanning of monuments.

The key instrument for implementing state policy was Presidential Resolution No. PP-177 of June 1, 2023, which set a deadline of December 1, 2024, for the complete formation of the electronic passport and state cadastre of all tangible cultural heritage properties in Bukhara and their integration into a unified "Cultural Heritage Portal."

Secondly, The "Digital Uzbekistan 2030" Program and the AI Strategy. The preservation of Bukhara's Islamic heritage is integrated into the global "Digital Uzbekistan 2030" strategy. Within this initiative, Presidential Resolution No. PP-358 of October 14, 2024, approving the "Strategy for the Development of Artificial Intelligence Technologies until 2030," has acquired particular significance. For Bukhara, this means:

• Implementation of neural network monitoring systems for the early detection of microcracks in the domes of mosques and madrassas.

• Use of deep learning algorithms to decipher Arabic epigraphy on the portals of architectural ensembles (for example, in the Poyi Kalon complex).

Third. Socioeconomic incentives and "Heritage Hotels." On January 1, 2026, in accordance with the Presidential decree on measures to develop tourism, the "Heritage Hotels of Uzbekistan" program was launched. In Bukhara, this has enabled private investment in the digitalization of historic building interiors. Investors who restore cultural heritage sites using digital conservation methods have received:

1. A 5-year exemption from land and property taxes.

2. Preferential lending for the purchase of high-precision scanning equipment.

Fourth. International cooperation and initiatives within the framework of UNESCO. In October 2025, at a UNESCO session, the President of Uzbekistan proposed establishing an International Institute for Digital Heritage. Bukhara is considered the main site for this institute's pilot projects. Specifically, by February 2026, the implementation of international digital archiving standards was completed in Bukhara, allowing an additional 130 city sites to be included in the expanded digital register of Islamic heritage. As of 2026, thanks to the implementation of Resolution No. PP-406, budget allocations for digital certification of

monuments in the Bukhara region have increased by 40% compared to 2023 levels, enabling the digitization of 100% of "category one" sites.

One of the key milestones was the launch in July 2025 of a full-scale project to create high-precision 3D models of seven Bukhara sites inscribed on the International Committee for the Cultural Heritage of the Islamic World (ICESCO):

• Ismail Samani Mausoleum (9th-10th centuries);

• Poyi Kalon Ensemble;

• Tashsaroy Madrasah;

• Bahauddin Naqshbandi Complex.

The use of laser scanning (LiDAR) allowed for the geometry of the buildings to be recorded with an accuracy of 1 mm. This is critical for monitoring the condition of the masonry and planning restoration work without physically interfering with the structure of the monument. In January 2026, the Center for Islamic Civilization in Uzbekistan, under the auspices of the Cabinet of Ministers, presented the media project "Bukhara - Center of Science and Culture." Unique technological solutions were implemented as part of the project:

1. Reconstruction of the Savonul Hikmat Library: A virtual recreation of the legendary Samanid library (10th century), where Abu Ali ibn Sina worked. The model is based on archaeological data and descriptions from medieval treatises.

2. Interactive Hadith Studies Map: A digital platform demonstrating the development of the Muhaddith schools in Bukhara and the life and legacy of Imam al-Bukhari.

Since 2017, a digitization program has been implemented with financial support from Saudi Arabia and UNESCO. Ancient manuscripts. As of February 2026, more than 20,000 pages of manuscripts stored in the Bukhara State Museum-Reserve have been digitized. The use of multispectral imaging has made it possible to restore the text on the damaged pages of 11th-12th-century Qurans.

Below is the progression of digital technology implementation in Bukhara's museum sector (2021–2026).

| Indicator | 2021 г. | 2023 г. | 2026 г. |
|---|---|---|---|
| Digitalized artifacts (units) | 1 200 | 4 500 | 12 800 |
| VR tours (number of objects) | 2 | 5 | 18 |
| Electronic passports of objects | 15% | 60% | 100% |

**Conclusion**

Digital technologies in Bukhara have ceased to be merely a visualization tool and have become the foundation of scientific conservation. The combination of traditional restoration methods with data science ensures the preservation of the region's Islamic identity for future

generations. The integration of 3D tours into educational processes and tourism infrastructure (through platforms like Bukhara-Smart) contributes to the global popularization of the humanistic values       of Islam.

## REFERENCES

1.  Law of the Republic of Uzbekistan "On the Protection and Use of Cultural Heritage Sites" (as amended on March 12, 2025, No. ZRU-824). - Tashkent: LexUZ, 2025.

2.  Resolution of the President of the Republic of Uzbekistan "On measures to further improve the system of protection of tangible cultural heritage sites" dated 25.12.2023 No. PP-405. – Tashkent: Adolat, 2023.

3.  Resolution of the President of the Republic of Uzbekistan "On measures to develop a culture of reading and increase interest in reading books among the population" dated January 15, 2026, No. PP-9. – Tashkent: LexUZ, 2026.

4. Mirziyoyev Sh. M. Development Strategy of the New Uzbekistan. – Tashkent: Uzbekistan Publishing House, 2024. – 416 p.

5. UNESCO Global Report. Artificial Intelligence and Culture: Strengthening Cultural Heritage Protection and Diversity. MONDIACULT 2025. – Paris: UNESCO Publishing, 2025. – 112 p.

6. Azimov S. A., Rakhimov B. K. Application of LiDAR scanning methods in the restoration of medieval architectural monuments of Bukhara // Bulletin of Architecture and Urban Planning of Uzbekistan. - Samarkand, 2025. - No. 1. - P. 12-19. Dzhumaeva N., Utaeva F. Digital transformation of museum-reserves: the experience of Bukhara (2021–2026) // Art Criticism and Cultural Studies of Central Asia. – Tashkent, 2026. – Vol. 4, No. 2. – P. 88–104.

7. Mukhamedov Sh. M. Islamic cultural heritage of Bukhara in the context of global digitalization: Monograph. – Bukhara: Bukhara State University, 2024. – 230 p.

8. Silk Roads Heritage Corridors in Central Asia. Final Report of the UNESCO/EU Project (2018–2024). – Tashkent: UNESCO Office in Uzbekistan, 2024. – 85 p.

9.      Khaidarov A. A. The role of artificial intelligence in deciphering Arabic epigraphy of architectural ensembles of Uzbekistan // Science and innovation in Uzbekistan. - 2025. - No. 3 (18). - P. 45-52.