

O. Yevsyeyev, O. Pushkar, and L. Potrashkova, "DISTRIBUTED SYSTEM FOR AR CULTURAL HERITAGE PROJECTS DEVELOPMENT USING AI", *ITLT*, vol. 111, no. 1, pp. 86–109, Feb. 2026.

Abstract

This article presents a comprehensive framework for developing interactive media components in augmented reality (AR) cultural heritage projects using artificial intelligence (AI) tools. The system aims to improve the accessibility, engagement, and educational effectiveness of cultural heritage learning by streamlining the creation of high-quality multimedia content. The proposed solution consists of three interconnected subsystems: (S1) task definition and project coordination, (S2) AI-driven content generation (using GANs, OCR, 3D modeling, and NLP), and (S3) historical and cultural validation. These subsystems are integrated through a distributed knowledge base (DKB) that facilitates remote collaboration and ensures transparency, cultural sensitivity, and adherence to historical accuracy.

The research demonstrates how AI can significantly reduce development costs and time for AR projects while preserving educational and cultural value. Methods for developing interactive elements include virtual characters, restored 3D models, localized environments, and adaptive content for diverse audiences. Evaluation of generated content involves a rigorous multi-method validation process, including SWOT and ABC-XYZ analyses, iterative expert feedback, and machine learning-based classification and clustering. These evaluations address key challenges such as AI-induced historical inaccuracies, culturally insensitive representations, and the ethical dilemmas inherent in machine-driven storytelling.

The study of the practical implementation of the proposed system is focused on a project aimed at popularizing mythology within the context of Ukraine's cultural heritage. This confirms the system's effectiveness in improving content quality, user engagement, and interdisciplinary collaboration. A functional prototype of the DKB, implemented in the Notion Space environment, further demonstrates the practicality of the approach. Results from expert and user testing indicate a statistically significant improvement in both the authenticity and educational impact of the generated materials.

Keywords: distributed knowledge base, augmented reality, artificial intelligence, interactive media, cultural heritage research, virtual interactive characters