AI-DRIVEN INTERGENERATIONAL ARCHITECTURE FOR SUSTAINABLE HERITAGE RESTORATION

[1]SAKINA MUHAMEDJANOVA, [2]SHOIRAHON ODILOVA, [3]JASMINA MAMADJANOVA, [4]SOFIA DERIPALKO

[1]Architecture and Design, Central Asian University, Tashkent, Uzbekistan
[2]Business School, Central Asian University, Tashkent, Uzbekistan
[3]Architecture and Design, Central Asian University, Tashkent, Uzbekistan
[4]Architecture and Design, Central Asian University, Tashkent, Uzbekistan
Email: [1]s.mukhamedjanova@centralasian.uz, [2]sh.odilova@centralasian.uz, [3]240437@centralasian.uz, [4]240063@centralasian.uz

Abstract - This study explores how artificial intelligence (AI) can support inter‑ generational sustainability in architecture by transforming the way we design, evaluate, and preserve the built environment. It focuses on three main roles of AI: generating low‑ impact architectural solutions, predicting long‑ term performance of buildings and cities, and restoring cultural heritage as a resource for future generations. AI-driven tools can rapidly propose and optimize design options for facades, layouts, and structures, reducing material use, energy demand, and operational emissions across a building's life cycle. Predictive models enable architects and planners to anticipate energy consumption, climate risks, and patterns of human movement, helping shape resilient spaces that remain functional and inclusive over time. In heritage contexts, AI can reconstruct "digital twins" of damaged sites from scans and historical records, informing careful restoration and extending access to cultural memory. The paper also discusses how meaning, ethics, and responsibility evolve when AI becomes a co‑ designer. It argues that while AI can improve efficiency and expand creative possibilities, inter‑ generational sustainability still depends on human judgement, cultural understanding, and ethical oversight. Rather than replacing architects, AI should act as a partner that strengthens long‑ term environmental and cultural stewardship in architectural practice.

Keywords - Intergenerational Architecture; Artificial Intelligence; Sustainability; Performance Prediction; Heritage Restoration.