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Enhancing agency and spatial reconstruction: the transformative impact of AR on artistic creation—A systematic literature review

Yongzhi Wang

Savannah College of Arts and Design, Savannah, USA

wangyongzhi111@gmail.com

Abstract. With the rapid global advancement of human-computer interaction technology and the continuous development of Augmented Reality (AR), its impact on artistic creation has significantly expanded. This study explores, through a systematic literature review, how AR technology has transformed contemporary art practices and the technological logic underlying this transformation. A total of 28 core articles published between 2011 and 2025 were analyzed, revealing the technological evolution of AR from early "image-triggered" to "spatial-aware" approaches. The findings indicate that "no-code" tools, such as Adobe Aero, Instagram filters, and WebAR, have significantly lowered the barriers to artistic creation, expanded creative agency, and transformed viewers from passive appreciators into co-creators. In addition, AR, through spatial reconstruction, multi-sensory integration, and "temporal overlap" mechanisms, transforms artistic creation from a static physical space into a dynamic, participatory hybrid digital-physical space. This review concludes that AR, as an augmentation technology, has fundamentally changed the creative logic and aesthetic experience of contemporary art. The paper also outlines future directions for AI-driven real-time AR art and discusses emerging legal and ethical challenges.

Keywords: Augmented Reality (AR), art creation, no-code, digital space, public art, multisensory integration, Human-Computer Interaction (HCI)

1. Introduction

Amid rapid global developments in human-computer interaction, Augmented Reality (AR) technology is advancing at an unprecedented pace. With advancements in AI and AR, artistic creation is no longer primarily focused on traditional real objects, but rather on creating digital spaces that blend the virtual and the real. From AR-based museum guides to interactive filters on social media, AR has become a key bridge connecting traditional art forms with digital spaces.

Despite its significant creative potential, AR-based artistic practice still faces challenges, including technological barriers and an imbalance stemming from a limited pool of creators. This study aims to explore, through a systematic literature review, how AR technology fundamentally supports artistic production.

Specifically, it analyzes how no-code AR tools lower technical barriers, enable broader participation, and promote "mass creation" and participatory art practices.

Furthermore, this study explores how AR, through multimodal interaction, reshapes spatial perception, relocating art from offline physical environments to online social media. Ultimately, this research seeks to demonstrate how AR technology, as a novel means of assisting creative processes, fundamentally changes both the social support framework and aesthetic experience of contemporary artistic creation.

2. Research questions

This literature review aims to develop a comprehensive understanding of how AR is changing the mode of creative practice and to identify the technological requirements that support this creative process. The study addresses the following research questions:

- RQ1 - What types of AR technology have been used to aid the creation of artworks?
- RQ2 - How does AR technology support the creation of artworks?

3. Data collection

A comprehensive literature search was performed using Google Scholar. Boolean operators were applied with the following search string:

("Augmented Reality" OR "AR") AND ("Artistic Creation" OR "Digital Arts") AND "Support"

Inclusion criteria required that studies be directly relevant to artistic research and the human-computer interaction sub-discipline.

To guide the analysis, Qualitative Analysis Questions (QAQ) were developed based on themes identified in the literature. Table 1 summarizes the analysis questions derived from the relevant literature. Three key questions were used to determine whether articles were relevant to the research questions.

Table 1. List of qualitative analysis questions

QAQ	Answer
QAQ1: Has AR-assisted artistic creation generated a unique artistic language that traditional media could never achieve?	Yes/No
QAQ2: Will the popularization of AR technology make artistic creation more "professional" or more "popular"?	Yes/No
QAQ3: How do creators define the balance between "virtual" and "real"? Will the digital layer diminish the original value of physical artworks?	Yes/No/Partially

4. Results

From an initial pool of 273 articles, 28 met the inclusion criteria and were selected for the final analysis. Articles that failed to meet the relevance requirements or did not adequately address the qualitative analysis questions were excluded. Table 2 presents the selected studies and their alignment with the three qualitative analysis questions.

Table 2. Results of the selected articles

Reference	Author (s)	Year	Type	Q1	Q2	Q3
[1]	Bauer, A. et al.	2025	Proceeding	Yes	Yes	No
[2]	Sattar, G. et al.	2025	Journal	Yes	Yes	No
[3]	Işık, V.	2024	Journal	Yes	Yes	Yes
[4]	Wei, W.	2024	Journal	Yes	Yes	No
[5]	Chen, J. et al.	2024	Proceeding	Yes	Yes	No
[6]	Gould, C.	2024	Demonstration	Yes	Yes	Yes
[7]	Sun, J. & Jiang, A.	2024	Journal	Yes	Yes	No
[8]	Ariwodo, K. et al.	2024	Poster	Yes	Yes	No
[9]	Lovett, L. et al.	2024	Journal	Yes	Yes	Yes
[10]	Takala, G. B.	2023	Journal	Yes	Yes	No
[11]	Handayani, A. P.	2023	Proceeding	Yes	Yes	No
[12]	Qian, J.	2022	Proceeding	Yes	Yes	No
[13]	Vavassori, V.	2022	Journal	Yes	Yes	Yes
[14]	Norizan, A. & Ab Ghani, Z.	2022	Journal	Yes	Yes	No
[15]	Park, S. et al.	2021	Proceeding	Yes	Yes	No
[16]	Bauer, V. & Bouchara, T.	2021	Proceeding	Yes	Yes	No
[17]	Clarke, P.	2021	Journal	Yes	Yes	No
[18]	Salako, O. et al.	2021	Proceeding	Yes	Yes	No
[19]	Jónasson, N C.	2020	Thesis	Yes	Yes	Yes
[20]	Szabo, V.	2018	Journal	Yes	Yes	Yes
[21]	Kljun, M. et al.	2018	Journal	Yes	Yes	Yes
[22]	Deliyannis, I. et al.	2017	Journal	Yes	Yes	No
[23]	Buhl, M.	2017	Journal	Yes	Yes	No
[24]	Pucihar, K. C. et al.	2016	Poster	Yes	Yes	No
[25]	Jefferies, L. N.	2015	Proceeding	Yes	Yes	No
[26]	Gandy, M. & MacIntyre, B.	2014	Proceeding	Yes	Yes	No
[27]	Wright, R.	2014	Journal	Yes	Yes	No
[28]	Flintham, M. et al.	2011	Proceeding	Yes	Yes	Yes

Following the selection process, publication trends from 2011 to 2025 were analyzed and presented in Figure 1. The results show that 2024 had the highest number of published articles (7 articles), while 2015, 2016, and 2020 each had only one publication. Moderate publication levels were observed in 2021 (3 articles) and 2022 (4 articles), while 2014, 2017, 2018, 2023, and 2025 each contributed two articles.

Table 3 presents the distribution of selected articles by database source. The majority of the selected articles were published in the ACM Digital Library and open-access databases (6 articles each). The IEEE Digital Library contributed 2 articles. Meanwhile, only 3 articles were published by SpringerLink and 1 article from De Gruyter. Two articles were selected from the ScienceDirect database, as well as two from MIT Press and two from Taylor & Francis/Routledge. Four articles were drawn from comprehensive academic journals.

Figure 1. Number of publications vs. year

Table 3. Distribution of the papers according to the electronic database

Electronic database	Number
ACM Digital Library	6
IEEE Digital Library	2
ScienceDirect	2
SpringerLink	3
MIT Press	2
De Gruyter	1
Taylor & Francis / Routledge	2
Open Access	6
Comprehensive Journals	4

5. Discussion

5.1. Technological trajectory: from markers to environmental sensing (RQ1)

By summarizing the AR technologies identified in the selected papers, a composite technological framework emerges, ranging from early visual AR systems to more advanced integrations involving AI, audio, and gesture interaction. The literature shows that the application of AR systems has gradually shifted from early, more basic marker-based approaches to spatial or geospatial systems. This reflects a transformation in AR-assisted artistic creation, moving from early planar displays to sophisticated three-dimensional and real-world environments. In terms of technological evolution, this represents a progression from image-based (2D) to object-based (3D) and finally to environment-based (SLAM/Geospatial) systems.

Analysis of the literature shows that many studies use marker-based AR technology as the core element of interactive visual creation, demonstrating high technical stability and relatively efficient cost control. Norizan and Ab Ghani stated in their digital art magazine research that "Augmented Reality Mobile Application was developed... to attract the younger generation..." [14]. This suggests that image-triggered AR remains a dominant approach for art promotion and interactive publications, especially for younger users. In the Table 4, Lovett et al. further explored the artistic possibilities of trigger-based markers, transforming AR markers from

functional QR codes into fabrics or paintings with artistic value, thereby reconstructing "markers into physical works" [9].

Research also indicates that room-scale and markerless AR enable three-dimensional space to become a canvas. Chen et al.'s research on children's creative tools showed that children could model a complete room within 15 minutes. They observed that children viewed AR as a "reshaping of the room" rather than a simple overlay, demonstrating a strong spatial narrative capacity [5]. Their experimental data showed that when the technology shifted from simple object coverage to a "room-scale" understanding, the creators' spatial cognition and immersion significantly increased.

The transformation of AR visual technology into three-dimensional space demonstrates that artistic production through AR is no longer limited to restrictive QR code markers. In the Table 4, Bauer et al. proposed a "Markerless AR utilizing geospatial tracking" method in Augmenting Murals, addressing the difficulty of placing physical markers in large-scale outdoor mural creation. This indicates that AR platforms have expanded from local-scale planar recognition to location-based, large-scale outdoor spatial art exhibitions [1].

AR-assisted art creation, as presented in the literature, is not limited to visual expression. It also demonstrates how auditory enhancement and AI generation are merging with other expressive forms. The traditional definition of "artistic creation" is evolving, as AR-assisted expression now includes spatialized sound representation and AI-assisted material generation, thereby expanding perceptions of art. Park et al. introduced the Mixed Scape framework, indicating that AR technology has evolved into a hybrid medium combining audiovisual elements in the Table 4. They state that "Integration of research modules where soundscape studies, music concrète research, and artificial intelligence are combined... [which] facilitates the exploration and expansion of mixed reality systems" [15]. This research highlights multimodal audio AR as an important component in electronic music and environmental art creation.

Sun and Jiang used AR to optimize CAD model interaction, noting the "accurate integration of CAD model... integrates intuitive interaction modes such as gesture and voice recognition" [7]. This indicates that AI-driven gesture recognition and voice control are becoming standard technologies in AR art creation. In the Table 4, Işık points out that AI technologies (such as Midjourney and Leonardo.ai) serve as "front-end generators" for AR creation in "Exploring Artistic Frontiers in the Era of AI," providing extensive 3D assets and textures for AR scenes, while AR acts as the carrier of these AI-generated materials [3]. Experiments by Işık and Qian further show that AI-assisted image recognition and Natural Language Processing (NLP) are emerging as new engines of AR creation, enabling artworks to possess intelligent interactive capabilities [3, 12].

The literature also indicates that, with the popularization of tools such as Adobe Aero and Instagram Filters, AR-assisted art creation is shifting from high-barrier programming environments toward broader accessibility. As AR technology shifts to mainstream mobile devices, AR-assisted art creation is becoming more accessible, and artistic creation no longer relies on in-depth C# programming. This democratization of AR-assisted art was highlighted by Jónasson, who explicitly discussed the realization of mural animation through Unity and commercial mobile phones in his dissertation [19].

Ariwodo in the Table 4 focused on the no-code tool Adobe Aero, describing it as "a snapshot of the possibilities of AR art creation… within a limited timeframe" [8]. Pre- and post-surveys results showed that students without programming backgrounds could complete 3D art creations using Aero in a short time and that the technology effectively increased their creative confidence.

Handayani in the Table 4 notes that Instagram filter technology enables artists to quickly transform 2D works into 3D animations, facilitating secondary creation and dissemination [11]. In the Table 4, Lovett also

described content such as the "ARGH Mateys" WebAR website developed using AR.js, A-Frame, and Howler libraries, enabling arts-led co-creation through accessible web platforms [9]. This demonstrates that web-based AR technologies are central to promoting participatory creation. The usability of AR tools directly influences the level of artistic participation.

Overall, the literature in the Table 4 shows that the simplification of AR technology and lightweight tools such as WebAR and Adobe Aero significantly lowers the barrier to artistic creation and makes it more accessible. The primary AR frameworks in contemporary art include mobile SLAM tracking, cross-platform WebAR distribution, AI-based image recognition, and multimodal sensory enhancement (audio + haptic). Collectively, these technologies support a shift from passive observation to collaborative creation.

Table 4. List of AR technology types and their characteristics from the selected articles

ID	Type of AR Technology	Characteristics of AR
[1]	Geospatial AR (Markerless)	Exploring Freedom, Large-Scale Mapping
[2]	AR & Multimedia Platforms	Critical Thinking, Inclusiveness
[3]	AI, AR & 3D Printing	Cross-Media Integration, Automation
[4]	AI, NFT & Blockchain AR	Authentication, Evolution
[5]	Room-Scale AR Authoring Toolkit	Usability, Spatiality
[6]	AR Avatar & QR Tracking	Embodiment, Narrative
[7]	AR-based CAD Optimization	Intelligent Optimization, Design Precision
[8]	Adobe Aero (No-code AR)	Popularization, Rapid Prototyping
[9]	Tag-based AR (AR.js, A-Frame)	Materiality
[10]	Interactive Media Art	Empowerment, Collaboration
[11]	Social AR (Instagram Filters)	Sociality, Aesthetics
[12]	AI-driven VR/AR Teaching	Learning Efficiency, Semantic Understanding
[13]	Mobile AR & Digital Mapping	Contextualization, Authenticity
[14]	Mobile AR, Digital Magazine	Attractiveness
[15]	Mixed Reality (MR) Soundscape	Auditory Correspondence, Intelligent Analysis
[16]	Audio AR (Spatial Audio)	Real-Time Interactivity, Multimodal
[17]	AR Toolkit & Performance	Community Participation, Performing Arts
[18]	AR App (Mobile-based)	Creativity Cultivation, Remote Accessibility
[19]	Unity AR & 3D Animation	Low Cost, Story-Driven
[20]	Mobile AR & 3D Modeling	Narrativity, Cultural Memory
[21]	AR Engagement Continuum	Continuum, Audience Role Shift
[22]	Game-based AR & Web Tech	Gamification, Crowdsourcing
[23]	AR Learning Design	Sociomateriality, Teaching Method
[24]	AR Gaming Interface	Engagement, Playfulness
[25]	Participatory AR Art	Participation, Social Generation
[26]	DART (Authoring Toolkit)	Efficiency of Creation, Interdisciplinary Collaboration
[27]	Mobile AR (Handheld)	Portability, Ubiquity
[28]	Large-scale AR Installation	Spatial Trajectory, Synergy

5.2. Creative mechanisms: spatial reconstruction and agency (RQ2)

Analysis of the literature reveals that AR technology's role in assisting artistic creation extends beyond visual enhancement. It also demonstrates significant advantages in spatial composition and the popularization of artworks. The core strength of AR lies in breaking down the limitations of physical space, enabling artists to create "on-site" without disrupting the original environment. Vavassori, in research on street art, notes the use of augmented reality to narrate artworks within their own "placeness" in the Table 4, addressing both the ephemerality of street art and the evolving relationship between street art and AR [13].

Bauer et al. in "Augmenting Murals," experimented with the dynamic enhancement of large-scale murals [1]. Their findings show that markerless tracking enables artists to add dynamic interactions, such as blinking and movement, to static murals, thereby giving public art renewed vitality. By generating digital canvases within real space, AR allows creators to experiment directly in the real world, eliminating the need to imagine the relationship between the work and its environment. Through geospatial tracking, AR provides a "contactless" creative method that liberates artworks from traditional frames or screens, enabling them to engage in dialogue with urban environments and historical sites. The introduction of AR technology enables real-time feedback, fundamentally altering the artist's decision-making logic.

Sun and Jiang note that AR systems, through precise alignment and real-time updates to CAD models, enable "intuitive and efficient" interaction via gestures and voice recognition [7]. This immediate visual feedback enables artists to make more precise decisions regarding proportion, color, and layout before physical interventions (e.g., painting or construction) occur. In the Table 4, Similarly, Szabo argues that Digital Heritage technologies transform historical archives into 3D reconstructions, enabling creators to engage in "virtual archaeological" artistic re-creations based on physical remains [20].

The Room-scale AR Authoring Toolkit developed by Chen et al. enables users to reconstruct private rooms into creative spaces [5]. This mechanism changes the logic of artistic creation: art is no longer an isolated entity, but rather an enhancement and reinterpretation of a specific environment by the artist. AR allows artistic production to transcend the limitations of the canvas, enabling artists to break through those constraints and transform urban spaces or indoor environments into dynamic narrative carriers. A key contribution of AR is its ability to shorten the distance between the initial concept and the visual prototype.

In reviewing the decade-long evolution of Designer's Augmented Reality Toolkit (DART), Gandy and MacIntyre in the Table 4 emphasized that it was designed to allow artists without technical backgrounds to "preview" digital content in the real world [26]. By embedding complex programming logic within a visual interface, DART enables artists to focus on design rather than technical implementation, thereby significantly shortening iterative development cycles. Ariwodo similarly demonstrates, through the case of Adobe Aero, that no-code AR tools enable students to realize creative ideas within a short timeframe, compressing the learning curve that would otherwise take weeks into a single creation [8].

AR also blurs the boundary between "creator" and "audience." By overlaying dynamic effects such as animation, sound, and AI onto physical works, AR transforms artistic production from a static process into a performance-like experience. Through multimodal data, static presentation becomes an ongoing process. The Mixed Scape framework proposed by Park et al. demonstrates how AR can support auditory art creation by analyzing ambient sound with AI and converting it into visual/spatial audio [15]. This extends traditionally singular visual practices into multi-sensory artistic forms.

Lovett et al.'s experiments further demonstrate how AR enables the digital transformation of traditional art creation [9]. When traditional handicrafts are augmented with AR functionality, they support new forms of cocreation, transforming static material works into dynamic digital entities. AR technology enables artworks to

evolve in real time in response to viewer behavior or environmental change. By integrating sound, gesture recognition, and AI optimization, AR transforms the creative process into a continuous feedback loop.

Szabo further emphasizes AR's unique capacity to explore the past [20]. By overlaying 3D reconstructions and historical archives directly onto sites, AR supports spatialized narratives in which past and present coexist. Its core logic lies in enabling temporal overlap between physical reality and digital archives, allowing artists to construct non-linear narratives within the same geographical coordinates.

In research on the Museum of Augmented Reality Street Art (MAUA) in Milan, Vavassori argues that AR addresses the perishability of street art [13]. By digitally overlaying lost or damaged works onto existing street facades, AR preserves a sense of place while merging digital and physical layers. Through this temporal overlay mechanism, AR expands artistic expression beyond spatial reconstruction to include temporal manipulation.

Case studies also show that AR lowers the technical threshold for artistic creation through no-code tools, enabling the public to directly engage in digitally assisted creation in real physical environments, thus democratizing the right to create. Ariwodo demonstrated how teachers and students can quickly deploy 3D models into real-world spaces for visual testing without writing code, using tools such as Adobe Aero and Blender [8]. This mechanism is particularly valuable in zero-budget contexts.

Jónasson explored adding 2D/3D animated storylines to existing stairwell murals using mobile AR tools with a near-zero budget, demonstrating that AR can be a highly cost-effective medium for enhancing art [19]. Sun and Jiang's real-time CAD alignment further shows how gesture-based and voice-based interaction improve design efficiency [7]. Together, these examples demonstrate that AR technology reduces technical barriers while increasing creative efficiency.

Traditionally, audiences have occupied passive roles in exhibition contexts, partly due to technological constraints and production costs. AR, however, reshapes this relationship by enabling audiences to participate in the creative process. In the Table 4, Salako et al. highlight how AR can reveal behind-the-scenes creative processes in art creation, which is crucial for students in different locations to gain creative inspiration and develop creative skills [18]. Takala in the Table 4 argues that digital tools empower audiences to collaborate, thereby democratizing art [10]. Similarly, Sattar et al. found that AR visualization of abstract concepts enhances student engagement and critical thinking in art courses [2].

Flintham et al. in the Table 4 describe AR as a participatory model that transforms viewers from passive observers into active contributors through interactive interfaces [25]. Furthermore, Kljun et al. and Čopič Pucihar et al. further in Table 4 show how AR games and digital graffiti systems allow visitors to leave personalized digital traces on historical sites [21, 24]. Such participatory mechanisms expand the social boundaries of artistic creation and shift art from closed museum environments into fluid digital spaces.

Handayani explores how Instagram AR filters provide new aesthetic experiences for 2D artworks [11]. By transforming static works into dynamic 3D experiences, artists can directly interact with their audiences on social media platforms. This art-social filter model shortens the distance between artwork and viewer and reduces reliance on traditional institutional gatekeepers such as museum directors or curators. As Handayani notes, AR filters significantly reshape how art is created, consumed, and perceived in the digital age [11].

Overall, the rise of code-free AR technologies represents not only technical simplification but also a social movement toward the universalization of art. Through educational applications and social media integration, AR fosters collaborative creative environments in which the value of artworks is no longer determined solely by the scarcity of their physical form, but rather by the accessibility, shareability, and social collaboration of their digital layer.

AR technology therefore signals a paradigm shift in the ontology of artistic creation, transforming artworks from isolated physical objects into experiences. As Takala suggests, participatory AR practices support the democratization of artistic sovereignty [10]. Through real-time iteration mechanisms explored by Gandy and MacIntyre and social media-driven aesthetics described in Handayani, AR shortens the distance between conception and perception [11, 26]. More importantly, as demonstrated by Szabo and Vavassori, AR allows artists to overlay historical contexts and narratives across time dimensions in the real environment, reconstructing art as an ongoing social practice project that integrates the past and present, the virtual and the real [13, 20].

6. Conclusion and future work

An analysis of the literature on AR-assisted art creation reveals a significant shift in technological development, from "image-triggered" to "spatial sensing" approaches. Early AR-assisted art relied on stable but limited marker-based technologies. With the maturation of Simultaneous Localization and Mapping (SLAM) and Geospatial technologies, AR has expanded beyond the physical canvas into hybrid spaces where the real world and digital layers intersect. This shift liberates art creation from the constraints of physical media, allowing the real world to be overlaid onto a dynamic narrative space. Overall, AR supports art creation through three core methods: spatial construction, multi-sensory integration, and the continuity of the artwork.

Furthermore, AR-assisted art once required advanced programming skills, creating a high technical barrier. The widespread adoption of no-code and lightweight tools, such as Adobe Aero, Instagram filters, and WebAR platforms, has significantly lowered the technical barrier to artistic creation. Despite its creative potential, the expansion of AR art into public environments raises legal and ethical concerns. Issues such as conflicts between digital overlays and physical ownership, as well as copyright protection for NFT-based digital assets, require interdisciplinary discussion. Moreover, there is an urgent need to establish a comprehensive evaluation model that integrates indicators of art aesthetics, cognitive load assessment, and social impact dimensions to more deeply define the social value of AR art.

Finally, although AI currently functions as a front-end tool for generating digital assets, future research should explore how to utilize AI to achieve real-time, adaptive digital asset generation in AR scenes. Such development would enable artworks to automatically optimize based on the physical environment and user emotions, thus achieving genuinely intelligent augmented reality art.

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