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From object to process: New paradigms of interactive art in public space

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Abstract: This scholarly article focuses on the exploration of current trends in artistic creation realised in real time through the use of digital and interactive technologies. It pays particular attention to works situated in public space, where intense interaction occurs between technological systems, the artist, and the audience. The theoretical framework draws from an interdisciplinary perspective that connects digital art with posthumanist philosophy. This approach understands artistic creation as a distributed process in which human, technology, and environment are interwoven, collectively generating meaning and aesthetic experience. Through selected case studies, the article presents two primary modalities of interactive art. The first is understood as an open, algorithmically driven process in which the final form of the artwork evolves over time based on environmental inputs or audience interaction. The second emphasises embodiment and sensory engagement, where the audience becomes an active co-creator of the artistic experience through physical presence, movement, or biological feedback. The discussion focuses on the ephemeral, processual, and participatory nature of these works, while also reflecting on the technological, aesthetic, and social challenges related to their production, documentation, and interpretation. In a broader cultural and philosophical context, the article examines how real-time artistic practices contribute to the redefinition of public space, the reconsideration of the audience's role, and the transformation of the very concept of artistic creation in the digital age.

Keywords: interactive art, tech art, digital aesthetics, public space, performativity, ephemeral art, sensor technologies

INTRODUCTION

In contemporary art, the symbiosis between technology, live process, and audience is increasingly taking centre stage. Digital and electronic media no longer serve merely as tools—they are becoming active co-creators of the artwork itself (Manovich, 2001; Paul, 2015). Artists work with algorithms, sensory systems, artificial intelligence, and generative code in ways that allow the work to emerge in real time—often right before the eyes of the viewers (Dixon, 2007). This shift is not merely technical; it may be understood as a manifestation of a broader paradigmatic transformation in artistic practice. As Thomas S. Kuhn outlines in *The Structure of Scientific Revolutions* (Kuhn, 1970), the term "paradigm" refers to a shared set of assumptions, values, tools, and practices that define what is considered "normal" activity within a given epistemic or cultural framework. However, paradigms are not permanent—they can be disrupted by new questions, experiments, and experiences, and replaced by new frameworks that redefine the subject and nature of the field.

This article explores the integration of artificial intelligence into real-time artistic performance, which significantly expands the horizons of creative possibility—enabling interactive storytelling, deepening the nuances of human expression, and opening up new forms of collaboration (McCormack et al., 2019). At the same time, this technological development raises fundamental questions about ethics, authorship, and the very nature of the artistic experience. The shift from artwork as a static object to a processual, performative, and interactive form of creation is especially prominent in artistic practices embedded in public spaces or presented at art festivals. Here, the artwork transforms into a living interface between human, environment, and technological apparatus—a dynamic, fluid field in which meaning is continuously (re)configured in response to input data, sensory feedback, and audience participation (Dixon, 2007; Paul, 2015). As Erdmann-Goldoni (2024) demonstrates, such artistic practices can also serve as forms of social revitalisation, where public space ceases to be merely a site of transit and becomes a platform for cultural experience and symbolic meaning.

In this context, the concept of artistic intervention also comes to the fore—a term rooted in the discourse of the 1990s. As Hito Steyerl (2002) notes, intervention in art is not only an act of disrupting or reconfiguring existing visual regimes, but also an

attempt at active social engagement, often in support of a community or in response to specific cultural or societal challenges. Contemporary media artworks are shifting from presentation to participatory presence within space, where artistic creation becomes part of a broader social and technological system. Electronic and posthumanist art practices blur the boundaries between physical and digital, between author and audience, between medium and environment. This article focuses on works realised in real time and in public space, analysing how new technologies transform the aesthetics, form, and meaning of artistic creation.

ART AS PROCESS: LIVE CREATION IN REAL TIME

Art understood as a process rather than a static object has its roots in the avant-garde movements of the 20th century. As early as the Dadaists and Futurists, artists experimented with action, chance, and ephemerality, foreshadowing a shift from the finished artifact to the creative act. However, a true turning point came in the 1950s and 1960s, when movements such as Fluxus began to treat artworks as events, experiences, or living processes. Artists like Allan Kaprow, Yoko Ono, Nam June Paik, and Joseph Beuys emphasised time, presence, corporeality, and interaction with the audience, expanding the scope of art beyond the boundaries of the visual object (Kaprow, 1993; Goldberg, 2011). This shift was also accompanied by significant theoretical reflection. In *The Open Work*, Umberto Eco (1989) argued that an artwork is not a definitive, closed whole but an open structure whose meaning emerges in cooperation with the recipient. This laid the foundation for understanding art as a dynamic system of meanings, which later influenced participatory and interactive approaches in digital art.

Since the 1990s, with the development of the internet and digital media, the processual nature of art has deepened significantly. Numerous interactive and generative forms have emerged that change in real time and respond to input from the environment or audience. The artwork is no longer merely a record of creation but the creation process itself—a living system shaped by data, algorithms, and human interaction (Edmonds et al., 2006; Paul, 2015). A specific area of this development is live coding—a practice in which artists create sound or visual compositions through real-time programming. The code is often projected as part of the performance, becoming both a visual and meaningful element of the work (Collins et al., 2004). A typical example of this approach is the phenomenon of Algorave (Fig. 1), where artists generate music live in front of an audience without prior preparation. The audience simultaneously watches the coding process on screen, dissolving the traditional divide between stage and audience, between author and consumer (Collins and McLean, 2014).

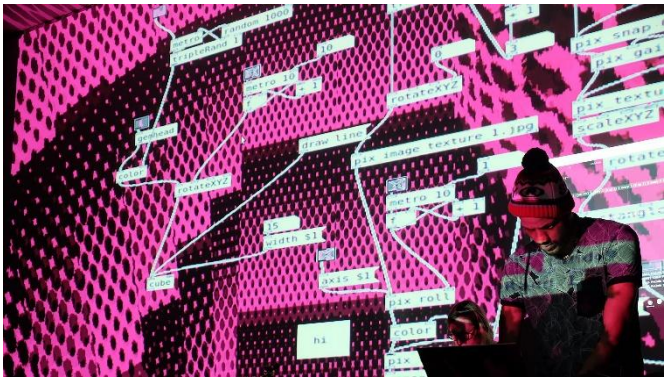

Fig. 1. Algorave. (Photo: Antonio Roberts, 2014; Source: Stroehle, 2019)

A significant category within this context is generative algorithms, which create audiovisual structures based on environmental inputs. These works have a parametric nature—their final form is never entirely predictable and reacts to specific spatiotemporal contexts (Galanter, 2003). Similarly, robotic installations and wearable technologies enable performative forms of creation, where the artist's body becomes an interface—a responsive, sensor-equipped medium. These approaches often draw from posthumanist theories that view the human body as an expandable, technologically modulated system rather than a fixed biological entity (Braidotti, 2013; Dixon, 2007). Artists such as Stelarc and Lu Yang work with their own bodies as digital interfaces that are part of a broader informational system.

Today, live, interactive art is also gaining a social dimension. Works that use digital media are increasingly taking place in public spaces, involving active audience participation and overlapping with real social structures. Artistic interventions today are not judged solely by their form or style, but primarily by their impact on social reality. In this spirit, Siglinde Lang (2015) sees the artwork as an "open process" that only comes into being through interaction with the audience. The viewer is no longer merely a witness, but a co-creator of meaning and outcome. This development confirms that contemporary art is no longer only about form or content, but increasingly about relationships, interactions, and time-bound processes in which the roles of creator, medium, and recipient are constantly being rewritten.

METHODOLOGICAL FOUNDATIONS

This study is based on a qualitative, exploratory methodology aimed at identifying and analysing certain emerging tendencies in the field of interactive art created in real time and situated in public space. It does not seek to verify hypotheses in the statistical sense but instead offers an analytical reflection that combines a theoretical framework with the interpretation of specific artistic cases. The research draws from an interdisciplinary framework that integrates knowledge from digital art, performance studies, media theory, and posthumanist thought (Braidotti, 2013; Salter, 2010; Kwastek, 2013). The study proceeds from the assumption that new forms of interactive art mark a shift from object-oriented understandings of art towards processuality and systems thinking, where technology and environment are not merely contextual but active agents in creation.

The article analyses three case studies (*Cooperation Process*, *Dung Dkar Cloak*, *YoungSonic*), selected for their representativeness in terms of technological diversity, different models of interaction, and their situating in public space. These studies are not treated as empirical material in the strict sense of case study research but as model examples that illustrate broader trends and simultaneously serve as critical probes into the ongoing transformation of artistic practice. The methodological approach includes a comparison of these cases in terms of their artistic structure, technical nature, and degree of audience participation. This approach enables the observation of how an emerging paradigm of artistic creation takes shape through these examples—one that redefines the relationships between author, audience, technology, and public space. The goal is not to establish this paradigm as a stable system but to highlight its formation in motion, in the present, and through concrete artistic practices.

The case studies were selected from the ISEA 2025 program as representative examples of different modalities of interactive art—performative (live coding) and sensorily embodied (tactile feedback). Their selection was based on the contrast in forms of interaction, while sharing a common orientation toward presence, processuality, and public space. The analysis is based on a combination of critical reading of the artwork, observation of its dramaturgical structure, and reflection on the conceptual and technical elements that influence audience participation.

CASE STUDIES: TECHNOLOGY AS CO-CREATOR

Contemporary artistic practice increasingly integrates technologies that enable the creation of artworks in real time and in the direct presence of an audience. These technologies do not merely play a supportive or representational role but enter the very structure of the creative process as active co-authors. The result is an artwork that is open, dynamic, and mutable, with its final form depending on the interaction between system, environment, and viewer (Edmonds et al., 2006).

At the International Symposium on Electronic Art (ISEA), numerous recent projects have been presented that incorporate such technologies into live artistic practice. To compare principles of authorship and creative participation, we may examine two notable works from the ISEA 2025 program, both of which engage real time, technology, and interaction, yet from distinct perspectives. The first, *Cooperation Process* (Fig. 2, 3), represents an instance of performative collaboration in a digital environment, where the viewer observes the emergence of the work as an open process involving multiple authors. The second, *Dung Dkar Cloak*, explores sensory interactivity through material engagement—merging digital textile with tactile sound response, transforming the viewer into an active co-creator through their physical presence. These two realisations illustrate different modes of live art that are grounded in interactivity, environmental sensitivity, and technology as a creative partner.

Cooperation Process (2025) is an experimental form of live coding performance developed by artists Sungwon Lee, Se Won Jeon, and Jae Yi Cha. At the core of this multimodal performance lies the concept of cooperation as a creative process taking place in real time. Instead of the traditional view of collaboration as a division of tasks, the artists are working simultaneously in a shared programming environment, constantly intervening in each other's output and decisions. The result is an unpredictable, dynamic, and continually evolving audiovisual structure, whose aesthetic value lies not only in the final output but especially in the act of creation itself. The fundamental dramaturgical principle of the work is a shared coding space, in which each of the three participants becomes both author and respondent. Here, the principle of reactive improvisation, known from musical improvisation, is transposed into the domain of software coding. Rhythmic, harmonic, and visual components develop through constant feedback among participants, enabling layering and transformation of digital structures in real time. This approach highlights the performativity of the algorithm: it is not just what is executed, but how, when, and by whom.

Fig. 2. ISEA 2025, Sungwon Lee, Se Won Jeon, and Jae Yi Cha, Cooperation Process. (Photo: Paulína Ebringerová, 2025)

One of the key aspects of *Cooperation Process* is its ability to make the act of creation itself visible as part of the artistic experience. The audience witnesses not only the resulting sound and visuals, but also the evolution of code, its edits, errors, and corrections. This approach emphasises the transparency of algorithmic creation and opens questions regarding autonomy, authorship, and creative control in digital collaboration. The work thus reflects broader tendencies in contemporary media art, where the boundaries between performer and programmer, between code and aesthetics, and between planning and improvisation are increasingly blurred. *Cooperation Process* functions not only as an artistic experiment but also as a research tool exploring collective creation in digital environments.

Fig. 3. ISEA 2025, Sungwon Lee, Se Won Jeon, and Jae Yi Cha, Cooperation Process. (Photo: Paulína Ebringerová, 2025)

Whereas *Cooperation Process* highlights collective creation through digital language in real time, the installation *Dung Dkar Cloak* (2023–2025) by the artistic duo EJTECH (Judit Eszter Kárpáti and Esteban de la Torre) shifts the interaction toward material touch and sonic feedback (Fig. 4, 5). This textile object, crafted from conductive fibres and algorithmically designed fractal structures, functions as a multimedia interface: by touching its surface, real-time sound responses are activated. The work merges textile design, digital code, and sound synthesis into a complex system in which the viewer is not merely a recipient but a sensorimotor activator.

Fig. 4. Judit Eszter Karpati Esteban de la Torre, Dung Dkar Cloak. (Source: EJTECH, 2025, edited by the author)

The tapestry was created within the research framework of the Moholy-Nagy University of Art and Design (Budapest) and has been exhibited at events such as Sound Scene (Smithsonian Hirshhorn Museum) and Intermezzo (House of Music, Hungary).

The visitor physically enters into the work—through touch, they determine sound parameters such as frequency and filter, transforming the piece from a passive medium into a live performative system. In contrast to *Cooperation Process*, where the act of creation is shared but remains digitally autonomous, *Dung Dkar Cloak* requires human presence and physical interaction for its activation.

The two works thus represent different modalities of live creation: the former as a transparent performative display of authorship, the latter as a sensorily mediated collaboration between human, technology, and material. *Cooperation Process* is an open creative process in which the viewer is primarily a witness—observing the development of code, its errors, the artists' interventions, and the audiovisual result, but not interfering in the act of creation itself. The artistic experience is conveyed through observation and the understanding of digital collaboration.

By contrast, *Dung Dkar Cloak* simply does not function without the physical contact of the viewer. It is a system whose activation depends directly on touch, proximity, or movement within the space. The viewer here is not only an activator but a co-author—their bodily presence and gestures directly influence the sonic component of the work. In this way, the piece becomes an interactive musical instrument with no fixed form, but one that reacts in real time to external stimuli. While *Cooperation Process* opens up the inner workings of digital creation as a performative outcome, *Dung Dkar Cloak* turns attention to bodily experience and sensory perception as preconditions for the work's very existence. The former operates even without the viewer's active engagement; the latter simply cannot exist without it. This comparison underscores the essential role of interaction in contemporary art—not as an accessory, but as a constitutive element of the artwork itself.

Fig. 5. ISEA 2025, Judit Eszter Karpati Esteban de la Torre, Dung Dkar Cloak. (Photo: Paulína Ebringerová, 2025)

THE POSTHUMANIST DIMENSION OF LIVE ART

Contemporary art realised in real time often transcends the boundaries of human subjectivity and reflects a posthumanist perspective that challenges traditional dichotomies such as human–machine, subject–object, and creator–tool. Within this discourse, the human is no longer seen as an autonomous author but as one element of a distributed creative system, in which algorithms, sensors, neural networks, and immaterial data structures play active roles.

With the advent of interactive and live technologies, the nature of artistic presence in public space is fundamentally changing. The traditional notion of public art as a static object—such as sculptures, monuments, or murals—is being replaced by dynamic, time-bound events that emerge from a dialogue between technology, audience, and environment (Bishop, 2012; Kwon, 2002). The artistic act becomes a performative process, where the artwork exists only in the time and space of its unfolding and often depends on the participation of the audience, which becomes an inseparable part of it (Kaye, 2000).

In this context, performativity does not merely imply a theatrical or dance element, but rather a broader mechanism of repetition, response, and adaptation (Butler, 1993). Artistic interventions often take place in public squares, on streets, among architecture and people, incorporating changing conditions such as urban soundscapes, the flow of people, light, data, or microclimates (Kozel, 2007). The artwork is situated and contextual—it arises in relation to a specific site and evolves along with it.

Audience participation goes beyond the symbolic level. The viewer is not just a recipient but an activator, even a co-author—their presence and movement influence the course and form of the work. Technological systems (such as motion sensors, microphones, cameras, GPS tracking) capture input in real time and transform it into visual or sonic outputs. This creates a dialectical relationship between the body and the algorithm, between physical presence and digital output (Salter, 2010; Kwastek, 2013). An example of this approach is the work *YoungSonic: Nidifying the Sonic Creatures* (2025) by artist Jsuk Han (Fig. 6). In this project, autonomous “sonic creatures” respond to spatial stimuli and audience behaviour. Their “nidifying” in a specific environment expresses a connection between biological, acoustic, and social systems. The audience not only influences the sonic output but also alters the trajectories of the entities themselves—thus becoming part of the work's processual nature. This bio-inspired approach shifts the focus from object-based art toward a systemic logic of a mutable, living environment.

Fig. 6. YoungSonic: Nidifying the Sonic creatures, loudspeakers, PVC pipe, computer, sound installation, 2024, Jsuk Han. (Photo: Studio HAERAN, 2024; Source: Daehyung, 2025)

Public space as a medium also demands a different kind of perception compared to the gallery setting. It is unpredictable, open, and heterogeneous—making it an ideal laboratory for testing new forms of interactive and performative art. In the case of *YoungSonic: Nidifying the Sonic Creatures* (2025), the environment becomes not just a site of occurrence but the very material of the artistic process. The work does not exist outside of its activation—its meaning emerges through interaction and perception, which changes with each new participant. Real-time art in public space thus creates a new kind of dramaturgy in which technology, space, and human presence are in a constantly shifting balance. A key outcome of this process is that the artwork is no longer a closed entity, but a network of relationships that is renewed with every new perceiver, in every new moment.

CHALLENGES AND POTENTIAL OF EPHEMERAL CREATION

Art realised in real time within public space represents not only a significant shift in aesthetic and technological approaches, but also opens a range of theoretical, practical, and ethical questions that must be addressed. One of the key challenges is the ephemerality of the artworks themselves. Art that emerges as a process, event, or living system is typically time-bound and difficult to capture within traditional archival formats. This raises the following question: how can we preserve the memory of an artwork that existed only in the present and under constantly changing conditions? Standard photographic or video documentation often reduces the multi-layered experience to fragments that fail to convey the interaction, dynamic transformation, or the artwork's specific relationship to its environment. The problem of documentation, in this context, becomes both philosophical and practical—it is about preserving the memory not of an object, but of an experience.

Closely related to this is the issue of curation and presentation: how can a work that exists only through time be exhibited or represented outside of traditional galleries? Public space as an exhibition framework demands new dramaturgical and organisational strategies that account for its temporality, openness, and unpredictability. Curators, artists, and architects must collaborate with technological partners, municipal institutions, and communities. This gives rise to new interdisciplinary models of production that connect artistic creation with urban planning, software design, and social research. The ephemeral and living nature of these works allows art to intervene in the social space in a more fundamental way. Because such works are created "here and now," they can flexibly respond to current stimuli. Art thus becomes a form of interventionist medium—it does not operate only symbolically, but also actively reshapes spatial and social relationships through presence and interaction.

A significant aspect is the transformation of the viewer. The visitor no longer observes the work from a distance but enters into it, activates it, and becomes part of it. This shift changes the way individuals perceive technology, space, and themselves. Interaction with ephemeral art can become a tool for introspection, collective consciousness, and a redefinition of one's relationship to reality—from object to process, from observer to co-creator. Live artistic creation, though impermanent and unpredictable, holds a unique potential. It allows us to think differently, to perceive connections in real time, and to learn from relationships rather than from static objects. Its value does not lie in permanence but in intensity—in its ability to transform, and to be transformed. In this sense, these artistic practices become part of a broader cultural reflection that emphasises presence, change, and dialogue.

As Siglinde Lang (2015) notes, “Art needs communication, it needs publicity: without publicity, art is not perceived as art. Art without communication is meaningless and loses its potential.” In this sense, it is not only the responsibility of artists, but also of curators, critics, and researchers to seek new forms of communicating works, preserving them, and further developing their social impact. Interactive art simultaneously generates new layers of memory and identity—not only through documentation or recording, but through embodied experience that becomes inscribed in the participant's body, as well as through digitally shared experiences that enter the realm of collective cultural consciousness. In this way, public space is transformed into an affectively charged site, carrying the traces of lived events while also becoming an open archive of evolving cultural memory.

CONCLUSION

Technologically mediated artistic creation represents one of the most significant shifts in the contemporary understanding of art as a cultural phenomenon. Works that emerge in real time, in direct contact with the audience and environment, disrupt traditional notions of the artwork as a closed object. Art becomes a process, an event, and a relationship—where technology is not merely a tool but an active partner in creation. This shift can be understood as an emerging paradigm which—following the concept introduced by T. S. Kuhn—signals a transformation in the shared practices, values, and ontological assumptions of artistic activity. While not yet a fully stabilised framework, the analysed case studies illustrate how a new approach to authorship, interaction, and public space is beginning to take shape.

From a posthumanist perspective, the field of creation expands into hybrid relations. Art is not created *for* the human, but *with* the human and *beyond* the human—in collaboration with algorithms, sensors, environments, and other forms of intelligence. The ephemeral, processual, and participatory nature of these works presents challenges in terms of documentation, sustainability, and institutional frameworks. At the same time, it offers the potential for new cultural experiences—ones that are open, unpredictable, and anchored in the present. Nowara et al. (2025) emphasise the humanising potential of installation art, which introduces elements of sensory response, engagement, and identification into public spaces. These very dimensions can also be observed in the works analysed in this article, where contact with technological media creates an emotional bond between the environment, the body, and cultural experience.

The future of interactive, real-time art can thus be seen as a sketch of an emerging paradigmatic framework in which the artist becomes a facilitator of environments and processes, the viewer an active co-creator, and technology a contextually sensitive medium. Within this interplay, space opens not only for new artistic forms, but also for new forms of communication, identity, and social cohesion. This article contributes to current reflections on digital and performative art. It examines performative systems in both their material-sensorial and social dimensions, proposing that they be read as processes in which technology, the body, and public space are in constant reconfiguration. This model of analysis expands the discourse of interactive art to include the dimension of real social participation. Real-time art teaches us to perceive creation as a relationship and the world as a network in which every moment is unique and every encounter creative. Ultimately, this is not only about the future of art, but about the future of our capacity to feel, think, and act in a world that is increasingly interconnected, intelligent, and constantly in motion.

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