



Interactive art as reflective experience: Imagineers and ultra-technologists as interaction designers

Marianna Charitonidou

To cite this article: Marianna Charitonidou (2020) Interactive art as reflective experience: Imagineers and ultra-technologists as interaction designers, *Visual Resources*, 36:4, 382-396, DOI: [10.1080/01973762.2022.2041218](https://doi.org/10.1080/01973762.2022.2041218)

To link to this article: <https://doi.org/10.1080/01973762.2022.2041218>



© 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 19 May 2022.



Submit your article to this journal [↗](#)



Article views: 3174



View related articles [↗](#)




View Crossmark data [↗](#)



Citing articles: 1 View citing articles [↗](#)

Interactive art as reflective experience: Imagineers and ultra-technologists as interaction designers

Marianna Charitonidou 

The article investigates how the use of extended reality technologies and interactive digital interfaces have affected the design of exhibition spaces. Its main objective is to shed light on how these technologies have influenced the ways in which immersive art installations are conceived and experienced. Particular emphasis is placed on the impact of interactive technologies on how visitors experience exhibition spaces. The article examines an ensemble of immersive art cases, paying special attention to the distinction between immersion and interactivity. Two concepts that are pivotal for understanding the transformations concerning the subjectivity of the exhibition visitor those of the “imagineer” and the “ultra-technologist”, which are analysed in the article. The intention is to render explicit how extended reality technologies have contributed to the design of immersive experiences, significantly influencing the interrelations between the technical, aesthetic and institutional aspects concerning exhibition design and the methods of dissemination of art.

Keywords: Augmented Reality; Virtual Reality; Interactive Media Art; Immersion; New Media Art; Story-driven Immersion; Exhibitions

Introduction

At the centre of this article is the role of extended reality technologies in designing immersive experiences in the case of art practices that place particular emphasis on participation, interaction, technology and digital media. Of great importance for understanding what is at stake in the case of the design of exhibition spaces that use augmented and virtual reality and interactive digital interfaces are the differences between real environment, augmented reality, pure mixed reality, augmented virtuality and virtual environment.¹ For instance, in the case of pure mixed reality, virtuality and reality are merged. Chun-An Chen and Hsin-I Lai have described augmented reality as the “Digital information presented in the real-life surrounding”, and virtual reality as the “Digital information that provides a new world of immersion”.²

The current context concerning the design of exhibition spaces is characterised by an emerging tendency to rely on curatorial processes that are based on the application of interaction design methods and the promotion of new media art practices.³ A seminal work for understanding the new aesthetic experience related to the

so-called interactive media art is Katja Kwastek's *Aesthetics of Interaction in Digital Art*, in which "the aesthetic experience of interactive art [is located] in the oscillation between flow and distancing and in the oscillation between action and reflection".⁴ Another book that is enlightening as far as the practices of new media artists are concerned is *Media Art Histories* edited by Oliver Grau, in which the contributors examine the involvement of media artists in net art and interactive, genetic and telematic art.⁵ Steve Dixon, in *Digital Performance: A History of New Media in Theater, Dance, Performance Art, and Installation*, distinguishes four types of interactive art and performance according to "the openness of the system and the consequent level and depth of user interaction: 1. Navigation 2. Participation 3. Conversation 4. Collaboration".⁶ At the core of the article is the reconfiguration of the interaction between collections, public knowledge and civic society thanks to the use of extended reality technologies.

From Space Syntax Theory to Experiential Immersive Art Theory

Space syntax theory tools could contribute significantly to the endeavours of investigating the impact of interactive technologies on how visitors experience exhibition spaces. According to space syntax theory, "the space of inhabitation is configured", in the sense that configuring refers to the "act of turning the continuous space into a connected set of discrete units".⁷ At the centre of space syntax theory is the intention to go beyond the dichotomy between "space-as-form and society-as-content".⁸ To understand the implications of space syntax theory for analysing the design of exhibition spaces, one should bear in mind that "the relationship between society and space is not merely that of mapping one domain onto the other but has a dynamic aspect as well; each modifies and restructures the other".⁹ As Sonit Bafna remarks, "The aim of space syntax research is to develop strategies of description for configured, inhabited spaces ... in such a way that their underlying social logic can be enunciated".¹⁰

British anthropologist and museologist Sharon Macdonald, in "Interconnecting: Museum Visiting and Exhibition Design", underscored that there is a necessity to conduct further research on "how physical spatial layout – and perhaps matters such as the perceived boundaries of an exhibition or its sequencing – might be mediated by technologies such as interactive computer guidebooks".¹¹ Macdonald examines the different trends in so-called museum visitor research. Among the tendencies she examines are so-called "directed behavioural studies", which focus on the investigation of "specific aspects of visitor behaviour in exhibitions".¹² Macdonald also sheds light on the new directions in the domain of exhibition media, placing particular emphasis on how "different media 'afford' different kinds of audience relations and may also carry particular connotations".¹³

Sharon Macdonald draws upon the research of Bill Hillier and Kali Tzortzi, who have underlined that "patterns of spatial relations are so basic to our existence that they form part of the apparatus we think with, rather than think of".¹⁴ Useful for comprehending how space syntax research can serve as a tool for explaining the ways in which the incorporation of interactive digital interfaces in exhibition design affects

visitors' perception are studies on how "the visitor's perception is 'staged'".¹⁵ Macdonald suggests as a new direction for the space syntax research: the investigation of "how physical spatial layout—and perhaps matters such as the perceived boundaries of an exhibition or its sequencing—might be mediated by technologies such as interactive computer guidebooks".¹⁶

Sharon Macdonald wrote the aforementioned article in 2007. Since then, there has been an evolution concerning the introduction of space syntax methods to the interpretation of interactive art.¹⁷ However, in the majority, the studies that draw upon the methods of space syntax theory concern the domain of urban design, urban planning and urban sciences, and focus on pedestrian movement and notions such as walkability. This is the case, for instance, for articles such as "Combining Multi-criteria and Space Syntax Analysis to Assess a Pedestrian Network: The Case of Oporto", authored by Mona Jabbari, Fernando Fonseca and Rui Ramos,¹⁸ and "Space Syntax: Consolidation and Transformation of an Urban Research Field", authored by Kayvan Karimi.¹⁹

In the field of interactive art and exhibition design that focuses on the potentials of virtual and augmented reality, there are not extensive studies that draw upon space syntax theory. Instead of focusing on the application of space syntax theory to the analysis of the impact of extended reality technologies on the exhibition visitors' experience, the current debates are dominated by narratives, theories and interpretative methods that focus on designing engaged experience and animating the archive.²⁰ Particular emphasis is placed on the role of immersion. Moreover, another concept that dominates the current context in museum and curatorial studies is that of 'digital storytelling'.²¹ According to Zoi Popoli and Izabela Derda, "The storytelling of immersive exhibitions is different from the exhibition of tangible objects curated for structured exploration".²² Immersive art is based on the intention to enhance the engagement of visitors through the enhancement of their interaction not only with the installations and artworks, but also with the other visitors.²³ In this sense, in the case of immersive art visitors are treated not as spectators, but as active agents within the process. Zoi Popoli and Izabela Derda have used the term "story-driven immersion" to describe the process of strengthening "exhibition design by supporting the creation of a multi-sensory, visceral, and hence immersive space capable of engaging visitors in the story".²⁴

Contemporary Art Versus New Media Art: Challenging the Division Between the "Duchamp Land" and the "Turing Land"

The key argument of this section of the article is that computer-based art or new media art was developed shaping a new perspective that was initiated by the happening and performance art movement. This new perspective characterising computer-based art or new media art was related to a reconceptualization concerning the relationship between art and space, on the one hand, and the relationship between art and the concept of participation, on the other. This means that, in order to grasp what is at stake in the case of computer-based art or new media art, it is important to

comprehend the shifts its emergence provoked as far as the interaction between the audience and the artworks is concerned. These shifts are also related to the transformations of the concept of artistic action. On June 19, 2010, a debate entitled “Contemporary Art and New Media: Towards a Hybrid Discourse” was held within the framework of Art Basel. This debate brought together French curator and art critic Nicolas Bourriaud, Austrian post-conceptual artist, curator and new media theoretician Peter Weibel, and Michael Joaquin Grey, an artist whose work has bridged the boundaries between art, science, media and the imagination. The theme of the aforementioned debate was the division between mainstream contemporary art and new media art. The discussion was coordinated by Edward Shanken.²⁵

An article that played a significant role in the evolution of the debates between the advocates of contemporary art and those of new media art is that of Claire Bishop, entitled “Against Digital Art History” and published in the *International Journal for Digital Art History* in 2018.²⁶ Moreover, Francesca Albrezzi’s PhD dissertation entitled “Virtual Actualities: Technology, Museums, and Immersion”, defended at UCLA in 2019, is useful for better understanding the history of digital art. Albrezzi, in this dissertation, sheds light on the tension between computational methods and humanistic inquiry that characterises the debates related to digital art curatorial practices.²⁷

Ernest Edmonds, Lizzie Muller and Matthew Connell have related Nicolas “Bourriaud’s rejection of art delivered through new technologies ... [to] ... a frustrating history of division between contemporary and computer-based art”.²⁸ More specifically, they have interpreted this rejection as an outcome of the division characterizing contemporary art scene “between ‘Turing land’ (inhabited by the computer-arts) and ‘Duchamp land’ (inhabited by post-modern conceptual art)”.²⁹ Certain art theorists, such as the pioneering theorist of digital culture and media artist Lev Manovich, who oppose the “Duchamp land” against the “Turing land”, tend to argue that artists belonging to the latter “lack irony in their critique of art mediums”, in contrast to the artists of the “Duchamp land”.³⁰ Instead of interpreting the “Duchamp land” and “Turing land” as opposing realities, we could understand them as the outcome of an inevitable and continuous exploration towards a dynamic understanding of the dynamics between space, technology and experience through participation, immersion and other forms of manipulation of reality.

Two exhibitions that are of great significance for understanding the tension between “Duchamp land” and “Turing land” are *Software: Information Technology: Its New Meaning for Art*³¹ and *Cybernetic Serendipity: The Computer and the Arts*.³² The former was curated by artist and critic Jack Burnham and was held at the Jewish Museum in Brooklyn, New York City between September 16 and November 8, 1970, and the Smithsonian Institution, Washington, DC between December 16, 1970 and February 14, 1971. The latter was curated by Jasia Reichardt, in collaboration with technological adviser Mark Dowson and musical adviser Peter Schmidt. It was designed by Franciszka Themerson and was held at the Institute of Contemporary Art (ICA) in London from from 2 August to 20 October 1968. The exhibition *Cybernetic Serendipity: The Computer and the Arts* centred on cybernetic art. This exhibition

also toured across the USA, being displayed in galleries such as the Corcoran Gallery of Art in Washington DC and the Exploratorium in San Francisco.

The Concept of Virtual Museum and the Renewed Role of the Archive: Temporal Time and Space of Flows

A concept that is at the centre of this article is that of the “virtual museum”. According to Jihoon Kim, “The idea of the virtual museum is not entirely new in the digital age but is derived from the early twentieth century”.³³ More specifically, Kim argues that the work of László Moholy-Nagy, El Lissitzky and Frederick Kiesler is of great significance for understanding the history of the notion of virtual museum. According to Kim, they have played an important role in the formation of the concept of the virtual museum. Drawing upon the work of Erkki Huhtamo, Kim claims that a common parameter among the aforementioned figures – Moholy-Nagy, Lissitzky, and Kiesler – is their intention to treat artworks as “integral elements of a total environment that envelops the visitors and encourages them into a dynamic relationship with the space and all its dimensions and elements”.³⁴

A parameter that should be taken into account when we reflect upon the impact of virtual and augmented reality on exhibition design is the role of museums as “repositories of temporality”.³⁵ Manuel Castells has related the virtual museum to a new kind of temporality, which he describes as “temporal time”, and a new kind of space, which he describes as a “space of flows”. Useful for better grasping the notion of the virtual museum is the distinction that Castells draws between real virtuality and virtual reality. Instead of using the term “virtual reality”, he employs the term “real virtuality” because he believes that this concept offers him the opportunity to address the tension between “the reality which we live [and] ... the reality of communication media and Internet, which we do not live”.³⁶ Drawing upon Castells’s approach, we could claim that museums “constitute an accumulated historical tradition or a projection into the future [, being] ... an archive of human time, lived or to be lived, an archive of the future”.³⁷

Another trend that is closely related to the development of digital art concerns the reflections around the development of archives of born-digital art and the renewed role of the archive in the post-digital era. A case that is at the centre of these reflections is the formation of Rhizome – an art organization devoted to born-digital art and culture – in 1996. This organization, which is directed by Michael Connor, was affiliated with the New Museum, New York, in 2003. Since 2014, Rhizome has also been affiliated with NEW INC – a shared workspace and incubator programme supporting an anti-disciplinary community of individuals, small teams and collectives. Rhizome has played a significant role in the history, definition and proliferation of new media art. The activities of Rhizome are related to the trend of inventing new ways of conceiving the notion of the archive. At the centre of Rhizome’s interest is the investigation of network culture and born-digital art. Useful for better comprehending Rhizome’s approach is the exhibition *The Art Happens Here: Net Art’s Archival*

Poetics, curated by Michael Connor, who is Artistic Director of Rhizome, and Aria Dean, and held at the New Museum from January 22 to May 26, 2019.³⁸

As Jihoon Kim has highlighted, “Contemporary art production and curatorial practices across different media have widely questioned and explored the concepts and modes of the archive as the apparatus of storage, preservation, and access during the last 15 years”.³⁹ Despite the benefits and potentials of the digital archives, certain scholars such as Kim have highlighted the loss of certain aspects of the archive because of the shift towards the digital archive, paying particular attention to philosophical approaches such as those of Jacques Derrida, in *Archive Fever: A Freudian Impression*,⁴⁰ and Walter Benjamin, in *The Work of Art in the Age of Mechanical Reproduction* concerning the aura,⁴¹ and to artistic approaches such as those of Aby Warburg, especially in the case of the unfinished “Mnemosyne Atlas” (1924–1929),⁴² and Gerhard Richter, particularly in the case of “Atlas” (1964–present).⁴³ Kim, in the framework of her endeavour to render explicit in which sense the digital archive goes hand in hand with the risk of leaving behind some features of the archive as understood by the aforementioned thinkers and artists among others, remarks the following:

while the capacities of digital technologies are seen to offer us the opportunities to rethink the traditional assumptions of the archive and its objects, the experiences provided by these capacities are not totally unprecedented or limitless but should be supplemented by loss, disorder, disorientation, and unexpected encounter that are inherent in the traditional archive and acts of memory.⁴⁴

According to Jihoon Kim, a project that can help us reflect on the new role of the notion of archive in the field of digital art is Chris Marker’s “Ouvroir” (2008), a virtual museum in Second Life displayed at the virtual solo exhibition entitled *Chris Marker: A Farewell to Movies* organized by the Design Museum in Zurich. Kim has argued that “Marker’s virtual museum allows for the dialectic of the archive as marked by the possibility of collection and documentation as well as its inherent room for loss, fragmentation, and disorientation”.⁴⁵ The intensification of the interest in the concept of the virtual museum around the globe is also linked to the emergence of new forms of labour, while challenging the epistemological frameworks. As Hal Foster notes, in “The Archive without Museums”, a relevant question is that of how long it will take “the electronic preconditions of visual culture ... to grasp the epistemological implications”.⁴⁶

The Proliferation of Immersive Art Centres Around the Globe: Mori Building Digital Art Museum, Superblue and “Machine Memories”

A noteworthy case of immersive art centre is “Mori Building Digital Art Museum: teamLab Borderless” in Odaiba district of Tokyo, which opened its doors in June 2018 and received approximately 2.2 million visitors in 2019. The size of the aforementioned digital art museum, which hosts 50 artworks, is monumental: 10,000

square metres. Its conception was based on the intention to create a museum on digital art that would exhibit artworks promoting an interaction between the artworks and the visitors to the museum. To render possible this interaction with the visitors, the artworks are based on the use of 520 computers and 470 projectors. Among the 50 artworks that are on display in this museum are the following: *EN Tea House*, *Forest of Lamps*, *Athletics Forest*, *Borderless World* and *Crystal Universe*.

“Mori Building Digital Art Museum: teamLab Borderless” is operated by art collective teamLab and Mori Building Co., Ltd. The former is an interdisciplinary group of more than 600 “ultra-technologists” formed in 2001 in Tokyo, and the latter is a property management firm with a strong track record in supporting the arts and cultural sector in Japan. The main scope of teamLab is the creation of immersive digital worlds. Among its co-founders is Toshiyuki Inoko. To better grasp the institutional aspects behind the dissemination of teamLab’s work, it would be useful to bring to mind that this art collective has been represented by Pace Gallery since 2014. Since 1960, Pace Gallery has represented the most significant artists and estates of the twentieth and twenty-first centuries. Apart from the foundation of Mori Building Digital Art Museum: teamLab Borderless, teamLab has also been involved in the foundation of “teamLab Planets” in Toyosu in Japan and “teamLab Borderless” in Shanghai in China. Another museum that uses augmented reality is the National Museum of Singapore, which has hosted an immersive installation called *Story of the Forest* by teamLab. The aforementioned artwork is an immersive installation that transforms 69 drawings from the William Farquhar Collection of Natural History Drawings into three-dimensional animations.

In spring 2021, an immersive art experience centre opened its doors in Miami, Florida. Its name is Superblue and it contains 31,000 square feet (2787 square metres) of exhibition space. In its foundation, apart from Pace Gallery, Laurene Powell Jobs was also involved. The inauguration of Superblue was accompanied by the opening of an exhibition entitled *Every Wall is a Door*. This exhibition brought together artworks by Es Devlin, teamLab, Yayoi Kusama, Random International, Studio Drift and James Turrell among other creators. Among teamLab’s immersive installations included in the exhibition *Every Wall is a Door* are: *Universe of Water Particles*; *Transcending Boundaries*; *Flowers and People, Cannot be Controlled but Live Together*; *Life Survives by the Power of Life II*; and *Massless Clouds Between Sculpture and Life*. Shantelle Rodriguez is the director of experiential art centres for Superblue. The foundation of Superblue is symptomatic of a shift in the institutional aspects concerning immersive art. The artists receive part of the income from the tickets and, in this way, they can be financially more flexible.

Another example of immersive art exhibition that is noteworthy is *Machine Memories: Space*, which was inaugurated on March 19, 2021 at Pilevneli Gallery in Istanbul, Turkey. This exhibition included an ensemble of artworks of media artist Refik Anadol (Figures 1–4). For the creation of the immersive artworks that are displayed in this exhibition, Anadol used complex artificial intelligence (AI) algorithms in order to create extended reality experiences. Among the artworks on display were an artwork entitled *Machine Hallucinations*, which showed some views from the International Space Station (ISS) telescope. Among the sponsors of the exhibition were

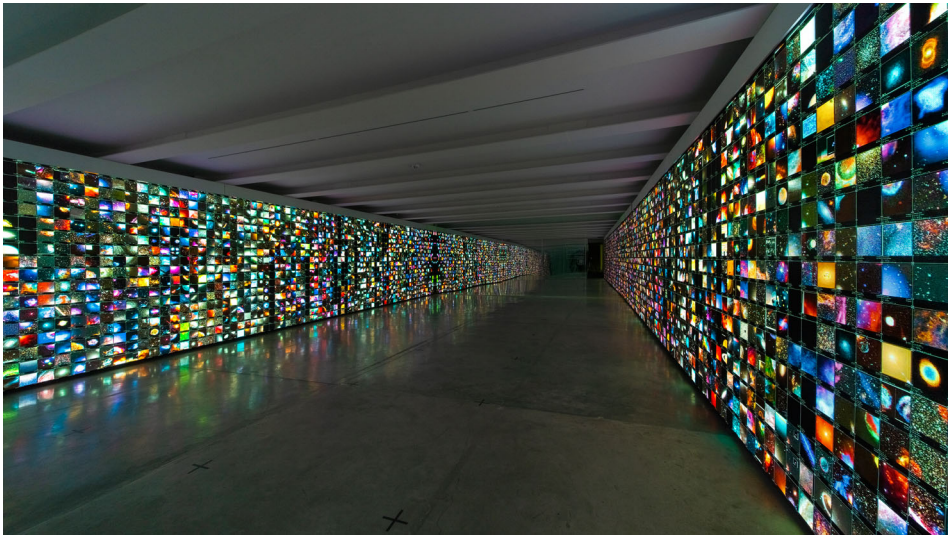


Figure 1. DATA TUNNEL, 2020-21. Custom software site-specific installation. Duration: 9 minutes. This artwork was displayed at the exhibition “Machine Memories: Space” with artworks by Refik Anadol. This exhibition was held between 19 March and 26 April 2021 at Pilevneli Gallery in Istanbul. At the core of the artworks displayed in this exhibition was the creation of immersive digital worlds that became possible thanks to the use of AI. For more information about the exhibition: <https://www.pilevneli.com/exhibitions/38-refik-anadol-machine-memoirs-space-pilevneli-dolapdere/works/> © Refik Anadol.

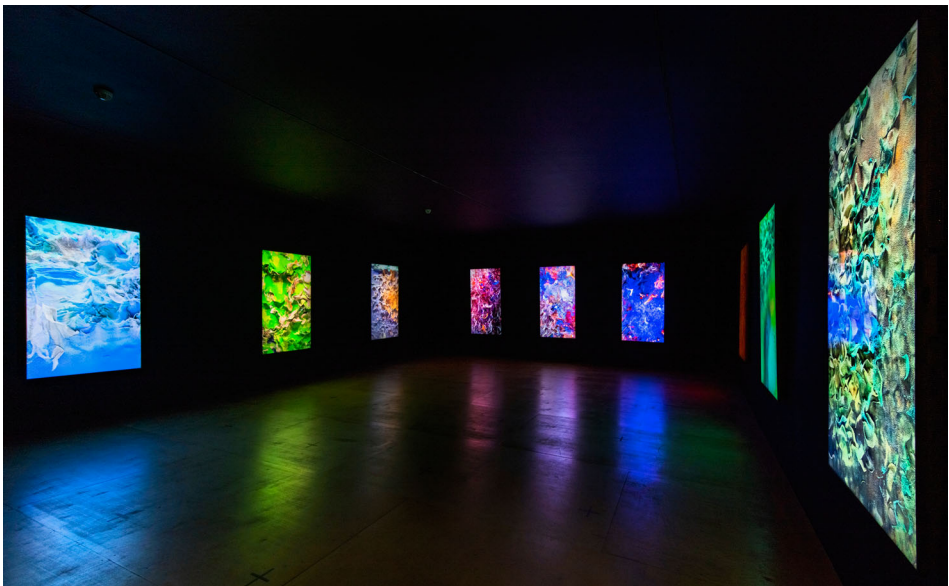


Figure 2. MACHINE HALLUCINATIONS: ISS DREAMS - A - B - C, 2020 - 21. MACHINE HALLUCINATIONS: HUBBLE DREAMS - A - B - C, 2020 - 21. MACHINE HALLUCINATIONS: MRO DREAMS - A - B - C, 2020 - 21. 4K data sculpture. Duration: 16 minutes. This artwork was displayed at the exhibition “Machine Memories: Space” with artworks by Refik Anadol. This exhibition was held between 19 March and 26 April 2021 at Pilevneli Gallery in Istanbul. At the core of the artworks displayed in this exhibition was the creation of immersive digital worlds that became possible thanks to the use of AI. For more information about the exhibition: <https://www.pilevneli.com/exhibitions/38-refik-anadol-machine-memoirs-space-pilevneli-dolapdere/works/> © Refik Anadol.



Figure 3. AI DATA SCULPTURE: ISS HUBBLE MRO, 2020-21. Custom software site-specific installation. Duration: 13 minutes 50 seconds. This artwork was displayed at the exhibition “Machine Memories: Space” with artworks by Refik Anadol. This exhibition was held between 19 March and 26 April 2021 at Pilevneli Gallery in Istanbul. At the core of the artworks displayed in this exhibition was the creation of immersive digital worlds that became possible thanks to the use of AI. For more information about the exhibition: <https://www.pilevneli.com/exhibitions/38-refik-anadol-machine-memoirs-space-pilevneli-dolapdere/works/> © Refik Anadol.

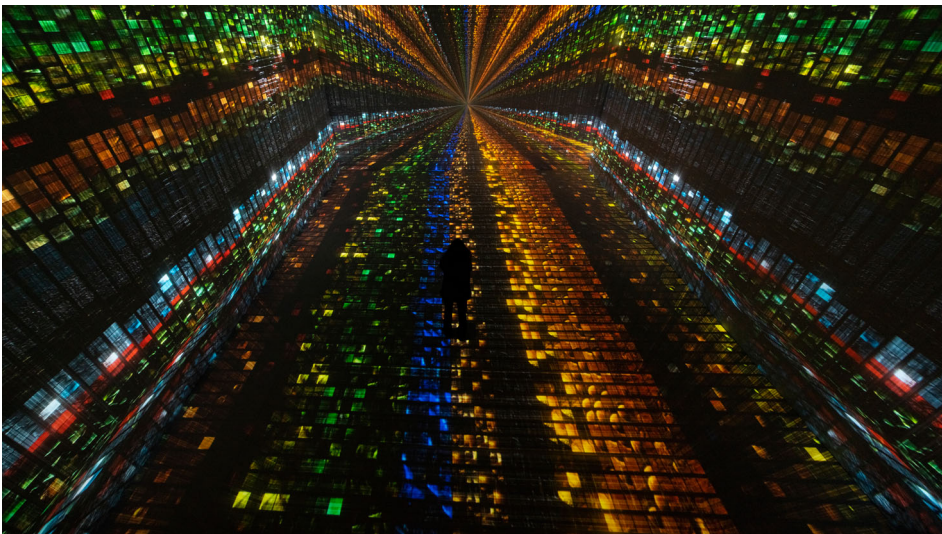


Figure 4. MACHINE MEMOIRS V.2, 2020-21. A/V performance in an 18 channel immersive room. Duration: 18 minutes. This artwork was displayed at the exhibition “Machine Memories: Space” with artworks by Refik Anadol. This exhibition was held between 19 March and 26 April 2021 at Pilevneli Gallery in Istanbul. At the core of the artworks displayed in this exhibition was the creation of immersive digital worlds that became possible thanks to the use of AI. For more information about the exhibition: <https://www.pilevneli.com/exhibitions/38-refik-anadol-machine-memoirs-space-pilevneli-dolapdere/works/> © Refik Anadol.

Istanbul Metropolitan Municipality, BMW distributed by Borusan Otomotiv in Turkey, IMM subsidiary Kültür AŞ and the Samsung Galaxy S21 Series. The exhibition consisted of two components: “Memoirs” and “Dreams”. “Memoirs” consisted of a series of raw data-driven installations, including more than two million images that were captured using the ISS, Hubble and MRO telescopes and other sensors and satellites. “Dreams” included various three-dimensional data sculptures and an immersive AI cinema installation. The artworks of media artist Refik Anadol were created using advanced 3D printing techniques and represent landscapes inspired by the views from the ISS, Hubble and MRO telescopes.

Towards a Conclusion or the Imagineers and the Ultra-technologists as Interaction Designers: Interactive Art as Reflective Experience

According to Zoi Popoli and Izabela Derda, “The term immersion has for a long time been almost exclusively linked to the gaming industry”.⁴⁷ Popoli and Derda argue that “immersion is neither the outcome of the evolution of digital technologies, nor is it even a new concept”.⁴⁸ At the centre of this article was the idea that a new kind of subjectivity emerges thanks to the development of experiential immersive art. Two exhibition design approaches that are of great importance for understanding the transformations of the subjectivity of the visitors of the exhibitions, the exhibition designer and the curator is the so-called “co-production” approach. An aspect of the “co-production” approach that could help us better comprehend what is at stake in immersive art is its tendency to treat the “visitors as co-creators of their experiences”.⁴⁹

The term “imagineer”, which was used by Panayiota A. Demetriou, can describe well this new kind of subjectivity. According to Demetriou, “The Imagineer is an interaction designer, an experience designer, a user experience researcher, a facilitator, a connector and networker, a translator, a project manager, a visionary entrepreneur”.⁵⁰ The shifts in subjectivity concern both the visitors and the creator. The visitors adopt a more active role, which is achieved thanks to their interactivity or interaction with the artworks. In parallel, the status of the creators is significantly transformed in the case of experiential immersive art. The artworks are not any more related to the intentionality of an artist who conceives them and leads the process of their making. On the contrary, they are conceived as the outcome of a much more complex and transdisciplinary process, which can be achieved thanks to the formation of multidisciplinary art collectives such as teamLab. Symptomatic of this stance is the fact that the people who work for teamLab use the term ‘ultra-technologist’ to describe their professional activity, discipline or field of expertise rather than the most conventional term “artist”. The shifts that take place in the field of arts, curation and museums concern not only the artists and the visitors, but also the whole system of dissemination and promotion of the arts, including all its institutional aspects. The system of financing the artists and the museums, and the status of art galleries are transformed as well.

An important distinction is that between interactivity and immersion. According to Panayiota A. Demetriou, interactivity and immersion differ in the sense that the

former involves “attentiveness to signs”, while the latter “occurs at the disappearance of signs”.⁵¹ Useful for understanding when an experience is immersive is the remark that “for an experience to be considered immersive it must be more than a three-dimensional image that surrounds a user”. The current trends in immersive art are characterized by the tendency to prioritize augmented reality over virtual reality. A common critique of virtual reality is related to the fact that it “has been considered to restrict immersion by isolating its users, not only the person wearing the headset, but also anyone standing near them”.⁵²

Two aspects of interactive art on which particular emphasis should be placed are the following: firstly, the capacity of interactive art to enhance a reflexive experience vis-à-vis the immersion of technologies in our quotidian life; and secondly, the intention of interactive art to trigger interactions among the visitors to exhibition displays. The first aspect is addressed by Ernest Edmonds, Lizzie Muller and Matthew Connell, in their article entitled “Living Laboratories for Interactive Art”, in which they claim that “Meaning occurs through the process of exchange, and interactivity itself is the very medium of the work”.⁵³ In this article, Edmonds, Muller and Connell analyse “how interactivity as a medium produces meaning”, reminding us that:

interactive art has emerged as a contemporary art form that offers a reflective experience of the complexity of modern, technologized existence, in much the same way as the novel emerged to reflect the individual’s experience of the socio-economic changes of the eighteenth century.⁵⁴

As far as the second aspect of interactive art mentioned above – its potential to enhance interaction among visitors – is concerned, Christian Heath, Dirk vom Lehn and Jonathan Osborne have highlighted that “There is a growing interest in developing exhibits that support interaction and collaboration amongst multiple participants”.⁵⁵ They have also shed light on the fact that “Galleries and museums also provide an interesting substantive domain for addressing a pervasive theme in symbolic interactionist research: how meaning and experience arises in, and through, interaction even among people who may simply happen to be in each other’s presence”.⁵⁶

To provide an overview of the generalized use of virtual reality and augmented reality technologies in museums and art galleries in Europe, we can bring to mind that, in 2015, they were used “in exhibitions in over a quarter of European museums”, as Richard Yu-Chang Li and Alan Wee-Chung Liew underscore.⁵⁷ This was the case in 2015, and today the use of virtual reality and augmented reality technologies in museums and art galleries in Europe is much more generalized than back then. The coexistence of the virtual and the physical enhances the sense of immersion, not only the interaction between the visitor and the artwork, but also the exchanges between the visitors. To fully grasp the transformations that immersive art provokes, we should seriously take into consideration the interrelations between the technical, the artistic and the institutional aspects that it involves. Augmented reality is just one of the various forms of mixed reality technologies that can be used in exhibition design and in the creation of immersive art artworks. A feature of augmented reality

that is at the centre of the reflections developed in this article is the coexistence of the digital content and the physical world. Instead of reducing our understanding of immersive art installations and artworks to technology-driven art, we should try to interpret their digital technology applications as means making possible “a wide range of methods to convey a story”⁵⁸ and not as their purpose per se.

Acknowledgements

I am grateful to Refik Anadol for sending me the photographs from the exhibition *Machine Memories: Space* at Pilevneli Gallery in Istanbul and for giving me permission to use them in this research article.

DR. IR. MARIANNA CHARITONIDOU is an architect, engineer, urban planner, historian and theorist of architecture and urbanism, an expert in sustainable environmental design, curator, lecturer and postdoctoral researcher at the Faculty of Art History and Theory of Athens School of Fine Arts, the School of Architecture of the National Technical University of Athens and the Department of Architecture of ETH Zurich. As lecturer and postdoctoral researcher at the Chair for the History and Theory of Urban Design of the Institute for the History and Theory of Architecture (gta) of ETH Zürich, she conducted a project entitled “The Travelling Architect’s Eye: Photography and the Automobile Vision”. She was the curator of the exhibition entitled *The View from the Car: Autopia as a New Perceptual Regime* at the Department of Architecture of ETH Zurich (<https://viewfromcarexhibition.gta.arch.ethz.ch>). In September 2018, she was awarded a Doctoral degree all’unanimità from the National Technical University of Athens. She is currently editing her PhD dissertation “The Relationship between Interpretation and Elaboration of Architectural Form: Investigating the Mutations of Architecture’s Scope” (jury: Jean-Louis Cohen, Bernard Tschumi, George Parmenidis, Pippo Ciorra, Constantinos Moraitis, Kostas Tsiambaos and Panayotis Tournikiotis) into two books. She also holds a MPhil in History and Theory of Architecture from the School of Architecture of the National Technical University of Athens (2013), a Master’s in Science in Sustainable Environmental Design from the Architectural Association in London (2011), a Master’s in Architectural Engineering at the Aristotle University of Thessaloniki (2010), and a Master’s in Architecture from École Nationale Supérieure d’Architecture Paris Malaquais (2008). She has been a Visiting Research Scholar at Columbia University’s Graduate School of Architecture, Planning and Preservation (invited by Professor Bernard Tschumi) and the Institute of Fine Arts of New York University (invited by Professor Jean-Louis Cohen), the École française de Rome (2016–2017 and 2017–2018), the Canadian Centre for Architecture (CCA) for her project “The Modes of Representation of Peter Eisenman, John Hejduk, Aldo Rossi and Bernard Tschumi: The ‘Observer’ vis-à-vis the Strategies of De-codification” (Doctoral Students Grant Program 2018) and the Getty Research Institute. She has presented her research at many international conferences and has published numerous articles and chapters in scientific peer-reviewed journals and edited volumes focused on architecture and urban planning. Email: m.charitonidou@icloud.com, Website: <https://charitonidou.com>

ORCID

Marianna Charitonidou  <http://orcid.org/0000-0003-1083-4861>

Notes

- 1 Carlos Flavián, Sergio Ibáñez-Sánchez, and Carlos Orús, “The Impact of Virtual, Augmented and Mixed Reality Technologies on the Customer Experience,” *Journal of Business Research* 100 (2019): 547–60, doi: <https://doi.org/10.1016/j.jbusres.2018.10.050>.
- 2 Chun-An Chen and Hsin-I Lai, “Application of Augmented Reality in Museums – Factors Influencing the Learning Motivation and Effectiveness,” *Science Progress* 104(S3) (2021): 1–16 <https://doi.org/10.1177/00368504211059045>.
- 3 Nora O. Murchú, “A Designerly Way of Curating: Reflecting on Interaction Design Methods for Curatorial Practice,” in *Curating the Digital: Space for Art and Interaction*, eds. David England, Thecla Schiphorst, and Nick Bryan-Kinns (Cham: Springer International Publishing, 2016), 9–19.
- 4 Katja Kwastek, *Aesthetics of Interaction in Digital Art* (Cambridge, MA: MIT Press, 2013), 163.
- 5 Oliver Grau, ed., *Media Art Histories* (Cambridge, MA: MIT Press, 2007).
- 6 Steve Dixon, *Digital Performance: A History of New Media in Theater, Dance, Performance Art, and Installation* (Cambridge, MA: MIT Press, 2007), 563.
- 7 Sonit Bafna, “Space Syntax: A Brief Introduction to Its Logic and Analytical Techniques,” *Environment and Behavior* 35(1) (2003), 17, doi: <https://doi.org/10.1177/0013916502238863>.
- 8 *Ibid.*, 18.
- 9 *Ibid.*
- 10 *Ibid.*
- 11 Sharon Macdonald, “Interconnecting: Museum Visiting and Exhibition Design,” *Co-Design: International Journal of CoCreation in Design and the Arts* 3(1) (2007), 158, doi: <https://doi.org/10.1080/15710880701311502>.
- 12 *Ibid.*, 151.
- 13 *Ibid.*, 153.
- 14 Bill Hillier and Kali Tzortzi, “Space Syntax: The Language of Museum Space,” in Sharon Macdonald, *A Companion to Museum Studies* (Chichester: John Wiley & Sons, 2011), 283.
- 15 Macdonald, “Interconnecting,” 158.
- 16 *Ibid.*; Marianna Charitonidou, “Digitization’s Impact on the Design of Art Museums: New Tendencies in Interactive Digital Interfaces,” *Casa Lezza: una finestra sul mediterraneo* 5(2020): 14–19, available at: https://www.researchgate.net/publication/348160199_Marianna_Charitonidou_Casa_Lezza_una_finestra_sul_mediterraneo_5_Luoghi_per_mostrare_catalogo_a_cura_di_Antonello_Monaco_14-19_ISBN_979-12-200-6252-7.
- 17 Marianna Charitonidou, “Digitization’s Impact on the Design of Art Museums: New Tendencies in Interactive Digital Interfaces,” *Casa Lezza: una finestra sul mediterraneo* 5 (2020): 14–19, doi: <https://doi.org/10.3929/ethz-b-000401520>.
- 18 Mona Jabbari, Fernando Fonseca, and Rui Ramos, “Combining Multi-criteria and Space Syntax Analysis to Assess a Pedestrian Network: The Case of Oporto,” *Journal of Urban Design* 23(1) (2018): 23–41, doi: <https://doi.org/10.1080/13574809.2017.1343087>.
- 19 Kayvan Karimi, “Space Syntax: Consolidation and Transformation of an Urban Research Field,” *Journal of Urban Design* 23(1) (2018): 1–4, doi: <https://doi.org/10.1080/13574809.2018.1403177>.
- 20 Hannah Lewi, Wally Smith, Dirk vom Lehn, and Steven Cooke, *The Routledge International Handbook of New Digital Practices in Galleries, Libraries, Archives, Museums and Heritage Sites* (London : Routledge, 2019).

- 21 Peng Liu and Lan , “Museum as Multisensorial Site: Story Co-making and the Affective Interrelationship between Museum Visitors, Heritage Space, and Digital Storytelling,” *Museum Management and Curatorship* 36(4) (2021): 403–6, doi: <https://doi.org/10.1080/09647775.2021.1948905>.
- 22 Zoi Popoli and Izabela Derda, “Developing Experiences: Creative Process behind the Design and Production of Immersive Exhibitions,” *Museum Management and Curatorship* (2021), 385, doi: <https://doi.org/10.1080/09647775.2021.1909491>.
- 23 Ibid.
- 24 Ibid., 399.
- 25 Edward A. Shanken, “Contemporary Art and New Media Digital Divide or Hybrid Discourse?,” in *A Companion to Digital Art*, ed. Christiane Paul (New York: Wiley-Blackwell, 2016), 463–81.
- 26 Claire Bishop, “Against Digital Art History,” *International Journal for Digital Art History* 2 (2018): 198–213. doi: <https://doi.org/10.11588/dah.2018.3.49915>.
- 27 Francesca Albrezzi, “Virtual Actualities: Technology, Museums, and Immersion” (PhD thesis, UCLA, 2019), available at: <https://escholarship.org/uc/item/5tc2q2dt>.
- 28 Lizzie Muller, Ernest Edmonds, and Matthew Connell, “Living Laboratories for Interactive Art,” *CoDesign: International Journal of CoCreation in Design and the Arts* 2(4) (2006), 202, doi: <https://doi.org/10.1080/15710880601008109>.
- 29 Ibid.
- 30 Melissa Langdon, *The Work of Art in a Digital Age: Art, Technology and Globalisation* (New York: Springer, 2014), 16; Lev Manovich, “The Death of Computer Art,” *The Net Net*, October 22, 1996, available at: http://absoluteone.ljudmila.org/lev_manovich.php. See also: <https://rhizome.org/community/41703/>; Lev Manovich, *AI Aesthetics* (Moscow: Strelka Press, 2018); Grant D. Taylor, *When the Machine Made Art: The Troubled History of Computer Art* (London : Bloomsbury Academic, 2014).
- 31 Jack Burnham, “Notes on Art and Information Processing,” in *Software: Information Technology, its New Meaning for Art: An Exhibition Sponsored by American Motors Corporation* (New York: Jewish Museum, 1970), 10–14; Melissa Gronlund, *Contemporary Art and Digital Culture* (London : Routledge, 2016), 56–87.
- 32 María Fernández, “Detached from History: Jasia Reichardt and Cybernetic Serendipity,” *Art Journal* 67(3) (2008): 6–23. doi: <https://doi.org/10.1080/00043249.2008.10791311>; Jasia Reichardt, ed., *Cybernetic Serendipity: The Computer and the Arts* (New York: Frederick A. Praeger, 1969).
- 33 Jihoon Kim, “The Archive with a Virtual Museum: The (Im)possibility of the Digital Archive in Chris Marker’s *Ouvroir*,” *Memory Studies* 13(1) (2020), 93, doi: <https://doi.org/10.1177/1750698018766386>.
- 34 Kim, “The Archive,” 93; Erkki Huhtamo, “On the Origins of the Virtual Museum,” in *Museums in a Digital Age*, ed. Ross Parry (London; New York: Routledge, 2009), 121–135. This paper was originally presented at the Nobel Symposium “Virtual Museums and Public Understanding of Science and Culture,” Stockholm, 26–29 May, 2002, 6, available at: https://www.nobelprize.org/nobel_organizations/nobelfoundation/publications/symposia/ns120-lectures/huhtamo.pdf.
- 35 Manuel Castells, “Museums in the Information Era: Cultural Connectors of Time and Space,” in *Museums in a Digital Age*, Ross Parry, ed. (London : Routledge, 2010), 427–34.
- 36 Ibid., 428.

- 37 Ibid., 431.
- 38 Michael Connor, Aria Dean, and Dragan Espenschied, eds., *The Art Happens Here: Net Art Anthology* (New York: Rhizome, 2019).
- 39 Kim, “The Archive,” 91.
- 40 Jacques Derrida, *Archive Fever: A Freudian Impression*, trans. Eric Prenowitz (Chicago: University of Chicago Press, 1998).
- 41 Walter Benjamin, *The Work of Art in the Age of Mechanical Reproduction*, translated by J. A. Underwood (London: Penguin Books, 2008); Marianna Charitonidou, “Archives of Architecture Museums: The Effects of Digitisation”, *OASE* 99 (2017): 77–81, available at: <https://www.oasejournal.nl/en/Issues/99/ArchiveOfArchitectureMuseums>.
- 42 Roberto Ohrt and Axel Heil, eds., *Aby Warburg: Bilderatlas Mnemosyne: Commentary Volume* (Berlin: Hatje Cantz, 2022).
- 43 Benjamin H. D. Buchloh, *Gerhard Richter: Painting after the Subject of History Books* (Cambridge, MA: MIT Press, 2022).
- 44 Kim, “The Archive,” 91.
- 45 Ibid.
- 46 Hal Foster, “The Archive without Museums,” *October* 77 (1996): 97–119. Available at: <http://links.jstor.org/sici?sici=0162-2870%28199622%2977%3C97%3ATAWM%3E2.0.CO%3B2-X>; Marianna Charitonidou, “Archives of Architecture Museums, 80”.
- 47 Popoli and Derda, “Developing Experiences,” 385 1.
- 48 Ibid.
- 49 Ibid; C. Antón, C. Camarero, and M.-J. Garrido. “Exploring the Experience Value of Museum Visitors as a Co-creation Process,” *Current Issues in Tourism* 21(12) (2018): 1406–25, doi: <https://doi.org/10.1080/13683500.2017.1373753>; Morten A. Skydsgaard, Hanne Møller Andersen, and Heather King, “Designing Museum Exhibits that Facilitate Visitor Reflection and Discussion,” *Museum Management and Curatorship* 31(1) (2016): 48–68, doi: <https://doi.org/10.1080/09647775.2015.1117237>.
- 50 Panayota A. Demetriou, “‘Imagineering’ Mixed Reality (MR) Immersive Experiences in the Postdigital Revolution: Innovation, Collectivity, Participation and Ethics in Staging Experiments as Performances,” *International Journal of Performance Arts and Digital Media* 14(2) (2018), 170, doi: <https://doi.org/10.1080/14794713.2018.1511138>.
- 51 Ibid., 177.
- 52 Ibid., 178.
- 53 Muller, Edmonds, and Connell, “Living Laboratories” 197.
- 54 Ibid., 202.
- 55 Christian Heath, Dirk vom Lehn, and Jonathan Osborne, “Interaction and Interactives: Collaboration and Participation with Computer-based Exhibits,” *Public Understanding of Science* 14(1) (2005), 95, doi: <https://doi.org/10.1177/0963662505047343>.
- 56 Muller, Edmonds, and Connell, “Living Laboratories,” 191.
- 57 Richard Yu-Chang Li and Alan Wee-Chung Liew, “An Interactive User Interface Prototype Design for Enhancing On-site Museum and Art Gallery Experience through Digital Technology,” *Museum Management and Curatorship* 30(3) (2015): 208–29, doi: <https://doi.org/10.1080/09647775.2015.1042509>.
- 58 Popoli and Derda, “Developing Experiences,” 399.