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The Intersection of Digital and Spatial Immersion: Architecture of Pavilions at Expo Dubai 2020

Abstract: Expo Dubai 2020 is clear evidence of a 21st-century radical switch regarding the reception of art exhibitions. As Virtual Reality, Augmented Reality, and Artificial Intelligence technologies have already developed enough to show significant influences on art, the following topic considers the merging of architecture and digital art, which are building immersive experiences together. The aim of this paper is to establish the level of inseparability and the type of connection between spatial and digital aspects that cooperatively stimulate and define the movement of visitors. As the creative capacity of architecture and digital art is unlimited in production, three country pavilions, Brazilian, South Korean, and Italian at Expo Dubai 2020, with distinct concepts are analyzed. Selected pavilions were showing diverse approaches to the application of digital technologies within the space, which makes new possible categories to be explored. A strongly emphasized multisensory aspect of spatial experience can be discovered through simple architectural technology in the Brazilian pavilion combined with the symbolic element of water, sounds, and vapors together with digital projections. Symbiosis of digital and architectural components of space is reached in the Italian pavilion by the double shifting of both digital and physical parts of the rope façade. The apparent combination of digital and analog surfaces on the kinetic facade in the Korean pavilion completes the basis for discussion about methods of hybridization of architecture and digital art. Although architecture is, according to Peter Sloterdijk, the original form of *immersion*, the selected pavilions demonstrate that participants of the state-of-the-art symbiosis of architecture and digital art can experience new types of immersive reception, simultaneously showcasing the application of the concept of mimesis.

Keywords: Expo Dubai 2020; immersive reception; the symbiosis of architecture and digital art; spatial immersion; architectural pavilion.

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Introduction

An architectural pavilion in ingrained definitions is denoted by multiple characteristics or descriptions such as temporality, spatial structure with lightly constructed elements, a house in a garden, or even a subdivision of some larger building.[1] However, the focus of this research about mentioned typology is on its capacity for experimentation and innovation in architecture, especially in the manner of illuminating the possibility of hybridization with contemporary digital technology or digital art. The pavilion's appearance, as much as its technical and creative development in the field of exhibition design since the middle of the 19th century,[2] undeniably achieved its zenith at the World Expo 2020 held in Dubai from October 2021 to March 2022. Considering the possibility of a broad understanding of the exhibition's official topic "Connecting Minds, Creating the Future", one of the interpretations explained as creating the future of symbiotic architectural and digital design will be set as a starting point and hereafter reassessed theoretically and through analysis of aesthetic qualities of three country pavilions: Brazilian, South Korean, and Italian.

Referring to the definition that a pavilion is a medium for exploring new architectural concepts, new methods, and new materials,[3] the three mentioned projects represent innovation for all three aspects, where the category of new methods in architectural design possibly stands out as significant for the research of conjugation of digital art and architecture. This conjugation, applied to the typology of the architectural pavilion, analyzed through the lenses of the common concept of mimesis and further through individual immersive reception of space presents the main problem of the discussion. The influence of the digital technologies of virtual reality (VR) and augmented reality (AR) has shown a variety of use as technical support in architecture, in the cases of advanced representation of 3D models for new projects, the support for buildings in construction phases, restoration projects, etc. The history of digital art and specifically virtual art have developed interdependently with the history of media and resulted in a significant metamorphosis of art.[4] Nowadays architecture has reached the level where its connection to digitalization has overstepped the simple technical and representational use of digital technologies and it has started to create a convenient field for experimentation of the application of digital tools and digital art within the space. That is where the architectural typology of the pavilion has fitted and served as a spatial, initial, and driving component for experimentation and the creation of a new type of visitor experience. The reception of artworks is simply extracted in literature and recognized by three categories: direct reception, cultural reception, and productive reception.[5] Direct reception, which covers the perceiver's

[1] Gonca Tuncbilek, "Experimentation in Architecture: Pavilion Design," *Athens Journal of Architecture* 6, 4 (2020): 397.

[2] Ibid., 399.

[3] Ibid., 398.

[4] Oliver Grau, *Virtuelna umetnost* (Belgrade: Clio, 2008), 13.

[5] Miško Šuvaković, *Pojmovnik suvremene umjetnosti* (Zagreb: Horetzky, 2005), 539.

direct confrontation to art, and productive reception with the visitor's engagement in creating and completing the art will be explained through examples, while cultural reception will not be included. The physical nature of architecture requires a visitor's physical presence in order to be perceived. Digital art, on the other hand, has enabled the virtual presence of visitors. Considering two opposing types of presence, and further explications of selected architectural pavilions, we will discuss the nature of new immersive experiences that include both direct perception with physical presence and reception of digital art at the same time, revising existing types of reception.

Three approaches to the implementation of digital art into space will be showcased gradually from the experientially most simple Brazilian pavilion up to the hybrid approach of the Italian pavilion, all with one common question about the type of experience they offer visitors.

Brazilian Pavilion: Double Mimesis in Space

The Brazilian Pavilion is an architectural example that contains the collision of analog and digital media that construct an architectural concept together. On one side, the analog medium in space is an imitation of nature, which indicates the materiality of water in space. On the other side, it contains a digital medium that can be viewed as a digital imitation of nature through video animations projected on a white screen.

The seemingly simple architecture of the pavilion, formed out of vertical and diagonal steel profiles that tighten the white fabric on four sides, however, has its structural complexity expressed in the horizontal projection of the roof.[6] This architectural structure was deliberately chosen as the first in the analysis of three architectural examples, precisely because of the strong play on architectural concepts. In this sense, the architectural concept begins its expression from the exterior and comes through the designed roof impluvium, which, like a vortex, merges the creative concept into the interior. The concave impluvium, slightly shifted from the center, generally is a utilitarian element in architectural practice, and in this context, it introduces a narrative about traditional and vernacular aspects of architectural design. Its asymmetry and new appearance in pavilion architecture point to issues that are beyond the philosophical, aesthetic, and metaphysical concepts. Applied geometry implies the appearance of water, which is the central concept of the pavilion.

The element of water, in this case, represents the biodiversity of Brazil that is the natural heritage and fertility of the region, which indicates the category of sustainability discourse at the Expo (Figure 1). Although it belongs to its specific category of topics, the concept of the pavilion reflecting the water mirror is reflected in other social and psychological aspects of the atmosphere of the space. Analogous imitation of nature in the pavilion, pointing to water, steam, sounds, and temperature, creates a particularly new level of social aspect with enhanced visibility of visitors and the

[6] https://jpg.arq.br/portfolio/pavilhao-do-brasil-expo-2020-dubai/?fbclid=IwAR2OEkIm1o-Em398EqX210x7Xk6I2-ctGc-v7o-Lf9Mjht1v6AyWOrmFovTI, acc. on April 23, 2022.

addition of interaction through space. Accordingly, metaphor leads primarily in the literature of the disciplines of philosophy, about which Alberto Pérez-Gómez writes in particular:

> We may recall that the four other solids – the tetrahedron, the cube, the octahedron, and the icosahedron – were related by Plato in his *Timaeus* to the fourth basic elements: fire, earth, air, and water. The quintessence is the origin of all the other elements (like Plato's *chora*), regulated by a dynamic proportion that can be seen as an empirical regulator of organic growth and as the ultimate symbol of ontological continuity.[7]

Gómez emphasizes the narrative of the symbolism of water dating back to Plato, in his work *Timaeus*. The metaphorical nature of water began with the story of matter, which consists of all four elements, *prima materia*, and indicates that the phenomenon of water has always been a symbol of life.[8] In fact, in Vitruvius' work *Ten Books on Architecture*, he pays attention to every natural element. In his work, water is the principle of all things.[9] Therefore the notion of water was an extremely important figure in the disciplines of architecture and art even then. The water mirror, scattered on the ground floor of the pavilion, in addition to its symbolic value, also has a usage norm, with the fact that visitors can walk through the water, creating the atmosphere of a water square. In this way, by simply walking through the water, an interaction of visitors and analog nature is created, which leads to the appearance of an immersive experience for visitors. The additional immersion of the space is increased by the digital imitation of nature with reflecting videos on the canvas walls of the pavilion.

Projecting videos of nature on a white canvas creates an additional scenic character of the pavilion (Figure 2). Therefore, the intersection of art and technology in this pavilion really manifests itself in the meeting point of analog and digital media. An important aspect of this pavilion is the interactivity itself, which is obtained by double *mimesi*s, double natural, and artificial imitation of nature. The method of interactivity in this context conditions the merging of the subjective state of the participants with the internal perspective of the creative act and the objective state of the physical architectural space, which includes issues of wider artistic and architectural discourse. In this way, the interactivity mechanism frees the structure of a closed steel canvas cube into a slightly transparent pavilion, which narratively influences the position and meaning of art and architecture in the social and cultural construct, creating an overall professional reality. Finally, besides direct reception which occurs once the visitor enters the pavilion and sees the first projection on canvas, productive reception takes place when visitors participate in the creation of ambiance by their movement

[7] Alberto Pérez-Gómez, *Chora Volume One: Intervals in the Philosophy of Architecture,* ed. by Alberto Pérez-Gómez and Stephen Parcell (Canada: McGill-Queen's University Press, 2004), 19.

[8] Ibid., 19.

[9] Vitruvius, *Ten Books on Architecture*, ed. by Ingrid D. Rowland and Thomas Noble Howe (Cambridge: Cambridge University Press, 2001), 96.

through the surface of the water. Thus, considering the movement and interaction which bring the subjective feeling of being absorbed into space, immersive reception can be introduced as an updated type of reception of space.

South Korean Pavilion: Digital and physical movement within Facade

Next in line, the pavilion of the Republic of Korea was singled out as one of the largest pavilions in the Expo complex. If we take a look at the imposing pavilion from the exterior, we almost immediately notice the sharpness of expression in the digital architectural concept. It is a digital facade that consists of a matrix of rotating cubes and horizontal communications in the shape of a ramp.[10] Mobility, in this context, is explained in the narrative of kinetic architecture. Kinetic facade, in research practice, can be divided into four types: translation, rotation, size, and deformation in the movement of materials.[11] In that sense, this type of digital facade fits into the category of rotational movement. These kinetics through the transformation of the movement of the cube affect the change in the physical appearance of the facade of the pavilion, but not the overall structural form. Accordingly, the word *kinetics*[12] itself participates greatly and emphasizes the strong digital parametric character of the pavilion, a method of movement that creates the starting point of artistic and architectural creativity.

In addition to the central theme of the digital medium, an analog medium in the micro level of design also appears. The cube, as a central element of architecture, consists of four visibly highlighted sides, of which one side is a digital surface, and the other three surfaces are simply painted in different colors (Figure 3). An analogous illusion of the concept is expressed in three colored surfaces of the kinetic cube module. These three sides of colored geometry represent a break in the narrative of the pavilion's digital technologies. They simulate abstract patterns in the conflict of digital and analog discourse in artistic and architectural practices. In that sense, the entire structure of the pavilion can be observed in its architectural polychrome, which represents a specific phenomenon of coloristic ambiance. The appearance of color, as well as kinetic movement, in the composition represent the activation of the perception of the external environment, which includes complex physiological, physical, and psychological processes. It is a phenomenon of color that is conditioned by the emphasis on cultural identity and the symbolic representation of Korean dynamism and mobility.

An important aspect of the entire composition of the pavilion is the continuous line of movement of the ramps, which allows a different experience of space (Figure 4). In that sense, the state of immersion is stimulated by the continuous walk of visitors through the monumental and polychrome matrix of the building, in which the interaction of external and internal experience of space is achieved. In the continuous

[10] https://parametric-architecture.com/south-korean-pavilion-designed-by-moon-hoon-mooyuki/?fbclid=IwAR1yjxzrtjtFBHyRLjHmQfZHGL9g3XDpWD28K0Dw_vjmThZoT1Sa0jcel74, acc. on April 30, 2022.

[11] Basma Nashaat and Ahmed Waseef, "Kinetic Architecture: Concepts, History and Applications," *International Journal of Science and Research (IJSR)* (2018): 756.

[12] Jack Burnham, *Beyond Modern Sculpture* (New York: George Braziller, Inc., 1975), 219.

experience, the artistic, traditional, cultural discourse about the country appears, as well as the projection of the central space of Madang, creating a new scene in the spontaneous artistic manifestations of the pavilion. Therefore, it can be noticed that, in addition to the continuous rhythm of the composition, there is also a central corner of the pavilion's immersive composition.

Accordingly, the narrative of the pavilion is primarily reflected in the digital intent that turns the statics of the object into a dynamic system and in the metaphor of surfaces that return architecture and art to analog discourse. The monumental architecture of the pavilion, which is based on modules, is a pattern of anti-mimesis, it does not imitate nature, but expresses its own geometry. Therefore, the pavilion can be viewed as a digital work of art, which symbolizes the traditional, cultural, and technological development of their country, capturing modern moments.

Italian Pavilion: Recycled Digital Facade

The authors of the Italian project presented their vision of reconfigurable architecture, which explains the main idea of the term pavilion generally in literature. Simply, elements of the roof can afterward be used as boats, facade ropes can be used for nautical purposes, new materials that were introduced were made from reused sand, orange peels, algae, etc. All in all, the entire pavilion can be disassembled and reused for new purposes.[13] Through that, the experimentation with new materials is absolutely transparent. The outstanding property of the Italian Pavilion at EXPO 2020 Dubai is, by all means, its innovation regarding the explained circular design, which still does not introduce the topic of the intersection of digital and spatial. However, the next level that brings up the mentioned topic and questions of new methods tested in the pavilion design is its multimedia facade. Besides being created from two million recycled plastic bottles; the unconventional facade wall has LEDs integrated in the ropes (Figure 5). The unusual experience created by this design is upgraded by the composition of the interior path and escalator, which creates a new perspective for visitors by being elevated 11 meters from the ground (Figure 6). Being non-standard, this perspective takes visitors to the state of immersion in space while standing above the entire pavilion, while the experience of walking on the path is further upgraded by Enel X's digital installation.[14] The digital content on the recycled ropes facade, the escalated path, and the crescendo of light effects point out the inseparability of architecture and digital art in order to create a specific immersive experience.

Again, as pointed out in elaboration about the Brazilian pavilion, mimesis as an approach or concept can be used to present artwork. This second case of mimetic presentation differs from the described video projections on white canvas, even though digital tools were used in both cases to create the artwork. Digital tools applied in process of creating a copy of Michelangelo's *David* are 3D scanning and 3D printing.

[13] https://carloratti.com/project/italian-pavilion-at-expo-dubai-2020, acc. on April 27 2022.

[14] Ibid.

In general, such an artwork's perception doesn't depend on the space around it, since it is usually positioned in traditionally designed museums. Regardless, the position of *David* in the Theatre of Memory, which covers his entire body, making it exclusive and visible only to selected guests, offers a new experience of looking at *David*'s eyes at his height directly. After the designed path which floats above the installations and the rest of the exhibition, the positioning of *David*'s replica in such a way also presents a strong decision in architectural design that influences the perception of the artwork.

Discussion: Concept of Mimesis and Immersion as a Method

If the architectural concept is observed as a thought construct that is both subjective and objective, while considering the process of merging between the subjective and the objective, a new question can arise from the relationship between the architectural concept and digital reality. Looking at the Brazilian pavilion, and highlighting its relevant symbolic values afterward, the intersection between the architectural and artistic creative act becomes clear. In this kind of creative intention, almost immediately, we notice that poetry (lat. *poesis*) is completely based on nature. By integrating nature into the physical space of the pavilion, a special category of architectural and artistic concept is created. It is about the emergence of the *concept of mimesis*, which in contemporary architectural and artistic theories can be viewed as a reproduction or production of natural forms, processes, and phenomena projected through the digital medium. The appearance of the term mimesis in this regard encourages a review of the initial scientific meaning of the phenomenon. Mimesis is an ancient topic that dates back to the period of the Ancient Greek rhetorical tradition. The historical turning point of the phenomenon of mimesis is marked by its appearance in the Plato's and Aristotle's dialogues. The original definitions at the time included far-reaching discussion of art and literature with their socio-political context. Throughout history, mimesis as a concept has been rejected on several occasions in the modern era and today it seems that it is symbolically developing anew as a concept. The contemporary notion of mimesis includes new definitions. However, the key has always been in the imitation or reproduction of reality, which is reflected in the contemporary concept of mimesis revived through the architecture and digital content of Brazilian and Italian pavilions.

Reproduction of natural reality in relation to the concept of mimesis implies the notion of the desire for adaptation that opens questions about identification with place or space (psychological dimension), outside the usual architectural discourse of occupying physical space. The mentioned identification with space encourages the visitor's individual immersion in space. In his book *Camouflage,* British architect and theorist Neil Leach analyzes one's desire to adapt in the context of architectural design.[15]

"The action of mimesis is dependent upon a state of mind. We have to be receptive, and alert to the possibilities of the creative imagination."[16]

[15] Neil Leach, *Camouflage* (Cambridge: MIT Press Ltd., 2006), 3–7.

[16] Ibid., 30.

The desire to adapt or merge requires subjective experiences of space, and further it implies the merging of the subjective state of consciousness and objective space. This type of subjective state contains mimetic impulse which leads the subject to adapt to environmental aspects by imitation. [17] Accordingly, emphasizing the natural features in the space of the Brazilian pavilion, more precisely walking through shallow water with the reflection of videos of nature, the emergence of *immersion methods* is noticed. In that sense, the method of immersion is expressed through the subjective experience of the nature of the visitor, which is combined with the imitation of nature in the objective space of the pavilion.

By stepping outside the comprehension of mimesis as a reproduction of natural forms, we can point out the digital copy of the Renaissance statue in the Italian pavilion, the already mentioned monumental replica of Michelangelo's *David*, assembled on a 3D printer. Creating a replica of the sculpture carries a different vision of the mimesis concept compared to the natural form of the concept in the Brazilian Pavilion. In this sense of the mimetic concept, the replication of *David* is a metaphor in the perspective of a renewed artistic spirit in architectural creation. This time, the charm happens in direct contact between the visitors and the sculpture. The 3D twin with its central layout in the interior and its monumental scale, in the concept of mimesis, symbolizes the reproduction of a work of art that carries with it different philosophical and aesthetic perspectives of thought.

The strongest expression of immersion methods occurs through a continuous line of movement in the pavilion of the Republic of Korea. As stated, the phenomenon of immersion occurs in the loss of the boundary between the outer and inner space of the pavilion itself. Sloterdijk defines immersion as a method which unframes images and vistas, dissolving the boundaries with their environment.[18] In the merging of exteriors and interiors, the method of immersion almost immediately casts the visitor as a subject that becomes part of the objective space of the digital facade.

Going through three separate architectural examples, we noticed that the concept of mimesis, crossed with the method of immersion, creates a relation of fusion of the subjective and the objective. This approach of hybridization of architecture and digital and concurrently made hybridization of mimesis and immersion surely are expressed by the double phenomenon of mimesis through the pavilion of Brazil, then in the replica of *David* in the Italian pavilion, while the strong immersion without mimesis is expressed in the South Korean pavilion. The concept of mimesis and the method of immersion could not work together without a digital medium in examined examples. It can be concluded that digital technologies, with their infinite capacity to reproduce reality, have become a direct extension of this formulation of the architectural concept.

[17] Neil Leach, *The Anaesthetics of Architecture (*Cambridge: MIT Press, 1999), 40–41.

[18] Peter Sloterdijk, "Architecture as an Art of Immersion (2006)," *Interstices: Journal of Architecture and Related Arts* 12 (March 2011): 105.

Conclusion

Immersive experience or even immersive reception, combining direct and productive reception, manifests the specific impact of the hybridization of architecture and digital art. The space is the controlling component that intentionally guides the visitors to perceive digital art or digital elements of space in a specific way. If hybridization by definition marks the merging of multiple entities, which after being merged once cannot function separately afterward making the same ambiance, it is more simple to finally understand the type of relation of digital and spatial, confirming it through each of three pavilions. The simplicity of the Brazilian structure and the element of water could not follow the whole concept without digital content on canvases that were being reflected on the water's surface. The perception of digitally designed kinetic cubes with digital screens could not be experienced in such a way in the South Korean Pavilion if the architectural design did not provide a path that made visitors move intermittently through the facade and the interior. Otherwise, the digitally designed kinetic movement of the cubes would be perceived as part of the composition at the facade surface only from the distance. The circular approach and reusable identity of the Italian pavilion would not offer the same experience if digital media and installation with the path and escalator as interior interventions were not introduced. The inseparability of digital and spatial in this type of pavilions motivates further investigation of creativity where space and digital are treated both in two ways: as artistic expression and as tool or medium. New methods of hybridization of digital art and architecture are tested and proved as progressive through these three examples, showcasing the creative capacity of their merging. It is proved that new materials, new concepts, and new methods can be successfully implemented in pavilion typology making EXPO 2020 Dubai the exhibition that created the future of symbiotic architectural and digital design. At the same time, the playful application of the concepts of mimesis and immersive reception as a consequence are demonstrated as a promising creative approach to the design of architectural pavilions.

Furthermore, enhanced spatial immersion as a result of the hybridization of the digital and spatial presents the opportunity for research in the fields of architectural design, theories of art and digital media as well as for research of theories of perception.

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Figure 1: MMBB Arquitetos, Ben-Avid and JPG.ARQ, *Day Interior View* of *Brazilian Pavilion at EXPO Dubai 2020* (Copyrights: Leonardo Finotti)

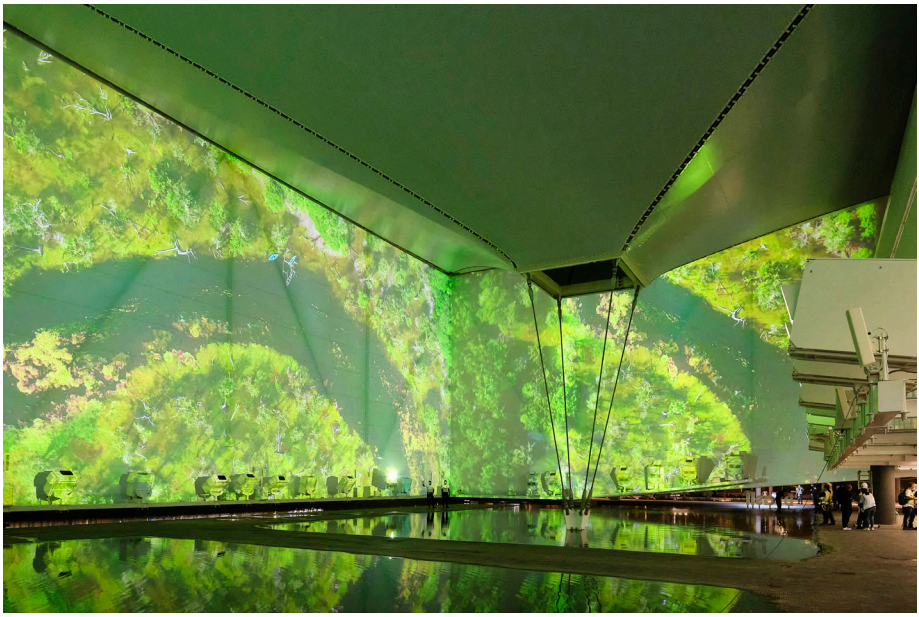

Figure 2: MMBB Arquitetos, Ben-Avid and JPG.ARQ, *Night Interior View of Brazilian Pavilion at EXPO Dubai 2020* (Copyrights: Leonardo FInotti)

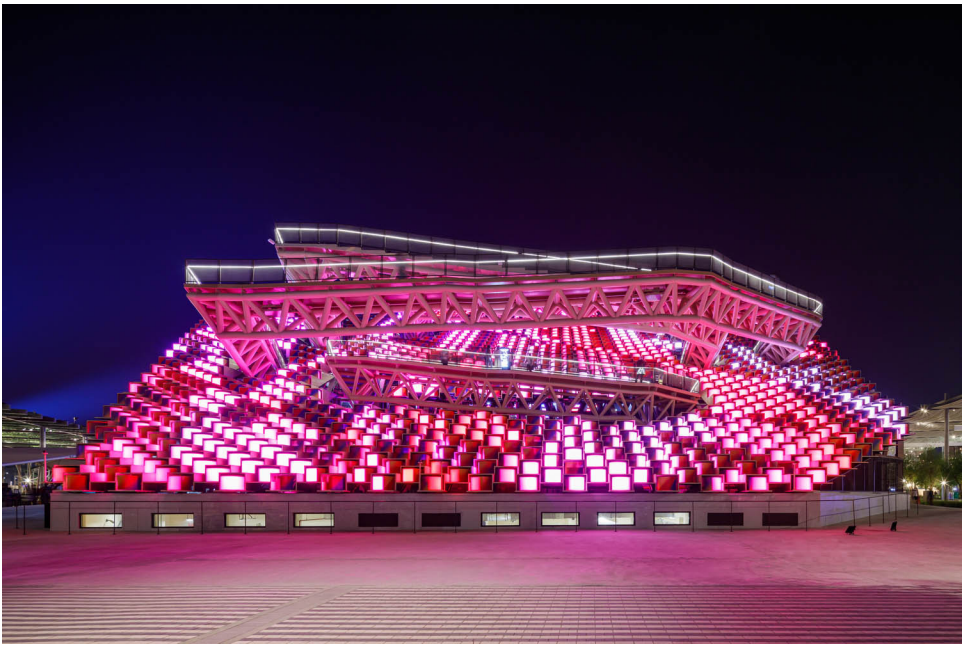

Figure 3: Moon Hoon and Mooyuki, *Facade View of South Korean Pavilion at EXPO Dubai 2020* (Copyrights: Changmook Kim)

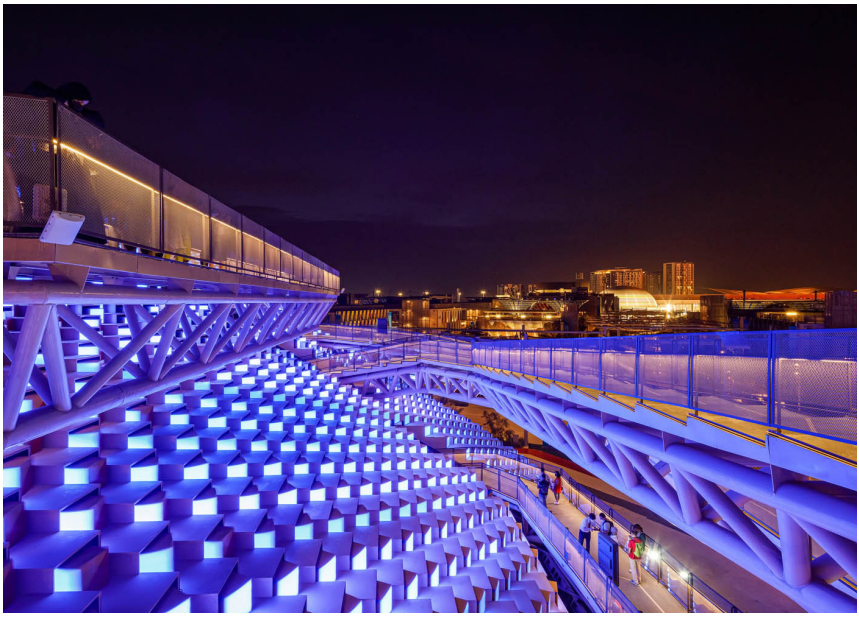

Figure 4: Moon Hoon and Mooyuki, *View from the ramp at South Korean Pavilion at EXPO Dubai 2020* (Copyrights: Changmook Kim)

Figure 5: CRA, Italo Rota Building Office, Matteo Gatto and F&M Ingegneria, *Facade View of Italian Pavilion at EXPO Dubai 2020* (Copyrights: Michele Nastasi)

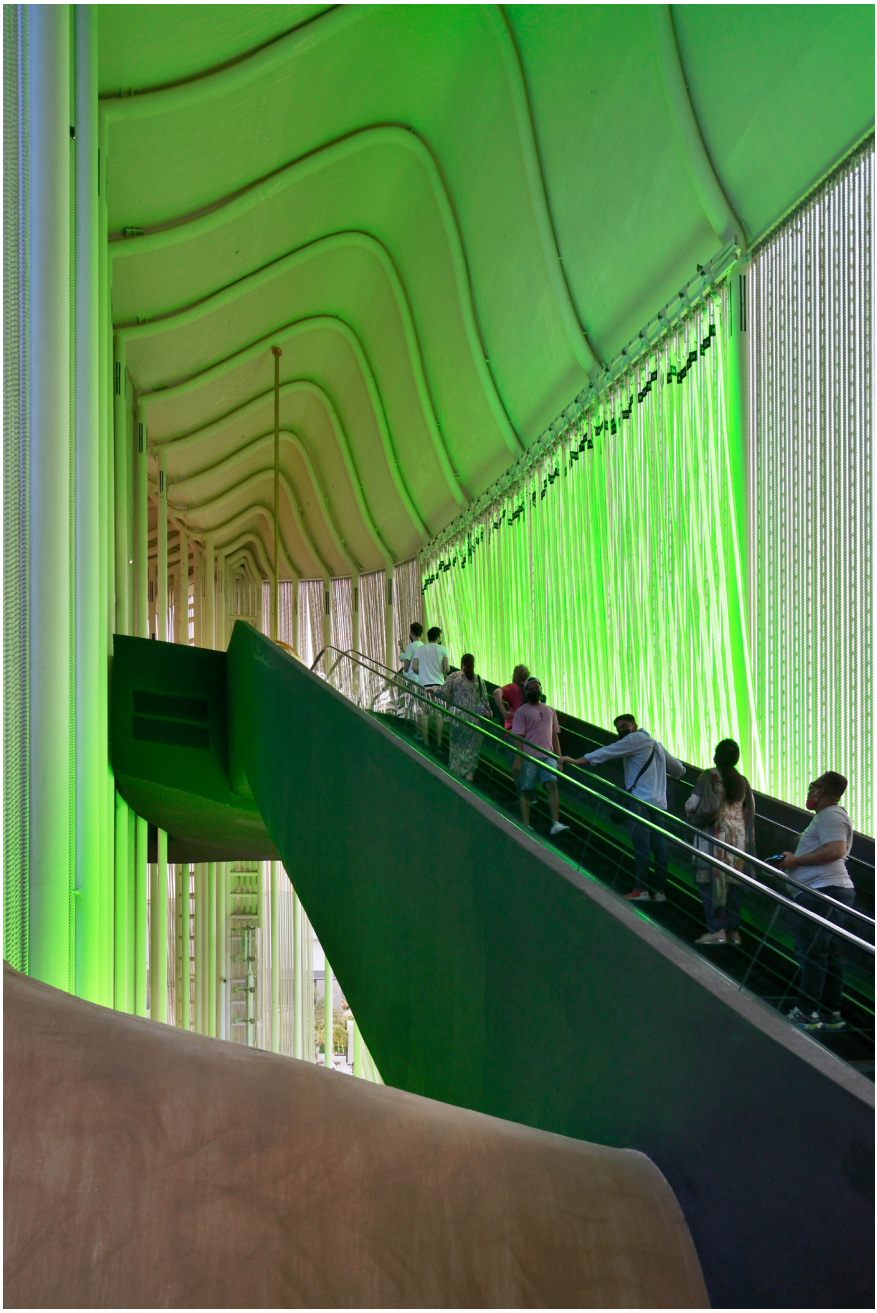

Figure 6: CRA, Italo Rota Building Office, Matteo Gatto and F&M Ingegneria, *Interior View from the path at Italian Pavilion at EXPO Dubai 2020* (Copyrights: Michele Nastasi)