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(UN)REAL VIRTUAL ARCHITECTURE

(NIE)REALNA ARCHITEKTURA WIRTUALNA

Abstract

Virtual architecture – idea, concept, immaterial illusion of reality created with the help of digital technologies, without clearly defining its character – true or false? The complex issue and its resolution depend on so many factors and interpretations that it is difficult to find a clear position or uniform view on this matter. The article attempts to determine the “place” for a specific type of architecture that is implemented in virtual reality. The authors consider its truthfulness, taking into account virtual, augmented and mixed reality. The assessment is made, inter alia, in the context of the assumption that today’s digital design is more “real” than traditional design, and that the possibilities of user interaction with virtual space are constantly evolving, striving for full delusion of the senses.

Keywords: virtual architecture, truth, VR, the senses

Streszczenie

Architektura wirtualna – idea, koncepcja, niematerialna iluzja rzeczywistości wykreowana za pomocą cyfrowych technologii, bez jednoznacznego określenia jej charakteru – prawdziwa czy fałszywa? Złożona kwestia, a jej rozstrzygnięcie zależy od tak wielu czynników i sposobów interpretacji, że trudno o jednoznaczne stanowisko lub jednolity pogląd w tej sprawie. W artykule podjęto próbę określenia „miejsca” dla specyficznego rodzaju architektury, która realizowana jest w rzeczywistości wirtualnej. Autorzy rozważają jej prawdziwość, biorąc pod uwagę wirtualną, rozszerzoną i mieszaną rzeczywistość. Ocena dokonywana jest m.in. w kontekście założenia, że dzisiejsze projektowanie cyfrowe jest bardziej „rzeczywiste” niż projektowanie tradycyjne i że stale rozwijają się możliwości interakcji użytkownika z przestrzenią wirtualną, dążąc do pełnego oszukania zmysłów.

Słowa kluczowe: architektura wirtualna, prawda, VR, zmysły

1. INTRODUCTION

I do not remember the times of my early childhood, what the door of the rural home of my grandfather looked like, however, I remember its weight and resistance, and its greying surface, worn out through the decades, and I especially well remember the smell of the house interior which assaulted me as an invisible wall placed immediately behind the door.¹

That is how Juhani Pallasmaa, in his book *Eyes of the Skin*, recalls the impression that his grandfather's country house made on him during his childhood. Despite the privileged role of sight in relation to the other senses,² the visual image was lost in his memory as the years passed. A decisive role in recalling this memory was played by touch and smell, which made past sensations fuller and easier to recall. A meeting with architecture became a multi-sensual experience of the relation between subject and place.

Architecture is an integral part of our surroundings, an inseparable element of place, our reality, past, and future. It is our daily life: the church tower on the horizon, the dense urban buildings, and the scattered rural farm buildings. It is a treehouse, a bridge over the river, a stream crossing, and also a fence that separates a garden from a road. Architecture surrounds us, as an element of space, it affects all senses of the recipient. The diversity and multitude of sensory stimuli coming from the surrounding environment, allows us to better remember and construct our mental model, which causes our experiences to become more cohesive and significant.³ We are directly connected with our surroundings which influence and shape us.

During the last several decades, digital technology has entered our reality to such a degree that currently it is difficult to find a domain of human life which remains outside the influence of the popularization and development of information technologies. The development of technological thought brought about changes in the media, as well as in art, science, philosophy, technology, and also in architecture. Architects were supplied with powerful tools, which allowed them to simulate physical space to an unprecedented degree. We have gained the opportunity to immerse ourselves in virtual space as well as full control over the creation process and of that what is found in this space.

Therefore, the material, physical world, is not the only point of reference in our lives. The real world penetrates the virtual world and vice versa. This fascinating phenomenon is a process that requires observation and research. As the world becomes more and more complex, while the technologies which we use on a daily basis change our perception of reality, many questions, concerns, and doubts arise.

In analyzing selected literature consisting of magazine articles, academic essays, and books concerning architecture, its perception and experience, as well as the use of virtual

¹ J. Pallasmaa, *Oczy skóry. Architektura i zmysły*, Instytut Architektury, Kraków 2012, p. 66.

² *Ibidem*, pp. 21–26.

³ “Besides the role they play in thoughts about action, images of the environment serve to organize our perception, allow us to code, structure, and store visual and spatial information, as well as directly facilitate and regulate our reactions to things which we see. In allowing us to recognize, select, register and keep specific aspects of our unique personal experience in the world, these diagrams constitute a lasting reality, which we construct based on the phenomena of direct perception.” D. Stea, *Architecture in the head: cognitive mapping* [in:] J.T. Lang, *Designing for Human Behavior: Architecture and the Behavioral Sciences*, Dowden, Hutchinson & Ross, Stroudsburg 1974.

reality in architecture, we strive to understand the amount of influence the evolution of virtual reality has had on architecture. What is real in times of post-reality, where the process of getting to know reality occurs along with the process of its creation and what is false? Does frequent and deep immersion into virtual space bring with it the threat of wrong perception of real world and thus the threat of truthfulness for real architecture? Is it a threat to the truthfulness of real architecture? What is virtual architecture and where is its “place”? Is virtual architecture real?

2. DEVELOPMENT

2.1 SPACE

We exist in a real, physical, tangible, and true space. It is the easiest to describe space in terms of what we see, since sight is a sense directed at its perception. However, we experience all of its aspects and get to know it better thanks to the synchronic cooperation of all senses.⁴ Sight informs us what space looks like, however, we interact with it physically thanks to the remaining senses. Sight concentrated in front of us provides us with a stereoscopic image and information on the geometry of space, hearing informs us what is happening behind us and around us. Hearing is a great supplementation of sight. Places and objects which fill up this physical space possess smell and taste. When we interact directly with space, the sense with the greatest impact enters the fray – touch. It does not inform us of the space itself, but thanks to it we register its additional properties. We perceive temperature and material structure, density, and weight of objects which fill the space. Just as taste and smell, touch easily brings back memories and we experience it the most strongly. It plays a key role in interacting with space.⁵ We touch door handles, rails, we move things, lean on them, sit, feel the wind, and temperature. When we walk, we feel the unevenness of the surface, even through the soles of our shoes. We experience space through all our senses, but without touch it seems to be missing something. In using this sense, we also put into action the process of shaping space. Regardless whether we are building a house, planting a tree, chiseling a sculpture out of a rock, or just drawing, we always use touch.

2.2 PERCEPTION

As a species, we have the need to modify and change our surroundings. The shape and form born out of an idea, art, and technology, defines space and gives it its functions. We fill this space with geometrical forms, bestowing significance upon them, in such a way as so they ensure safety and fulfill both our basic physiological and social needs, as well as those of a higher level (respect and recognition, self-fulfillment). Places and buildings created during the creative process are given properties that reflect the traits of our personality and our sensitiveness. They illustrate our understanding of space.

⁴ At this moment we are omitting the time of stimuli interpretation by various senses. A state that was assumed was one occurring in our consciousness which takes into account the synchronization which takes place in the brain.

⁵ We are conscious of being affected by the illusion of the sense of sight. Subconsciously, what we touch, we deem as real and true.

Being in places shaped in such a way, we experience them, become familiar with them, and learn them. This experiencing is always accompanied by emotions.⁶ Emotions consolidate our recollections and supplement those already existing in our memory. Memories build our personality and develop our sensitiveness. We are subject to positive feedback. We shape space creating places, while the places shape us.⁷ The experiences we acquire allow us to shape better places. Due to multiple copying of the loop of this process, space that is available to us today is filled with architecture.

2.3 RELATIONS

An inseparable part of the physical space in which we live and operate is the architecture with which we have contact for the greater part of our life. And while the work of an architect is experienced in “the same degree by the eye, nose, skin, tongue, the skeleton, and muscles,”⁸ spatial relations are experienced mostly with the aid of sight. Sight interprets not only the physical space. Sight is able to transport us to a dimension different than the physical one. Looking at a picture or a painting we participate, in a way only slightly different from the standard one, in the space depicted in this visual presentation. This is the virtual space. We see it, understand it, but we do not experience it in a physical way. A prototype of virtual space may not even exist, may not have a real counterpart, however, looking at a visual presentation we are under the impression of its reality and our presence (participation) in it. Access to virtual space is gained by a specific type of medium, it can be a drawing, photograph, or a visualization displayed on a screen. A set of images from our visual memory allows us to unambiguously interpret the space presented on an image. This space, in a way, remains an element of real space due to the medium, but in itself it does not physically exist. The virtual space of a given medium is shared by all the participants, while the medium is a window through which we are granted access to it. In times dominated by devices that send and generate images, we participate in this space more often than our consciousness would have us believe. We are connected with it by the presentation of space, which we see on the screen in the cinema, on a monitor or TV, and even on the smartphone, it can be an advertising banner or project visualization.⁹

2.4 ADDITIONAL SPACES

By imagining what is not present in a painting or photograph, adding those elements which are invisible and enhancing them by the experiences of our own memories, we enter the mental space. Similarly to virtual space, the mental one is a non-physical space.¹⁰ As opposed

⁶ Stronger sensations (more powerful stimuli) are accompanied by stronger emotions.

⁷ “Space created by man can enhance human emotions and human perception. [...] People are more aware of who they are and how they should behave when they find themselves in surroundings designed by man, than if they are surrounded by nature in its original state.” Yi-Fu Tuan, *Przestrzeń i miejsce*, Państwowy Instytut Wydawniczy, Warszawa 1987, p. 133.

⁸ J. Pallasmaa, *op. cit.*, p. 51.

⁹ The medium must be unambiguously interpreted and present an image of spatial arrangements. In such a window we see the natural environment along with architectural objects which fill up its space and the people who use them.

¹⁰ O. Ettlinger, *In Search of Architecture in Virtual Space: An Introduction to The Virtual Space Theory*, South African Journal of Art History, 2007, no. 2, pp. 10–23, <http://virtualspacetheory.com/public/Or-Ettlinger-In-Search-of-Architecture-in-Virtual-Space.pdf> (access: 15.4.2020).

to virtual space, mental space is available solely to the subject. We use it to build all kinds of mental models and when we imagine what cannot be seen. In a mental space with the participation of stimuli from the environment and the knowledge we possess, we construct a model, which becomes the basis for further interpretations and the understanding of the perception of our surroundings. The mental model does not need to be identical with reality, and mental models concerning the same situation or the same environment in mental spaces of various persons differ from one another. They can even be very different since the construction of such a model depends on many factors including individual experience (previously acquired information), the method of information assimilation, sensitivity, and the subject's perceptiveness.

It is in mental space where creative processes commence, those that when visualized become a "window" of the virtual space. These processes can be inspired or released by stimuli from either the real or virtual space. These spaces result from each other. Each of them can be experienced with varied intensity, and it depends on our imagination and sensitivity, and also memory.

2.5 PROJECT

Architecture is fully experienced in physical space. As architects, until recently, we used¹¹ models and layouts¹² which were the real, physical, tangible reflection of the designed object. In order to facilitate this task, along with the layout we made sketches of what had previously come to our imagination.¹³ Such activities allowed us to correct what we have imagined and detail subsequent stages of work, so as to eliminate all doubts concerning the completion of the object. A set (design) created in such a way represented something unreal, but possible to implement. A word which describes such a state – "which may exist (is theoretically possible)"¹⁴ – is "virtual."

Today the word "virtual" is most often associated with digital technologies. Due to the development of technical infrastructure, it is often connected with various activities describing the remote performance of actions with the use of a computer or defining something which does not physically exist but has been visualized in some sort of way. It is also often connected with architecture. This connection is appropriate because virtual space, to a significant degree, is "built up" by architecture. We come in contact with virtual architecture

¹¹ The past tense used, applies to the tendency of the young generation which is focused on taking advantage of digital methods of design. The authors of the article, despite working in a digital environment, still use traditional design methods, believing them to be a tool which helps in the development of spatial imagination and allows for the creation of a tactile bond with the model and definitely recommend such methods.

¹² A layout as a specific type of a model used most of all by architects to replicate the appearance and the arrangements of the designed object. The making of a model is used in many professions, mainly technical ones, however, in the times of the development of digital technologies, models describing phenomena and processes, as well as behaviors are used more and more often.

¹³ Completing an image of this, generated (created) in our imagination vision required the proper manual skills, necessary to clearly visualize the object. Digital devices and software facilitate the completion of professional works for those with lesser manual ability which is replaced with knowledge regarding the use of digital tools.

¹⁴ *Wirtualny* [in:]: *Słownik wyrazów obcych PWN* [Polish Scientific Publishers Dictionary of Foreign Terms], Wydawnictwo Naukowe PWN, Warszawa 1995.

when we watch its visual presentation. This can be a visualization which is a realistic image completed by a calculating machine based on the construction of an advanced/complicated (containing numerous information and parameters) digital 3D model.¹⁵ Visual architecture may also be depicted by a conceptual two-dimensional (2D) image. It is rather a vision, a sketch, a main objective and it does not have to completely correspond with the spatial construction of the object, however, it does have to fulfill the criterion of unambiguous interpretation. The possibilities of interacting with visual architecture depend on the way in which it was developed. A 2D image can be displayed or printed, however, it always remains flat. On the other hand, the 3D model can be viewed from all sides, also from the inside. Thanks to advanced lighting and material simulation, a 3D model can appear so realistic that it is difficult to differentiate between the real object and its image (the represented object looks like the real one).

2.6 ACCESS TOOLS

In order to fully experience the “three-dimensionality” of virtual space, we must use additional tools. One of those readily available tools is a smartphone or a tablet. A device acts as a kind of “filter” placed between the user and the observed space. Thanks to the camera “the filter” registers our surroundings,¹⁶ calculates its own position and interposes the digitally generated image of a non-physical 3D object onto the image of our surroundings. This object can be a model of a designed building or a model of any object, also an animated figure. The model can be viewed from all sides by moving in real space or by moving the marker placed in it. Objects can be divided into individual sections by deciding which of these remain visible, in this way acquiring the ability to view the interior of the object or obtain information about its structure. Such a solution is known as augmented reality (AR). Ronald Azuma presents a definition which is a synthetic description of augmented reality. He defines AR as a system:

- which connects within itself the real world and virtual reality;
- is interactive in real-time;
- enables freedom of movement in three dimensions.

A similar solution but one which requires a more advanced filter is mixed reality – MR.

As opposed to AR, the filter is attached to the user's head. A device equipped with a set of sensors and cameras registers our surroundings and displays digitally generated objects on a semi-transparent glass. The registration of the position of the user's hand allows interaction with the generated object. In both of the above-mentioned cases, we are dealing with a connection between reality and virtual reality.

The third solution is virtual reality. In this case, the image may be recorded by a 360 camera, however, more often it is an entirely digitally generated environment. The development of techniques of rapid imaging allows us to obtain unprecedented reality – subsequent barriers, which until recently have been difficult to overcome, begin to disappear. It is possible

¹⁵ 3D – three-dimensional. Three dimensions of such a digital model are virtual, its space is described based on visual interpretation of digital data stored in computer memory and displayed with the use of an appropriate device. The model can vary in time and be described as a 4D model (three dimensions of space, and time).

¹⁶ Certain solutions require placing a “marker” within the field of view of the filter. The marker may be virtual, calculated based on the analysis of an image (space) in this field of view.

to generate an environment containing billions of surfaces while extending realistic lighting all the way to the horizon of the virtual world.¹⁷

The name virtual reality sounds like an oxymoron, containing a contradiction describing what is both real and unreal. However, in limiting the meaning of the word virtual to non-physical and staying true to the conviction that virtual may be real, we avoid such a paradox.

Obtaining additional information about our surroundings thanks to stimulating more of our senses, allows us to better experience non-physical, virtual space, to “immerse ourselves” in non-physical space. The degree of immersion depends on the set of devices used. Participation in virtual space may be passive, e.g. when watching a film, but we can also participate in a virtual space by interacting with it and changing it. Thanks to the development of digital technologies today, a fuller experience is possible. Currently, natural stimuli may be replaced with those created artificially. We obtain such an illusion by watching a screen that displays a stereoscopic image and putting on a set that generates surround sound. We put on special gloves which guarantee haptic sensations, while

our body is covered in a suit ensuring tactile sensations over most of its surface. Devices that generate air circulation and changes in temperature while also imitating smell and taste allow for the creation of an illusion of an environment different than that in which we currently find ourselves. Artificial stimulation of the senses is not identical to that which comes from real interactions. The first space with which a man deals, is the real one. As the original space, it is our point of reference when we come in contact with virtual space. However, this does not present a problem for the user. We do not always require an exact replication of the stimulus. In receiving “artificial” stimuli, we supplement them by our imagination recalling natural ones.¹⁸ We do this especially when we want them to be real, when they suggest to us what we want to experience.

An element describing virtual reality is the so-called I³ triangle. It consists of three elements: immersion, interaction, and imagination.¹⁹ Depending on the set of access tools used, the contribution of individual components varies. A set of tools enabling participation in virtual reality is the basic criterion for distinguishing types of non-physical reality.

The border between individual realities is unclear. The basic criterion of differentiation is the set of tools used allowing for participation. We participate in mixed reality if the device can interpret space in front of itself as three-dimensional and uses this in generating virtual objects. In addition, interaction with objects can define in which reality we currently find

¹⁷ Epic Games revealed a fifth-generation Unreal Engine on May 13, 2020. The introduction of the engine is planned for 2021. The engine is equipped with technologies that facilitate the generation of views of complex 3D scenes in real time in 4K resolution. The engine has built-in modules: Nanite – the use of three-dimensional mesh of film quality with automatic LOD (Level of Detail), Lumen – eliminates the need to create a light map by calculating reflections and shadows dynamically, Niagara – for fluid and particle dynamics, Chaos – for physics.

¹⁸ The use of virtual reality is based on the desire to feel it, we care about the fullest participation, we expect stimuli and we want to feel them.

¹⁹ “By virtual reality, we mean a space created by the interaction of immersion as a feeling of belonging to an artificially created reality, interaction as a possibility for the user to create changes in this reality and his imagination allowing for sensations which are not perceived by sight.” A. Bładowski: *Rozwój wirtualnej rzeczywistości jako narzędzia interpretacji przestrzeni*, Przestrzeń, Ekonomia, Społeczeństwo, 2018, no. 13/1, pp. 85–100, <http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.desklight-9af32b7d-8430-444f-a67f-1554ebc7411d> (access: 15.4.2020).

ourselves. Reality is augmented if the interactions with the object (apart from those assumed by the object's creator) are not possible. When we create an object, when the object is "open" and we can modify it according to our own preferences, then we find ourselves in mixed reality.

The entirety of virtual worlds and their elements,²⁰ sensors, all the equipment and software necessary to participate in them and create them is called extended reality²¹ – XR. It is made up of all the realities mentioned above and acts as the link between them and real reality (RR).

Complete immersion carries the risk of losing the point of reference. Such a situation was presented in the movie *Inception*. The film shows the possibility of entering into a dream, falling asleep in a dream, and entering another level of dreaming. Since the characters lack points of reference to reality, after several jumps it is very difficult to specify on which level they currently find themselves. The movie talks, among others, about getting lost in those levels. In such a situation, even the real level (truth) may be deemed as a dream (false). A mistake made in this case can have severe, including life-threatening, repercussions.

In connection with the above, we quote the question that Stanisław Lem asked many years ago:

Is it possible – we may ask – to create artificial reality, which is similar to the natural one, but impossible to differentiate? The first topic – is creating worlds; the second – illusions. Yet, these are perfect illusions. I do not know if we may simply call them illusions. You must judge for yourself.²²

2.7 VIRTUAL ARCHITECTURE

You are in an unknown house, you look around with interest, walking through subsequent rooms. The interior was designed with a sublime taste, while the prevailing atmosphere of harmony fills you with tranquility. You see enormous windows, through which delicate and soft light seeps in. One of them is open, you hear the sound of the sea, feel its scent, the wind gently brushes your face. Despite the heat outside, the stone floor provides pleasant coolness. You sit down on a comfortable sofa, and feeling the texture of the material under your fingers, you fall into a pleasant, velvety softness... tired, you close your eyes and reluctantly turn off the virtual reality set... it is time to come back to the real world.

We have reached the stage where the presented scenario becomes more and more possible to implement. The creation and development of virtual reality allowed us to immerse ourselves in and experience worlds and environments which we could never have imagined. The exorbitant pace of technological development began a new era. These changes concern every aspect of our life, including architecture, which splits into two, one that we have known until now and another which exists in another dimension – in virtual space. It is quite possible that today, in front of our very eyes, the architecture of the future is born.

In order to appropriately understand the possibilities and implications that the development of virtual reality brings into the world of architecture, summing up reflections up

²⁰ Many elements used in every reality (e.g. 3D objects are used in each of them).

²¹ XR – extended, and AR – augmented.

²² S. Lem, *Summa technologiae*, Wydawnictwo Literackie, Kraków 2000, p. 242.

to this point, we must specify how we understand the main concepts which appear in this publication.

In the present article, we treat virtual reality as a tool which allows us to peek into virtual space, and also a tool for its creation. Virtual reality is a visual space, but not a physical one,²³ in which there is a possibility to experience stimuli with the aid of devices that stimulate them, while on the other hand, real space is the material environment which directly affects our senses.

The virtual world is a world of virtual space, today identified with “the world of art, film, music, computer games, research projects, thoughts, imaginations, implemented through visualizations”²⁴ and also the Internet and digitally generated environment, which is influenced by the person who is experiencing it.²⁵ The real world is a physical and material space.

The reality in which we function is comprised of both the real and virtual space. Technological development causing their smooth connection has led to the creation of a reality which is called postmodernism or post-reality,²⁶ in which these spaces penetrate each other, while the borders between them tend to disappear.

In recent years, the discussion on virtuality has also covered architecture. Or Ettliger has developed a theory of virtual space which has “at its basis an interpretation of virtual space as a general space which we see with the aid of visualized images, as well as ‘virtual’, as a description of any given visible object found in this space.”²⁷ Taking into account the fact, that architecture per its definition, is understood as the art of shaping space, it can be assumed that architecture created in virtual space is referred to as virtual architecture.

The users of virtual space make a choice “between the desire to immerse themselves as deeply as possible in an image (in an artificially generated world) and the desire to experiment, with the goal to try and check something, which can later be done in reality.”²⁸ The division of virtual space into a kind of virtual “machine to inhabit” of the post-reality era, and into space which serves the purpose of checking and testing solutions which we would like to apply in the real world, essentially corresponds to the aims attributed to virtual architecture: “the simulation of physical architecture or functional spatial places.”²⁹

²³ Or Ettliger defines virtual space as space encompassing that which is created by any medium able to describe space outside of direct physical surroundings.

²⁴ A. Latawiec, *Rola symulacji w kreowaniu świata wirtualnego* [in:] A. Kiepaś, M. Sułkowska, M. Wołek (eds.), *Człowiek a światy wirtualne*, Wydawnictwo Uniwersytetu Śląskiego, Katowice 2009, p. 53.

²⁵ We can speak of artificial immersive environments, visible thanks to special sets (virtual reality), which allow for complete immersion in virtual space. The user who remains in this environment has a four-dimensional time and space continuum at his disposal and remains in constant interaction with it.

²⁶ Post-reality is known as the fourth wave of computer technologies which comes after the development of personal computers, the world wide web and mobile technologies. The development of technologies permits full immersion in a stream of stimuli, visual, tactile, auditory, and saporific, in such a way that it is difficult to separate the real world from the virtual one.

²⁷ O. Ettliger, *op. cit.*

²⁸ T. Miczka, *Czysta iluzja i testowanie realności: dwie rzeczywistości wirtualne – dwa uczestnictwa* [in:] A. Kiepaś, M. Sułkowska, M. Wołek (eds.), *Człowiek a światy wirtualne*, Wydawnictwo Uniwersytetu Śląskiego, Katowice 2009, pp. 11–30.

²⁹ M. Maher, S. Simoff, N. Gu, H. Lau, *Designing Virtual Architecture*, 2000, https://www.researchgate.net/publication/2393916_Designing_Virtual_Architecture (access: 15.4.2020).

The above-mentioned theses correspond to the division which we implement in order to define the place of virtual architecture. We can point out two principal areas in which virtual architecture develops:

- virtual architecture perceived as an effect of the work of an architect, a form of a simulation of physical architecture connected with the designing workshop, and
- virtual architecture created as a result of the expansion of people into cyberspace, created to exist in a digital world.

Architectural simulations. Until recently the main attribute of architectural design which allowed for contact with the object or space, before their creation in real space, was drawings known as plans, perspective drawings depicting the object form, layouts implemented as a model in scale, and renderings, two-dimensional representations of three-dimensional objects generated by a computer. Along with the coming of virtual reality (designing with the use of virtual reality technology is the main focus of the present work) which to a greater and greater degree is able to cheat our senses, there are first signals that true sensations of space will be available prior to the construction, while architects will have the possibilities to design directly in the virtual space.

Using virtual reality as a tool for designing and placing a design in the virtual space is a new field of activities for architects. Although VR systems are based mainly on engines which are used for computer games, while applications for iterative designing are still being developed³⁰ and require specialist knowledge, the potential for their use as an interactive working space for architectural design is very promising indeed. Currently, we can see a broader and broader application of this technology in modeling, visualizing as well as the presentation of architectural designs. Thanks to VR, we have the opportunity of a photorealistic representation of ideas and rapid and multiple simulations of potential solutions. The exact representation of the final vision helps in the dialogue between people engaged in the creation of the project, but also in collaboration with clients, which can significantly decrease the number of corrections of the work being developed. The real estate industry has also noticed the potential of VR and currently uses new solutions in order to obtain clients.

Digital world. However, the role of virtual architecture cannot simply be reduced to being a stage in the designing process, its potential is used for research, educational, and popularization purposes. Digital reconstructions of important architectural works are studied by historians and conservation officers and also made available to sightseers through applications.³¹

³⁰ An example of such an application is the Anywhere project, presented in June of 2015 in the main offices of Carl Zeiss Oberkochen, Germany, whose author is Constantinos Miltiadis. The goal of the Anywhere project is to transcend the borders of the “physical presence of man in space, by replacing kinesthesia, vision, and hearing with artificial sensory experiences in a fully interactive virtual environment. Blending aspects of both reality and virtuality, the project creates the first real presence in an augmented reality space.” The virtual space with new properties of heterotrophy and heterochrony serves as a novel platform for architectural speculation. Virtual architecture, the content of these environments is immaterial, not limited by the properties of the physical world, may remind us of and transport us to everything that is real or possible. *Project Anywhere*, <http://studioany.com/projects/project-anywhere/> (access: 10.6.2020).

³¹ M. Helenowska-Peschke, *Architektura w kontekście fenomenu wirtualnej rzeczywistości*, Czasopismo Techniczne Architektura, 2011, vol. 108, no. 4-A/2, pp. 141–146, https://repozytorium.biblos.pk.edu.pl/reduo/resources/32382/file/suwFiles/HelenowskaPeschkeM_ArchitekturaKontekscie.pdf (access: 15.4.2020).

Virtual space is also a place where architecture is created not as a simulation of a planned physical object but as the realization of ideas, fleeting visions, and dreams, metaphors and illusions, concepts without the limits of the physical world, without specifying, forcing and distinguishing directions of perception and cognition. Virtual architecture from this point of view becomes a creative manifesto, a symbol of an era, in which it is created.

Aleksander Asanowicz formulates a thesis that “in the area of the interface man-computer there is a quality revolution. It is possible to enter virtual worlds where nothing other than virtual forms exist.”³² Due to the above and due to the popularization of digital technologies today we can already speak of a new generation – a generation of users and inhabitants of cyberworlds. Krzysztof Kalitko believes, based on Michael Benedict's theory of space, that since in a virtual world similarly to the physical one space may be designed and inhabited, therefore virtual space should be shaped by architectural form.³³ A response to this postulate is the developing concepts of virtual places designated for people to meet, work, study, or play.³⁴

Architects due to their knowledge and experience in spatial design, seem to be predestined to design virtual architecture. Virtual space creates other possibilities and other limits, taking into account this aspect, designing in it should not be a direct copy of the real space. However, virtual architecture may take on the form of a skeuomorphic design.³⁵ Designers who refer to forms and structures recognizable to the user, help him this way to understand and move about in the virtual environment. Virtual architecture may also take on the form of a relation between elements and objects located in the virtual space. Marcos Novak, one of the premier contemporary ideologists and creators of virtual architecture in the world, who refers to himself as a transArchitect,³⁶ created the concept of liquid architecture, imma-

³² A. Asanowicz, *Systemy rzeczywistości wirtualnej w architekturze*, Architecturae et Artibus, 2012, vol. 4, no. 4, p. 11, [http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-9c82ae7e-67f2-4628-a038-c99020c564f4?q=bd85ea7a-c6b8-4a78-8d52-e47ae57169ea\\$15&qt==IN_PAGE](http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-9c82ae7e-67f2-4628-a038-c99020c564f4?q=bd85ea7a-c6b8-4a78-8d52-e47ae57169ea$15&qt==IN_PAGE) (access: 15.4.2020).

³³ K. Kalitko, *Architektura wirtualnej kolonizacji*, Kultura Współczesna, 2003, vol. 37, no. 3, pp. 78–79, https://www.nck.pl/upload/archiwum_kw_files/artykuly/7_krzysztof_kalitko_-_architektura_wizualnej_kolonizacji.pdf (access: 15.4.2020).

³⁴ Currently, video games are the most colonized area of the virtual world. They are characterized by a wealth of worlds in which space is an important element of the game. The space assumes various functions in relation to the attitude of service. Space is a tool to help, the player gets to know the world and the laws that govern it. The shape of the environment and its appearance symbolize the ideas, aspirations and artistic visions that accompany it. Space in the game of history, the game designer is more an architect than a creator of the story. Most fascinated internet users in the digital world parallel to real virtual life. An example of such phenomena can be the game “Second Life.” Several million game users, called residents, inhabit a free virtual world. In this world, they appear in the form of a customized avatar. Each player has the option of limiting the environment. It can also create three-dimensional objects using embedded software. The characters are animated and played by players not only on how they look and move, but also on the sounds they play. SL has its own currency for which you can buy land, goods or services.

³⁵ The recreation of the property, shape texture, color, or function of the original object in a substitute material. Skeuomorphism may be used purposefully in order for the new look to seem familiar and friendly

³⁶ “The term ‘transarchitecture’ describes a ‘transformation or transmutation of architecture in the direction of overcoming the contradiction between the physical and the virtual as well as the suggestion of continuum, which leads from physical architecture to technologically enhanced architecture to cyberspace architecture. Transarchitecture is to be perceived as a way of expanding and strengthening

terial architecture of cyberspace, whose form morphs in accordance with the needs and the intentions of the viewer.

2.8 REAL UNREAL

The attempt to answer the question about truth or lie in the case of defining architectural space is extremely problematic and quite complicated. Meandering among the issues of semiotics, logic, psychology, computer science, and architecture brings about numerous difficulties. In contemporary discussions on the subject of virtuality, which also encompasses architecture, once again we are discussing the question of relations which occur between reality and virtuality, physicality, and intentionality. The questions of sensual perception, perception, and experience are reconsidered. More and more often we ask ourselves the question whether virtual is real or is it false, a lie, an illusion?

In the present article in referring to virtual architecture, we use the terms “real” and its contradiction “unreal”. In our opinion, such a comparison better shows the character of relations between reality and virtuality (the issue of objective truth has not been agreed upon to this day, while we consider a lie to be intentional and as such we exclude it from the domain of architecture). It is difficult to come to unambiguous conclusions living in the era of post-reality, where the real world penetrates the virtual one and vice versa, while the borders between them become blurred. Searching for the answer about the reality of virtual architecture, in order to make this task possible, we believe it is necessary to establish a point of reference.

We believe that the most obvious point of reference in our reflections is the existence of man in a real, physical, and material world. In such a context, the architecture which we deem as real is the physical and material architecture that surrounds us, which we fully experience with all our senses.

Thanks to the development of virtual reality technology, it is possible to achieve complete immersion and experience of virtual architecture with the participation of all the senses. Virtual architecture comes from the material world and it is built to resemble physical architecture. Man, as the common element of material and virtual worlds, brings the meaning and prototypes from the real world into the virtual world as the secondary one. The virtual architecture generated by devices and tools (media) which are elements of the material world, remains an immaterial creation. It is an illusion of direct experience which does not occur physically. In the simplest of systems, virtual architecture must be regarded as not fulfilling the conditions of existing in the real world (physicality, materiality, direct impact) and as a consequence it is unreal.

However, if we assume that virtual architecture does not step outside the boundaries of the digital world with its direct actions, but only indirectly through man (the common element) do the effects of its impact materialize in the physical world and as a consequence we establish the existence of identity among various entities (the breaking of the law of

the goal and meaning of architecture in the era of information, which allows us to research alternative paths to narrow borders of the discipline of construction. Transarchitecture studies the aspects of technological and theoretical progress of space and their connection with the studying of various spatial patterns, which could not have been studied earlier. Computers should be seen both as tools for studying these spatial patterns as well as the creators of instances for new architecture.” *Marcos Novak*, <https://www.floornature.de/marcos-novak-5052/> (access: 10.06.2020).

contradiction)³⁷ as a reference point, we can say that virtual architecture is real in the context of the physical world.

In treating the virtual entity as a representation of the user which is subject to rules and functions according to the principles of the virtual world, and virtual architecture as an environment of its functioning, we move the context of evaluation outside the material world.

The fact that we ourselves become part of the virtual world, becomes a reference point and we assume that the architecture surrounding us is real. It takes on, similarly to the physical world, the appropriate functions and is a counterpart of real space. It defines conditions of use, facilitates orientation, sorts and segregates spaces. Is the equivalent of real space in virtual space.

3. SUMMARY

We are currently witnessing the birth of a new trend in architecture design. It is the virtual architecture available through digital technologies, which is governed by its own laws and is filled with artificially generated stimuli. Full immersion in the virtual world can cause loss of human contact with reality and wrong perception of the real world. However, despite the threats, for architects it is undoubtedly a chance to explore and visualize the world existing so far only in the imagination. Freedom and liberty in creation will allow you to break with design conventions. As a result, it should be hoped that the architecture of the future, taking advantage of the richness of experience flowing from alternative realities, while remaining firmly rooted in the stimuli of the real world and a properly formed “reference point,” will not lose the essence of true architecture.

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