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TECHNOLOGY VS CREATIVITY IN ARCHITECTURE: STRIVING FOR SYNERGY

TECHNOLOGIA KONTRA KREATYWNOŚĆ W ARCHITEKTURZE: DĄŻENIE DO SYNERGII

Abstract

Contemporary interdisciplinary design allows the construction of buildings of any complexity. Technological progress, computer-aided calculations and high-strength materials are pushing the boundaries of creative architectural design. The use of new communication tools that help the architect cooperate with specialists facilitates project coordination and the ability to perform complex structures. The article examines the complex relationship between technology and design in architecture, asking questions about the role and importance of cooperation between computers and designers in the creative process. Research methods include analysis of the use of advanced computer programs and their impact on the programming process. The results indicate that, despite their many benefits, digital tools can also limit designers' creativity, forcing them to rely more on the capabilities of technology than on creative vision.

Keywords: computational design, creative independence, digital tools

Streszczenie

Współczesne projektowanie interdyscyplinarne pozwala na wznoszenie budynków o dowolnej złożoności. Postęp technologiczny, obliczenia wspomagane komputerowo i materiały o wysokich parametrach wytrzymałościowych przesuwały granice możliwości kreatywnego projektowania architektonicznego. Wykorzystywanie nowych narzędzi komunikacyjnych pomocnych architektowi we współpracy ze specjalistami ułatwia koordynację projektu i możliwość wykonywania skomplikowanych konstrukcji. W artykule zbadano złożoną relację pomiędzy technologią i projektowaniem w architekturze, zadając pytania o rolę i znaczenie współpracy komputerów i projektantów w procesie twórczym. Metody badawcze obejmują analizę wykorzystania zaawansowanych programów komputerowych i ich wpływ na proces programowania. Rezultaty wskazują, że mimo wielu korzyści narzędzia cyfrowe mogą również ograniczać kreatywność projektantów, zmuszając ich do opierania się bardziej na możliwościach technologii niż twórczej wizji.

Słowa kluczowe: projektowanie obliczeniowe, niezależność twórcza, narzędzia cyfrowe

1. INTRODUCTION

In recent decades, the development of information technology has revolutionized the practice of architectural design. The leap from manual drawing and modeling to digital 3D modeling and parametric optimization has opened up new opportunities for architects, enabling the implementation of advanced designs with complex geometry and specific

construction requirements. The work examines how these tools influence the creativity, efficiency and quality of contemporary architecture. Advanced software such as Revit or Rhinoceros 3D with extensions for parametric design enable precise modeling and data management, which is crucial in communication between architects, investors and contractors. Computerization of processes allows for complex strength, thermal and energy analyses to be carried out, which increases the safety and durability of buildings. The use of artificial intelligence and parametric algorithms in design allows for the automation and optimization of design, which significantly shortens the work time on the project and increases its precision.

Despite many advantages, digital tools pose a challenge in practical application. Dependence on algorithms and ready-made solutions can limit creativity, leading designers to rely more on technology than on their own intuition. Professional software is often expensive and complicated to use, which is a barrier for less experienced architects and offices with a smaller budget for digital development. Unequal access to advanced digital tools may also deepen the differences between large and small architectural practices.

Is it possible to design without using computers? While digital tools offer undoubted benefits in terms of efficiency and complexity of designs, it is important to recognize that the designer using the software is bound by the possibilities that the program offers. Thus, its ability to explore new concepts may be limited by the parameters and functionalities that the software enables. As a result, architecture implemented using computers may sometimes reflect the capabilities of a given technology rather than the unlimited creativity of the designer.

Examples of architectural models such as Sagrada Familia, which were created without access to modern technologies, remind us of the possibilities offered by deep reflection on form and function. In turn, projects such as Burj Khalifa or Shanghai Tower show how much technologies can expand the boundaries of what is architecturally possible. Ultimately, it is essential to strike a balance in which technology serves as a tool to expand the boundaries of design possibilities, rather than as a means to limit architects' creative aspirations. The question of whether and how we can maintain creative independence in the era of computer dominance remains open, requiring constant reflection and adaptation in both architectural theory and practice. The article discusses the impact of advanced information technologies on the practice of architectural design. An analysis of how these tools impact architectural designs is presented, while raising issues related to the potential limitation of creativity by dependence on algorithms and ready-made solutions.

2. TECHNOLOGY VS CREATIVITY IN ARCHITECTURE

In the context of contemporary architecture, fundamental questions arise regarding the role and impact of technology on creativity in the design process. The accelerated pace of design, dictated by the emphasis on efficiency and profitability, often reduces the time devoted to creative considerations, leading to the duplication of ready-made patterns and adaptation to strictly defined regulations. Is it possible to maintain originality and innovation in such an environment, especially when theoretical concepts such as the Vitruvian Triad seem to have less and less in common with the realities of architectural practice?

In today's world, where technology has become an integral part of the design process, there is a risk that creativity will be reduced to the ability to use computer programs. On the other hand, modern digital tools enable the implementation of projects that would be unattainable without their help – for example, thanks to intelligent architecture that uses parameterization and optimization based on data and artificial intelligence. This technology allows for the design of more complex and functional objects, as well as for more effective project management and coordination between various industries.

In the field of architecture, the integration of digital tools such as 3D modeling and process mining is changing the way creativity is conceptualized and realized in sustainable building design. These technologies enable architects to analyze and evaluate design solutions based on the extensive data generated during the design process. By utilizing data on technology usage, researchers and practitioners can identify patterns associated with frequently used commands in computer programs. Such insights can directly influence the creative outcomes of architectural designs. As digital tools become more embedded in the field of architecture, they provide a basis for more systematic exploration of how to optimize and measure creativity, supporting deeper integration of technology and creative processes in architecture¹. Advanced information and data organization capabilities also increase the innovation of design decisions and foster greater creativity in design².

2.1. COMPUTER AND ANALOG TECHNIQUES

It becomes crucial to find ways to use technologies that support rather than limit the creative process. The ability to design from traditional sketches on paper can preserve the architect's original vision before it is transformed by the software used. Conceptual drawing is a process involving tactile, visual and motor coordination that fosters creativity and serves as a cognitive basis for developing architectural ideas. However, the advent of digital technologies introduces potential changes to these inherent creative processes. Examining the practices of renowned architects such as Ando, Hadid, and Gehry illustrates a variety of approaches to integrating preliminary visualizations and iterative sketches into the design process. This highlights the diversity in the handling of concept drawings in the face of technological advances. In the context of architectural education, it is extremely important to teach the features of traditional drawing techniques so that young architects can apply new technologies without losing the essence of intuitive, practical creative processes. Balancing technological benefits while maintaining the intuitive nature of hand drawing is essential to nurturing creativity and innovation in this field³. The relationship between computer technology and architectural creativity is highlighted by the shift from traditional, manual methods, such as sketching and physical modeling,

¹ W. Gao et al., *Impact of 3D modeling behavior patterns on the creativity of sustainable building design through process mining*, "Automation in Construction" 2023, vol. 150, art. no. 104804. DOI: 10.1016/J.AUTCON.2023.104804.

² C. Chai, X. Zhang, X. Yi, *Research on the influence of organizational form of inspirational information in conceptual design: Workload and creativity*, "Advanced Design Research" 2023, no. 1(2), pp. 78–86. DOI: 10.1016/J.IJADR.2023.09.002.

³ H.C. Gomez-Tone, J.F. Raposo Grau, *Characterization of conception drawing in architecture to face technological mediations*, "Frontiers of Architectural Research" 2024, no. 13(3), pp. 425–428. DOI: 10.1016/J.FOAR.2023.12.013.

to modern computer-aided design tools. Traditionally, these tactile and visual methods have played a key role in developing a deep, intuitive understanding of architectural forms. However, while CAD provides precision and efficiency by reducing the need for physical resources, it may not engage sensory exploration as effectively as manual processes. This change poses an educational challenge: how to integrate digital tools without compromising the basic creative intuition that manual techniques support. In an educational approach to architecture, it is crucial to balance the benefits of technology while maintaining core creative practices that foster an intuitive connection to design processes⁴. The same is true in the case of architectural models – the search for architectural shapes is possible thanks to modern digital technologies and computer modeling, which significantly speeds up the entire process. In the past, this process was carried out analogously, for example in the case of the Sagrada Familia cathedral, designed by Antoni Gaudí, where the model of the building was created from bags filled with sand⁵. Although modern computer technologies eliminate the need for physical materials and are less time-consuming, design work in a digital model may not be as intuitive and accurate as with traditional, physical models.

2.2. TECHNOLOGY IN CONTEMPORARY ARCHITECTURAL EDUCATION⁶

The integration of digital tools in architectural design offices has significantly transformed both the teaching and practice of architecture, which is particularly evident with the shift to online education caused by recent global events such as the Covid-19 pandemic. Digital tools have become a staple of architecture curricula, moving beyond mere design and representation to become central means of communication and collaboration. These tools facilitate a wide range of architectural processes, from initial conceptualization to detailed presentations, increasing efficiency and interactivity in the learning environment.

As architectural design offices move from physical spaces to virtual platforms, the use of digital tools blurs the boundaries between virtual and actual reality, expanding the possibilities of architectural representation and communication. Students use a variety of programs to create detailed plans, sections and 3D models, as well as CAD and BIM tools that are essential to contemporary architectural practice.

However, this change also creates challenges, particularly in preserving the hands-on learning experiences that are the foundation of traditional architectural education. Despite these obstacles, the widespread use of digital tools in design studios is democratizing access to advanced technologies, preparing students for a future in which digital proficiency will be very important. This evolution reflects a significant change in the approach to teaching and learning architecture, adapting educational practices to the demands of the contemporary professional landscape.

⁴ A.B. Daemei, H. Safari, *Factors affecting creativity in the architectural education process based on computer-aided design*, “Frontiers of Architectural Research” 2018, no. 7(1), pp. 100–106. DOI: 10.1016/J.FOAR.2017.09.001.

⁵ M. Kurcjuś et al., *The interdisciplinary designing in form, function, and structure coherency*, “Acta Scientiarum Polonorum. Architectura” 2023, no. 21(3), pp. 3–13. DOI: 10.22630/ASPA.2022.21.3.17.

⁶ S. Ceylan et al., *The contribution of digital tools to architectural design studio: A case study*, “Ain Shams Engineering Journal” 2024, no. 15(7), art. no. 102795. DOI: 10.1016/J.ASEJ.2024.102795.

2.3. ARTIFICIAL INTELLIGENCE – ARTIFICIAL CREATIVITY

Artificial intelligence can generate products that seem original and effective but lack the depth and authenticity of human creativity. Despite its ability to generate new and useful results, it does not engage in a creative process comparable to human creativity. Human creativity is not just about creating novel objects, but includes intentionality, intrinsic motivation and authenticity – qualities that artificial intelligence cannot replicate because it lacks awareness⁷.

The use of computer hardware and artificial intelligence in architecture speeds up the design process, but it also raises questions about the potential decline of the role of the traditional architect. Inspirations generated by machines, although not always groundbreaking, are the result of data analysis and may prove useful in the context of new design requirements. Undeniably, many modern objects that go beyond the limits of architectural possibilities could not be created without the support of advanced computer calculations. New materials and technologies enable the implementation of projects that were impossible to achieve in the past. Architects, like structural engineers, use software not only for modeling and visualization, but also for coordination in complex interdisciplinary projects. While these technologies significantly facilitate and improve the quality of design on a larger scale, their effectiveness depends on the skills and knowledge of the people using them.

Artificial intelligence facilitates co-creation to enhance creative expression and problem-solving, especially relevant in fields such as art and design. At the professional level, AI can automate routine tasks, allowing professionals to focus more on innovation. This is evident in industries such as architecture, where artificial intelligence manages complex data so that architects can focus on design aspects. At the same time, over-reliance on artificial intelligence must be prevented, bearing in mind that artificial intelligence complements rather than displaces human creativity⁸.

The integration of artificial intelligence, in particular through text-to-image technologies, can support creativity in the architectural design process. Artificial intelligence tools such as DALL-E 2, Midjourney and Stable Diffusion allow architects and designers to visualize and manipulate design concepts in novel ways, promoting the generation of innovative solutions to complex challenges. These technologies expand the scope of creative possibilities beyond conventional methods, providing new perspectives and diverse visual representations⁹.

2.4. BRAIN-COMPUTER INTERFACE

The study of monitoring human brain activity and using it to control environments or applications is known as brain-computer interface (BCI). Such an interface also allows manipulation

⁷ M.A. Runco, *AI can only produce artificial creativity*, “Journal of Creativity” 2023, no. 33(3), art. no. 100063. DOI: 10.1016/J.YJOC.2023.100063.

⁸ Z. Ivcevic, M. Grandinetti, *Artificial intelligence as a tool for creativity*, “Journal of Creativity” 2024, no. 34(2), art. no. 100079. DOI: 10.1016/J.YJOC.2024.100079.

⁹ N.O. Hanafy, *Artificial intelligence’s effects on design process creativity: “A study on used A.I. Text-to-Image in architecture”*, “Journal of Building Engineering” 2023, vol. 80, art. no. 107999. DOI: 10.1016/J.JOBE.2023.107999.

of communication devices. Signals from the brain can be converted into commands that control applications. Control is intentional when the user intends to give a specific command to a device supported by the BCI¹⁰. Brain-computer interfaces represent a groundbreaking advancement in the field of architectural design, facilitating the direct translation of an architect's thoughts into design elements in a virtual reality environment. This technology enables architects to manipulate and interact with design elements using mental commands, eliminating the traditional intermediate steps associated with physical or digital design methods. This direct interface can enhance creativity by enabling architects to more seamlessly transform their ideas into visual forms. However, BCIs also pose challenges, such as the cognitive demands placed on users and the accuracy of translating thoughts into action, which can impact the smoothness and intuitiveness of the design process. Effectively integrated BCIs could significantly change the way architects interact with design tools, aligning the design process with processes of imagination and creativity¹¹.

3. ARCHITECTURE IN THE DIGITAL ERA

Contemporary architecture uses advanced technologies to transform designers' visions into real objects that go beyond traditional concepts of space. A key element enabling the implementation of these ambitious projects is the digitalization of the design process, including the use of building information modeling (BIM) software and 3D visualization techniques. These tools allow you to design and implement complex concepts that would be impossible to implement using traditional methods.

3.1. SWATCH, BIEL, SWITZERLAND¹²

The double-curved wooden shell of the Swatch headquarters in Biel (Switzerland) is one of the largest wooden structures in Europe. The four-story office building with an irregular floor plan and arched section was designed by Shigeru Ban Architects. Due to their free shape, none of the 4,500 glued wood segments are identical. The wooden structure consists of bent glued timber beams produced on CNC machines (Computerized Numerical Control).

Production data for gluing and CNC machining came directly from the 3D model – 2D drawings would not have worked for the object due to its irregular shape. An iterative optimization process was used, generating a NURBS (Non-Uniform Rational B-Spline) surface from a series of curves and checking it against the floor plan and curvature requirements. Many details go into the glued timber frame segments – over 140,000 bolts, screws and joints had to be present in the 3D model to be correctly included in the production data. The

¹⁰ A. Nijholt, *Introduction: Brain-Computer Interfaces for Artistic Expression* [in:] A. Nijholt (ed.), *Brain art. Brain-computer interfaces for artistic expression*, Springer, Cham 2019, pp. 1–29.

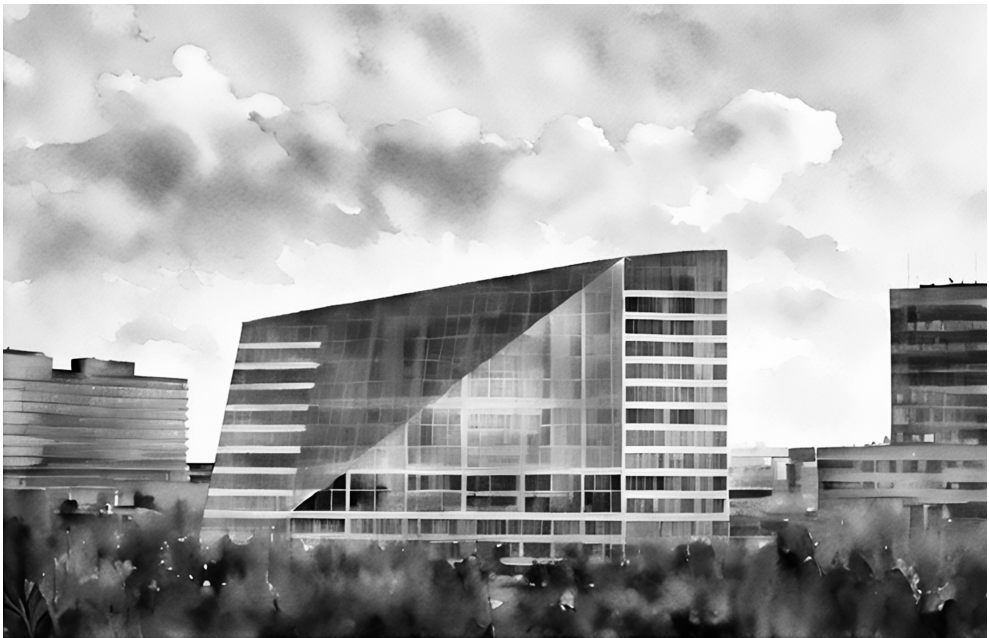
¹¹ Q. Yang, J.G. Cruz-Garza, S. Kalantari, *Brain-computer interfaces as an architectural design tool: Feasibility and usability study*, “Automation in Construction” 2023, vol. 154, art. no. 105011. DOI: 10.1016/J.AUTCON.2023.105011.

¹² H. Stehling, F. Scheurer, S. Usai, *Large scale free form timber grid shell digital planning of the new Swatch Headquarters in Biel, Switzerland* [in:] J. Burry et al. (eds.), *Fabricate 2020: Making resilient architecture*, UCL Press, London 2020, pp. 210–217.

project demonstrates the fundamental role of technology in contemporary architecture – its integration facilitated the meticulous implementation of a complex architectural vision, which is a significant achievement in the use of wood in large-scale structures.



III. 1. Swatch Headquarters, Switzerland. Author's compilation.



III. 2. The EDGE, Amsterdam. Author's compilation.

3.2. THE EDGE, AMSTERDAM, NETHERLANDS¹³

The Edge in Amsterdam exemplifies the integration of cutting-edge technology and sustainable design practices. It uses Internet of Things (IoT) technologies to improve building management and performance, including automated systems to visualize energy performance, monitor building occupancy and analyze energy use after occupancy. Its design has achieved a BREEAM rating of 'Outstanding', highlighting its green features such as solar panels, rainwater harvesting and the use of geothermal energy, which significantly reduce its carbon footprint. The building uses Building Information Modeling (BIM) not only during construction but also in ongoing management, facilitating efficient operation and maintenance, leading to cost savings and environmental benefits. There are motion, temperature, light and air sensors located in the building.

3.3. GOOGLE BAY VIEW, CALIFORNIA, USA¹⁴

Google Bay View is an example of modern sustainable design and construction, using numerous technologies to create an environmentally friendly and human-centric workplace. The campus integrates green technologies such as the largest geothermal facility in North America, which significantly reduces reliance on conventional heating and cooling methods.



Ill. 3. Google Bay View, California. Author's compilation.

¹³ A. Jalia, R. Bakker, M. Ramage, *The Edge, Amsterdam. Showcasing an exemplary IoT building*, https://www.cdbb.cam.ac.uk/system/files/documents/TheEdge_Paper_LOW1.pdf (access: 7.06.2024).

¹⁴ D. Radcliffe, *Bay View is open — the first campus built by Google* [in:] *The Keyword*, 17.05.2022, <https://blog.google/inside-google/life-at-google/bay-view-campus-grand-opening/> (access: 10.06.2024).

The project emphasizes adaptability and the well-being of residents, with particular emphasis on air quality, natural lighting and acoustics. The building uses 100% outdoor air for ventilation. The materials used to build the campus were carefully selected to minimize environmental impact and health risks, in accordance with rigorous guidelines. The holistic approach to sustainable design is also reflected in the campus' energy strategy, which includes a photovoltaic envelope and the provision of energy from nearby wind farms. Water systems are designed to have a positive impact on the environment, and features such as above-ground ponds and a wastewater treatment system help meet the demand for non-potable water through recycling.

4. CONCLUSION

In the past, architectural objects were created that were works of art that did not require computer support – brilliant realizations of master architects characterized by ideal proportions. Today, with advanced digital tools at our disposal, the question arises whether our architecture has actually become better. On the one hand, computer programs offer incredible possibilities in terms of designing fancy shapes or the time necessary to develop design documentation, but on the other hand, they limit the designer's creativity to the functionalities that the software enables. It may happen that the final shape of the project is the result of the program's capabilities, rather than a conscious decision of the designer. Also, considering how a different program would impact the design highlights the impact that digital tools have on the final outcome of an architect's work.

Technology significantly facilitates many aspects of the design process, such as documentation, parametric programming, unification of graphics, the ability for many people to work on one project and integration with other industries. This enables the implementation of projects that would be unattainable without digital support. This, in turn, sheds light on the value of technology in modern architecture, provided it is used in a way that allows for the full use of the designer's skills, rather than merely automating and duplicating existing schemes.

It is important for architects to perceive digital technologies as supporting the creative process, not as its determinant. The key is to find a balance between technological efficiency and creative freedom, which will allow for fuller use of the potential of these tools without limiting the human dimension of design. The article emphasizes that digital technologies offer significant opportunities for architecture but require conscious and sustainable use. Research should continue on how best to integrate these tools in the design process so that they support creativity and innovation in architecture, while not losing the human aspect of creative activity.

Technology, after all, remains just a tool – powerful, but still dependent on human initiative and creativity. The integration of digital technology in architecture is significantly transforming this field, especially with regard to the ecological and cultural dimensions. Digital tools such as computer-aided design (CAD), virtual reality (VR), and data-driven methods are revolutionizing the way architects design and construct buildings. These technologies enable a greater degree of experimentation with forms, materials and spatial configurations, facilitating more sustainable and innovative solutions that were once difficult to implement. However, this technological change also poses challenges, especially regarding architectural

identity and cultural preservation. As digital tools make architectural practices more global, there is concern that unique local architectural identities may be diluted as a result of a more uniform global aesthetic. Therefore, the challenge for modern architecture is to use these advanced technologies in a way that respects and takes into account the cultural and ecological context of each project. This approach ensures that distinct local character and environmental sustainability are maintained while taking advantage of global technological advances¹⁵.

References

- [1] Ceylan S., Şahin P., Seçmen S. et al., *The contribution of digital tools to architectural design studio: A case study*, “Ain Shams Engineering Journal” 2024, no. 15(7), art. no. 102795. DOI: 10.1016/J.ASEJ.2024.102795.
- [2] Chai C., Zhang X., Yi X., *Research on the influence of organizational form of inspirational information in conceptual design: Workload and creativity*, “Advanced Design Research” 2023, no. 1(2), pp. 78–86, DOI: 10.1016/J.IJADR.2023.09.002.
- [3] Daemei A.B., Safari H., *Factors affecting creativity in the architectural education process based on computer-aided design*, “Frontiers of Architectural Research” 2018, no. 7(1), pp. 100–106. DOI: 10.1016/J.FOAR.2017.09.001.
- [4] Gao W. et al., *Impact of 3D modeling behavior patterns on the creativity of sustainable building design through process mining*, “Automation in Construction” 2023, vol. 150, art. no. 104804. DOI: 10.1016/J.AUTCON.2023.104804.
- [5] Gomez-Tone H.C., Raposo Grau J.F., *Characterization of conception drawing in architecture to face technological mediations*, “Frontiers of Architectural Research” 2024, no. 13(3), pp. 425–428, DOI: 10.1016/J.FOAR.2023.12.013.
- [6] Hadjadji N., Toulou N., Dorra M., *Impact of digital architecture: The impact of digital technology on ecological formations and its effect on determinants of identity and culture in architectural design*, “Journal of Engineering Research”, 7.09.2023, article in press. DOI: 10.1016/J.JER.2023.09.004.
- [7] Hanafy N.O., *Artificial intelligence’s effects on design process creativity: “A study on used A.I. Text-to-Image in architecture”*, “Journal of Building Engineering” 2023, vol. 80, art. no. 107999. DOI: 10.1016/J.JOBE.2023.107999.
- [8] Ivcevic Z., Grandinetti M., *Artificial intelligence as a tool for creativity*, “Journal of Creativity” 2024, no. 34(2), art. no. 100079. DOI: 10.1016/J.YJOC.2024.100079.
- [9] Jalia A., Bakker R., Ramage M., *The Edge, Amsterdam. Showcasing an exemplary IoT building*, https://www.cdbb.cam.ac.uk/system/files/documents/TheEdge_Paper_LOW1.pdf (access: 7.06.2024).
- [10] Kurcjuusz M. et al., *The interdisciplinary designing in form, function, and structure coherency*, “Acta Scientiarum Polonorum. Architectura” 2023, no. 21(3), pp. 3–13. DOI: 10.22630/ASPA.2022.21.3.17.
- [11] Nijholt A., *Introduction: Brain-computer interfaces for artistic expression* [in:] Nijholt A. (ed.), *Brain art. Brain-computer interfaces for artistic expression*, Springer, Cham 2019, pp. 1–29.
- [12] Radcliffe D., *Bay View is open — the first campus built by Google* [in:] The Keyword, 17.05.2022, <https://blog.google/inside-google/life-at-google/bay-view-campus-grand-opening/> (access: 10.06.2024).

¹⁵ N. Hadjadji, N. Toulou, M. Dorra, *Impact of digital architecture: The impact of digital technology on ecological formations and its effect on determinants of identity and culture in architectural design*, “Journal of Engineering Research”, 7.09.2023, article in press. DOI: 10.1016/J.JER.2023.09.004.

- [13] Runco M.A., *AI can only produce artificial creativity*, “Journal of Creativity” 2023, no. 33(3), art. no. 100063. DOI: 10.1016/J.YJOC.2023.100063.
- [14] Stehling H., Scheurer F., Usai S., *Large scale free form timber grid shell digital planning of the new Swatch Headquarters in Biel, Switzerland* [in:] Burry J. et al. (eds.), *Fabricate 2020: Making resilient architecture*, UCL Press, London 2020, pp. 210–217.
- [15] Yang Q., Cruz-Garza J.G., Kalantari S., *Brain–computer interfaces as an architectural design tool: Feasibility and usability study*, “Automation in Construction” 2023, vol. 154, art. no. 105011. DOI: 10.1016/J.AUTCON.2023.105011.

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