sciendo

ISSN 2729-7640

ALFA ARCHITECTURE PAPERS
OF THE FACULTY OF ARCHITECTURE AND DESIGN STU
www.alfa.stuba.sk

4/2023 (Vol. 28)

Summaries

ARCHITECTURAL ALCHEMY: LEVERAGING ARTIFICIAL INTELLIGENCE FOR INSPIRED DESIGN – A COMPREHENSIVE STUDY OF CREATIVITY, CONTROL, AND COLLABORATION

Lenka Petráková, Vladimír Šimkovič

Keywords: design, architecture, artificial intelligence, AI, creativity

Traditional architectural design provides a human-centric and intuitive way of creating spaces based on personal creativity, experience and cultural history. The final design usually unfolds linearly with predetermined approaches set in early stages, and sometimes, the experience can overshadow objective evaluation. In contrast, the design approach enhanced by Artificial Intelligence (AI) leverages technology to expand the boundaries of inspiration and creativity, offering new ways for exploration and innovation. AI enhances creativity by allowing architects to experiment with novel forms, structures, and ideas at an unprecedented pace. This fosters an environment where architects can explore and innovate more freely and faster without the typical constraints of manual design.

This research paper explores the complex role that Artificial Intelligence can occupy in architectural design. Contrary to the view of AI as a mere utility tool, the paper posits that AI can function as a collaborative partner, advancing human creativity by offering innovative design possibilities. Originating from 1950s computer science explorations, AI has come a long way to permeate various industries, including architecture, where it is notably propelled by recent advances in machine learning algorithms like Generative Adversarial Networks (GANs).

This paper delves into the effectiveness of AI-driven design approaches, exploring new ways of inspiration and innovation in the architectural sector while researching how we can control AI in the design process and use it as a tool instead of an autonomous designer. When working with the two platforms (Midjourney AI and Stable Diffusion), the questions are multifaceted and require careful consideration: How do text-to-image and image-to-image generation algorithms contribute to a more vivid visualisation of designs? How can we enable greater control and flexibility in the design process? What are their comparative strengths and limitations in the context of architectural design? How can AI's role be moderated within the design process to ensure it functions as a collaboratively interactive tool rather than an autonomous designer? By focusing on these questions, the paper aims to investigate the mechanics of these platforms, evaluating their relative capabilities and providing insights into how they can be effectively harnessed in modern design practices.

To empirically validate these concepts, our paper conducts a comprehensive three-phase investigation featuring nine tests that meticulously assess the strengths and shortcomings of two leading AI platforms: Midjourney AI and Stable Diffusion. These

platforms harmonise human creativity with AI-generated solutions by utilising features such as text prompts and image references, and they open up unprecedented avenues for innovation in architectural design.

Our comparative analysis shows that Midjourney AI excels in creating initial design concepts based on text prompts, mainly due to its extensive data libraries. However, it is deficient in refining these designs and providing designers with adequate control. Conversely, Stable Diffusion offers greater control to designers through features like ControlNet, enabling the selection of various control mechanisms. Nevertheless, Stable Diffusion's generated visuals may lack definition compared to Midjourney AI, mainly because its generative models are smaller. In both systems, a standard limitation is an emphasis on shape and aesthetics at the expense of understanding the functionality of the given geometry.

Building on our empirical findings, the paper illustrates how designers can exert nuanced control over this emerging AI-driven design methodology to optimise workflow. The tests we conducted provide invaluable insights into these AI platforms' capabilities and limitations. They also offer practical guidelines for overcoming these challenges through a balanced, hybrid approach that amalgamates the best elements of Midjourney AI and Stable Diffusion. Instead of positioning AI as a rival to human ingenuity, our methodology envisages it as a valuable adjunct, enhancing the collaborative potential between humans and machines in architectural design.

The research validates two key hypotheses regarding the harmony of creativity, control, and collaboration, stressing that human architects and AI platforms benefit from iterative feedback and ongoing adaptation. In conclusion, the study asserts that AI is not just a technological supplement but a transformative catalyst that has the potential to redefine the architectural design process fundamentally. It further emphasises that while AI can amplify and extend human creative instincts, the essence of creativity remains a uniquely human attribute. As such, the paper foresees a future for architectural practice that is both technologically advanced and artistically profound, thereby heralding a new paradigm in which human expertise and machine capabilities coalesce to create enriched design outcomes.

In summary, this paper contributes significantly to the ongoing conversation about integrating AI and machine learning in architectural design. The paper advocates for a balanced, dynamic partnership between human creativity and technological innovation, explaining the transformative potential inherent in such collaborations.

COLOUR IN THE ENVIRONMENT FOR OLDER ADULTS

Monika Hencová, Veronika Kotradyová

Keywords: social inclusion, older adults, health, interior, furniture, colours

A large part of public and residential interiors is not designed for or adapted to the needs of older people. The trend of aging population is a demographic phenomenon, but its consequences affect the entire society. One of the priorities of the modern society is to address the issue of social integration of people with disabilities. Many professional articles and publications have been published, which have led to the development of guides and documents related to barrier-free accessibility. It should be a new standard to level the visiting opportunities for all types of people. Accessibility is an essential part of new buildings, but also of the renovation of older architecture. It is not only people with health, hearing, visual, or other disabilities who encounter problems in the public environment, but social inclusion also concerns other vulnerable groups of the population – children, mothers with strollers, neglected people, and older adults. The vision is to improve the quality of life without discrimination. In designing, the diversity of people, their needs, and constraints must be considered so that all users feel equal and have the same opportunities to be an active part of the community. Approaches to designing environments that address the diversity of people's needs and requirements are called human-centred design, which encompasses universal design, design for all, inclusive design, user-friendly design, design for all ages, and accessible design. Living in your own home for as long as possible is one of

the most important requirements of aging people. Their desire is to be as self-sufficient as possible. The living space for older adults with mobility impairments needs to be adapted to allow sufficient room to manoeuvre and change directions. Their greatest need is for safety, functionality, and comfort.

As we age, our visual perception changes, but so does our sensitivity to certain colours. Age-related changes in vision occur in all layers of the eye and can have different effects. First of all, the change in vision is caused by the tissues of the eyelids and the muscles around the eyes becoming flaccid. The biggest changes affect the lens of the eye, which hardens, thickens, and becomes less flexible. Changes to the lens allow less light to enter the eye and make it harder to recognize the environment a person is in. The most common problems associated with vision loss are loss of central vision, which allows us to see fine details and colours, blurring of the eye, reduced sensitivity to contrast, reduced ability to see in low light or at night, difficulty seeing objects up close, loss of normal vision, and also increased sensitivity to glare.

Whether it is adapting existing rooms in the home or designing a public service space, colour plays an important role in the space. When used purposefully, colour is a powerful tool that can not only enhance design aesthetics but also greatly help older adults feel independent and safe. Elements that can compromise our safety should be designed in contrasting colours. Moving through space is a multisensory experience. People use most of their senses such as sight, hearing, smell, and touch in addition to moving their bodies. Disorientation and unfamiliarity with the environment can increase fear in people and have a negative impact on their overall well-being. Flooring in areas designed for older adults should be designed in contrast to the walls and should be complemented with relief features such as artificial guidelines of different textures and colours. Older adults may be disoriented or feel unsafe if the space blends before their eyes and they cannot determine where they are walking. Alternating the colours of floor coverings, marking the purpose of rooms with embossed signs, or other wayfinding signs are helpful in supporting older adults‘ orientation. In circulation areas, there should be no obstacles on the ground that restrict the movement and safety of older adults. Safe floors should be solid, uniform, and protected against abrasion and slipping. The choice of solid floor coverings or tiles that do not shimmer is appropriate so as not to impair spatial orientation. If a carpet is used, it is advisable that it is low pile and passable by wheels. Carpeted floors have several major advantages. Carpets transmit fewer pathogens to the hands than vinyl or rubber floors, and some serious pathogens survive for a shorter time. They reduce noise and glare, make walking easier, reduce the likelihood of falls and subsequent injuries, and prolong visits with family and friends (increasing social support).

The colour scheme of the individual zones in the apartment can be a good aid to spatial orientation. Furniture elements or doors, for example, should have a contrasting colour to the wall on which they are mounted. Contrasting or different colours should also be used for elements or objects that may pose a safety risk to users. Warm and pleasant to the touch colours are preferred for furnishings. The monotony and lack of sensory stimuli in interiors can hinder users' orientation as they lack the visual cues needed to identify architectural elements. Colour contrasts in interiors need not be limited to walls and floors; the contrast between stair arms and walls, and colour highlighting of important points and zones is also appropriate. Aging eyes lose the ability to distinguish bright colours, making yellows and other pastel colours appear white. Shades of blue, green, and purple are classed as cool colours and can be seen as grey. People with colour deficiency are best able to perceive bright colours at the warm end of the spectrum, such as red and orange.

Colour can significantly help with orientation in space, but it is the architect who addresses the core principles. Spaces for the elderly should be organized, clear, and allow natural movement. Orientation in space is also closely related to the navigation system integrated in it. A wayfinding system in spaces for older adults helps with spatial orientation and navigation. A good navigation system is clear, understandable, intuitive, and non-verbal. Many studies can now be found that examine the impact of physical elements on well-being in health care settings for older adults, but few are concerned with colour. These homes often have neutral to hospital-style facilities. Instead of institutional aesthetics, one should begin to think about adding more of a sense of home, and colour may be one of the most useful elements for this purpose. In

addition, colour can be used to emphasize the difference between rooms designed for relaxation and those designed for activities.

FINE ART AS AN INTEGRAL PART OF ARCHITECTURE: POLITICAL AND SOCIAL ASPECTS OF THE FORMATION OF THIS SYNTHESIS IN THE 20TH CENTURY

Peter Mazalán, Katarína Morávková

Keywords: fine arts, politics, synthesis, architecture, history

The theme of the connection of visual arts with architecture, or the cooperation of visual artists with architects in post-war Europe, basically follows two lines: a theoretical line and a political-institutional line. Especially in Eastern European architecture and socialist construction, art had specific conditions for its emergence between 1950 and 1989. Two terms arose in the German environment that are also used in principle in translations in other parts of Europe: the term "architekturbezogene Kunst" (architecture-related art), used by the Bauakademie as an official technical term in the German Democratic Republic, and the phrase "Kunst am Bau" (art in architecture) referring to the same concept in the democratic Federal Republic of Germany, however, the term was intended to have a primarily educational function.

Aesthetic education thus had the function of conveying socio-political messages. Just as knowledge of the history of art and the history of architecture is necessary for analysing this period, knowledge of the political-economic circumstances is necessary in the field of realisations in architecture, because by definition this public art is a political affair and not independent creation. Art in architecture was promoted not only in communist countries (for ideological reasons), but also in Western Europe as an aesthetic cultivation of contemporary architecture. From the mid-1950s onwards, visual art in architectural space appeared more and more frequently, which led to the adoption of legislative measures that regulated and supported this practice. A gradual transformation in the understanding of the task can be observed over the period under review, or the position of "public art", presented as part of architecture or public space. This is naturally attributed to social development. If at the beginning of the 1950s the mission was to convey ideology and indoctrinate it, in the next period the focus shifts more towards design with the task of cultivating the "environment" and creating a certain atmosphere.

The study also peripherally explores forms of arts support in the context of other European countries. The idea of integration between art and architecture dates back to the very origins of both disciplines. During the avant-garde movement at the beginning of the twentieth century, it acquired a new meaning and social purpose and became one of the most defining characteristics of modernism. Modernism arose from the expectation of moral and material reconstruction of the world devastated by war, which served as a tool to strengthen collective identity and, consequently, to forge the bond between the city and its inhabitants.

Our study traces the development of the relationship and funding of visual arts in architecture in the Slovak and European context in the 20th century. In 1965, Government Resolution No. 355/1965 was adopted in Czechoslovakia. Art in architecture was considered to be a work that constitutes an integral part of architecture and its design was already part of the project documentation. In practice, these works were placed in public spaces, in the interiors of buildings or in the immediate vicinity of buildings' exterior, or were part of the design of a housing estate. The works are often fixed into the architectural framework, which means that they cannot be manipulated in any other way, they can only be destroyed. Furthermore, our paper deals with the ongoing research of works of art created in the context of architecture in Slovakia.

RISE OF CONTAINER STRUCTURES ALONG THE DANUBE RIVER IN BRATISLAVA: TRANSFORMATION OF THE EMBANKMENT AFTER THE RIVER REGULATION

Monika Bočková

Keywords: Bratislava, Danube, embankment, urban history, post-socialist city

The paper observes the space along the Danube River in Bratislava as a relatively newly formed terrain, which was created as a by-product of the river regulation at the end of the 19th century. The emerged space offered attractive and spacious building plots for various new typologies and rather than a compact city block, these were mostly hosted in the container-like structures. Referencing the theoretical work of De Solà-Morales, the containers are understood as self-standing, large-volume envelopes containing large interior and exterior spaces, drawing people from the city streets into an artificial environment that creates a controlled platform for order and consumption. The paper distinguishes three different periods of embankment development that correspond to the political and economic historical framework and highlights the specific characteristics of each of them. The first, interwar era brought the concept of freestanding palaces on the waterfront, be it a student dormitory, a national museum, or an art association building. However, the most prominent topic was the International Danube Fair and the pavilions that would host such an event. The fair was more spectacular than a traditional marketplace. These shopping festivities, which lasted on average from 8 to 13 days, were a kind of spectacle, as the situationist Guy Debord later elaborated on these events. The fair was originally held in the premises near the winter port, but later it was considered it should move to the western part of the embankment, on the former Danube alluvium. In the second period, after World War II, the socialist regime took over the under-construction exhibition complex on the waterfront to complete it as a Park of Culture and Recreation. The period of socialism was generally characterized by ambitious plans on both sides of the river, but at the same time, the inability to implement these plans in full. This phenomenon is well illustrated by the construction of the Podhradie housing estate and the construction of the multi-purpose exhibition complex (later named Incheba), which were implemented only to a limited extent, in a fragmentary manner. Finally, the construction of real private container-like structures in the sense of their commercial program and isolated form occurred on the linear space of the embankment only after the fall of socialism. The city was undergoing a post-socialist transformation, a lengthy process that led from the rejection of communism and central planning to the building of democracy with a market economy. After 1989, Bratislava's territorial strategies also changed. A former “caring” socialist city has gradually become an entrepreneurial capital that did not hesitate to privatize the housing stock and sell off large areas for new, private developments. Together with the formation of strong domestic financial elites, these factors set the new condition for the real estate market and resulted in the construction boom on the waterfront. The long-awaited construction on the waterfront is now in the hands of the private sector, while containers-like residence complexes and shopping malls are ultimately raising the questions about the public space and Rem Koolhaas's idea of the "generic". The current construction on Bratislava’s embankment can be analysed from different points of view. The paper presents one of them, namely an insight into the historical context and the conditions that defined the nature of waterfront development in the 20th century. For construction in the 21st century, other actors and other policies and the economic situation were critical. Nevertheless, the article tries to compare the volume and content of these new developments. It transpires that each era produces its characteristic layer in the urban fabric, and the one we experience today is no different. The paper concludes that the city waterfronts generally have a unique capacity to provide an open and neutral space for all kinds of social life. They are often the most attractive thing that cities have to offer. While in many European cities recreational facilities are still part of the area along the river, Bratislava has not offered this option for four decades. Instead, complexes of often questionable value and generic nature are being built on its shores. As the history shows, to build a public and continuous embankment in Bratislava is a vision that has always been beyond the possibilities of the city. Today's efforts to close the gap on urban development also bring valuable waterfront space, but only under the conditions of associated commerce.

PRESENTATION OF OLDER LAYERS AND FINDINGS ON HISTORICAL ARCHITECTURE USING THE METHOD OF ANALYTICAL PRESENTATION: EXAMPLE OF THE OLD TOWN HALL IN BRATISLAVA, SLOVAKIA

Andrej Botek

Keywords: analytical presentation, Old Town Hall, Bratislava, façade restoration

Analytical presentation is one of the methods used in the process of monument restoration. After its origin in the first decades of the 20th century, it was often used mainly in the 1960s–1980s. Frequently, it has been used (sometimes stereotypically) to renew facades of the monument buildings containing findings of various style adjustments. A specification of individual monument values subsequently conditions not only the need for its preservation and monument renewal, but also their possible presentation in a new situation. Critics legitimately criticize the analytic method for destroying younger layers and disturbing the visual unity of the architectonical concept and characteristics of elements. The resulting expression of the realized analytical method is always a question of the scope of the chosen analytics, its acting within the whole and the relationship to other valuable layers. Consequently, there are cases when its use is adequate, but also when it is a questionable solution.

As an example, we can mention the Old Town Hall in Bratislava, Slovakia. The work was created by gradual unification of several medieval buildings during the 14th and 15th century. The oldest part is the tower with a two–floor house in the yard, mentioned as early as 1330, but the oldest parts date back to the 13th century. Gradually, other houses were acquired, rebuilt, and modified several times. The last unification of the facade was performed in the 19th century in the classicist style. The first great renovation was realized in the 1960s when new knowledge about its development was gathered and many important fragments of older layers and artefacts were uncovered. During this renovation, the method of large analytic presentation of several older adjustments was adopted, partially by using reconstructions. The renovation performed in the 1990s was devoted mainly to the facades. The last renovation was performed in 2008–2011. Today, we can observe various historical restorations of the facades with various analytical presentations.

The largest areas of analytical presentations are realized on the northern facade in the courtyard. In the front of the wall, there is storey arcade (dated 1581) built with gradation of matter typical for Renaissance. The back wall is reconstructed in the medieval style with medieval windows and openings (some as niches); younger perforations are shown in various parts. The facades facing the Main Square are divided into four segments. The former style dating back to the 19th century showed it in a single visual style. The southern part is designed with the Renaissance style prevailing, another part is designed in a late medieval style with reconstruction of a rich plastic decoration. The northern part is characterized by a Renaissance expression with a late Gothic arch and portal with an oriel above it. The tower in the corner of the square and the street is shown in the visual form of the Baroque style with a Renaissance balustrade. On the facades, various medieval windows are presented in the form of openings or niches. The major visual effect is created by rich plastic bifora with wimpergs on the first floor. The facade in the narrow Kostolná Street shows a reconstructed medieval plaster with curvilinear windows (niches) and a presentation of battlements in the western part. The rest of the wall shows another Gothic style (with a network) and larger windows, some of them from the Baroque period.

Monument researches are an important part not only of knowledge about the development of specific monuments over centuries but also of the next analysis of values that appear in the methodical project of renovation. The primary condition for an architect's work in a monument area is a thorough knowledge of the resulting research materials. Questions of conservation, presentation, surface modification, and painted and decorative layers are the most common issues in the restoration of historic facades, but in practice there are also issues of modifying sculptural elements connected with architecture (balustrades, reliefs, amphoras, statues, ...). The multi-layer structure of the determined values leads not only to the necessity of their documentation but also to efforts to make available at least part of these older artifacts, which otherwise remain under younger layers. This constitutes the essence of the analytical method in the field of the renovation of architectural monuments. A presentation of older layers and adjustments is not necessary. What is more important? Knowledge of older forms at the cost of visual fragmentation, or a complete image of the whole, covering up older values? In the end, every analytical presentation is only partial. It is not possible to present all older findings in their full extent. The use of the analytical method remains an object of discussions among experts.

The restoration of the Old Town Hall is a good example not only for various analytical presentations, but also concerning the questions about the rate of using this method in specific conditions and their influence on the visual perception. The protection of cultural heritage is not only protection of artistic or historical values, but also a preservation of the identification function of a cultural symbol. And the Old Town Hall in Bratislava fulfils this requirement significantly.