

An Investigation on Meaning of Ornaments in Architectural Façade: In Case of Contemporary Architecture and Digital Age

Nazgol Hafizi

Department of Architecture, Eastern Mediterranean University, Famagusta, Cyprus

Email address: Nazgol.eyc(at)gmail.com

Abstract— *Ornaments have been an element of architectural design for decades. They represented diverse symbolic meanings at different times, but the goal was always to make the building interact with societies. Ornaments in architecture can be observed reappearing after the modernist movement. Still with the same fundamental purpose of communicating, but in various formats this time. The look of ornamentation altered in the digital era and contemporary architecture, due to technology improvement and computer assistance. Contemporary ornaments are no longer an afterthought to the building, but rather form the whole façade structure. As a result, the distinction between architecture and adornment in modern building is blurred. This gives the building the capacity to communicate several symbolic meanings and provide a multi-sensory experience for people. This article attempted to provide a historical overview of ornaments in architecture, from their origins to their return in the digital era and contemporary architecture. It has also been attempted to decipher the language of contemporary ornament and the role of technology in it. Later, several effective cases of contemporary architecture were explored, which presented current ornamentation by utilizing new technology, materials, and patterns.*

Keywords— *Contemporary Architecture, Digital Age, Façade design, Meaning, Multi-sensory Experience, Ornaments.*

I. INTRODUCTION

In recent years, technology advancements, societal reasons, and general industry have all confirmed a continual shift in the architectural perspective on ornamentation. As a result of these changes, debates over the idea of ornament in the digital era have arisen. Artists have played an important role in conveying social and economic values via ornamental designs throughout the history of architecture. However, the industrial revolution altered this dominant position, leading architecture to a new critical viewpoint focused on social functioning rather than the pointless repetition of fictitious images [1].

The study of the history of architecture and ornaments reveals an enthralling circle of relationships. This relationship has manifested itself in various forms; at times, it is a pure expression, while at other times, it is used to indicate power. This playful interaction throughout history has aided the evolution of ornaments from the carvings in caves by the first humans to the technical improvements of ornaments in contemporary buildings. It is well understood that the spatial expression of architectural design is demonstrated by the capacity to communicate via materials and shapes. The relationship between architecture and ornament has become particularly strong as a result of the enhanced communication

capacity made available by technical breakthroughs, new methodologies, and computer science [2].

All of today's arguments about architecture and ornaments do not belong in this age. These debates were initiated in the 14th century by Leon Battista Alberti. He associated ornamentation with religion and private estate in his works. Architecture was seen as a "beautiful art" by Alberti and his beliefs. Furthermore, Alberti considered that decoration is a factor between the nature of materials and the imagination of an architect that may create visual beauty. Decades after Alberti's debate on architecture and ornaments, Wendel Diettelin asserted, in a paradoxical manner, that the ornament is not an element related to the structure. Still, it is an architectural element itself [3].

The history of this relationship, the significance of ornaments in architecture, and the importance of ornaments in architectural design have all been extensively discussed. This study has analyzed the significance of ornamentation in architecture and people's perspectives of this topic from the past to the present in a succinct manner. Furthermore, this article attempts to present ornaments in architectural design in the digital era and discover the significance and impacts of technology on the meaning of ornaments in architecture while presenting people's perceptions of this notion in modern times. An intensive literature study was conducted in order to achieve this goal. As a result, case studies from contemporary architecture with adaptable and innovative building skins were examined in terms of ornamental meaning and communication.

II. ORNOMENTS AND ARCHITECTURE

Architects have been influenced by developments such as industrialization, globalization, and environmental concerns in the last decade. The growth of architectural practice over the previous century has been extremely rapid, to the point that theory can no longer keep up. Because of technical advancements and the addition of new principles to architectural practice, there is an increasing need on theorists to examine these new themes and address the problems that arise within them. One of the questions that has yet to be clearly resolved is about the architectural ornaments of the digital era. Are ornaments making a comeback in architecture following modernism? What new connotations do ornaments have in the digital age? What is the function and significance

of ornamentation in contemporary architecture? With the reintroduction of ornamentation in architecture, resolving these problems is becoming increasingly important.

Various ornamental traits and meanings in building may be recognized up to the modernist movement. The elimination of ornamentation from architectural designs began as part of this trend, and from certain viewpoints, this removal has importance in and of itself. Ornaments have made a comeback in architectural designs in recent years. However, its reappearance has a new significance. Ornaments can be defined differently in the digital era than they were before modernism [4].

First and foremost, in the past, decorations were added to a specific portion of the façade and had a significant importance. In contrast, as seen in Figure 1 Sauerburch Hutton, ornaments in contemporary architecture are not only one feature, but the entire façade. In the past, ornaments were placed to the façade to complete and polish the structure. They were acting as an extra cosmetic. The importance of contemporary ornamentation has altered, and it is now portrayed as a full façade, rather than an addition that may be removed. This new degree of interaction between structure and ornament is not visible in the classic sense. The distinction between ornament and the structure itself is dissolved in this new approach. This relationship may be observed in the Olympic Stadium in Beijing, which was designed in 2008 by Herzog & de Meuron (Figure 2) [5].



Fig. 1. Sauerburch Hutton, designed by Boehringer Ingelheim Pharmacological Research Laboratories, 2002, Biberach Germany [7].



Fig. 2. Beijing National Stadium, designed by Herzog & de Meuron, 2008, Beijing Retrieved from [8]

Finally, post-modern architects and theorists attempt to strike a balance in incorporating ornamentation into design, but not in the conventional sense or precisely as it was

attempted in modernism. The slightest addition to the design has a major meaning for at least some individuals in the traditional use of ornaments. To this day, current period theorists think that not all contributions provide a definite purpose to society and that they do not have to [6]. However, as is obvious, society, users, and architects all play important roles in determining meaning.

III. ORNAMENTS AND USERS

There are two major types of individuals that have a relationship with ornaments. Designers and those for whom the ornament is meant.

The first category in terms of ornaments is architects, who create the ornamentation aspects for their designs. Designers and architects may be observed through the ornaments added to the design until the 18th century. The ornaments presented the design elements and demonstrated the architect's originality. Ornaments were so displaying their design language and ingenuity. The designer's vision was linked to the significance of the ornaments in this case [9].

Along with the second group are the recipients of the ornament. This group might include clients or members of the public who notice the ornamentation on the building's façade. The significance and meaning of ornaments in culture have evolved over time. Throughout history, ornaments were used to display the owner's status. However, at the end of the 17th century, and with a shift in society's preference for separating private and public appearances, ornaments on the exterior of buildings become shallower and more prominent in private spaces. Ornaments took on new importance in the nineteenth century when society began to use them in graves. During this time, ornaments begin to portray the dead meaning as well.

The change of the significance of the ornament over time might show the importance of the users (designers and society) in this topic [10]. It emphasizes the crucial function of society in giving these components significance. Thus, the topic resurfaces now, in the contemporary period, with technical advancements, computer science, and new social standards, what is the significance and role of ornaments in architecture?

IV. HISTORICAL REVIEW

A brief history of art reveals a wave-like utilization of ornamentation in building. A simple glance at history will help you comprehend the wave-like utilization of ornamentation. Ornaments were widely used during the Romanesque and Gothic periods. It declines throughout the Renaissance period, and by the Baroque period, ornaments as an integral aspect of design reappeared. This usage declined significantly later in the art and craft movement and, later, in the modernist era [11].

Different architectural styles exhibit a variety of ornamentation styles. These disparities may be traced back to the cultures of the societies. Throughout history, numerous civilizations were represented in distinct and diverse types of ornaments, each reflecting a particular significance.

Among ancient societies, the Egyptians were the first to add ornaments to their structures. The nature served as their

inspiration for ornament creation. As a result, they ornamented their columns and walls with palm plants or papyrus. The same form of ornamentation can be seen in Assyrian civilization, but with various alterations; they employed nature, trees, and animals as ornamentation. Following the early emergence of ornaments, the Greeks created a new ornaments language by inventing inventive designs that introduced Doric, Ionic, and Corinthian. Following in the footsteps of the Greeks, the Romans attempted to construct ornamentation based on what the Greeks had introduced to their architecture [12]. Figure 3 depicts the evolution of ornamental columns from the Egyptian to the Greek periods.

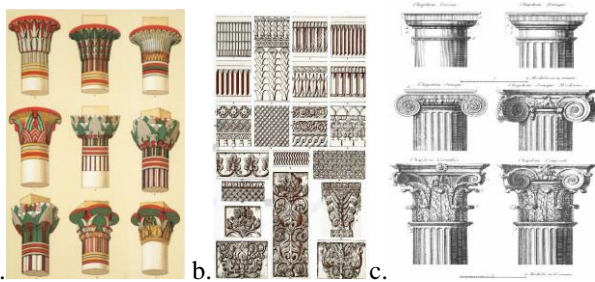


Fig. 3. Architectural ornamentation in ancient cultures. (a. Egyptians, b. Assyrian, and c. Greek) [13].

With the advent of industrialization and the emergence of factories, decorations of all forms, materials, and colors were attainable. This technical availability coincides with the modern era's aim to eliminate ornamentation from building in favor of presenting structure. Architects were separated into two categories during this time. The first set of architects, such as Frank Lloyd Wright and Louis Sullivan, attempted to include ornamentation into their designs while maintaining a contemporary style, as shown in Figure 4.

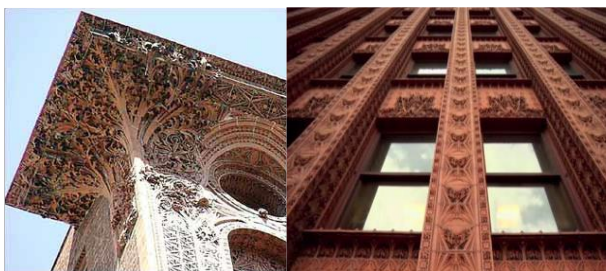


Fig. 4. Louis Sullivan usage of ornaments in the modern era (Guaranty Building, 1896) [14].

On the other side, as Adolf Loos noted in *Ornament and Crime*, there existed a view that the loss of ornament signified the advancement of civilization. He considered ornamentation to be inadequate and eliminating them to be a sign of progress. As a result, designs with a radical approach of removing all decorations arose [15].

Buildings without ornamentation were introduced to architectural history in the 1920s by architects such as Le Corbusier. Since then, such designs have been synonymous with modernist architecture, known for their simplicity and clean geometry. As a result, this style, subsequently known as International Style, became an astatic entity, and it quickly became the sole approved manner of design. This rigid norm

of modernism began to be questioned in the postwar years. In 1941, John Summerson stated [16]:

"Architecture has, with some difficulty, liberated itself from ornament, but it has not liberated itself from the fear of ornament" [16]

In the 1950s, a unique topic on architectural ornaments was emphasized. The new discussion was about the hazy line between ornaments and structure. A clear example of such design is the use of flying buttresses, which served as a structural feature while also serving as an ornamental element. As a result, the modernist movement, which attempted to eliminate ornamentation in order to reveal the structure, might get a fresh viewpoint. The building itself might be an ornament. As a result, during the 1960s, architects such as Le Corbusier, the international style pioneer, were adopting a sculptural approach to design. Mies van der Rohe's design, as illustrated in Figure 5, exposes the structural I-beams with an ornamentation approach, which is proof of ornaments revival in architecture [17]



Fig. 5. Ornamental usage of the structure by Mies Van der Rohe [18].

V. CONTEMPORARY ORNAMENTATION

The literature demonstrates an interest in refuting the Loos argument and reintroducing ornamentation into architecture. The large volume of journal papers, exhibitions, and published books dealing with the area of ornaments in the last hundred years demonstrates the present heightened interest in ornaments in architecture [19].

In recent years, ornament literature has argued the significance of this feature in the current and digital eras by evaluating contemporary facades from the perspective of contemporary ornamentation. This examination focuses on two dimensions of theories and practices. Theoretical research focuses on the symbolic meaning of current ornamentation, whereas practical research focuses on technology and material utilization. However, the high level of interest in study on this issue is valid from both viewpoints [20]. The return of ornaments to convey the modern technology of the digital era rather than presenting its traditional roots and style is why this aspect has received more attention in recent years. Despite the fact that the roots of tradition may still be observed in digital age ornaments. Pattern usage from Op art in the 1960s, for example, has acquired new interpretations in recent years. An examination of Antoine Picon's perspective on the current meaning and presence of ornaments will be valuable for

assessing the current meaning and presence of ornaments. According to his research on the perceptions of users and viewers of contemporary ornaments;

The first distinction in the presence of current ornamentation is that these ornaments are more outward and shallower. Traditionally, they were in the shape of a sculptural addition to the structure, but today they are shown as the entire façade. In certain ways, they are not bold and unique to the building, but rather presented with a shallow and fuzzy style. Furthermore, the decorations of the modern age transcend beyond the aesthetic and provide viewers with sense. In other words, the ornaments of the digital era depict many people sceneries. They are not just visible features of the façade, but they entice visitors to touch them in order to experience the materials, textures, and motions. As a result, they provide users with a remarkable experience [21]. This multi-sensory component of modern decorations can provide observers with a more in-depth and personal experience [22].

In addition to the user's relationship with ornaments, the architect's relationship with ornaments has evolved to some level. One of the designers' ambitions is to create a "out-of-the-box" design. This potential has been provided to designers as a result of computerization in the digital era. The possibility of having original items with novel innovations at a lower cost. The qualities of decorations in a scene have altered since many people feel that improved technology can allow architects to exhibit their aesthetic sense in a more pleasant way [21].

Aside from the differences brought about by the digital era, there are some commonalities between traditional and contemporary decorations.

The key characteristic that has remained constant throughout history is the communication goal. Ornaments aspire to communicate at any time and on any size (local or global). In this way, ornaments from different eras have the same monetary worth. Many architects assume that in the digital era, they lost the symbolic meaning from their architectural ornaments, but as Robert Levit stated, meaning always reappears [23]. Even though some architects try to disregard the symbolic worth of the ornaments, the meaning of societies will be provided. Ornaments are always communicating.

Picon's viewpoint on current ornaments might be summarized by saying that he believes in the limitations of contemporary ornaments. As previously said, ornaments have returned in contemporary architecture with a strong connection to sophisticated technology. They represented themselves by design and texture—contemporary ornaments lose their political and subjective significance. However, as Levit stated, the meaning will emerge, and in this situation, ornaments show personal features of architects, individuals, and communities [22].

In contrast to traditional ornaments, neither the broad concept nor the language of current ornaments have been established in theory or practice. The advanced methods, technology, and equipment that aid in the construction of contemporary architectural ornamentation can be identified. As a result, several new terminologies, such as pixelization,

digital, and virtual, have been added to the study of ornamentation [24].

Architects employed the same technique used in postmodernism to develop a façade with the symbolic feature of conveying the building's purpose in the digital era. Charles Jencks argues that prominent modern structures convey various meanings. Symbolic connotations present the building's purpose and attractiveness. The language of modern ornamentation is more than just a superficial indication. Throughout history, ornaments were important in buildings because they expressed the culture of the people who lived there. It is the same in the digital era, but they boost commercial success and public society to some extent. In this way, ornaments in the contemporary and digital era have a symbolic meaning. On the building's façade, they depict a variety of topics relating to societal ideals and prestige. In general, ornamentation in contemporary architecture have a significant relationship with the building's façade and materials. As previously said, in the digital era, modern adornment is displayed as an entire façade rather than just a component of it [25]. As seen in Figure 6, an outstanding demonstration is the Arlanda hotel, whose façade represents the power narrative [26].



Fig. 6. the Arlanda Hotel, a 2007-project-design by Bjarke Ingels Group (BIG) in Stockholm [27].

VI. THE TECHNOLOGY OF DIGITAL ERA AND ORNAMENTATION

The use of technology and new sciences in the study of contemporary ornament is crucial. This article does not debate the aesthetics of high-tech or digital-age structures. Rather, it focuses on the influence of technology on ornamentation throughout this period of time. Using appropriate technology, materials, and application processes, the entire façade is transformed into an ornament. Recent technical advancements allow us to move away from static ornamentation and toward dynamism. These technologies were first shown in adaptable and kinetic facades. Of course, the elements serve structural and physical tasks, such as shade devices, but they are also architectural ornaments. These dynamic façades are the ornamentation of building in the digital era that computer technology may produce. So, in the digital era, technology not only provides us with the potential to create aesthetic concepts, but it also provides equality to art and architecture, bringing ornamentation to a previously unexplored level [28].

As a result of this evolution, there are constructions and mass productions that perceive the link between architecture and ornament as an opportunity and are producing façade systems with built-in ornamentation effects. If this evolution follows the right path, claddings made of various materials, textures, colors, and so on can provide a significant design. On the other side, this might result in a library of ornamentation that, if misused, can drive design in the wrong direction. To elaborate, by abusing these shapes, textures, and colors, architectural aesthetic qualities can be damaged, and architecture can become kitsch [29].

Another significant component that should be stressed is the location and cultural values of each group, which have been overlooked by this system and the subsequent consequence of globalization. The growth of ornamentation art in the digital era should be found on the local values and traditions of cultures. Smart use of the return of current ornament on the building façade may more effectively reflect the local culture than employing the same old fashion ornaments. Taking certain ornaments from tradition and reinterpreting them according to the digital era to a pattern design of cladding, may be highly valuable and responsive to a people's cultural demand, even more than employing the same folkloric element itself [29].



Fig. 7. Al-Bahr Tower, shading devices [30]

The Al-Bahr Tower in the United Arab Emirates, seen in Figure 7, is a notable illustration of this assertion. Using technology and computer science, this landmark building of the digital age added dynamism to the building façade. This structure is a great example of what has been discussed thus far. The shade mechanisms on the building's façade are intended to save energy (lighting control system). They do, however, have ornamental value. The line between structure, function, and ornamentation is perfectly blurred here.

However, owing to the design of the shadings influenced by Mashrabiya, this completely modern structure has been localized by exhibiting Arabic culture (traditional Arabic shading). As a result, Al-Bahr Tower is an excellent example of exhibiting contemporary ornamentation in the digital era.

A few more effective examples of current ornaments in the digital era will be investigated in the case study section of this article. Each structure was chosen due to the various aspects and approaches to contemporary ornaments.

VII. CASE STUDIES

The extensive literature analysis demonstrated the future reintroduction of ornamentation following the modernist movement. Theoretical study demonstrates the many interpretations provided by contemporary ornamentation, as well as the role of technology in this topic. This section of the article attempts to provide existing instances of contemporary ornamentation in the digital era. In this fashion, four cases were chosen and investigated from the standpoint of ornamental meaning.

Jean Nouvel- Institute du Monde Arab:

The Institute du Monde Arab, created by Jean Nouvel in 1988 and seen in Figure 8, is not just one of Nouvel's notable designs, but also a design that combines art and technology. The end consequence of this contribution is a dynamic façade. The façade is composed of repeating adaptable squares.

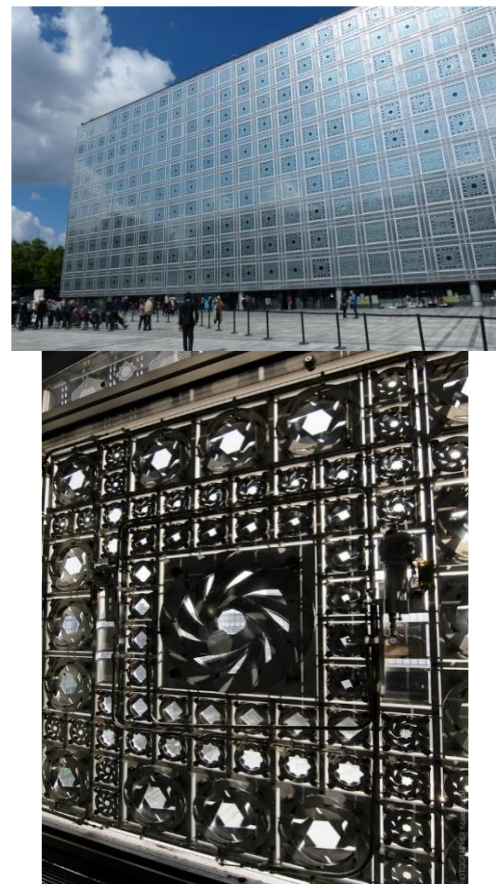


Fig. 8. Institute du Monde Arab [32].

These 240 squares are photosensitive devices that regulate how much natural light enters the building. As a result, this building might be one of the first to be high-tech and demonstrate architectural and technological advancement. The architect employed a modest scale ornamental design in this structure and adapted it to the building size using technology. Using this method, Nouvel constructed a façade that serves as an ornamental feature for the structure as a whole. This structure is an excellent example of displaying contemporary ornamentation. The design on the façade brilliantly blurred the line between usefulness and beauty. There is no way to remove the building's ornamentation because the whole façade communicates and has ornamentation qualities [31].

Ravensbourne college:

Ravensbourne College (Figure 9) was built with 28,000 different sizes and colors of aluminum tiles. The tiles represent the dominating technology of manufacturing in the digital era. A fascinating tile design serves more than just decorative and aesthetic purposes. Using this pattern, the architect attempted to trick visitors' perceptions of the building's massive scale while maintaining a fun and thrilling impact for the building and spectators.



Fig. 9. Ravensbourne College in Greenwich, UK, 2010 by the Foreign Office Architects [34].

This structure exemplifies yet another dimension of technology's effect on contemporary ornament. In this case, technical advances enabled the production of the architect's concept. The aesthetic component of the façade has nothing to do with the operation or construction of the building, but rather with the perception goal that the architects attempted to achieve. Although the ornaments (building façade) have no functional use, they are more than just extra construction components. The line between architectural design and aesthetic ornamentation is blurred in this case [33].

Louis Vuitton store, 5th avenue store:

This structure is a fantastic example of portraying contemporary architecture in the digital era. The store seen in Figure 10 is housed in a 1930s-era structure with glass panels. Glasses made as a performative pattern as a result of technical development. The building's façade communicates with the public from a commercial standpoint while displaying its purpose, thanks to technology. This structure exemplifies a fresh feature of ornamentation in the digital era. Aside from the beautiful qualities that the glass pattern generates for the public, the commercial purpose has become blurred inside. This structure is a great illustration of how technology, ornamentation, and commercial meaning can be integrated into architecture [31].



Fig. 10. Louis Vuitton Store in the 5th Avenue of New York, built by the Japanese architect Jun Aoki in 2004 [35].

Peter Zumthor, Bruder Klaus Field Chapel:

“To me, buildings can have a beautiful silence that I associate with attributes such as composure, self-evidence, durability, presence, and integrity, and with warmth and sensuousness as well; a building that is being itself, being a building, not representing anything, just being.”- Peter Zumthor

Zumthor thinks that construction, as a means of expressing the meaning of existence, may be wonderfully depicted in the same way that all natural things are. And the form and materials of the building should reflect its beauty and decorative element. Zumthor's approach is shown by the Klaus Field Chapel (Figure 11), which was constructed in 2006 near Koln, Germany. Light is crucial in the design of this one-of-a-

kind shaped building with a one-of-a-kind structure and material utilization. The architect created the decorations in this amazing example by modifying the prescribed area, materials, and other architectural components. The use of light is the main decorative aspect in this design. The architect made advantage of digital era technologies by presenting a modern form and materials, as well as using light as an ornamental element into the design.

With this strategy, the aesthetic feature of this building cannot be eliminated because it is a part of the entire structure. Within the chapel's idea, the light is completely connecting with users. In contemporary architecture, the line between nature, architectural concept, building utility, and ornaments is blurred. [29].



Fig. 11. Bruder Klaus Field Chapel [36].

VIII. CONCLUSION

In examination of the history of ornaments in architecture can reveal the prevalence of this feature at various times, from Vitruvius' blue column through Mies van der Rohe's design in the modernist movement and later in the digital era. Comparing traditional and contemporary ornaments reveals the new vocabulary of contemporary ornament as well as their similarities. Although ornaments in both traditional and contemporary approaches share the value and aim of communication, the influence of digital era technologies have resulted in innovative ornament appearances.

The contemporary ornaments are portrayed as a comprehensive structure with many symbolic connotations, rather than as an additional ornamental feature of the building. Contemporary ornaments blurred the lines between functionality, structure, architectural idea, and public communication. It is not as straightforward as it used to be to separate ornamentation from fundamental architectural features.

The digital age's technologies enable the public to have a multi-sensory experience, while ornaments interact with diverse values such as power, advertisement, nature, and so on.

Aside from researching literature, this article attempted to give a few cases of contemporary architecture that presented ornamentation from various viewpoints in order to highlight the fresh reappearance and significance of ornaments in the digital age. Each case study features a one-of-a-kind mixture of ornamentation and contemporary architectural style.

Finally, this article emphasizes that buildings, as a component of the urban fabric, will always communicate with society. The use of ornaments, whether traditional or contemporary, will always provide symbolic implications. Even eliminating the ornamentation and demanding minimalism might communicate certain ideas. Thus, even when they do not exist, ornaments are always parts of communication. As a result, knowing the power of technology and ornaments in recent years is critical for all architects.

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