The Impact of Artificial Intelligence on Architecture

Serdar Kasap[1], İbrahim Batuhan Doğan[2], Gizem Seri Yeşil[3], Parisa Güneş[4]

[1]Bilecik Şeyh Edebali Unıversıty

[2]Bilecik Şeyh Edebali Unıversıty

[3]Beykent Unıversıty

[4]Bilecik Şeyh Edebali University

DOI: https://dx.doi.org/10.47772/IJRISS.2025.90900056

Received: 21 August 2025; Accepted: 27 August 2025; Published: 29 September 2025

ABSTRACT

This study aims to investigate and discuss the effects of artificial intelligence (AI) on the field of architecture. It addresses the conceptual framework of AI, its integration into contemporary architectural practice, the contributions AI offers to the discipline of architecture, and the new conditions arising from these processes. Fundamentally, AI applications that mimic human behaviors have gained a significant place in daily life due to technological advancements. AI models human behavior to provide rapid access to information, thereby facilitating and transforming human life both directly and indirectly. Additionally, through various strategic solutions offered via extensive databases, AI contributes to professional environments as well. In this context, the impact of AI on the architectural discipline is evaluated as multidimensional at both theoretical and practical levels.

In architectural work, it is undeniable that AI has become a new and transformative technology influencing the field through vast databases, diversified proposals, and visualization applications. One of the primary reasons for this impact is the considerable time and cost savings AI applications provide to architectural processes. With the acceleration of technological developments, it is predicted that AI will play a pioneering role not only in architecture but also in many other disciplines in the future for innovation and idea generation. Although the architectural design process involves collaboration among numerous experts from the initial to the detailing stages, architects remain the leading actors in making fundamental design decisions. During the design process, considering the diversity of the sector and user expectations, experts have started to explore and examine the opportunities offered by AI technologies. In solving complex architectural problems requiring advanced expertise, AI algorithms utilizing databases capable of generating multiple design alternatives and performing numerical analyses are increasingly being employed in architectural applications. The calculations AI performs, the 3D visualizations it produces, and the various design options it offers continue to expand the use of this technology in architectural practice every day. Within the scope of this study, the applications of AI in architecture have been focused on, with examples analyzed and evaluated through AI-generated visuals and resulting products.

Keyword- Artificial Intelligence, Architecture, Design Process, AI Algorithms

INTRODUCTION

With advancing technology, computer systems have increasingly become an integral part of daily life. Alongside this development, interest and focus on artificial intelligence (AI), a crucial component of computer systems, have steadily grown. AI is defined as a collection of systems that, by taking in information, mimic human intelligence instead of natural intelligence, process, and improve the acquired data. Today, AI finds wide-ranging applications across various aspects of life.

The concept of artificial intelligence was first introduced at a conference held at Dartmouth College in 1956 by John McCarthy, Marvin L. Minsky, Nathaniel Rochester, and Claude E. Shannon, marking a significant milestone in the field [1]. Since its initial use in 1955, AI has branched into several sub-disciplines depending on the nature of the problem. These include Artificial Neural Networks (ANN), Fuzzy Logic, Simulated Annealing, Expert Systems, Computer Vision, Genetic Algorithms, Speech Recognition, Chaotic Modeling, and Robotic Technologies [2]. With technological progress, the definition of AI has continuously evolved, expanding both in number and functional diversity of its subfields. Fundamentally, AI operates by modeling the cognitive processes of the human brain, transforming these processes into algorithmic structures and developing systematically functioning mechanisms. Accordingly, AI systems aim to simulate complex mental processes such as learning, decision-making, problem-solving, and adaptation.

The use of AI technologies enables individuals to complete tasks more quickly, resulting in significant time and resource savings. Consequently, perceptual and professional principles among individuals have undergone notable changes and transformations. Rapid technological advancements and AI applications have fostered shifts in perceptions at both individual and sectoral levels, leading to emerging new requirements and significantly impacting employee performance. Research findings indicate that when AI technologies are adequately understood and effectively utilized, there is a meaningful increase in employee performance. Beyond enhancing individual productivity, this also contributes to notable improvements in overall organizational efficiency and competitive strength.

As in many fields of life, technology advances daily in architecture and design disciplines, playing a decisive role in shaping sectoral directions. Initially limited to two-dimensional drawing software, architectural tools have evolved with the development of three-dimensional modeling applications, taking design processes to a more advanced level. Following this development, Building Information Modeling (BIM) systems emerged to address common challenges faced by all units involved in building design and actors from different disciplines within a unified platform. Alongside technological advances, accessible AI technologies began integrating into architectural design processes in the early 21st century. Particularly in mathematical operations such as visualization and cost calculations, AI provides significant facilitation; additionally, it stands out with its abilities to interpret, solve complex problems, quickly generate design alternatives, and improve existing options. The rapid integration of AI into the architectural sector and its capacity to create a strong data network have offered numerous advantages to the field, while also giving rise to diverse ideas and debates.

AI systems, possessing vast data networks, have led to a remarkable increase in the number of studies conducted through human-like systems without the need for human intervention, following the digital storage of work created by individual human efforts. With the training of these brain-inspired systems through various methods, their potential to offer different options and bring innovative solutions to planning and design processes has increased, leading to significant changes in fundamental design principles. Accordingly, transformations have occurred in architects' approaches to design processes and their perspectives toward AI technologies. The contributions of AI extend beyond design processes to influence designers' ways of thinking and the methods they develop, marking significant effects of this technology on the architectural discipline.

In conclusion, as in many sectors, AI has assumed an active role in architecture with technological developments, mimicking human intellect to lay the groundwork for new methods. The effective use of large data sets has broadened designers' visions and diversified design processes, making AI a driving force in architectural practice. The integration of big data technologies with architecture has enhanced efficiency in design workflows; AI-supported tools have significantly improved the effectiveness and productivity of design software used in the field.

METHODOLOGY

Intelligence and Artificial Intelligence

Since its inception, humanity has been engaged in a continuous process of development and transformation. Throughout history, human societies have progressed by maintaining a consistent tendency toward growth and improvement. From the moment humans first existed, there has been a curiosity to understand the workings of the mind, leading to various investigations in this regard. With the advent of technology, this developmental process accelerated, enhancing individuals' interest in information and their productive capacity. Over time, leveraging the possibilities provided by technological advancements, it became feasible to develop systems capable of imitating human cognitive functions and performing data-driven operations, laying the foundation for the emergence of artificial intelligence.

The evolution of artificial intelligence has been directly shaped by technological progress. However, AI has not been confined to the technological domain alone; it has also been addressed within various social science disciplines such as psychology, sociology, and philosophy, acquiring a multidimensional nature. Therefore, it is not possible to explain the historical development of AI solely from a technological perspective. As an interdisciplinary field, AI research encompasses both technical and theoretical dimensions, continuously evolving through the interaction of diverse knowledge areas.

The concept of AI was theoretically grounded in the 1940s through the "Boolean Circuit Model of the Brain," developed by McCulloch and Pitts [3]. Although many theories and concepts emerged during this period, the term “artificial intelligence” in its contemporary sense was first defined by John McCarthy in 1956 [4]. Professor John McCarthy initially coined the term AI, describing machines capable of thinking like humans, performing human tasks, and solving problems [5]. Today, with rapid technological advancement and tools that enhance human capabilities, the concept of AI continuously evolves and is examined from various perspectives. Given the diversity in its applications and usage areas, defining AI in a precise and universal manner proves challenging; thus, its definition varies depending on context and domain.

Nonetheless, the most widely accepted definition of AI is the realization of human activities by machines. From a scientific viewpoint, AI is an entity that can think like a human, produce solutions like a human, recognize shapes and images, interact with them, and solve complex and fuzzy problems. Fundamentally, it imitates humans and can solve many tasks—some even beyond human ability—in a short period.

As AI rapidly advances across many domains of life, industries and employees facing increasing challenges have begun to require a technology that could solve problems both logically and quickly, surpassing human intelligence. These software systems, capable of human-like behavior and solutions, have been able to propose many solutions rapidly in complex fields such as medicine, engineering, and architecture. AI technology, which gained popularity in the 1980s, has gradually found its place in daily life and various sectors.

In summary, although it is challenging to define AI precisely, many scholars have addressed it in different terms as an evolving technology based on human intelligence, capable of performing any human task and solving complex problems. AI technologies are diverse but fundamentally consist of five algorithms: Expert Systems, Machine Learning, Genetic Algorithms, Fuzzy Logic, and Artificial Neural Networks [6].

Expert Systems: Algorithms that develop computer programs capable of solving problems like a human expert, utilizing the knowledge and skills of one or more experts to provide solutions.

Machine Learning: Technologies that enable computers to learn, based on experiences, similarly to humans [7].

Genetic Algorithms: Developed to solve complex problems, these algorithms propose an initial idea that is subsequently evaluated and refined by individuals and experts. The learning process in these algorithms resembles that of living organisms [6].

Fuzzy Logic*:* A concept introduced by Prof. Dr. Lütfi Aliasker Zadeh in 1965, based on fuzzy set theory. It comprises three methods: fuzzification, fuzzy proposition processing, and defuzzification [8].

The Human Brain and Artificial Intelligence Working System

The human brain has historically been one of the most studied yet least understood organs. Due to its complex nature, knowledge about the brain is constantly evolving and developing. Learning lies at the core of human behavior, with neurons—nerve cells—playing a critical role in this process. The incomplete understanding of the brain's operational mechanisms has complicated clear definitions of both human intelligence and artificial intelligence. However, it is well established that learning occurs through neuronal connections. Learning is one of the brain's fundamental functions and has inspired the development of computers and intelligent networks.

Although the workings of the human brain inspire AI systems, they do not yet possess the capacity for autonomous learning or decision-making like humans. AI algorithms produce solutions, solve complex problems, and perform visualizations based on directives and parameters given to them. AI approaches are generally examined under four main categories:

- Thinking like a human,
- Reasoning,
- Acting like a human,
- Acting rationally.

In this context, learning lies at the core of AI technologies, to develop the ability to behave like humans. One of the most significant advantages of AI is its capacity to analyze large datasets in a very short time and arrive at the most accurate answers.

Human intelligence and artificial intelligence offer different approaches in terms of learning processes and problem-solving capabilities. Human intelligence encompasses complex abilities such as emotional intelligence, creativity, and experience. Humans, nourished by their emotions, experiences, and imagination, can produce creative and original outputs in design processes. Individuals who identify problems and produce solutions also integrate their emotions and human values into their designs, resulting in more human-centered outcomes [1].

On the other hand, AI stands out with its ability to process large datasets, recognize patterns, and generate a wide range of design alternatives under specific parameters. However, AI cannot establish emotional connections and can only develop data-driven decision mechanisms. This feature highlights both the strengths and the limitations of AI.

One of the fundamental differences between human intelligence and AI is the presence of emotional intelligence. While human intelligence can produce original, emotional, and creative solutions despite limited data-processing capacity, AI, although lacking creativity and emotional interaction, demonstrates superior processing power over large and complex datasets. Therefore, in today's design and problem-solving processes, the balanced integration of human intelligence and AI capabilities not only increases efficiency but also preserves the principle of human-centeredness [1].

Design Process in Architecture and Artificial Intelligence

The concept of design possesses a multidimensional structure and plays a guiding role across various art fields and sectors. Due to its broad scope, it is challenging to develop a definitive and universal definition of design. However, from a general perspective, design can be defined as the conscious and systematic process of bringing forth an element that does not yet exist. A more in-depth evaluation characterizes design as the process of conceptualizing and shaping a product, object, or a tangible or intangible concept with a holistic understanding, based on principles of functionality and aesthetics.

Design is not only a fundamental building block of different sectors and scientific fields but also occupies a central role in individual and social life practices. Particularly in creativity-based professions, the design process is a critical phase for the emergence of original products and concepts. Although this process varies depending on individuals' subjective approaches and specific sectoral requirements, it fundamentally involves information gathering, data processing, and systematic thinking activities. Thus, the design process manifests as a dynamic synthesis of creative thought and analytical reasoning.

Architecture, as a discipline centrally positioned within design processes, stands out as a field where creative thinking is systematically materialized. Architecture encompasses creative activities both mentally and physically within a multi-layered process extending from the initial sketch stage of a design to its final implementation. This process is not limited to shaping physical spaces but also necessitates a holistic approach addressing functionality, aesthetics, and human needs. Indeed, according to Demir and Aksu [9], architecture is not merely limited to building production but is a unique design practice integrated with creative problem-solving processes for complex issues.

The architectural design process is a multidimensional structure encompassing cognitive, emotional, and aesthetic dimensions beyond a functional activity. Among the various stages of the process, tangible and intangible elements interact reciprocally, resulting in a holistic design experience. Architectural communication holds particular importance within this unity, ensuring the meaningful translation of knowledge into a formal plane [10].

The design process in architecture is shaped by the interaction between the designer's creative impulses and data obtained from external factors. Creativity is not merely the product of individual intuition but is also shaped by environmental, cultural, and technological influences. Therefore, the design process is based on the mutual interaction of both individual and contextual dynamics.

One of the transformative factors reshaping recent design processes is the integration of artificial intelligence technologies into design practice. While traditional design approaches primarily rely on human creativity and experience, AI introduces new parameters such as data analysis, algorithmic processes, and automation, fundamentally transforming production methods in design. AI systems enable designers to focus more on creative activities by overcoming repetitive and time-consuming tasks. Particularly through machine learning and deep learning algorithms, user behaviors can be analyzed from large-scale datasets, allowing for the development of personalized design solutions.

AI's contributions to design processes are not limited to functional aspects but also make decision-making mechanisms more data-driven, rapid, and flexible. In this context, AI-supported simulation and modeling tools are effectively used in fields such as industrial design, architectural planning, and product development, resulting in more efficient, innovative, and sustainable designs. On the other hand, the entrance of AI technologies into the design field has sparked new discussions concerning creative freedom and ethical considerations. Opinions emphasizing that human intuition and creativity should remain the fundamental determinants of design have gained prominence in these debates.

In conclusion, the interaction between AI and design has not only accelerated production processes but also triggered a broader transformation, akin to the evolution of design itself. AI technologies have expanded designers' creative potential and enabled the development of data-driven, personalized, and more sustainable design solutions. Thus, design practice has evolved into a data-focused, interactive, and systematic structure beyond aesthetics and functionality.

Within the framework of advancing technological opportunities and global dynamics, individuals have significantly enhanced their capacities for design expression. At this point, architecture stands out as a discipline centered on the design process and characterized by extensive use of visual elements. In architectural practice—where static, physical, and mathematical principles are synthesized with aesthetic concerns—visuality occupies a central position at every stage of projects, from initial sketches to final presentations. Considering that the human mind processes information most effectively through visual tools, both the quality and diversity of visuals in architecture play a decisive role in the success of the design process.

However, in today's world, the increasing value of time has directed individuals toward methods that yield more efficient results in shorter durations. Where human labor is limited, technological tools—especially AI applications—offer important alternative solutions. AI mimics the problem-solving processes of the human brain, enabling the resolution of complex problems in a short time and providing predictive data analysis.

As Karabulut [11] states, with increased accessibility, the importance of visuality in the design process has grown even further. Particularly in architecture, the processes of data collection for problem-solving, evaluation of this data in design capacity, and ultimately developing creative design solutions reinforce the significance of visual perception and diversity.

In summary, the integration of AI technologies into design processes has transformed production methods across many disciplines, including architecture, providing time and cost savings while expanding the boundaries of creativity. This development has had a direct impact not only on professional practices but also on individual modes of expression.

The Importance of the Use of Artificial Intelligence in the Architectural Design Process

The architectural design process is a multi-stage, comprehensive procedure that prioritizes aesthetics and functionality while necessitating an interdisciplinary approach, from the conception of an idea to its construction. This process encompasses preliminary studies and research, conceptual design, advanced design and detailing, development of technical details, and construction phases. While aiming to create safe, functional, and sustainable spaces tailored to user needs and preferences, it is also essential to address the complex problems inherent within architecture throughout the process. However, this process can become lengthy and exhausting due to the necessity of balancing functionality, aesthetics, and environmental requirements, leading to potential time losses.

The inadequacy of traditional methods to overcome some of these challenges has prompted the search for new solutions. At this point, artificial intelligence (AI) has become an important support element in architecture, thanks to its extensive databases and rapid processing capabilities. From a classical (even cybernetic) perspective, technology is defined as an extension of the human body and enhances human influence over space [12]. In this context, the integration of technology into spatial production processes has become inevitable. It is emphasized that designers should not only strengthen their classical design practices but also effectively utilize contemporary technological opportunities [13]. On the other hand, the fact that technological tools are extensions of the human body and mind should not be forgotten, and human productivity and creativity must remain at the center of the design process [14]. The concept of AI refers to the modeling of human-like reasoning, learning, and generalization abilities through machines [15], and today it has been integrated into architecture as it has into almost every discipline [16].

Thanks to AI-based tools, spatial analysis can be performed, customized solutions can be developed according to user profiles, equipment placement can be optimized, and surveys (rölöve) can be extracted in a very short time. With the use of AI in architecture, various forecasts have been made about how this relationship will evolve in the future. Although some approaches suggest that AI could replace the designer, it is undoubtedly accepted today that technology will bring fundamental changes to architectural production methods [17]. In this context, AI should be seen not as a threat but as an opportunity to support the design process [18].

AI automates routine tasks, allowing designers to focus more on creative processes and expanding their service delivery capacity [19]. Particularly in generative design and data analysis, AI offers new perspectives, enhancing the capacity to produce both aesthetic and functional design solutions and making significant contributions to architectural design processes. As Bernstein states, AI will not lead to the complete automation of building design but will significantly augment the architect’s capabilities. AI is positioned not as a threat to the architectural discipline but as a powerful tool that transforms production methods, broadens the designer’s vision, and advances the field by providing time and cost savings.

Design Experiments With Artificial Intelligence

Artificial intelligence (AI) is used in many fields, including architecture, due to its ability to process various data streams and mimic human actions. The power of AI to analyze data has paved the way for developing new methods in the architectural domain by manipulating existing visuals.

Visualization through AI involves analyzing and processing existing data visually to produce new outputs [20]. AI-based visualization offers a more practical and faster process compared to traditional visualization methods. The ability to directly generate desired visuals using AI accelerates and simplifies many processes

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

and tasks [21]. While AI technologies can produce visuals in a short time with minimal human intervention, they also provide advanced capabilities for restoring existing structures in traditional forms [21].

Within the scope of this research and application, visual design products were created through AI technologies using selected datasets. For this purpose, specific data were chosen and visualization studies were conducted based on these data.The first dataset selected for this application consists of historic houses in Tokat. Images of the sample buildings intended to be studied with AI applications were provided, and new visuals were requested to be generated based on commands entered over these images.

The AI applications used in this study are currently more accessible and user-friendly tools: DALL·E, accessed via ChatGPT, and DreamLab, a service offered by Canva. The same images and commands were input into these applications, and a comparison was made based on the visuals they produced.

The first selected image is presented below as Figure 1. This image depicts a building currently functioning as the “Yüksek Kahve Democracy Museum.”

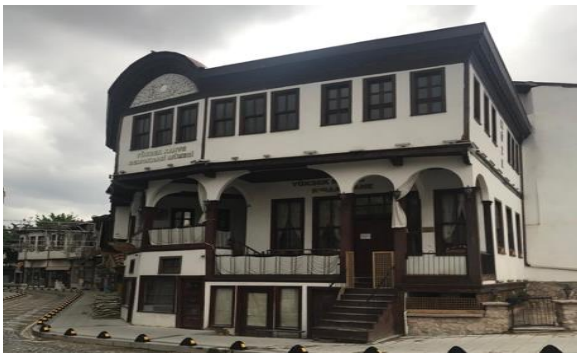

Figure 1 The Yüksek Kahve Democracy Museum Building in Tokat (Author’s archive, 2023)

The same image was uploaded to the AI applications, and specific commands were entered. The entered command is referred to as Command-1.

Command-1:

Could you modernize the building in the image while preserving its structural features and maintaining the existing façade openings and materials in a manner faithful to the original? During this process, please do not alter the building’s form or change its architectural elements such as window openings and arches.

After uploading the image and providing the command, the DreamLab algorithm generated visuals, which are presented in the table below. The same image and command were also input into DALL·E, and the resulting outputs are shown below (Figure 2).

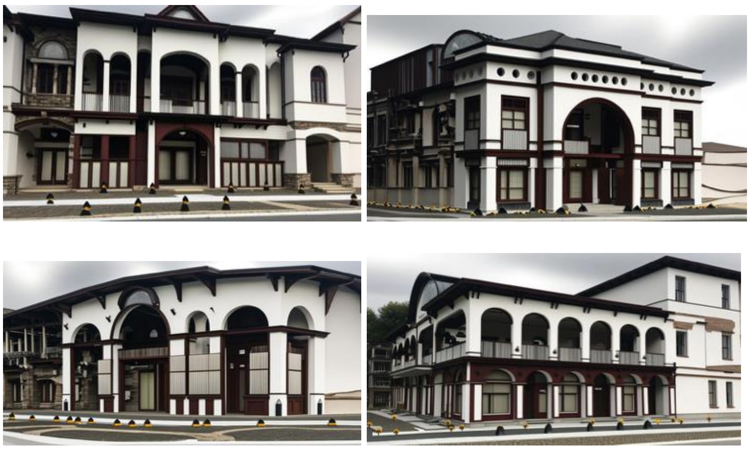

Figure 2 Visuals Produced via DreamLab

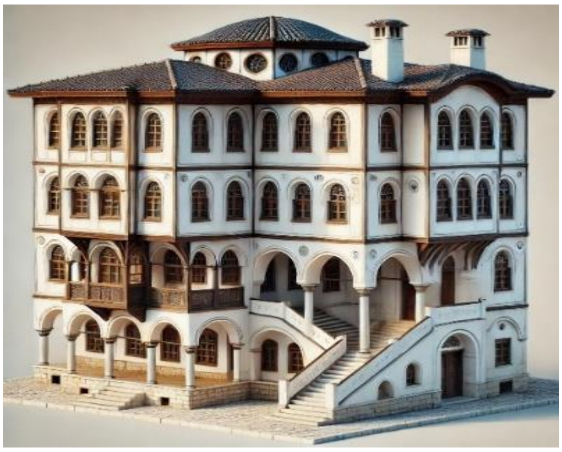

Figure 3 Visual Created by ChatGPT

Upon examining the results, it was observed that the DreamLab application provided suggestions that adhered closely to the original form and structural characteristics of the building based on the entered command. Architectural elements defining the building's character, such as arches and façade openings, were preserved in the proposal versions. In contrast, the output obtained via ChatGPT altered the original form of the building, modifying characteristic features like the building's overall shape and roof structure. However, it preserved the staircase at the entrance (Figure 3). The staircase was absent in the suggestions generated by DreamLab.

The second building for which a proposal was requested is presented in Figure 4. The roof, eaves, and window openings are structural elements that define the building's character. It was requested that the modernization of the building maintain these features. Accordingly, the command given to the AI applications was as follows.

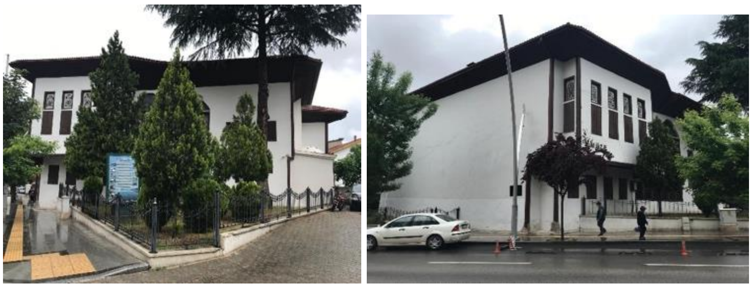

Figure 4 Second Sample Building Requested for AI-Generated Proposal

Command-2

Could you modernize the building shown in the image in a manner faithful to its original state? While doing so, please try to preserve the building's original form, materials, and facade features. The DreamLab application generated suggestions for the building as follows (Figure 5).

Using the same command, a proposal was also requested from ChatGPT. The examples produced by ChatGPT are shown in Figure 6.

Figure 5 Suggestions Generated by DreamLab for Second Sample

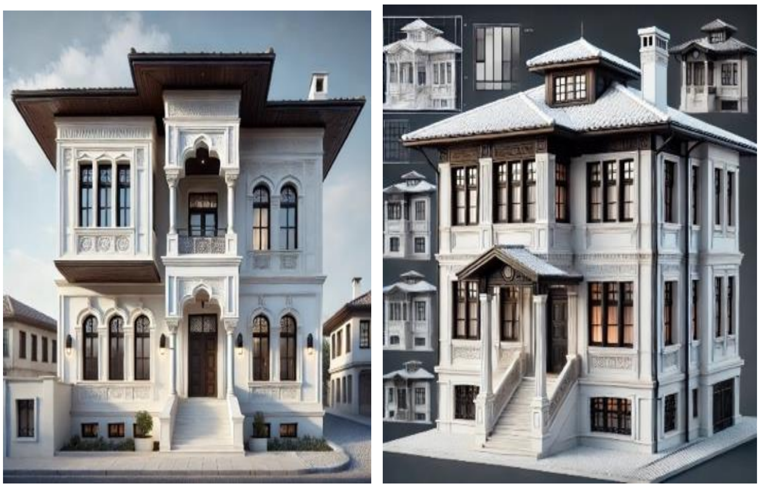

Figure 6 Proposals Obtained from ChatGPT

The suggestions produced by the two AI tools exhibit noticeable differences. The proposals generated by DreamLab modernize the building while better preserving its volumetric features and façade proportions. The materials and colors in these suggestions closely resemble the building's current state. Additionally, objects such as trees and cars depicted in the original image are also included in these AI-generated proposals. This indicates that the AI considered environmental context data while processing the visual according to the given command.

In contrast, the proposal obtained from ChatGPT shows significant changes in the building's massing and façade openings. The arched window openings in this proposal do not exist in the building's original image. Furthermore, despite not being present in the provided image, ChatGPT added a staircase to the building. This has resulted in a loss of the building's original form, its relationship with the surroundings, and its distinctive characteristics.

To test the AI's approach to different building types, a proposal was requested for the Kadı Hasan Mosque located in Tokat. According to sources in the literature, the structure is believed to have been constructed in the 15th century (Gündoğdu et al., 2006). Visuals of the building are provided in Figure 7. The aim in this example is to determine how AI-generated designs proceed when learning data related to different building typologies (civil, religious, etc.) and which elements they pay attention to in design.

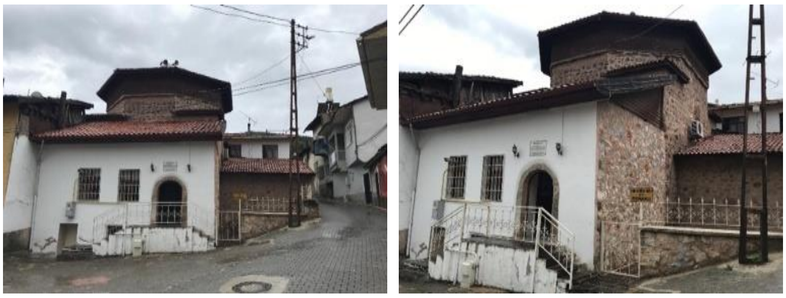

Figure 7 Kadı Hasan Mosque, Tokat (Author's Archive, 2022)

After providing the visuals shown in Figure 7, the following command was entered into the AI applications.

Command-3:

Could you modernize the building shown in the image in a manner faithful to its original state? While doing so, please try to preserve the building's original form, materials, and façade features. Pay attention not to alter the building's floor height or massing, and do not disrupt the roof structure. Please do not change the building's shape or make it appear larger or smaller than it is. Please consider that this building is a mosque.

Following this command, the DreamLab application produced the proposals shown in Figure 8.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

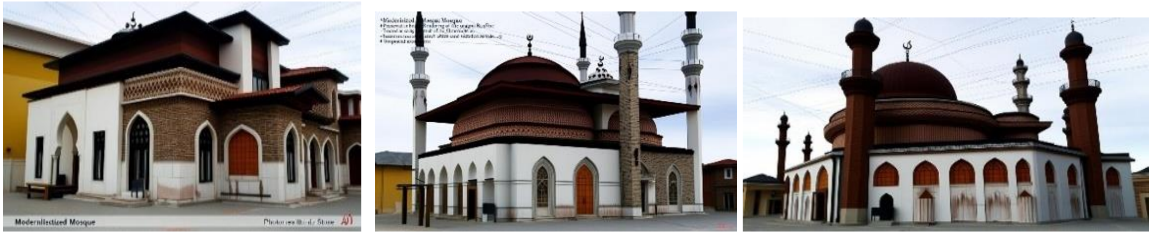

Figure 8 Proposals Obtained via DreamLab Based on the Given Command

Although the application attempted to use the materials of the building depicted in the image, it introduced significant alterations. As a result, the building’s original form and massing characteristics have changed mainly. Moreover, despite the original image not showing a minaret, the generated proposals included minarets. This outcome suggests that AI applications can be designed according to building typologies and their associated characteristics based on the commands given.

Using the same image and command, proposals generated via ChatGPT are shown in Figure 9.

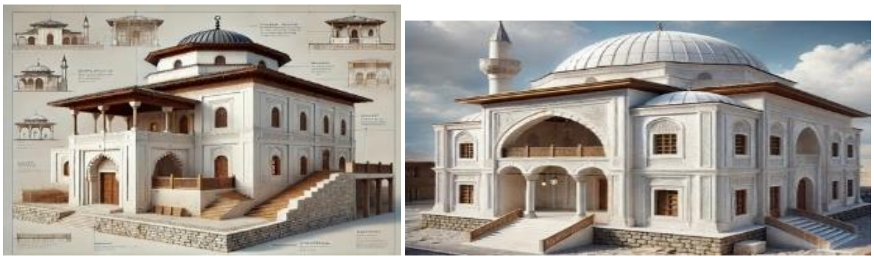

Figure 9 Proposals Obtained via ChatGPT Based on the Given Command

An examination of the visuals produced by ChatGPT reveals that the AI altered the building’s distinctive features, resulting in a new structure. It removed the stone walls, using that material instead in areas such as the ground floor, plinth, and stairs. The fact that the building was specified as a mosque influenced the AI design to diverge accordingly. ChatGPT designed the façade openings with arched forms and added a clearly defined dome in the proposals, despite no prominent dome being present in the original image. Additionally, similar to the other example, ChatGPT incorporated a minaret, aiming to reflect a typical mosque form.

Another example provided to the AI was a building located within a historical texture, constructed in an attached (row) pattern. The building features façade elements from different usage periods, inappropriate additions such as signs, and various modifications. The example building given to the AI for processing is shown in Figure 10.

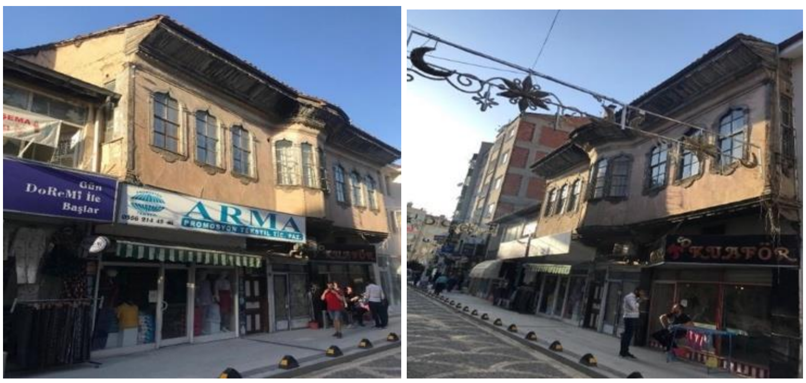

Figure 10 Example Building Processed by AI Applications

Along with the image, the following command was entered into the AI applications. To facilitate the preservation of the building’s unique characteristics, the command included instructions to remove inappropriate additions. The generated proposals are presented in Figure 11.

Command-4:

Could you modernize the building shown in the image in a manner faithful to its original state? While doing so, please try to preserve the building's original form, façade openings, façade features, and materials. Do not alter the building's mass, number of floors, or roof structure. You may remove inappropriate elements such as signs, advertisements, or similar features that are not original to the building. Please do not make the building appear larger or smaller than it is.

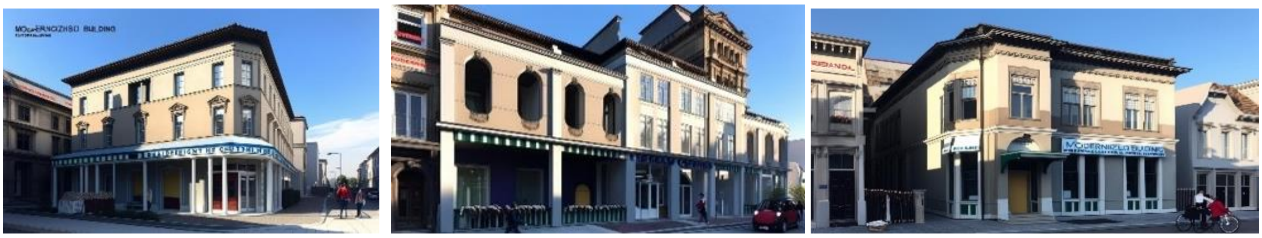

Figure 11 Proposals Obtained via DreamLab Based on the Given Command

The proposals obtained through the DreamLab application present varied suggestions and designs regarding the building's massing. Decorative details found on window surrounds and façade elements in the existing condition have been similarly processed in the proposed designs. The AI also recognized the building's location as being on a street that serves as a commercial axis and accordingly arranged the commercial façade to be suitable for shop windows. It even attempted to integrate inappropriate additions as part of the design, incorporating them into the building.

When the same command and image were given to ChatGPT, the resulting designs differed significantly. The proposals generated by ChatGPT showed significant changes in the building's form and façade features. Additionally, the relationship between the building and its surroundings, as well as its contextual placement, was less successfully conveyed compared to DreamLab's outputs. The designs obtained via ChatGPT are presented in Figure 12.

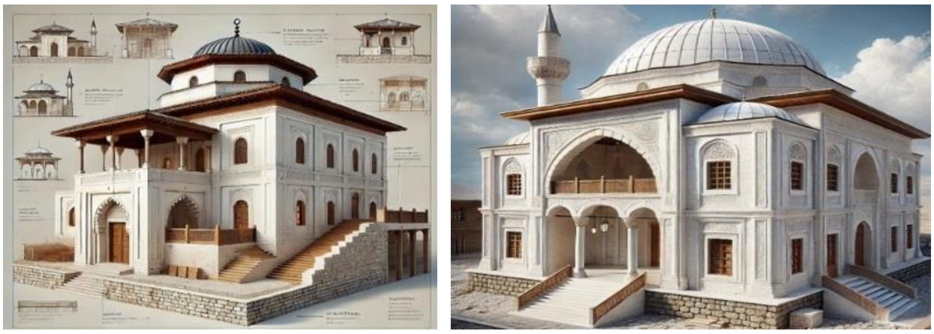

Figure 12 Proposals Obtained via ChatGPT Based on the Given Command

CONCLUSION

This study examined the impacts of artificial intelligence (AI) on the field of architecture, analyzing the contributions, advantages, and limitations of AI-generated data in design processes. Within the scope of the research, AI was tasked with developing design proposals for existing buildings with varying characteristics. The commands given to the AI applications included constraints such as preserving the structural features of the buildings, arranging forms, shapes, and façade openings according to the original, and maintaining the fundamental characteristics of the materials used.

Based on the given commands, the images of the relevant buildings were processed, and alternative design proposals were generated using AI-based tools. These proposals, produced by different AI applications, were comparatively analyzed. The evaluation revealed that among the two main AI applications used in this study, DreamLab yielded more successful results in preserving the original massing, color, and material

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume IX Issue IX September 2025

characteristics of the buildings. Moreover, the structural elements, such as the roof and overall form, were maintained more faithfully to the existing building character in the proposals generated by DreamLab. These findings provide valuable insights into the extent to which AI-supported design tools can produce effective and reliable solutions in architectural conservation and adaptation processes.

In contrast, the images obtained via ChatGPT showed a significant loss of the buildings' characteristic features. The proposals included notable changes in building massing, number of floors, and overall forms, substantially reducing the overlap between the original building and the AI-generated design. The study's findings indicate that AI applications have limitations in fully meeting the desired criteria under specific commands. For example, despite providing the original state of the buildings, AI increased the number of floors, enlarged the building forms beyond their actual scale, and introduced unexpected changes to façade elements—concrete indications of these limitations. Factors contributing to these outcomes include the quantity and quality of the data processed by AI applications, as well as the absence of professional filtering mechanisms. Additionally, a direct correlation was observed between the level of detail in the commands and the accuracy and consistency of the outputs. For instance, although the mosque image initially lacked a dome and minaret, the AI recognized this context and incorporated such architectural elements typical of mosque design into its proposals. This demonstrates that AI applications possess some capacity to process contextual data, but the granularity of user-provided commands plays a decisive role in shaping the results.

Comparing the AI applications used in the study, it was determined that DreamLab produced design proposals with greater compliance with the given commands compared to ChatGPT.

In conclusion, this study analyzed the potential and existing limitations of AI applications in the architectural discipline. The findings reveal that AI-supported tools can offer alternative design proposals based on specific commands; however, there are notable differences among applications in terms of accuracy and fidelity to the original structures. While DreamLab was more successful in preserving the core architectural features, ChatGPT-generated designs exhibited significant alterations to these criteria. The results underscore that AI tools hold considerable potential for architectural design processes but also highlight the necessity of human intervention due to the lack of professional knowledge filters, data processing constraints, and variability depending on the command details. For AI technologies to be more effective and reliable in architecture in the future, it is essential to integrate professional criteria based on architectural design principles into algorithms and to enhance the scope and detail level of user-provided commands.

REFERENCES

1. Alkan, İ., & Oduncu, S. (2024). Yapay Zekâ'da Güncel Yaklaşımlar: Bir Tasarım Aracı Olarak Veri Görselleştirme Teknikleri. Yedi, (Sanatta Dijitalizm [Özel Sayı]) [Current Approaches in Artificial Intelligence: Data Visualization Techniques as a Design Tool. Yedi, (Digitalism in Art [Special Issue]), 171–182.
2. Alpaydın, E. (2013). Yapay öğrenme [Machine Learning]. İstanbul: Boğaziçi Üniversitesi Yayınevi.
3. Arslan, K. (2020). Eğitimde Yapay Zekâ ve Uygulamaları. Batı Anadolu Eğitim Bilimleri Dergisi [Journal of Western Anatolia Educational Sciences], 11(1), 71-88.
4. Aydoğdu Çelik, M., & Çelik, Y. (2023). İngiliz Romantik Şiirinin Yapay Zekâ Teknolojisiyle Görselleştirilmesi. HUMANITAS - Uluslararası Sosyal Bilimler Dergisi, 11(INCSOS VIII Özel Sayısı), 21-36. https://doi.org/10.20304/humanitas.1247607
5. Barnett, R., Aglietta, M., Alvesson, M., Arendt, H., Astvik, W., Baudrillard, J., ... & Bourdieu, P. (2011). balance between catabolic and anabolic processes 184 balance in life 158–61 Bamford, Ken 36. anxiety, 208, 10.
6. Cevizoğlu, H. (2019). Artificial intelligence, philosophy of technology, and social life. In G. Telli (Ed.), Artificial intelligence and the future (1st ed., pp. 88–109). İstanbul: Doğu Kitabevi.
7. Demir, G. (2023). Mimarlıkta Tasarım Mekânı, Yaratım/Tasarım Düzlemi ve Tasarımcı Kimliği'ndeki Değişimler Üzerine Bir Okuma (Doktora tezi) [A Reading on the Architectural Design Space, Creation/Design Plane, and Changes in Designer Identity (PhD Dissertation)]. Gazi Üniversitesi, Fen Bilimleri Enstitüsü.

8. Demir, G., & Aksu, A. (2022). Mimarlıkta Tasarım Mekânı, Yaratım Düzlemi ve Tasarımcı Kimliği'ndeki Değişimlerin Tarihsel Süreç İçerisinde Örnekler Üzerinden Yeniden Okunması. Mimarlık ve Yaşam Dergisi [Architecture and Life Journal], (245-246).
9. Demirarslan, D. & Demirarslan, O. (2020). Tasarım ve tasarım süreci [Design and Design Process]. İksad Yayınevi.
10. İşler, B., & Kılıç, M. Y. B. (2021). Eğitimde yapay zekâ kullanımı ve gelişimi. Yeni Medya Elektronik Dergi [New Media Electronic Journal], 5(1), 1-11.
11. Karabulut, B. (2021). Yapay Zekâ Bağlamında Yaratıcılık ve Görsel Tasarımın Geleceği. Elektronik Sosyal Bilimler Dergisi [Electronic Journal of Social Sciences], 20, 1528–1529.
12. Keleş, M. B., Keleş, A., & Keleş, A. (2020). Makine öğrenmesi yöntemleri ile uçuş fiyatlarının tahmini. Euroasia Journal of Mathematics, Engineering, Natural & Medical Sciences, 7(11), 72–78.
13. Kurtboğan, H. (2023). Yeni Dünyada Yapay Zekâ Metaforu ve Yapay Zekanın Çalışan Performansına Etkisi (Yüksek lisans tezi) [Artificial Intelligence Metaphor in the New World and Its Effect on Employee Performance (Master's Thesis)]. Karamanoğlu Mehmet Bey Üniversitesi, Sosyal Bilimler Enstitüsü.
14. Luthra, N. (2019). AI in Architecture. Konsept Projeler, s.63, ss. 90–93.
15. Öztürk, E. (2018). Mimarlığın geleceği: ütopya mı, distopya mı? Yapı Dergisi, s. 436, ss. 42-44.
16. Öztürk, K., & Şahin, M. E. (2018). Yapay Sinir Ağları ve Yapay Zekâya Genel Bir Bakış. Takvim-i Vekayi, 6, 26–27.
17. Pirim, H. (2006). Yapay zekâ. Yaşar Üniversitesi E-Dergisi [Yaşar University E-Journal], 1(1), 81–93.
18. Wodzicki, C. (2019). AI in Architecture. Konsept Projeler, s. 62, ss. 76-79.
19. Yeşil, G. S. (2024). Mimari Tasarım Sürecinde, Eskizin Önemini ve Katkılarını Yapay Zekâ Desteği Üzerinden Değerlendirmek [Yüksek lisans tezi] [Evaluating the Importance and Contributions of Sketch in Architectural Design Process through AI Support (Master's Thesis)]. İstanbul Beykent Üniversitesi.
20. Yıldız, P. (2014). İç mimarlıkta yapay zekâ ve Türkiye'den seçilmiş örneklerin mekân tasarımı yönünden kapsamlı analizi çalışması [A Comprehensive Analysis of Artificial Intelligence in Interior Architecture and Selected Examples from Turkey]. Hacettepe Üniversitesi.
21. Yılmaz, A. (2019). Yapay Zekâ [Artificial Intelligence]. 6. Baskı, İstanbul: Kodlab.