The Effectiveness of Artificial Intelligence on Administrative Space Design, Applied on Administrative Space Design Course (1)

Assist.Prof. Dr. Maryhan Mohamed Yehia Mahmoud
Associate Professor, Department of Interior design, and furniture
college of applied art - October 6 university
Maryhan_yehia.art@o6u.edu.eg

Research Summary:

The field of design, especially interior design, has witnessed a remarkable development because of the integration of artificial intelligence applications to design, especially in last recent years. Thus, the research problem lies on, how to benefit from the features of artificial intelligence and how to produce, analyze and enhance the interior design process, especially in administrative space. This study is essential to understand how technology affects design and its potential to improve design quality, as artificial intelligence contributes to automating routine tasks of administrative interior design such as data entry, account follow-up, human resources management and customer communication. Artificial intelligence may help in improving strategic and operational decision-making by analyzing data based on accurate and realistic information and predicting future trends, thus helping senior management make more accurate and faster decisions. Artificial intelligence also helps in improving user experience by using smart and interactive technology that makes the user experience easier and more suitable for interior space.

AI may offer tremendous potential in administrative design to improve productivity, enhance creativity, and achieve more efficient designs, contributing to the development of innovative and effective work environments.

This study aims to identify and explore the applications of artificial intelligence and their effectiveness and enriching in administrative interior design by using platforms and programs.

The importance of the study also lies in following up and developing design process to keep pace with the ongoing developments in administrative interior design and how to benefit from them in practical application, and benefit from artificial intelligence on design process that refers to designer, user, and design process.

The research hypotheses that integrating artificial intelligence applications to design process may lead to more effective and efficient designs, in addition to studying the role of artificial intelligence applications and their impact on design process.

The study follows the descriptive analytical and applied approach to reach the extent of the impact of artificial intelligence techniques on design of administrative space, through a practical application of ideas proposed by third-year students in the Department of Interior and furniture Design under the supervision of the researcher in the administrative space Design course (1).

Key words:

Artificial Intelligence (AI) , Administrative Origin Design, Automation, User Experience (UX).

ملخص البحث :

شهد مجال التصميم وبالأخص التصميم الداخلي تطورا ملحوظا نتيجة دمج تطبيقات الذكاء الاصطناعي بالتصميم خاصة في السنوات الأخيرة. وبذلك تكمن إشكالية البحث في كيفية الاستفادة من مميزات الذكاء الاصطناعي وكيفية انتاج و تحليل و تعزيز عملية التصميم الداخلي و خاصا بالمنشأ الإداري. وتعتبر هذه الدراسة أساسية لفهم كيفية تأثير التكنولوجيا علي التصميم وإمكانيتها في تحسين جودة التصميم حيث يساهم الذكاء الاصطناعي في أتمتة المهام الروتينية للتصميم الداخلي الإداري مثل إدخال البيانات ، متابعة الحسابات ، إدارة الموارد البشرية و التواصل مع العملاء ، قد يساعد الذكاء الاصطناعي في تحسين اتخاذ القرارات الاستراتيجية و عملياتية عبر تحليل البيانات المبنية علي معلومات دقيقة وواقعية و التنبؤ بالاتجاهات المستقبلية ، وبذلك قد يساعد الإدارة العليا في اتخاذ القرارات أكثر دقة وسرعة ، كما يساعد الذكاء الاصطناعي في تحسين تجربة المستخدم من خلال استخدام التكنولوجيا الذكية و التفاعلية والتي تجعل من تجربة المستخدم أكثر سلاسة و ملائمة للفراغ الداخلي .

قد يوفر الذكاء الاصطناعي في التصميم الإداري إمكانيات هائلة لتحسين الإنتاجية و تعزيز الابداع و تحقيق تصميمات أكثر كفاءة مما يساهم في تطوير بيئات عمل مبتكرة و فعالة.

قد تهدف هذه الدراسة الي التعرف و استكشاف تطبيقات الذكاء الاصطناعي و مدي فاعليتها في بناء و إثراء التصميم الداخلي الإداري وذلك من خلال استخدام المنصات و البرامج .

كما تكمن أهمية الدراسة في متابعة وتطوير عملية التصميم لمواكبة المستجدات المستمرة في التصميم الداخلي الإداري وكيفية الاستفادة منها في التطبيق العملي ، و الاستفادة من الذكاء الاصطناعي في بناء عملية التصميم التي تعود علي المصمم و المستخدم و عملية التصميم بالنفع.

يفترض البحث أن دمج تطبيقات الذكاء الاصطناعي في عملية التصميم قد تؤدي الي تصميمات أكثر فاعلية و كفاءة ، بالإضافة لدراسة دور تطبيقات الذكاء الاصطناعي وتأثيرها على العملية التصميمية.

وقد تتبع الدراسة المنهج الوصفي التحليلي و المنهج التطبيقي للوصول لمدي تأثير تقنيات الذكاء الاصطناعي علي تصميم المنشأ الإداري وذلك من خلال تطبيق عملي لأفكار مقترحة من طلاب الفرقة الثالثة بقسم التصميم الداخلي و الأثاث تحت إشراف الباحثة بمقرر تصميم المنشأ الإداري (١) .

الكلمات المفتاحية :

الذكاء الاصطناعي ، تصميم المنشأ الإداري ، الأتمتة ، تجربة المستخدم.

Introduction:

Nowadays, the field of interior design is witnessing a technical revolution and successive developments, and one of the most important of these developments is artificial intelligence. Artificial intelligence appeared in the 1950s. In 1956, a group of researchers organized the Dartmouth Conference [(11)].

It was suggested that a machine could be designed to simulate any task that requires human intelligence [(1)]. Then research continued and progressed rapidly to enable machines to make decisions. Self-learning appeared in the eighties as a new approach to artificial intelligence. Despite these developments, a kind of stagnation occurred in the nineties as a result of technical limitations and lack of funding. Then this field regained its strength in the twenty-first century as a result of interest in scientific research and the availability of large amounts of data and computing resources.

The research discusses the applications of artificial intelligence as a powerful tool in the field of interior design, providing new possibilities for creating innovative and effective experiences. By leveraging machine learning algorithms and artificial intelligence techniques, designers can gain insights into user needs and create new and innovative design ideas, and automate routine administrative interior design tasks. The role of artificial intelligence in the design process is

still evolving, but it already has a significant impact on the way the interior designer works [2]. Artificial intelligence can be used to analyze huge amounts of data, such as data entry, tracking accounts, managing human resources, and communicating with customers. It may also help improve strategic and operational decision-making by analyzing data based on accurate and realistic information and predicting future trends. Thus, it may help senior management in making decisions more accurately and quickly. Artificial intelligence also helps improve the user experience using smart and interactive technology, which makes the user experience smoother and more suitable for the interior space. Artificial intelligence in administrative design may provide tremendous potential to improve productivity, enhance creativity, and achieve more efficient designs, which contributes to the development of innovative and effective work environments.

The research study focuses on the effectiveness of artificial intelligence applications in the design process in general and administrative building design in particular, and its application to students' design ideas for the administrative space design course [1].

Research problem :

The research problem lies in how to benefit from the advantages of artificial intelligence and how to produce, analyze and enhance the interior design process, especially for administrative interior space.

Research hypotheses :

- It is possible to take advantage of integrating artificial intelligence applications into the interior design process to create more effective and efficient designs.
- It is possible to study the role of artificial intelligence applications and their impact on the design process.

Research importance:

The importance of the study lies in following up and developing the design process to keep pace with ongoing developments in administrative interior design and how to benefit from them in practical application, and to benefit from artificial intelligence in building the design process which is efficient for the designer, the user, and the design process.

Research aims:

This study aims to identify and explore the applications of artificial intelligence and the extent of its effectiveness in building and enriching administrative interior design using platforms and programs.

Research Methodology:

The study follows the descriptive analytical and applied approach to determine the extent of the impact of artificial intelligence techniques on the design of the administrative space, through the practical application of ideas proposed by third-year students in the Department of Interior and Furniture Design, under the supervision of the researcher in course "the administrative interior space design (1)".

First- Theoretical Framework:

1- Artificial intelligence term (AI):

It refers to the ability of computer systems or software to simulate human mental processes such as learning, thinking, understanding, and making decisions, pic (1). To get the full value from AI, many companies are making significant investments in data science teams, a multidisciplinary team that uses scientific and other methods to extract value from data.

Pic (1) illustrate (AI) term
https://www.annajah.net/الذكاء-الاصطناعي-تعريفه-وأهميته-وأنواعه-وأهم-تطبيقاته-article-30227
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It combines skills drawn from fields such as statistics and computer science with scientific knowledge to analyze data collected from multiple sources. Artificial

Intelligence is about the ability to think superiorly and analyze data, although artificial intelligence presents images of high-performance, human-like robots dominating the world, it does not aim to replace humans, it aims to significantly enhance human capabilities and contributions [3].

It is briefly referred to ability of digital machines and computers to perform certain tasks that mimic and resemble those performed by intelligent beings and human mind, such as the ability to think or learn from previous experiences, or other operations that require mental operations [4].

1-1- The term artificial intelligence (AI) in design:

It refers to the use of artificial intelligence techniques to improve or enhance design processes in various fields, whether it is graphic design, product design, architectural design, interior design, furniture design.

2- Definition of artificial intelligence (AI):

It is a science concerned with ways and means of creating and designing intelligent devices and machines that can think and act like humans and perform multiple tasks that require intelligence such as learning, planning, speech recognition, facial recognition, problem solving, perception, mental and logical thinking [5].

Artificial Intelligence can automate many routine and time-consuming tasks, freeing the human worker to focus on more complex and creative tasks, leading to significant improvements in efficiency and productivity, in addition to saving costs for companies and institutions, it also improves decision-making processes, as artificial intelligence provides data-based insights and predictions that can help decision-makers make more accurate decisions [2].

2-1- Definition of artificial intelligence (AI) related to design:

Artificial intelligence has a significant impact on design in many fields, including architecture, interior design, and graphic design. It simplifies the design process by automating many repetitive tasks in design process. It also enhances the designer's creativity, so help designers

generate new and innovative ideas. Through tools that operate with artificial intelligence, which analyze huge amounts of data and provide insights into user preferences, which designers can use to create more innovative designs. Artificial intelligence also improves design accuracy, helping designers to ensure that designs are accurate and error-free, enhance design creativity, improve design accuracy, and improve user experiences. For example, artificial intelligence algorithms can analyze designs and identify potential problems that may occur with human designers. As artificial intelligence continues to develop, it is likely to become an increasingly important tool for designers in many industries [(2)].

3- The concept of artificial intelligence:

It is a field of computer science fig. (1) that focuses on developing systems and software, that enable machines to simulate human mental abilities, which includes [(6)] table (1):

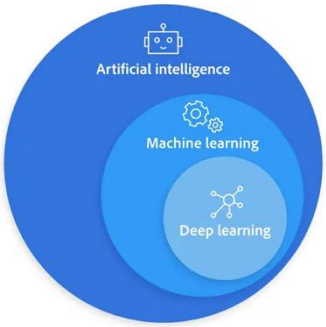


Fig (1) Explains the branches of artificial intelligence https://business.adobe.com/nz/products/real-time-customer-data-platform/ai-vs-machine-learning.html- 22/1/2025-3:31

Machine learning	Deep learning	Natural language processing
Machine learning is an artificial intelligence technique that includes training algorithms to recognize data patterns. Machine learning can be used to analyze user data and behavior to create more personalized and effective designs.	Using deep neural networks that contain many layers between inputs and outputs, where each layer filters and gradually decomposes information to learn how to recognize advanced and complex patterns, common applications of deep learning (image and video recognition, self-driving, natural language processing).	NLP is an artificial intelligence technology that involves machine learning to understand and process human language. NLP can be used to analyze customer feedback and review to improve product design and user experience.

Table (1) shows the different concepts of artificial intelligence.

4-The importance of artificial intelligence in design process:

Artificial intelligence aims to understand the complex mental processes that the human mind performs while practicing thinking, and then translate these mental processes into mathematical processes that increase the computer's ability to solve complex problems. Artificial intelligence is a simulation of human intelligence using programs, algorithms, systems, and machines. It is the science of engineering programs and smart applications capable of thinking in a way that mimics the human mind. This depends on studying human behavior by conducting experiments

on his actions and placing them in certain situations, and then monitoring his reactions and thinking patterns, to be simulated through complex systems, including machine learning, deep learning, neural systems, language processing, automated process automation, robots, and specialized systems based on the rules of human thinking. Artificial intelligence technology has introduced a new concept to the reality of interior design in general, and applications of artificial intelligence in design have become a modern trend that can be worked on and developed to reach the best possible results. What confirms the importance of artificial intelligence in design is the efforts of social media to apply this technology to enhance their role in competing.
Artificial intelligence has become a partner and a design tool that the designer can use to meet constantly evolving design needs [7].

5-The impact of artificial intelligence on the design stages:

Artificial intelligence affects the scenario in which the design takes place, according to a study conducted by Harvard University - School of Business Administration. By taking advantage of artificial intelligence applications, the stages of the design process can improve and develop. Intervention takes place at every stage of the design process. It started from the **research process**, which is the first stage of the design process, where it is used to analyze data and information and understand the user's needs and desires. Artificial intelligence, fig. (2) also facilitates the process of **analyzing data, determining relationships** between variables, and generating hypotheses and possible expectations for the design results.

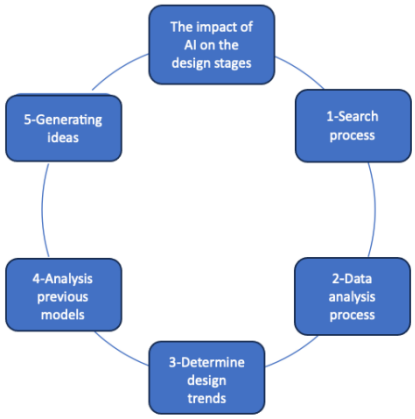


Fig. (2) The impact of artificial intelligence on the design stages

It can also **identify design trends**, such as using modern technologies that help the designer in implementation. Artificial intelligence can also be used to **develop machine learning** to develop data, and this information is used to improve the research results for the designer. As well as **automating tasks** in the research stage to save the greatest possible amount of effort and reach the highest degree of accuracy, so the designer devotes himself to creative tasks.
Artificial intelligence can also **analyze previous design models** and identify the advantages and disadvantages that must be improved, to help the designer achieve good designs.
Then designer moves to the stage of **generating ideas**, which is the most creative stage for the designer. Despite the increasing fears that artificial intelligence will replace the designer, it is considered one of the tools that helps the designer to reach the largest number of new and innovative ideas. The role of artificial intelligence in the stage of **generating ideas is divided into**:

- **Proposals for generating new ideas** using techniques such as artificial neural networks and deep learning.
- **Improving the design solutions** by entering the necessary information. The proposed design solutions can be analyzed and improved according to the information that was entered**.**

• **Improving the user experience** while developing ideas by entering and analyzing information, and in most cases user feedback has a direct relationship to improving the design.

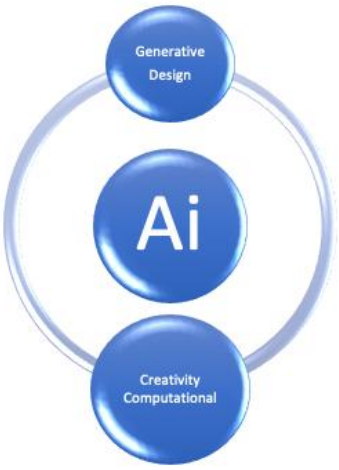
• **Mutual construction** so Artificial intelligence can transform the designer's lines into ideas that meet the user's needs, and the designer can work on design suggestions and develop them.

The role of artificial intelligence in **the initial design process** and transforming initial ideas into actual designs is also clear by creating the most realistic 3D models. Artificial intelligence platforms can also be used to scan the real world and create 3D models that can be used in the design process. The designer can **use technologies such as augmented reality and virtual reality** as an attempt to communicate with users and **create design experiences**. Thus, the designer reaches quick and accurate results, as he also uses artificial intelligence in the **detailed design stage** by specifying materials, technologies, furniture, etc. in the implementation process to meet the user's needs [2].

6- Artificial intelligence and its relationship to innovation and creativity in design:

AI can provide new perspectives, generate new and experimental ideas, and even offer insights that human artists might not have thought of on their own. At the same time, human creativity adds a depth of emotional and personal expression that is unique to the human experience [10]. By combining the strengths of both human art and AI-generated art, we can create a more dynamic, diverse, and creative art community that pushes the boundaries of traditional artistic expression.

This collaborative approach has the potential to inspire new forms of creativity, break down barriers between different artistic fields, and unleash a wealth of new ideas and approaches that have not been explored before. It also enhances a more open and experimental culture that encourages artists to explore new forms of creative expression without fear of judgment or rejection [8].



Artificial intelligence technology also contributes to the designer in creating a huge number of alternatives, which are not considered formal alternatives, but rather help the designer to develop executable idea alternatives, as well as the methods used to implement any of these alternatives. However, there are many aspects that artificial intelligence may overlook, such as the cultural, social, and psychological background of the user. Thus, the designer has a major role in achieving these aspects in the design.

Types of innovative design that help the designer [2]:

6-1- Generative design:

Generative design is an artificial intelligence-based design process that involves creating thousands of design options and then using algorithms to evaluate and improve them, fig. (3). This process can help the designer find new and innovative solutions to design problems. It is widely used in industrial and engineering design, where artificial intelligence can generate innovative solutions to complex problems.

6-2-Creativity computational:

Computational creativity refers to the use of artificial intelligence to generate creative outputs, such as art, music, and design. Computational creativity can help designers come up with new ideas and explore different design possibilities [6].

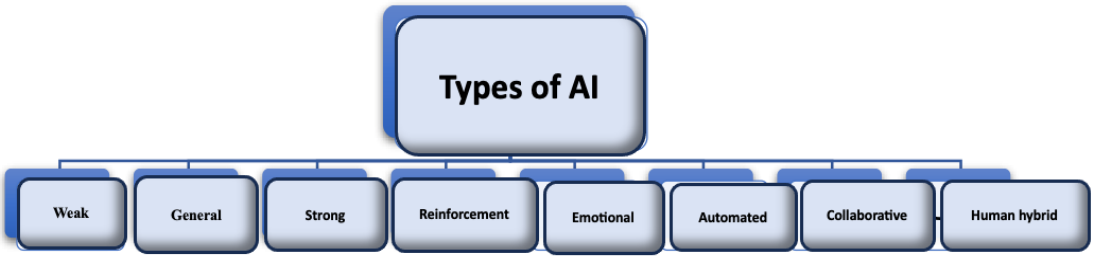


Fig. (3): Artificial intelligence related to design and innovation.

7-Types of artificial intelligence -Fig.(4):

Weak AI: It can do a small part of what human performance can do, as it is a type that is based on programming and intelligent capabilities for a specific field that does not have the ability to understand other fields. It is used in developing specific applications such as search engines and voice and image recognition.

• **General AI [5]:** It is an intelligent type that we cannot differentiate between the things that a human or a robot does. It performs cognitive functions like a human. It is also a type which can understand all fields and learn from new information continuously. It can solve various problems without the need to program it in advance.

• **Strong superhuman** Fig. (4) shows the types of artificial intelligence. humans, as it can do better than what humans do. It has many characteristics such as the ability to learn, plan, and communicate automatically, but it is still a hypothetical concept.

• **Reinforcement AI :**It depends on training intelligent systems to solve problems in a continuous manner by providing them with rewards or punishments when making correct or incorrect decisions. This type is used in developing robots, electronic games, and controlling industrial processes.

• **Emotional AI:** It aims to add emotions to smart systems and introduce them to human feelings and interact with them, this type is used in developing social robots and medical applications.

• **Automated AI [3]:** It is the use of artificial intelligence to complete the design process from the concept stage to the production stage, and automated design can help designers create more efficient designs with less human effort.

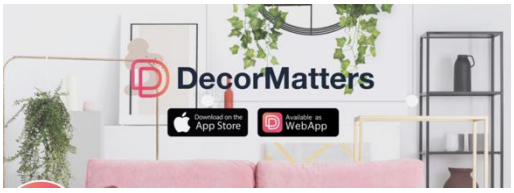
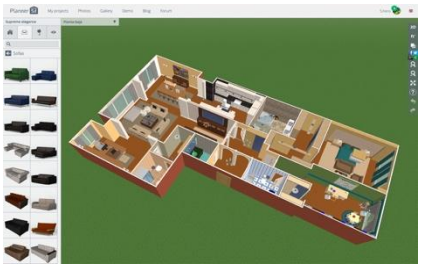
• **Collaborative AI:** It is the use of artificial intelligence to facilitate collaboration between designers, clients, and business owners. It can help teams work together more effectively and make better design decisions based on accurate data.

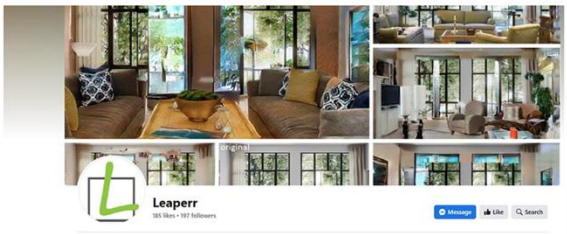
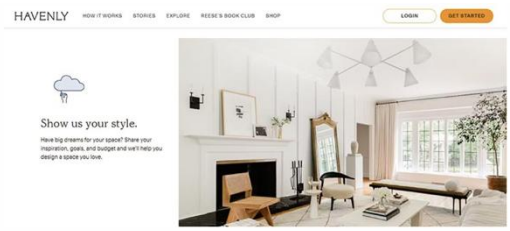
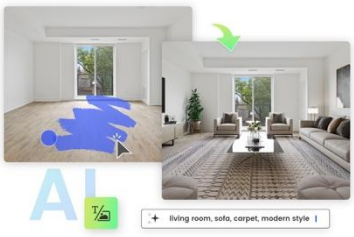
• **Human AI Hybrid [6]:** Hybrid human-artificial intelligence involves combining human creativity with tools and artificial intelligence techniques. This type helps designers create more innovative and effective designs.

8- Applications of artificial intelligence in interior design:

There are many applications of artificial intelligence in interior design table (2), as it allows the designer to choose the appropriate design, materials, and implementation methods in a virtual manner appropriate to the space, function, and budget, which saves [14] a lot of effort and time for designers.

Application Types used in interior design using AI	
• **Homestyler** An application that allows the interior designer to create 2D and 3D designs. It provides a library of furniture and interior design elements (floors/ceilings/walls), and displays the design from different angles, giving a realistic perspective of the space.	 **https://spencil.co/blog/ai-house-design/26/1/2025-10:30PM**
• **Room GPT** This application offers free tools supported by artificial intelligence to design and visualize residential interior design, in addition to supporting the Arabic language. The platform provides users with a few tools that enable them to upload images of their current spaces and explore a wide range of interior and exterior design ideas. They can also choose from different styles of design and conduct experiments on colors and furniture.	 **https://www.roomsgpt.io/#google_vignette/26/1/2025-11:05PM**
• **Midjourney** Used to create AI images for various designs, this application provides designers with a starting point for their interior design projects, allowing them to explore new design possibilities and push the boundaries of their creative vision.	 **https://www.globaltechcouncil.org/ai/midjourney-ai/26/1/2025-11:10PM**

• **SmartDraw** This application provides a wide range of design templates and icons, allowing users to easily create detailed floor plans and room layouts, for residential or office interiors.	 https://edrawmax.wondershare.com/floor-plan-tips/smartdraw-free-alternatives.html26/1/2025-11:15PM
• **Foyr Neo** This application is a tool that allows users to create 3D interior plans and designs. It is designed to help interior designers complete their projects faster and more efficiently. The app also contains more than 60,000 ready-to-use 3D models, including furniture and accessories, allowing users to use a variety of items.	 https://foyr.com/26/1/2025-11:46pm
• **DecorMatters** It is an application that enhances artificial intelligence technology in interior design, as it works with augmented reality (AR) technology. It allows the user to visualize new designs. It also contains a ruler to measure room dimensions, in addition to copyright licenses.	 https://emag.archiexpo.com/qa-decormatters-a-one-of-a-kind-app-powered-by-ai-and-ar/26/1/2025-11:48pm
• **Planner 5D** It is a tool supported by artificial intelligence, virtual reality, and augmented reality, to help create horizontal projections and interior designs. Anyone can use it, not just designers. The number of users of this application has reached 40 million users, and designs have been made on more than 80 million projects. The application (4) is available for the web on various operating systems such as Android, iOS, Mac OS, Windows.	 https://chromewebstore.google.com/detail/planner-5d/gjfkgdpkecnmfcgfpfibpcnkeakahllc?hl=ar&pli=1/26/1/2025-11:50pm

• **Leaper** An application that creates interior designs supported by artificial intelligence, a system that is a combination of deep learning, image processing, and advanced algorithms that can produce interior designs automatically. It is also an intelligent computer system capable of designing interior spaces without the need for a human designer. However, it is not limited to designers only, but also to ordinary users. To produce high-quality interior designs in a short time, the system studies a large amount of data consisting of high-quality images, and this allows it to understand the user's need.	 **https://spencil.co/blog/ai-house-design/27/1/2025-12am**
• **Havenly** This application contributes to collect some interior design ideas suitable for the space and choosing the appropriate idea, by knowing what the client needs and his way of thinking by conducting a simple test. The program's algorithms identify his taste and the things he prefers, know the desires and choices of the clients, and know his vision of his dream home, which helps to display elements and ideas that suit him.	 **https://spencil.co/blog/ai-house-design/27/1/2025-12am**
• **Interior AI** This application helps designers create many design concepts very quickly, choose colors, different furniture, and finishes, saving a lot of effort, resources, and time. Using AI-powered design tools will help you choose the best tools and designs easily in a short time.	 **https://www.fotor.com/features/ai-interior-design/27/1/2025-12:11amory**

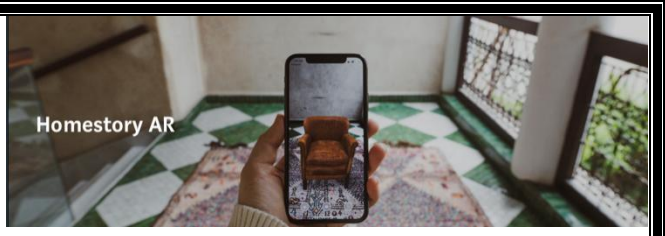
• **Homestory AR** It is one of the best applications that work with artificial intelligence technology in interior design and allows choosing different types of furniture. The program can present some ideas and elements for use in the space, which helps in making the design better. It also allows creating 3D images from different directions and angles of the space, like all 3D drawing programs.	 **https://medium.com/homestory-ar-27/1/2025-12:13am**

Table (2) shows the different applications of Artificial Intelligence.

9- Advantages of artificial intelligence in the design process:

Artificial intelligence offers many advantages in improving the design process, enhancing creativity, and achieving more efficient [3] designs, which contribute to develop work environments in an innovative and effective way. The most prominent of these features are:

- Improving efficiency and reducing time by performing repetitive and complex tasks quickly, which reduces the time the designer needs to focus on the creative aspects of the design.
- Eliminate human error as it does not lose focus or be affected by the surrounding environmental conditions.
- Generative design and creativity, as it generates innovative and new designs based on the designer's input, which enhances the ability of designers to explore new and unconventional solutions.
- Personalization by analyzing users' preferences and providing them with customized designs based on their data and behaviors.
- Improving performance through data analysis, as it can collect and analyze data related to the user's interaction with the design based on real feedback through criteria such as user experience and design interaction with the user.
- Integration with design tools such as (photoshop, illustrator, etc.) is now supported by artificial intelligence.
- It can predict future trends and patterns that help the designer make the best decisions for the benefit of the design.
- It supports collaborative design between design teams through smart tools, which improves collective decision-making.

artificial intelligence appeared as a tool to enrich [8] and revolutionize design practices, by increasing access to design tools among different individuals. In addition, AI can create new possibilities for creativity and innovation by generating innovative ideas and solutions that may not have been possible to achieve through traditional design methods (Verganti et al., 2020).

10- Disadvantages of artificial intelligence in the design process:

Despite the great advantages of artificial intelligence in design, there are disadvantages and challenges, the most prominent of which are:

- AI lacks the human dimension despite its ability to generate innovative design solutions. *
- AI-powered designs may be too technical and lack the emotional, cultural, or social depth that an interior designer can add.
- It relies heavily on data to generate results. If this data is inaccurate or incomplete, the results will be incorrect and inappropriate. Also, the use of non-diverse data leads to repetitive designs.
- Developing artificial intelligence systems in design, requires large investments in technology and human resources, and it also requires advanced expertise in programming and developing algorithms. The initial costs of applying artificial intelligence are high for individual designers or small companies.
- It lacks rapid adaptation to cultural or social changes and needs constant updates to maintain its ability to provide innovative designs that are compatible with user needs.
- Fear of designers relying excessively on it in producing designs, which leads to the loss of human creativity and the erosion of human skills on the long term.
- Problems may arise regarding intellectual property rights. Is the design produced through artificial intelligence by algorithms owned by the designer or by the artificial intelligence?
- Limited understanding of the cultural [8], social and emotional contexts that characterize human designs, leading to a loss of distinction and diversity.
- Some AI tools produce similar and repetitive designs because they rely on data that has been entered before, which may lead to a lack of diversity and innovation in designs, especially if the systems do not have the ability to provide completely new solutions.

So, the ideal approach is to combine human creativity with AI-generated art [9]. In this way, we can leverage the strengths of both and create more vibrant, diverse, and inclusive designs that embrace the potential of AI while preserving and celebrating the unique qualities of human creativity.

11- Artificial Intelligence is a double-edged sword:

The designer must take advantage of the positive side of artificial intelligence [1] in developing his design ideas and not rely entirely on producing final ideas for his work, as design is research and planning and the result of a group of mental experiments and the designer's vision through imagination, training, and experimentation. Every line must be according to good planning by the designer. Since the final output of artificial intelligence applications does not reflect the designer's experience to a large and complete extent, these results cannot be adopted as the final results of the design, but rather they are considered suggestions to reach a final design, designer can modify on it to reach results that are closer to the designer's thought and planning.

Dr. Ashraf Reda, Professor of Fine Arts and CEO of the Arts and Culture Complex at Helwan University, confirms that, "Artificial intelligence programs are important in developing work and reducing time, but they should not be relied upon for innovation, because it depends on creativity and human feelings, and the computer cannot replace the designer in design."

This does not mean that artificial intelligence cannot be used in a way that serves design, but rather that it cannot be used for inspiration. Artificial intelligence can draw a design in the style of a designer and based on the data and information entered, but it does not draw with the same sense and feelings as the designer. Artificial intelligence does not have the competence to pay attention to tiny details that the designer does, rather, the designer gets an image that does not match what he wanted, so he needs to modify small details and improve what he wants to reach the design that exactly matches his imagination and what he wants, but it is worth noting that the field of design with artificial intelligence will witness great development in the near future.

12- How artificial intelligence helps the interior designer in designing the administrative space:

Artificial intelligence can be a useful tool for the interior designer as it enhances creativity and helps improve efficiency and productivity. It is an integral relationship that can contribute to improving efficiency, enhancing the institutional experience, developing smarter work environments, designing organizational structures, work systems, and tools that contribute to managing work within institutions, it supports these designs through automation, which is the process of using smart technology to perform tasks automatically without the need for continuous human intervention. This is done by developing devices or programs capable of performing certain actions based on programmed inputs or through machine learning. It also analyzes data, which leads to improving organizational performance. Among the most prominent relationships between the interior designer and artificial intelligence in performing the design process are:

- **Generative design:** It allows the interior designer to rely on algorithms to create a variety of designs based on specific criteria such as (dimensions, materials, colors, design of interior design elements, technology). The designer can enter specific data, so that artificial intelligence generates different design solutions for multiple options.
- **Analyzing data to improve spaces:** The designer helps in analyzing data for interior space, such as (space measurements for each department, movement of people within the space, use of furniture) to improve functional efficiency. It helps the designer determine the best furniture distribution or improve the flow of movement within the spaces.
- **Customization and smart recommendations:** The designer helps in customizing designs based on customer requirements, by learning the patterns, behaviors, and needs of the user. He can also provide recommendations for colors, materials, furniture, and space distribution according to the distribution of departments in the administrative space.
- **Using augmented reality and virtual reality:** The designer can use augmented and virtual reality technologies supported by artificial intelligence to make it easier for designer to reach the final visualization of spaces before implementation.
- **Analyzing user behavior and improving the user experience:** User behavior can be analyzed and reflected in design, such as analyzing movement between different departments or interaction with furniture, and providing recommendations to improve the user experience, for example recommending, modifying the distribution of furniture, adding a specific color or technology to achieve comfort for user.
- **Automating repetitive tasks:** The interior designer spends a long time on repetitive tasks such as preparing plans, choosing colors, and searching for suitable materials for the space.

Artificial intelligence can automate these tasks. Tools supported by AI can provide suggestions for materials, colors, and technology based on trends or user requirements, which saves time for the designer to focus on the creative process of design.

- **Analyzing trends and predicting future designs:** By analyzing data and patterns, the designer can be helped to provide design ideas that meet the changing needs of the market.
- **Interactive design and development of smart spaces:** The designer can use artificial intelligence to design smart spaces that interact with the user. Smart devices can be integrated into lighting systems, sound systems, heat systems, and smart furniture can be used in administrative spaces to modify the interior environment based on the user's requirements.
- **Review and improve designs using artificial intelligence**: Some artificial intelligence tools can review designs and suggest improvements based on criteria entered by designers, such as improving lighting distribution or choosing materials suitable for the environment.
- **Project Management and Collaboration:** Artificial Intelligence provides intelligent reports to the designer about project status, deadlines and budget that helps the designer manage projects more efficiently.

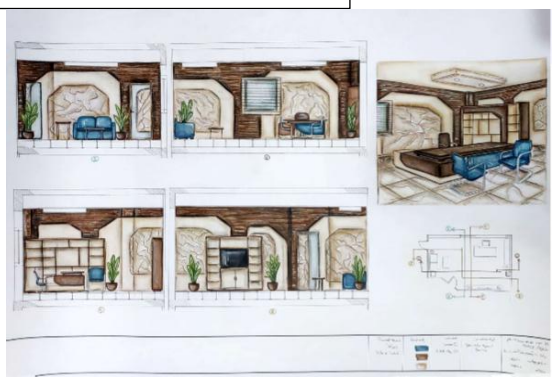
Artificial Intelligence offers many opportunities for the designer to improve performance by automating tasks and providing new design insights, analyzing data to improve the user experience, and achieving more accurate and innovative designs.

Second- Analytical and applied study of the role of AI on the administrative spaces course (1):

The application was carried out on the administrative spaces course (1) to compare and analyze the work of students in administrative projects and the use of artificial intelligence and comparison between the outputs of the same project. The "Chat GPT 4" application has been used to create AI images for various designs, as it provides designers with a starting point for their interior design projects, as artificial intelligence gives designers more time for creativity and inspiration, while computers deal with complex repetitive tasks that mainly depend on data. And through tables (3,4,5), which show the difference between the student outcomes projects for administrative spaces course (1) and the use of artificial intelligence for the same projects.

- **Application & Analysis of project (1) - table (3):**

Project (1): Tourism company (external / internal / religious)	It consists of a reception and waiting area, general administration staff rooms (human resources/it/financial affairs/legal affairs/external, domestic, and religious tourism reservations offices/meeting rooms/quality control room/customer service), a service area (office/bathrooms), and senior management staff rooms (deputy director/secretariat/director and secretariat), shown in pics (2,3,4).

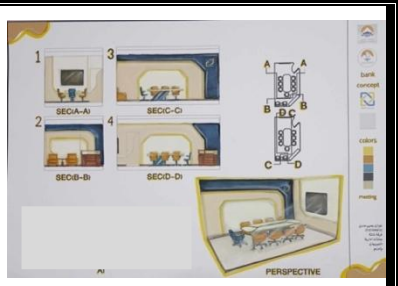
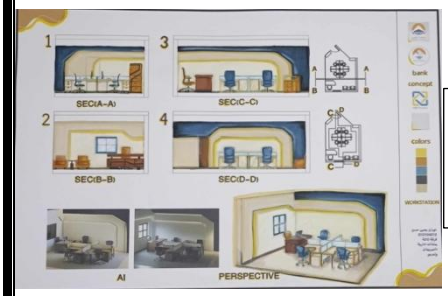
Student works: **• Horizontal projections** **• Vertical projections** **• Perspective**	 **Pic. (2) shows the horizontal layout of the tourism company, showing the distribution of administrative spaces using diagonal and perpendicular grids, and the distribution of administrative furniture to suit each space, with an explanation, mood board used in the project.** **Pic. (3) shows the vertical projections and perspectives of the meeting room.**  **Pic. (4) shows the vertical projections and perspectives of manger room.**
Artificial intelligence application:	After identifying and inventorying all the information necessary to create and prepare the design drawings for the project, and determining the relationships of the internal space to each other, AI contributes to the analysis of colors, materials and shapes, and the designer can make design choices based on real data.
Application "(Chat GPT 4)" for AI-(prompt):	**<u>Main meeting room:</u>** **Concept of design:** A modern meeting room, pic. (5), with broken line design & biophilic theme. Walls**: Combination** of wood, off-white marble with integrated LED lighting. **Ceiling: Suspended** panels with indirect light. Furniture**:** Meeting table has rectangular table with a wood and glass top, incorporating subtle broken line, administrative chairs with deep blue leather & gold metal accents. **Technology: Using** screens on the front of table for presentations.

	Natural **elements: Indoor** plants. **Flooring: Wooden** floor with subtle geometric patterns in marble.  **Pic. (5) shows a perspective of the meeting room space using AI application.** **<u>Manger office space:</u>** broken line wall concept, pic (6). **Walls:** Cladding with brown wood and off-white marble. **Furniture:** Brown wooden L-shape desk for more storage, brown leather head chair, two blue guests' chairs in front of the desk. **Natural elements:** Green indoor plants. **Flooring: Off**-white marble floor.  **Pic. (6) shows a perspective of the tourism company director's office room using the application of AI**

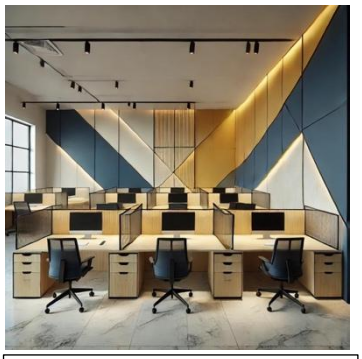
Table (3) shows project -1- Tourism Company.

- **<u>Application & Analysis of project (2)- table (4):</u>**

Project (2): Bank	It consists of the security and surveillance area, reception and waiting area, teller area, customer service area, treasury room, human resources department, legal department, financial department, marketing department, IT department, meeting room, service area (office/bathrooms), senior management staff rooms (deputy branch manager/secretariat/branch manager and secretariat) , shows in pics (7,8,9).

Student works: **• Horizontal projections** **• Vertical projections** **• Perspective**	 **Pic. (7) It shows the horizontal projection of a bank, showing the distribution of administrative vacancies inspired by the bank's brand, showing zoning. mood board and the materials and color scheme used in the project.**  **Pic. (8) shows the vertical projections and perspectives of the meeting room.**  **Pic. (9) shows the vertical projections and perspectives of workspace.**
Artificial intelligence application:	Artificial intelligence can identify, collect and inventory the types of data, specific to the administrative space "bank" and find possible relationships between the data. The power of artificial intelligence lies in the speed of analyzing huge amounts of data and suggest modifications to the design without error and with high quality. After that, the designer can choose and approve the appropriate modifications, including colors, materials, furniture, and choose the most appropriate for the project.
Application "(Chat GPT 4)" for AI-(prompt):	**<u>Meeting Room in ABK Bank:</u>** **Concept of design:** Analyzing logo lines, pic (10), diagonal lines wall in navy blue, off-white and yellow lighting. **Furniture:** Rectangular shape with minimalist style, head chair navy blue color & guests chair with orange color. **Materials used: Marble** used in flooring, gypsum board on walls. **Lighting: Gypsum** board ceiling with yellow LED light.  **Pic. (10) shows a perspective of the meeting room ABK-bank using AI application.**

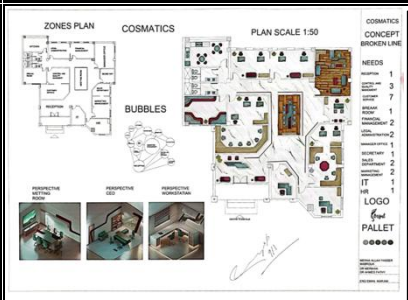
	Branding: Logo of the bank in front of meeting table beside data show screen for presentations. **Workstation space:** **Design: Using** angular lines from logo branding in wall design with navy blue color & off-white color theme, pic (11). **Furniture: Wooden** desks with glass partitions, including under desk drawer, and navy-blue office chairs to match with wall accents, ensuring a cohesive design. **Flooring:** Off-white marble for a luxurious and aesthetic. **Workstation placement in space:** Located beside windows for maximize natural light and create an open, airy feel. **Lighting:** Mixed natural light with artificial one for function and aesthetic ethics for officers.

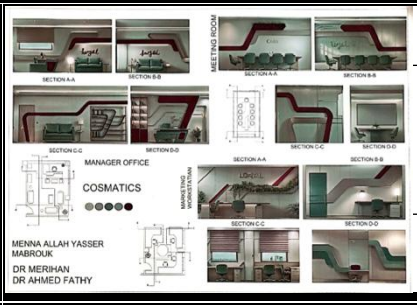


Pic. (11) shows a perspective of the workstation space in ABK-bank by using AI application.

Table (4) shows project -2-ABK-bank.

- **Application & Analysis of project (3)- table (5):**

Project (3): **Cosmetics company**	It consists of a reception and waiting area, general administration staff rooms (human resources / it / financial affairs / legal affairs / customer service / quality and control / sales and marketing), a service area (office / bathrooms), senior management staff rooms (director and secretarial), shows in pics (12,13).
Student works: **• Horizontal projections** **• Vertical projections** **• Perspective**	 **Pic. (12) shows the horizontal and perspective projection of cosmetics company, showing the distribution of administrative spaces using a diagonal grid, and the distribution of departments in a way that fits the space, showing zoning and arch. bubbles.**

<table>
<tr><td></td><td> 

Pic. (13) shows Vertical projections for meeting room, manager room, workspace room.</td></tr>
<tr><td>Artificial intelligence application:</td><td>Artificial intelligence cooperates with the designer in analyzing, inventorying, and collecting data to reach the desired results and assist the designer in the process of creativity and inspiration. The concept of artificial intelligence significantly redefines the role of the designer, starting from design to implementation, and liberation from the old, traditional models of the designer’s role.
Artificial intelligence prepares design drawings, explaining design solutions, identifying patterns.
Design styles, determining the relationship of administrative spaces to each other, choosing appropriate color plans for administrative activity, as well as materials and implementation methods.</td></tr>
<tr><td>Application “(Chat GPT 4)” for AI-(prompt):</td><td><u>Meeting room:</u>
Concept: Broken line with smooth edges on wall, pic (14), with lines colored by both colors dark red & dark green accents, on off-white walls.
Furniture: Rectangular table, mint green chairs.
Flooring: Off-white marble & dark brown lines (borders).
 
Pic. (14) shows a perspective of the meeting room using AI application.

<u>Modern Manger office</u> space:
Wall concept: Broken line design with smooth edges, pic. (15) in dark green &dark red on off-white walls.
Furniture: L shape reddish brown desk, with mint green head chair, and two guests mint green chairs.
 
Pic. (15) shows a perspective of manger room using AI application.</td></tr>
</table>

	Flooring: Off-white marble floor. **Natural elements: Indoor** plants **Workstation space**: **Concept of design: Broken** line with curved edges, pic (16). **walls cladding:** gypsum-board colored with green and dark reed with off-white in base. **Lighting: Workstation** located beside windows for Natural light mixed with artificial one for lighting space of work. **Acoustic panels:** Wood or fabric panels in walls and ceiling to enhance soundproofing. **Furniture:** Workstation wood desk with angular edges, with minimalist style, under-desk drawer for storge, mint green administrative chairs. **Flooring:** Worm -toned hardwood floor.

Pic. (16) shows a perspective of marketing management space of a cosmetics company using the application of artificial intelligence.

Table (5) shows project -3- Cosmetics company.

Third- Research Results:

1.The study showed that it is possible to benefit from AI applications represented by "Chat GPT 4" (as it helps in creating design ideas for the administrative space, as they are proposals that stimulate the designer's imagination to reach the final designs, designer can also modify on designs to reach an idea that is close to reality for implementation.

2.Artificial Intelligence not only automates processes, but also automates learning, which is the essence of innovation. Therefore, it provides unprecedented opportunities to significantly reduce the cost and time of developing new design solutions.

3.The study confirms that the design that comes out of AI is not considered a substitute for human creativity, but rather as a complementary tool to enhance and enrich the creative process.

Fourth- Research Recommendations:

1.**Scientific and research recommendation:**

The researcher recommends the necessity of including artificial intelligence and its applications related to interior design and furniture within the academic curricula for students of the scientific department in arts colleges and institutes in Egypt.

2.**Interior designers' recommendation:**

- Recommends the need to pay attention to recent developments in the field of interior design using artificial intelligence.

- It is recommended to benefit from AI applications in the fields of interior design, with the aim of enriching design and as a supportive tool for the designer.

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