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Deanship of Scientific Research

The Impact of Artificial Intelligence on the Development of Design Thinking for Interior Design Patterns in Commercial Spaces An Applied Study "An Office Space for Ward Mall in Amman"

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Abstract

Objectives: The following research paper applies artificial intelligence as a helpful tool in designing and illustrates the impact of using AI technology in an office space. Moreover, it infuses different styles such as Scandinavian style into the interior design of the space and measures the impact of AI technologies on the future of the design process and the interior designer.

Methods: The research follows the descriptive approach in analyzing the research model in developing applied design proposals by collecting information and data and analyzing them to achieve the research objectives. The research question lies in the extent of the impact of AI technology on the design process, and whether such technologies can replace the lead designer of the project.

Results: The study underlines the importance of using modern innovations like artificial intelligence in the realm of interior design for architectural spaces within the designated physical area. This gives the designer the freedom to improve their perception, ideas, and suggestions in a way that is open and reflective of the location and today's needs.

Conclusion: The design process is changing as a result of incorporating artificial intelligence (AI) into architecture; it is now quicker, more effective, and more sustainable.

Keywords: Artificial Intelligence; Office Space; Design Patterns; Scandinavian Style.

تأثير الذكاء الاصطناعي على تطوير التفكير التصميمي لأنماط التصميم الداخلي في المساحات التجارية دراسة تطبيقية "مساحة مكتبية لمجمع ورد مول في عمّان"

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ملخّص

الأهداف: تطبق الورقة البحثية التالية الذكاء الاصطناعي كأداة مفيدة في التصميم، وتوضح تأثير استخدام تكنولوجيا الذكاء الاصطناعي في مساحة مكتبية. علاوة على ذلك، فهي تدمج أنماطاً مختلفة مثل النمط الاسكندنافي في التصميم الداخلي للمساحة وتقيس تأثير تقنيات الذكاء الاصطناعي على مستقبل عملية التصميم والمصمم الداخلي.

منهجية الدراسة: يتبع البحث المنهج الوصفي في تحليل نموذج البحث في تطوير مقترحات التصميم التطبيقي من خلال جمع المعلومات والبيانات وتحليلها لتحقيق أهداف البحث. وتكمن مشكلة البحث في مدى تأثير تكنولوجيا الذكاء الاصطناعي على عملية التصميم، وهل يمكن أن تحل هذه التقنيات محل المصمم الرئيسي للمشروع.

النتائج: تؤكد الدراسة مدى أهمية استخدام الابتكارات الحديثة مثل الذكاء الاصطناعي في مجال التصميم الداخلي للمساحات المعمارية ضمن المساحة المادية المخصصة. وهذا يمنح المصمم الحرية في تحسين تصوره وأفكاره واقتراحاته بطريقة منفتحة ومعبرة عن الموقع واحتياجات اليوم.

الاستنتاج: تتغير عملية التصميم نتيجة لدمج الذكاء الاصطناعي في الهندسة المعمارية؛ حيث أصبحت الآن أسرع وأكثر فعالية واستدامة .

الكلمات المفتاحية: الذكاء الاصطناعي، المساحات المكتبية، أنماط التصميم، الطراز الاسكندنافي.

Introduction

With the great development in the revolution of modern technologies, one of them has emerged and left a lasting impact on our minds and of those who come after us, which is the artificial intelligence technology that mimics the human perception and mind worthily, and this technology has proven indisputably the ability to create a wide and unique space of ideas to give the designer's work a distinctive touch by using his imagination and visualization of design.

The interior design industry is all about the smart use of space with appropriately designed forms and shapes, along with measurable variables like lighting and color, as well as other aspects like furniture and material textures (Banaei et al., 2017). Artificial Intelligence (AI) is the science and engineering of making intelligent machines or computer programs, and the purpose of AI is to learn how to solve problems (Cioffi et al., 2020).

Artificial Intelligence (AI) has made it possible to simplify and reduce the steps of the design process. Intelligence (AI) has helped to streamline the design process by using machine learning and intelligent data analysis techniques to provide effective and fast design solutions to the issues designers face. Through the use of AI, designers can analyze data and generate models and design insights faster and more accurately, saving time and effort in understanding customer requirements as it has the ability to inspire and enhance the design process (Yamaguchi et al., 2019).

Literature review

Artificial intelligence (AI) technology

Artificial intelligence, also referred to as artificial intelligence (AI), is defined as a branch of information technology, which is the intelligence created or manufactured by humans in a machine or computer, so that it has the ability to perceive, learn, solve issues and make decisions in the same way as the human mind (Francis.2018).

Artificial intelligence has also been defined as the construction of computer programs that dedicate themselves to accomplishing tasks that are, in fact, satisfactorily accomplished by humans, because they require high-level mental processes, such as cognitive learning, memory organization and critical thinking, it is the process that aims to improve the cognitive and mental processes in artificial machines to be able to think, perceive and make decisions (Smith, 2018).

AI programs and applications are designed by studying how the human mind thinks, learns, decides, and acts while trying to solve an issue, and then using the results of this study as a basis for developing intelligent software and systems (Greenwald, 2021). Artificial intelligence is a science and technology, it is a science that combines many sciences, such as computer science, biology, languages, cognitive psychology, mathematics, engineering and others, and technology because it aims to produce systems based on knowledge in a specific field that can make the computer have the ability to think, see, speak, hear and move, these systems are called "system based knowledge", which are characterized by the ability to perceive, infer, deduce, and also to learn (Gengnagel, 2019).

Characteristics of artificial intelligence:

1. AI-powered interior design tools are on the rise. These innovative tools allow designers to experiment with more personalized and efficient options that reflect the client's vision and desires, without going through complex design stages manually. Artificial intelligence can affect all stages of the design process, and can be used to improve quality, efficiency, and save time and effort in the design process (Haefner, 2021).

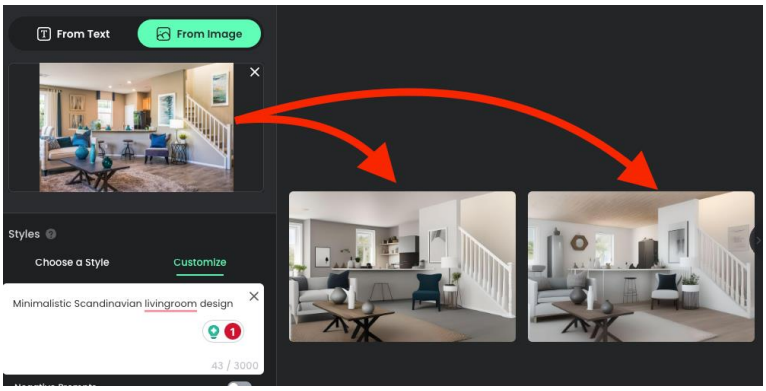


Fig: 1

Source: Artturi Jalli, Dec 28, 2023

Steps of using AI applications in interior design

2. The Concept phase aims to generate appropriate ideas to solve the design issue or meet the required need, and the methods of finding the general idea of the design vary from one designer to another, and depend on the type of project or product to be designed. This stage is considered one of the crucial stages in the design process in general, as it determines the general direction of the project and influences the later stages of the design process (Kapoor, 2023).

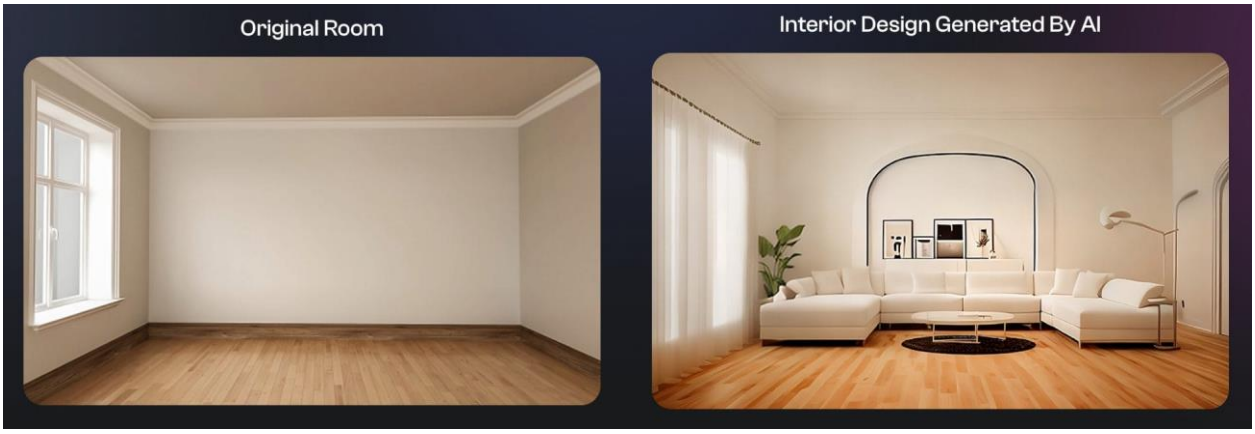


Fig 2

Source: Decorilla, Feb 29, 2024

This figure illustrates how to generate and add different patterns

3. The designer can also create 3D, 5D, sketches models of the interior spaces, input them into various AI programs and applications, and then the AI will suggest several alternatives. AI interior design is revolutionizing the décor and design industries by simplifying the process of choosing a look. It helps with ideation, vendor research, and even provides a glimpse into the future with 3D images, much like a reliable buddy (Mason, 2022).

fig3
3D pattern

fig4
sketches to real patterns

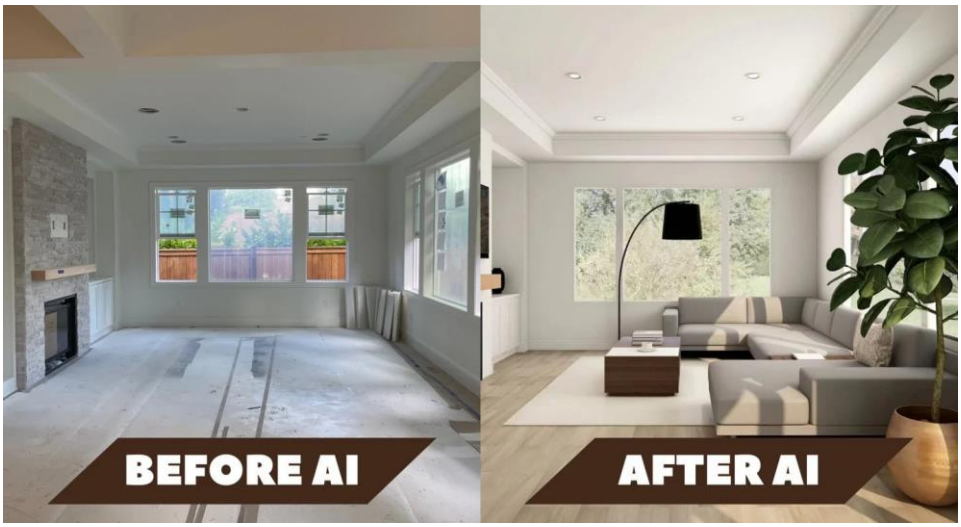


Fig5: 5D pattern

Source: (3) Kasia Chojecki, May 19, 2023
(4) Kamran Shahid, Jul 4, 2023
(5) Midjourney, August 2022

Scandanavian style

The Scandinavian interior design style, which has been popular since the 1950s, is still one of the most current styles for establishing a cozy home or workplace. Owing to the limited amount of bright days in the northern Scandinavian environment, an abundance of light and the right hues are significant features of this interior style (Erdoğan, 2006).

The efficiency and adaptability of even tiny trinkets are skillfully blended with the modesty and aesthetic simplicity of the Scandinavian design. Any room may be transformed into an attractively designed environment with the help of the geometrically accurate, straight lines and neutral color palette, which are genuinely ageless. Large, light-filled spaces, cozy cushioned furniture, and natural materials used for decoration—all of this appeals to those who value simplicity, adaptability, and unobtrusiveness in design (Ching, 2007).

The following characteristics are what make the Scandinavian style distinctive: expansive windows that let in an

abundance of natural light; an open floor plan that allows rooms to be combined into a kitchen, living room, bedroom, and office; imitation or natural materials used in décor (fur and textiles, stone and wood, glass and ceramics, brick and metal); colorful accents that break up monotonous lines and pure colors (paintings, posters, tapestries, sculptures, vases, original lamps, clocks, indoor plants); simple forms and the absence of ostentatious luxury, even the most expensive (Arslan, 2004)

The Scandinavian style in interior design is characterized by simplicity, functionality, and the use of light colors and open spaces. This style relies on simple furniture, clean lines, and the use of natural materials like wood.

The combination of artificial intelligence and Scandinavian design is driven by a desire for simplicity, efficiency, and functionality. AI can enhance the minimalist and practical aspects of Scandinavian design by optimizing space usage, improving energy efficiency, and providing personalized recommendations for decor and furniture. This synergy creates a harmonious and smart living environment that aligns with the core principles of Scandinavian design.

The study problem

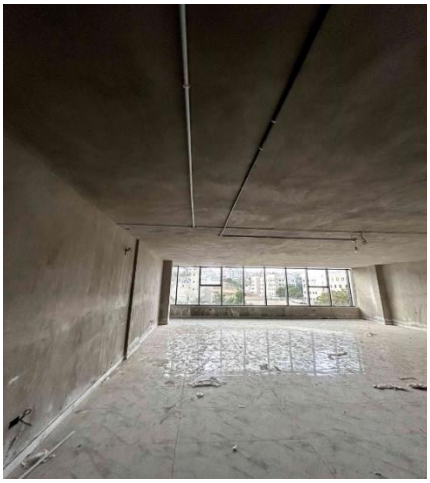
The research question lies in the extent of the impact of AI technology on the design process, and whether such technologies can replace the lead designer of the project. We must delve deeper into whether this technology has influential advantages in the design process, such as saving time and effort and highlighting more space for the designer to search for various options and ideas that are out of the box, unfamiliar, modern, novel and innovative.

Research methodologies

The research follows the applied- descriptive analytical approach by collecting and analyzing information and data, in order to achieve the research objectives and answer the research questions.

In this paper, we apply AI tools in designing the commercial office space in the Ward Mall. We depend on the following AI applications, such as Midjourny, Arch, and Remodel AI. The study sample was selected (office space in Ward Mall) in Amman, Jordan, and then studied the impact of modern technological applications such as artificial intelligence in structuring, formulating and implementing the project by implementing a design proposal using artificial intelligence (AI) technology on the study sample .A preliminary sketch of the office space to be designed was created to calculate the actual space and footprint of the space.

Here are photos of the office space before the design:



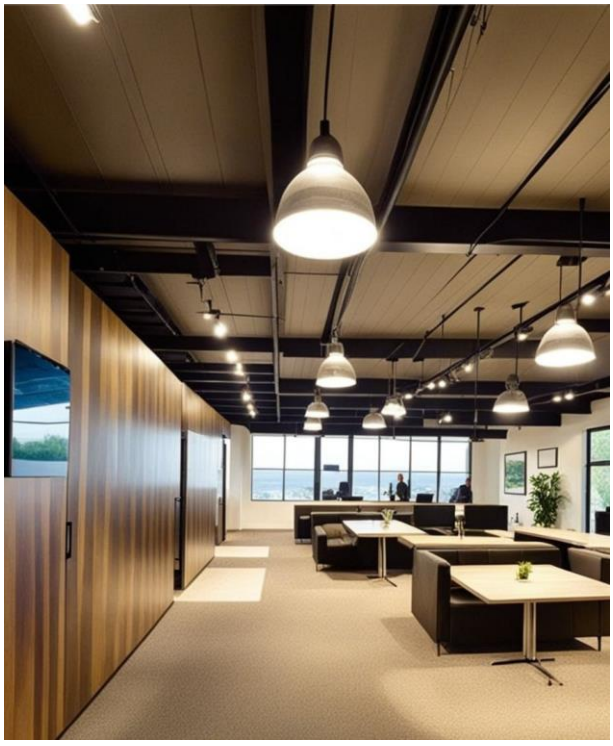
This photo is taken by the designer (The ceiling height 280 cm)

This photo is taken by the designer (The ceiling height 280 cm)

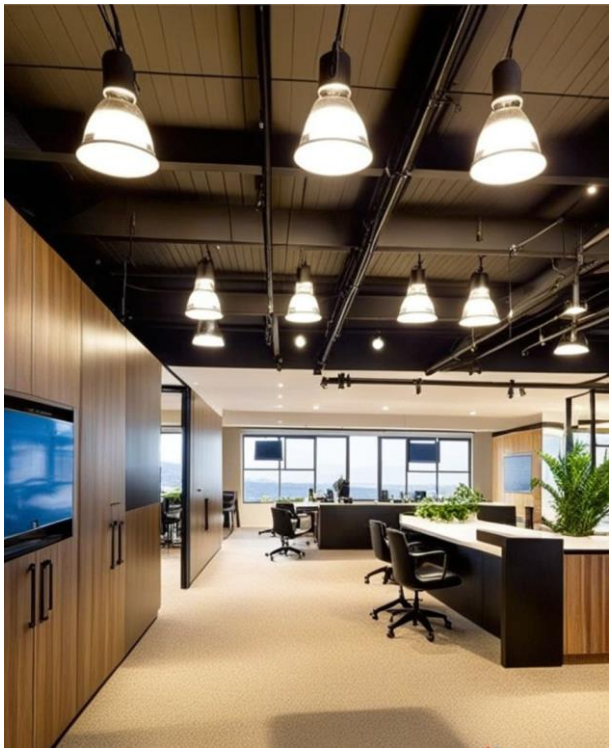
Results

The results showed the importance and role of AI technology in adding a kind of modernity and creative touch during the creation of the design and helped the designer to make decisions to implement and design the project. The AI technology also demonstrated the ability to choose the appropriate angles, colors and furniture by using the Scandinavian style in the design of the vacuum project in Ward Mall.

Original décor that gives spaces a distinct feeling of proportion is necessary for a Scandinavian interior design. Avoiding overdoing the space with decorative accents is a crucial requirement. Naturalness and environmental friendliness are embodied in modern Scandinavian interior design. As such, real wood or materials that mimic it are acceptable for use in surface design. In order to appear simple and natural, the surface should also have a basic polish.



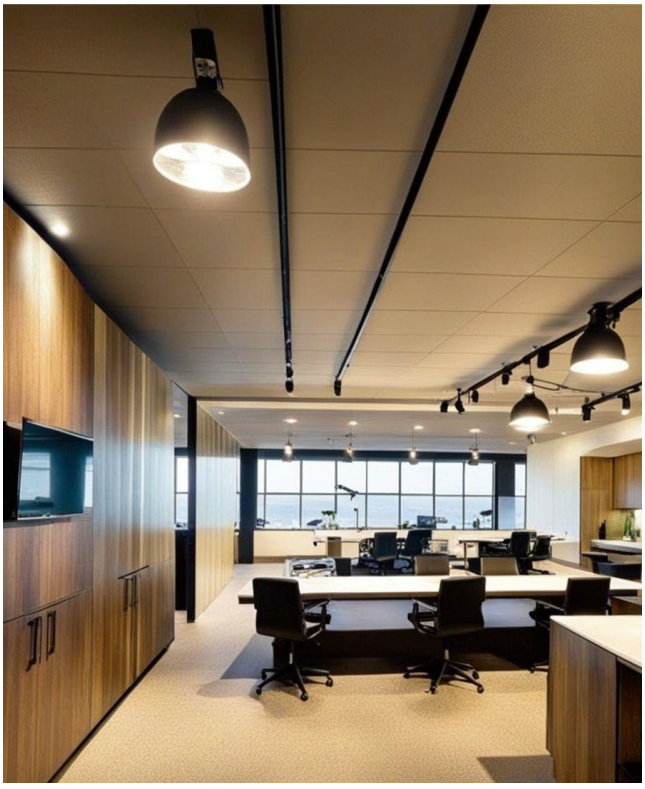
The first design concept of the office space The designer's work using Remodel AI application



Another design concept

The designer's work using Remodel AI application

(the light drops 30 cm from the ceiling)



Another design concept

The designer's work using Remodel AI application

White and its tones are the primary color used in Scandinavian design. To broaden the color palette, light brown and beige variations are employed. Additionally, there are one or two bright elements added to the general design, such as a creative office accessory, interesting furniture textiles, or a color contrast in wall decorating that uses beige or classic brown. It makes sense to employ light wood tones, which add coziness and warmth to the workspace, lessen the stark, white "laboratory effect," and lighten the seriousness to a comfortable level. For this, we choose modular furniture, wall panels and other decoration elements made of natural wood or high-quality.

A matte parquet board that resembles wood is used to embellish the floor in the Scandinavian style. The color of the walls is warm and bright. The ceiling should ideally be white or painted in soft, pleasant white tones. Panoramic windows, pendant lights, built-in lamps, and a plain, white ceiling all contribute to the abundance of light present.

Research results

1. Applying artificial intelligence as a helpful tool in designing

2. illustrating the impact of using AI technology in an office space

3. infusing different styles such as Scandinavian style to the interior design of the space

4. Measuring the impact of AI technologies on the future of the design process and the interior designer.

Conclusion

Creativity and innovation are the tools and talents of the human mind alone. The human mind cannot be eliminated or replaced, and AI is nothing more than technology and tools that govern and facilitate life in general. The applications and programs that work with AI are only a means and a tool that contributes to the elimination of repetitive activities and tasks and saves time and effort, and is not a substitute for the internal designer and cannot replace human creativity at the time.

The creative designer is the one who adapts modern capabilities to serve his design idea, and it can be used as a tool to enhance creativity, improve quality and efficiency, and save time and effort in the design process. Artificial intelligence is a brainstorming tool that has the ability to inspire and enhance the internal design process, and the accuracy of the results depends on the professionalism and skill of the designer in using these tools and how accurately he describes the input data and design elements to propose a set of alternatives that can be modified, until the designer reaches the final form of the design he thinks of (his design vision), i.e. they are tools that help the designer to produce the image he imagines based on his accurate description of it.

Recommendations

1- The need for designers to keep abreast of technological development and exploit the capabilities and potential of artificial intelligence tools and software to improve design efficiency in the field of interior design.

2- Urging students' technological skills and urge them to exploit and adapt technology in favor of the design process to keep pace with changes in the labor market.

3- Using innovating tools and programs that increase the efficiency of the design process using artificial intelligence techniques.

4- Designers must adhere to the rules and regulations of design, no matter how advanced the design software is.

Finding ways around the development of intellectual property law policies, regulations and standards to ensure that AI algorithms are used in a responsible and ethical manner in order to give legal protection to works that are the result of AI technology.

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