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THE ROLE OF ARTIFICIAL INTELLIGENCE IN ENHANCING THE BIOLOGICAL BALANCE IN ARCHITECTURE

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ABSTRACT

The research is a step towards integrating artificial intelligence techniques in the field of architecture with the principles of biogeometrics and energy design, to reach spaces that are more compatible with the user by realizing the characteristics of the energy present in the space. The research follows the descriptive and analytical approach in order to combine the two axes of the study. ; To understand more about the role of artificial intelligence in architecture and adding the biological dimension to obtaining regulated energy, through rapid and accurate analysis and modeling of data and preparing a set of proposals and modifying them easily based on the entered data, thus predicting regulated energy pathways and avoiding any harmful paths by identifying shapes and symbols. Colors, design patterns and other features, and classifying different data for the longest possible period. This is achieved by applying the principles of design using bioengineering and its sciences in integration with artificial intelligence programs to reach design configurations that are compatible with the user, which in turn achieves bio-balance, which contributes to improving the reality of architecture.

KEYWORDS: Artificial Intelligence (AI), Biogeometry, Biogeometry Design, Biodynamic Balance, Biogeometry Design Principles, Artificial Intelligence Software.

دور الذكاء الاصطناعي في تعزيز التوازن البيولوجي في العمارة

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الملخص

يعد البحث خطوة نحو الدمج بين تقنيات الذكاء الإصـــطناعي في مجال الهندســـة المعمارية و مبادئ علم هندســـة التشـــكيل الحيوي (البايوجيومتري) والتصـميم بالطاقة ، للوصـول إلى فراغات أكثر توافقاً مع المسـتخدم وذلك بإدراك خصـائص الطاقة الموجودة في الفراغ ، ويتبع البحث المنهج الوصفي والتحليلي وذلك للدمج بين محوري الدراسة ؛ لفهم المزيد عن دور الذكاء الإصطناعي في العمارة و إضافة البعد الحيوي للحصـــول علي الطاقة المنظمة ، من خلال تحليل ونمذجة ســـريعة ودقيقة للبيانات وإعداد مجموعة من المقترحات والتعديل عليها بســهولة بناءً على البيانات المدخلة، وبالتالي التنبؤ بمســارات الطاقة المنظمة وتلافي أي مســارات ضــارة من خلال تحديد الأشــكال والرموز والألوان وأنماط التصـميم والميزات الأخرى، وتصـنيف البيانات المختلفة لأطول فترة ممكنة.وذلك بالتطبيق لأسـس ومبادئ التصـميم بالهندسـة الحيوية وعلومها بالتكامل مع برامج الذكاء الإصـطناعي للوصـول إلي تكوينات تصـميمية متوافقة مع المسـتخدم والتي بدورها تحقق التوازن الحيوي مما يسهم في الإرتقاء بواقع العمارة.

الكلمات المفتاحية : التباين المكانى، دليل التنمية البشرية، دليل التعليم، دليل توقع الحياة، دليل الناتج المحلى الإجمالى.

Introduction:

Humans have been searching for an invention that can mimic the human mind in its pattern of thinking throughout history. Artificial intelligence has emerged to become an integral part of our daily lives, in the field of design, implementation, and monitoring the health and productivity of built spaces. It relies on the rapid processing of data and inputs, which allows designers to expand their visual base to obtain healthy and comfortable spaces.

As the wave of development has continued, invisible influences have emerged that were not previously perceived, such as frequencies, vibrations, and electromagnetic waves that surround humans and affect their biodynamic balance. In an attempt to understand the effect of design energy and shape energy, as living beings that occupy architectural spaces with geometric shapes are affected by the energy fields reflected by those geometric shapes, the science concerned with this study is called biogeometry.

Considering this, the research seeks to add the determinants and principles of bioformation (biogeometry) to artificial intelligence techniques in architecture to provide many designs, proposals, and presentation methods, and to provide appropriate solutions as quickly as possible in a way that achieves the biodynamic balance of humans. This is through the regulation of the energy surrounding the individual.

Research Problem:

The research paper addresses the impact of integrating bioenergy systems with artificial intelligence techniques in architectural output. This is in an attempt to achieve biodynamic balance. The research paper argues that there is a lack of understanding of the need to move towards the use of digital technologies and artificial intelligence, and to rely on advanced programs to integrate the biodynamic dimension of energy-based design. This is in order to provide the innovative solutions that they can offer in general, and in the field of architectural design in particular

Research Hypothesis:

Since artificial intelligence techniques have had a clear impact on the architectural field, integrating these techniques with the principles of biogeometry can help to avoid the negative effects on the user of architectural spaces and avoid any disruption to the surrounding energies. This can be achieved by combining artificial intelligence algorithms and large amounts of data with the addition of biodesign principles to the project data. This can enhance design capabilities in thinking and creativity and find innovative and unconventional design alternatives that achieve the biodynamic balance of the user and create a healthy and comfortable environment.

Research Objectives:

1. To explore the integration of artificial intelligence programs in the field of architectural design and biogeometry design towards unifying specialized competencies and knowledge at various levels of interaction.

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2. To apply the principles of energy-based design thinking and artificial intelligence tools to create innovative architectural solutions.

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3. To leverage artificial intelligence programs to improve the efficiency of architectural space and create a safe and healthy environment for users by applying bioengineering concepts in design.

To leverage artificial intelligence programs to improve the efficiency of architectural space and create a safe and healthy environment for users by applying bioengineering concepts in design.

4. To increase the awareness of architectural designers of the foundations and principles of bioengineering design and its sciences to avoid negative effects on the user.

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Importance of the Research:

The research on this topic is becoming increasingly important to explore the challenges and opportunities of artificial intelligence in architectural design, and to gain a better understanding of the potential role of artificial intelligence in architectural design to reach a clear mechanism to achieve human-friendly architecture by achieving the user's biodynamic balance.

Research Methodology:

The research will follow a descriptive and analytical methodology. This is to combine the two main axes of the study, which are the applications of artificial intelligence in architecture and biogeometry design. The research will analyze the forms that emit organized energy to achieve biodynamic balance.

1- Concepts and Terms:

1.1. **Artificial Intelligence (AI):** The ability of machines and digital computers to perform specific tasks that mimic and resemble those performed by intelligent beings and the human mind, such as the ability to think or learn from past experiences or other processes that require mental operations.

Figure (1) Artificial Intelligence Evolution in Smart Buildings for Energy Efficiency[1]

AI includes all applications that perform complex tasks. It aims to reach systems that have intelligence and behave in the way that humans do.

1.2. **Algorithm:**

An algorithm is a set of organized instructions that help a computer perform a calculation. It allows the computer to know what to do and when to do it.

1.3. **Biodynamic Design:**

[1]Artificial Intelligence Evolution in Smart Buildings for Energy Efficiency. (2021). Farzaneh, H., Malehmirchegini, L., Bejan, A., Afolabi, T., Mulumba, A., & Daka, P. P

Biodynamic design is the practice of designing spaces that consider the flow of energy through them. It is based on the belief that energy is present in all things in the universe and that it can have a positive or negative impact on human health and well-being.

Biodynamic design is based on the belief that energy is present in all things in the universe, and that it can have a positive or negative impact on human health and well-being. By using the principles of biodynamic design, designers can create spaces that support human health and well-being by shapes, natural light, and colors.

Figure (2) Natural light and ventilation

1.4 Biogeometry:

Biogeometry is a specific geometric science that works to balance energy within the human body in the surrounding environment. It can be considered a comprehensive science that is linked to many other sciences, the most important of which are engineering and medicine.

Everything in the universe has its own frequency and vibration. Therefore, the science of biogeometry deals with the material and qualitative aspects to achieve harmony between the energy of the human being, the energy of the architectural shape or space, and the energy of the surrounding nature. Each shape has energy and effect according to its dimensions and angles. Therefore, the goal of biogeometry is to positively influence the energy of the human being through the shape, according to the required function.

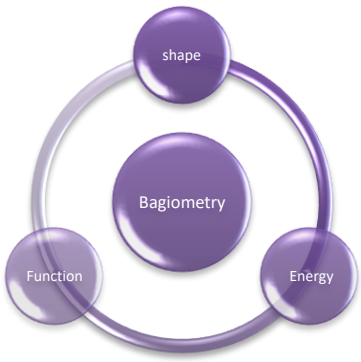


Figure (3) the relationship between geometric shape, function, and user energy in biogeometry

The figure (3) shows the relationship between geometric shape, function, and user energy in biogeometry. The shape has an impact on the energy of the user, depending on the function of the shape. Source: Researcher

It also seeks to organize the energy of the place through color distributions and design models that are placed inside the place to achieve balance in energies and introduce organized energy into different fields through:

- **The use of geometric shapes**: Geometric shapes have different energies and effects, depending on their dimensions and angles. For example, the circle is associated with peace and tranquility, while the square is associated with stability and order.
- **The use of colors**: Colors also have different energies and effects
- **The use of natural materials**: Natural materials, such as wood and stone, have positive energies that can benefit human health and well-being.

Biogeometry is a growing field of interest as people become more aware of the importance of energy and its impact on our lives.
Here are some examples of how biogeometry can be used:
-**An architect** might design a building with a circular floor plan to promote peace and tranquility.
-**A landscape designer** might plant trees and shrubs in a way that creates a sense of harmony and balance.
-**A therapist** might use biogeometry principles to create a healing environment for their clients.

Biogeometry is a powerful tool that can be used to improve the quality of our lives.

Figure (4) - Harmonious geometric shapes help to promote the flow of energy. For example, Br House: a circular floor plan can help to create a sense of peace and tranquility. source- https://www.pinterest.se/pin/614741417858320091/

The combination of architectural thinking and artificial intelligence algorithms can be a powerful force for creating more sustainable, creative, and healthy architectural projects in the future. Considering the principles of biogeometry, AI algorithms can help in designing projects that are healthier and well-being for humans. They can do this by designing projects that take advantage of the energy of nature and its positive impact on humans.

For example, AI algorithms can be used to analyze climate and environmental data to create more sustainable and energy-efficient architectural designs. They can also be used to create architectural designs that are more in harmony with nature and its energy.

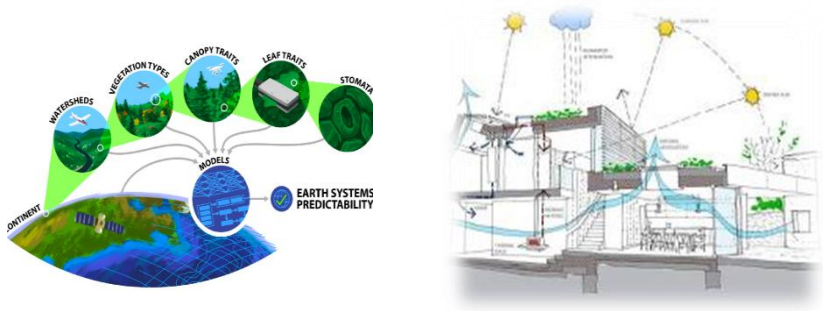


Figure (5) Sustainable architectural design Source : www.casa-architects.co.uk-

2- Artificial Intelligence in Architecture and Construction :

Researchers and developers specialized in artificial intelligence have been working on developing computer techniques that allowed computers to automatically recognize image elements and add an accurate description to each image. This allows for the creation of projects that are integrated with images and data. On the other hand, we find that another group of developers have resorted to developing a technique that relies on converting written texts into images and displaying them alongside a set of proposals in the form of completely new and non-copied designs.

This technique relies on the use of artificial intelligence to analyze the written text and identify the elements and relationships between these elements. Then, artificial intelligence creates new images and designs that are compatible with these elements and relationships.

This technique can be used in a variety of applications in architecture and construction, including:

- **Design:** It can be used to create new architectural designs by entering a simple and accurate description of the desired design. This technique can help architects create more creative and innovative designs.
- **Analysis:** It can be used to analyze data from buildings and engineering projects to identify weaknesses and improve performance. This information can help engineers create safer and more energy-efficient buildings.
- **Planning:** It can be used to create new urban plans by entering a description of urban needs and goals. This technique can help urban planners create more sustainable and efficient plans.

Maintenance: It can be used to create maintenance plans for buildings and engineering projects by entering a description of potential problems. This information can help engineers keep buildings in good condition and prevent breakdowns.

Figure (6) Some examples of AI outputs- https://digitalfutures.international/wp-content/uploads/2023/06/tifa.studio_a_building_that_adapts_to_different_weather_pattern_c2e36b8f-1094-47b7-8079-ecf5f2e07c5f-1.png

Artificial intelligence techniques continue to evolve, and it is expected to play an increasing role in architecture and construction in the future. In this context, Campo and colleagues presented an example of how generative adversarial networks (GANs)[2] can be used to produce architectural designs in a project called Robot Garden, which was developed at the University of Michigan. Additionally, another application allows designers to easily convert written descriptions of a space into realistic 3D images, giving them the ability to visualize different design options and experiment with them in minutes.

Figure (7) -University of Michigan explores low-carbon construction with robot-built pavilion - https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.dezeen.com

3- The Relationship between Artificial Intelligence, Machine Learning, and Deep Learning :

- Artificial intelligence (AI) means making the computer simulate human behavior in some way.
- **Machine learning** (ML) is a type of AI that consists of techniques that enable computers to learn from data and that enable us to build AI applications.

- **Deep learning** is a type of machine learning that enables computers to solve more complex problems using deep neural networks. Deep learning is a branch of machine learning, where the algorithms are inspired by the structure and function of the brain, called artificial neural networks.

[2] Generative adversarial networks (GANs) are a type of machine learning network that was invented by Ian Goodfellow and his colleagues in 2014. GANs can be used to generate realistic images, which can be used to visualize interior design, industrial design, shoes, bags, and more.

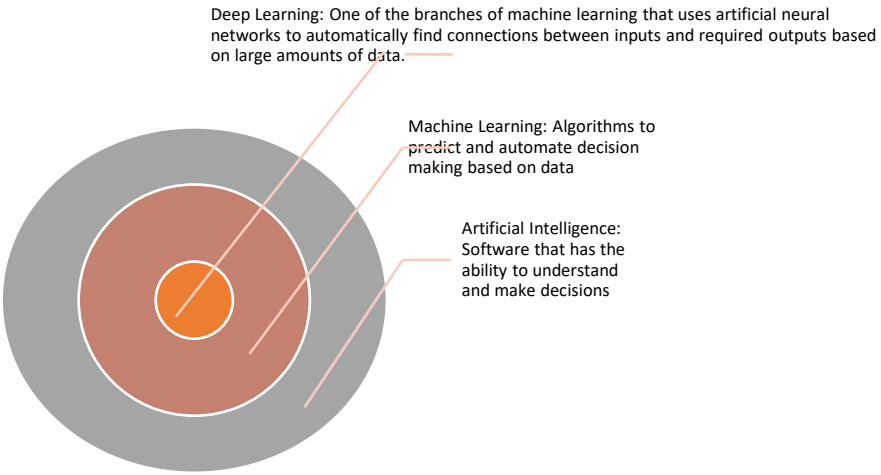


Figure (8) - Diagram showing the relationship between artificial intelligence, machine learning, and deep learning -. Source: Researcher

To leverage this, if AI allows the user to input design criteria or a set of "rules" into the system so that the machine can generate designs, plans, and outputs that are highly efficient and applicable based on your needs.

Since the research deals with organizing the relationship between the architectural design of architectural spaces and bioenergy sciences to reach the best building and improve the health of its residents and the efficiency of their performance, the relationship between architectural formation, bioenergy, and AI applications in architecture can be combined.

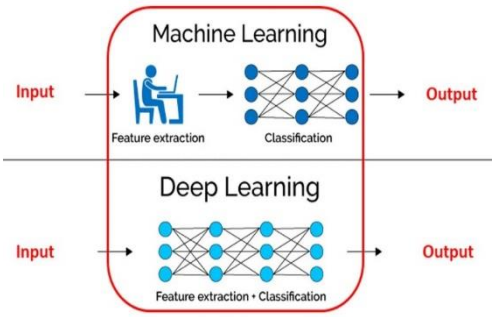


Figure (9) The relationship between machine learning and deep learning to solve more complex problems can be illustrated: https://www.academia.edu-

4- Biogeometry and its impact on human biobalance:

The human body has a bioenergy system that consists of a central and peripheral energy. The study of this energy is considered one of the fields of modern research to develop new therapeutic and diagnostic systems. The central energy level is a field of electrical fields surrounding the body that is affected by harmful energies, thus causing the body to become ill.[3]

[3]. A. Raafat, Environment and Space, Part One of the Architectural Creativity Trilogy, Third Edition, Interconcent, Egypt 2001, p. 44

5- The benefits of biogeometry design:

- **Improved health and well-being**: Biogeometry designers believe that carefully designed environments can help to improve human health and well-being. For example, using the right geometric shapes, proportions, and colors can create a sense of peace, calm, and stability, which may help to reduce stress, improve sleep, and promote focus.

- **Improved creativity and productivity**: For example, using the right colors and shapes can create a more stimulating and inspiring environment, which may lead to increased productivity and creativity.

- **Improved quality of life**: For example, using the right geometric shapes, proportions, and colors can create a more comfortable and welcoming environment, which may lead to increased life satisfaction.

- For example, research has shown that the Fibonacci sequence, which is a common pattern found in nature, can be used to create spaces that are more calming and relaxing.

Figure (10) – Bedroom geometric formations –source :https://www.lushome.com/category/feng-shui-home.

Geometric shapes have their own vibrations, and they affect their surroundings to a certain extent. Anyone who interacts with these shapes, in one way or another, receives this effect (vibrations) ،The brain translates any stimulus into vibrations that are transmitted by the nerves[4].

If this effect appears in the form of organizing energy, i.e., tuning and balancing it; this vibration is called an organized vibrational wave. If it causes a disruption, it is harmful vibrational energy. Therefore, the process of searching for the shapes that emit these organized waves is the beginning of the idea in the science of biogeometry, which may contribute to providing the appropriate environment.[5]

[4] I Karim, Zeinab Hamdy: Introductory Curriculum for Biogeometry, Group of Lectures, Biogeometric Consulting, Cairo, 2015

[5] A Mohamed Galal Murad, Wafaa Omar, Faculty of Fine Arts, Interior Architecture from the Perspective of Biogeometry, Minia University.

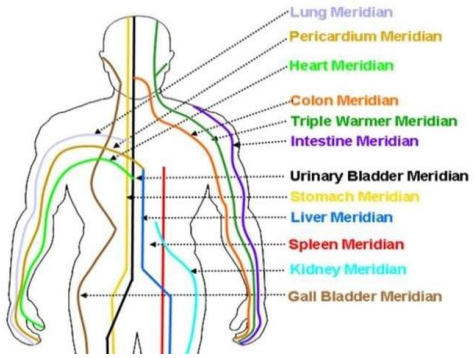


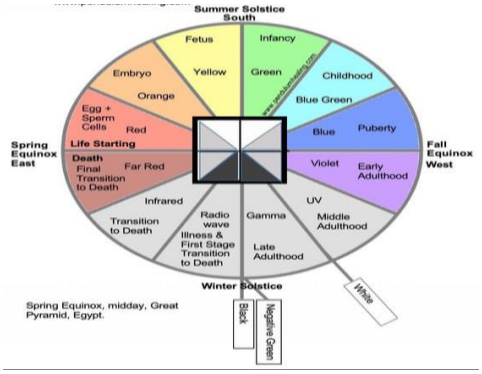
Figure (11) - The human body has twelve major energy pathways known as meridians.

6- The components of organized energy (Biogeometry energy)

Biogeometry is based on the use of organized energy emitted by geometric shapes. This energy has been discovered in natural places that have not been affected by human activity, as well as in other places such as places of worship. When this energy is measured, it is found to consist of three components at the highest harmonic level:

- Specific energy at the higher levels of gold
- Ultraviolet energy
- Specific energy at the higher harmonic level of negative green[6]

The specific energy at the higher levels of gold is associated with healing, regeneration, and spiritual growth. Ultraviolet energy is associated with cleansing, purification, and protection. Negative green energy is associated with balance, harmony, and peace. Biogeometry practitioners believe that these three components of organized energy can be used to create healthier and more balanced environments.



- Figure (12) -The color wheel is a circular arrangement of colors that shows the relationships between them. The colors are arranged in a circle based on their wavelength, with red at one end and violet at the other. Source: https://www.google.com/url?sa=i&url=http%3A%2 F%2Fo-axiology-o.blogspot.com

7- The concept of energy in design As everything has energy, and energy is nothing but moving vibrational waves in the universe, and these vibrational waves interact with each other through the law of resonance.[7].

[6] Ibrahim Karim: Back to a Future for Mankind, Op. Cit., P. 59

[7] Robert Gilbert: Egyptian-European Energy Work, Op. Cit, P. 45

It can be affected the vibrations of the brain by controlling the surrounding shapes and colors, so the design mechanisms used should consider the promotion of positive energies. –

8- The energy emitted by geometric shapes:

Geometric shapes, like anything else in the universe, have frequencies, vibrate, and resonate with other components of the universe. This is what is called "the energy of geometric shapes." Therefore, we can say that each geometric shape emits energy. This energy may be beneficial or harmful, depending on its frequency and whether it resonates with human energy or not.[8]

- Figure (13) -The balcony holder designed in the shape of the letter L is a simple and effective way to create a more positive and balanced environment. The letter L is associated with balance and harmony, and it is believed to emit a calming and soothing energy.

9- Adding the biogeometric dimension to architecture

Biogeometry can be incorporated into any stage of a project. For example, when selecting a site, the preference can be given to sites that are compatible with biogeometric principles. However, if the site is already selected, biogeometry can still be incorporated by considering the underlying ground networks and treating them in a way that is harmonious with the natural environment.

In existing buildings, biogeometry can be incorporated by redesigning the furniture and layout to create a more balanced and harmonious space. Alternatively, biogeometry shapes can be added to the existing space, such as by placing crystals or other objects with biogeometric properties. Here are some specific examples of how biogeometry can be incorporated into a project at different stages:

****Site selection**:**
- Consider the location of the sun, moon, and stars.
- Avoid sites that are in areas of geopathic stress.
- Choose sites that are in areas of natural beauty and harmony.

****Design:**

- Use biogeometric shapes and proportions in the design of the building.
- Incorporate natural elements into the design, such as plants, water, and sunlight.
- Consider the flow of energy through the building.

****Furniture and layout:**
- Arrange furniture in a way that creates a sense of balance and harmony.
- Use biogeometric shapes and patterns in the furniture and accessories.

[8] G. Nagy, (Architectural formation as a design system for environmental control), PhD thesis, Ain Shams University- 2007

- Place crystals or other objects with biogeometric properties in the space.

  By incorporating biogeometry into a project, architects and designers can create spaces that are more conducive to human health, well-being, and spiritual growth

.- **Figure (14)** - A healthcare project designed using principles of biogeometry.The project is characterized by its unique design that relies on specific geometric shapes, such as the circle, triangle, and square. These shapes are believed to have positive effects on health and well-being - SOERCE : https//www.urbanista.org/wp-content/uploads/2018/03/BioGeometry_photo-Ibrahim_Karim_Urbanista-Small-Post-Image4-300x198.jpg

10- Artificial intelligence applications in architecture:

Building Information Modeling (BIM) software is one of the first applications of artificial intelligence systems in architecture, such as Navisworks and Revit. AI applications are now based on machine learning algorithms with the greatest potential to improve the design process, explore elements, and copy them, such as compositions, materials, floor heights, windows, stairs, and so on.

- **Figure (15)** - The Heydar Aliyev Center is an example of a building that was designed using generative design. This type of design uses algorithms to create complex and organic shapes that are not possible to achieve with traditional design methods. Zaha Hadid, one of the most prominent architects known for using innovative design methods, designed the Heydar Aliyev Center. https://encrypted-tbn0.gstatic.com

In reflection of this idea, artificial intelligence can be used to improve building design by analyzing large amounts of data, including climate data, building codes, and construction costs. This can help architects make more informed design decisions and create buildings that are more efficient, sustainable, and aesthetically pleasing.

The adoption of artificial intelligence applications in architecture as essential programs has led to a qualitative shift in the engineering performance of various disciplines and architecture. New tools have emerged that have helped to improve the design process, construction, and maintenance of buildings such as :

10-1- **Visual search** is a new technology that allows architects to match images quickly and effectively with the elements that clients specify.

Augmented reality (AR) or 3D display which allows the enhancement of AI capabilities in the field of design. The importance of this technology lies in the fact that it relies on the fusion of digital information and

information derived from the surrounding environment, then displays them together through a rich information composite image. Which can be integrated with bioenergy pathways. By producing a virtual home.

11- Examples of some AI applications in architecture:

Here are some of the most prominent websites and applications that deal with the art of architecture, producing designs, and processing their data:

Midjourney is an open-source artificial intelligence (AI) program that generates images from textual prompts. It can be used to create architectural designs, and it has the potential to revolutionize the way we design buildings.

Figure (16) -An image of a house for a pianist, designed by Tim Fu using Midjourney.Source: Tim Fu. As a teaching example, Fu uses his “Villa Surrealiste.” This is his prompt: "rolling hills contemporary house luxury property pool cubist parametric timber structure modernist villa white renzopiano photography whitegranite futuristic cozy warm lights.[9]

12- "To use Midjourney for architectural design, you can follow these steps:

1. Create a Discord account or download the Midjourney app.
2. Go to the Midjourney website or app.
3. Click the "Sign in with Discord" button.
4. Sign into Discord and click "Sync".
5. In the text field at the bottom of the page, type "imagine/" followed by a detailed description of your architectural design.
6. Click the "Create" button.

Figure (17) -design across multiple view types using Midjourney. The fabrication of these dwellings would require a componentized approach, or form work to support the 3D printed arches. https://www.linkedin.com/in/stephencoorlas?trk=public_post_feed-actor-name

Application	description	example

[9] https://www.bloomberg.com/news/features/2023-01-31/architects-embrace-ai-art-generator-midjourney

Midjourney **is a website that uses AI to transform any creative text prompt into a detailed design, illustration, or artwork.**	The use of this innovation allows for visual feedback and the ability to see the preliminary design that the designer imagines. It can also provide solutions and suggestions for modification and improvement."	
Dall-E-Mini **is an open-source tool for creating images from text descriptions.**	Depends on transforming any fictional text description into accurate design, graphics, and artwork	
Planner 5D **is a 3D home design software that is powered by artificial intelligence (AI), virtual reality (VR), and augmented reality (AR).**	The tool is effective in easily creating floor plans and interior designs, as well as customized interior settings for homes, apartments, or offices.[10]	
Homestory AR **It is an iOS app that showcases different types of furniture, design fundamentals, and can display the covered space from different angles using a virtual 3D room.**	Users simply must scan the area they want to design, and the AI will measure the size and shape of the area and suggest the appropriate elements that provide the best design.	
IKEA Place **The app uses augmented reality to allow consumers to see IKEA products in their own space.**	The app uses your phone's camera to scan IKEA products, and then recommends the best matching options. It also provides the actual measurements of the furniture to ensure that it fits your space.	
Havenly With this AI-powered app, users can gather their design-related ideas and choose what suits them to bring a realistic touch to their imagination.	The algorithm will use the user's taste to select the appropriate design.	

Figure (18) The following Table showing the most prominent websites and applications used in architecture, produce designs, and process their data- source: Researcher.

13- Uses of Artificial Intelligence in Architecture and Construction:

[10] Evaluation of Interior Design Schemes Based on Artificial Intelligence Processing Technology (2020), Yanxia Zhang

Artificial intelligence (AI) is rapidly transforming the fields of architecture and construction. AI is being used to automate tasks, improve efficiency, and create new and innovative designs. Here are some specific examples of how artificial intelligence is being used in the fields of design, construction, and building health and productivity monitoring:

****Design**.

- AI can be used to create 3D models of buildings, which can be used to test different designs and evaluate them. AI can also be used to create more sustainable and efficient designs.

Figure (19) -3D model of a building- www.sketchfab.com

****Construction**

AI can be used to monitor the progress of construction and identify any potential problems. AI can also be used to guide robots in construction tasks.

Figure(20) -AIpowered construction robot .www.thesafetymag.com

****Building health and productivity monitoring**

Artificial intelligence (AI) allows the creation of extremely complex shapes that we previously thought were impossible. **Here are some of the implications of using AI in architecture:**

- AI can be used to monitor the performance of buildings and identify any problems or issues. AI can also be used to provide recommendations for improving performance.

- AI can be used to make improved design decisions based on algorithms. This can lead to more efficient and sustainable buildings.
- AI can be used to interact visually with design projects.

- AI can be used to automate tasks in construction and implementation. This can improve efficiency and safety.
- AI can be used to create integrated AI systems within homes and smart cities. These systems can control everything from lighting and temperature to security and transportation.

14- The principles of biogeometry (energy-based design):

The process of introducing balance in the above can be summarized by finding a set of formative values that give the design movement. Among these formative values:

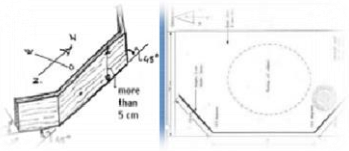
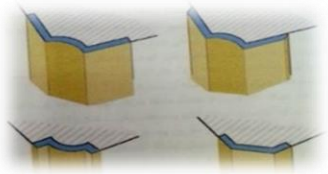
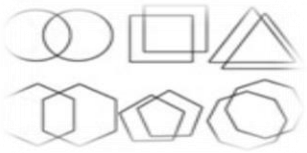
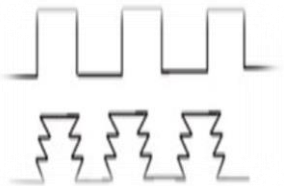
The principles of biogeometry	Description
Introducing organized energy through the idea of centrality	There are many ways to create centrality in a design. One way is to use a central axis or focal point. Another way is to use repetition or symmetry. When centrality is used effectively, it can create a sense of balance, harmony, and focus. 
Introducing organized energy through rotation	Rotation of shapes is one of the most important processes for generating and revitalizing the energy of a shape by finding a hidden center within it. 
The introduction of organized energy through transparency, transition, or transfer	when a design element is moved while maintaining its appearance, a dynamic rhythm is created that resembles the fluctuation of waves. When these rhythms are grouped together, rhythmic centers emerge that collect and organize the flowing energy, creating a beautiful and vibrant balance.
Introduction of movement to the formation through repetition	Repetition creates a type of movement within a design, resulting in organized energy that can introduce balance to the spatial spaces it contains. 
The introduction of movement to the formation through overlap (positive and negative)	Understanding overlap and its role in creating balance allows designers to create more dynamic and engaging experiences across various fields. By manipulating how elements interact. 
The use of the golden ratio in design can create a sense of balance and harmony.	This passage delves into the concept of proportions in biogeometry, specifically focusing on the golden ratio (1.618) and its ability to introduce balanced energy and identify the core components of organized energy within a design. 

Figure (21) -Table showing the principles of biogeometry design (energy design) - Source: Researcher

15- The impact of integrating biogeometry systems with artificial intelligence in architectural output:

It can be said that the integration of artificial intelligence tools with bioenergy systems in design can bridge the growing gap between consumer demands and the practical application of the solution that achieves healthy balance. This technology ensures a more comfortable and harmonious future with the frequencies, vibrations, and electromagnetic fields expected to exist in architectural spaces, as it can imagine customer desires, providing them with customized experiences. In fact, it redefines the shopping experience for the buyer, where he can imagine his dream home and make changes based on his preferences even before purchasing design elements. It also allows the designer different design alternatives that are in line with the principles of biogeometry, by considering:

15-1- **First, study the site in relation to the natural elements surrounding the building before starting the design** and provide the necessary information so that business analysts work with data scientists to identify problems and goals for site analysis from mountains, waterways, and trees. The relationship of the building with each of these elements has advantages from the biogeometric perspective. It also clarifies the best sites in relation to the street network. The approach raises the need to stay away from pollution sources, especially electromagnetic pollution, industrial pollutants, and harmful energy lines and paths before starting the design process.

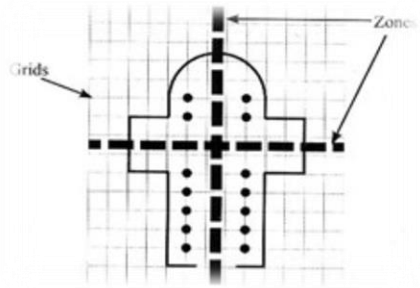


Figure (22) - showing the design according to the Earth energy networks to determine the locations of walls and columns according to a design module compatible with energy paths so that the harmony between the energy of buildings and the energy of connection to the ground is achieved.: https://encrypted-tbn0.gstatic.com

15-2- **Secondly: Architectural designs using Earth energy networks when placing a design module with orientation towards the cardinal directions,** where we prepare, explore, visualize and model the data on a platform that is bioenergy sciences, for example, orientation towards the cardinal directions, which is the method by which the energy of balance is introduced into the building mass by using the energy of the shape. Biogeometry does not impose a specific style in the design, but each designer remains with his style and thought, and the principles of biogeometry melt within the design.

15-3- **Thirdly, the executive designs and technical specifications for construction materials should be as natural as possible** or industrial in nature that is not harmful to the health of users of the space.

As discussed, the impact of the utility network and how it can carry with it balancing energy by introducing it to the water, electricity, and gas supply network. It also addressed the places of furniture and their shapes, and how to distribute and design them in a way that respects the principles of biogeometry, which can be a source of balancing energy within the space.

Here is an example of a biogeometric design: V1 HOUSE in the old residential area of Vinh City, Vietnam. The project achieved many of the values of biogeometric design, such as comfort, a sense

of peace and intimacy, in addition to maximum efficiency of spaces through transparency, balance in the use of materials and considering the orientation according to feng shui directions. All of this led to a smooth and continuous flow of energy, which is reflected positively on the building occupants. Figure (23)

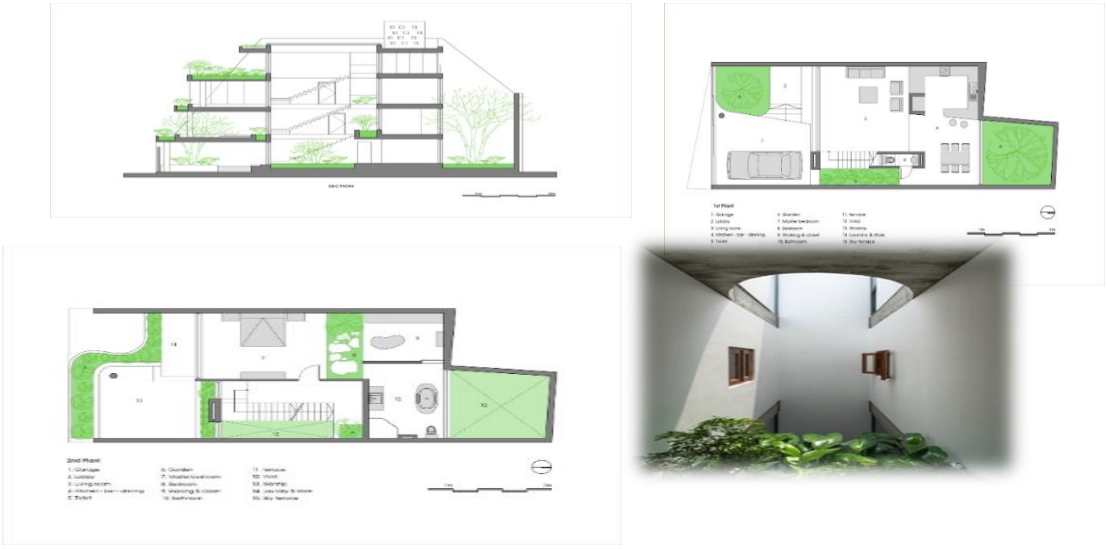


Figure (23) V1 HOUSE

Considering the above, we find that artificial intelligence techniques can be used to restore the lost energy balance within the space and increase the efficiency of performance within residential spaces by analyzing and studying the impact of the energies surrounding the space on human energy. This includes studying the mutual interaction between the energy emitted by the architectural product and the human, on the one hand, and the effect of the energy emitted by the surrounding environment on them, on the other hand, and the possibility of evaluating the interaction of the residential architectural product in the occupancy phase with the surrounding energy.

16- Stages of energy design (biogeometry) operations management in the light of artificial intelligence:

Artificial intelligence (AI) gives designers more time for creativity and inspiration, while computers handle complex, data-intensive repetitive tasks. The integration of AI technologies in architecture is significantly redefining the role of the designer from design to implementation and leading to freedom from old, traditional models of the designer role. AI also allows computers to activate a filtering feature based on bio-energy criteria and then enables the architect to implement any type of design pattern based on the preferences of bio-formation and the most compatible to achieve bio-balance through the analysis and memorization of data either by entering the required text or from thousands of images and videos using computer vision.

The main processes and stages in the design process can be summarized as follows:

Stages	The required works and tasks."	Add the biological dimension.	Integration of artificial intelligence applications.
Design - **Statement**: To define the	Collect all data pertaining to the client, the	Understanding the nature of the project and setting the methodology to minimize exposure to pollution	AI can identify, collect, and summarize all types of data. It can also find relationships

design problem and collect all project data".	project, and the end users.	sources, especially electromagnetic pollution, industrial pollutants, and harmful power lines and paths, are essential steps before starting the design process.	between data sets, generate results, and identify them using natural language processing. AI can also accelerate data preparation tasks, including data modeling and exploring missing data.
Documentation of data and information	In addition to defining the project's goals, it is also important to identify any constraints that may impact the project. These constraints could include things like available resources, regulatory requirements, or technical limitations.	Once all the necessary information for the project has been identified and gathered, the design process can begin. The first step is to address any environmental pollutants that may be present. This includes biological pollutants, such as bacteria and viruses, electromagnetic pollutants. 	Artificial intelligence (AI) tools are used to make design decisions based on real and verified data to determine the design model, analyze colors and shapes using machine learning algorithms, and collaborate with designers in creating visual complexes in mood boards.[11]
Concept Statement and Preliminary Schematic Design	Once the design concept has been defined, the design team can begin to prepare design drawings. These drawings will provide a visual representation of the project and include 2D or 3D design drawings, the project's overall layout, individual spaces, and design details.	To add biogeometry to the design, the designer could incorporate shapes such as the spiral or the golden ratio into the furniture, artwork, or other elements of the design.	(AI) provides designers with powerful tools to analyze data and suggest innovative and error-free solutions. It also contributes to achieving biointegration to create spaces that are more in harmony with nature and human health
Time Frame and Budget Estimate	Once the project schedule and budget have been approved by the client, the design team can begin working on the project.	When biogeometry principles become the driving force for a project, it is essential to consider their implications on the financial and temporal aspects, from material choices and construction techniques to implementation of biomimetic structures.12 	Aconstruction company could use AI to create a 3D model of a new building. This model could be used to simulate the building's performance in various weather conditions, identify potential structural problems, and make changes to the design before construction begins.

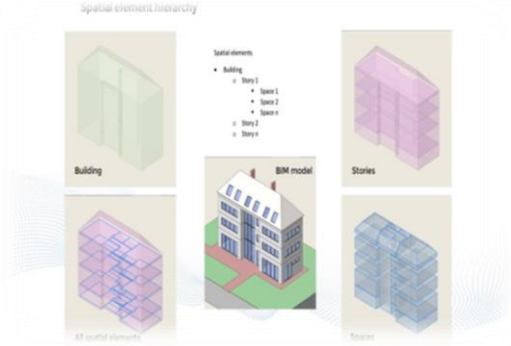
[11] *Mood boards are visual representations of a design concept. They typically include images, colors, textures, and other elements that convey the overall feel of the design.
[12] https://encrypted-tbn0.gstatic.com/image

Project Risk Management	Risk management begins with identifying potential risks. This involves determining the likelihood and impact of each risk.	By considering the financial and temporal implications of biogeometry principles in the early planning phase, designers and clients can identify the likelihood and impact of each risk.	Artificial intelligence (AI) can help organizations improve their project management by:Detecting risks early: AI can analyze large amounts of data to identify potential risks and making informed decisions.
Execution	In the implementation phase, all the planning that was done in the previous phases is put into action.	Biogeometry requires that construction materials be as natural as possible or be industrial materials that are not harmful to the health of the users of the space. In addition to furnishings and furniture be made of natural materials or be industrial materials that are not harmful to the health of the users of the space.	AI is being used to track productivity issues, real-time interactions between workers and machines on site, and alert supervisors to potential safety issues .and construction errors
Post-Occupancy Evaluation (POE)	Automated maintenance of buildings and constructions - collect all data related to the end users of the building (feedback) (study any modifications or reviews to improve the outcome of the project**.**	Ensuring the achievement of many values, such as comfort, a sense of peace and familiarity, in addition to the maximum efficiency of spaces through transparency, balance in the use of materials, furniture, and colors that reflects positively on the occupants of the building. In addition to the ability to control electromagnetic wave sources and measure frequencies	This technology can transform our homes into interactive environments where embedded home systems like the Ori and Eliq systems provide interactive furniture and appliances. 

Figure (24) - showing the design according to the Earth energy networks to determine the locations of walls and columns according to a design module compatible with energy paths so that the harmony between the energy of buildings and the energy of connection to the ground is achieved.: https://encrypted-tbn0.gstatic.com

From the above, we find that the emergence of AI-powered solutions and tools means that more architects can benefit from AI at a lower cost and in less time. As application developers deploy models in applications to create data-driven products, we note that AI algorithms can help designers add the biodynamic dimension to design and make spaces more balanced with their users by improving things like symbols, shapes, colors, structural structure, material selection, and furniture selection in accordance with the principles of bio-formation.

This is done by first analyzing a prototype model that is integrated with the principles of bio-formation. Then, the same pattern is applied to a new project. The project data is entered in text format to provide the most compatible design configurations with balanced energy paths. The organized energy paths are predicted, and any harmful paths are avoided by identifying the shapes, symbols, colors, and design patterns and achieving biodynamic balance.



.For example, walls could automatically receive a thicker insulation layer in accordance with the original orientations, or the floors on the ground floor could be given a different configuration than the floors above to avoid negative ground paths. AI saves a lot of manual work and reduces the risk of losing important details. Figure **.(25)**

In conclusion, AI is poised to play a major role in emerging construction technology. Future construction programs, using AI, will oversee entire projects, advise architects not only on design and construction, structural safety for different technological solutions for major projects, implementation, and selection of building materials, but also on risk management and predicting comfort levels and the healthy environment for building occupants. This means improving the construction industry, so it is imperative to realize how AI can affect the construction industry.

Conclusions:

1) Adding the determinants and principles of biogeometry to artificial intelligence techniques in architecture to provide many designs and proposals by integrating deep learning systems, image processing, and advanced algorithms that work to improve the health, psychological, and spiritual condition of occupants using these biological systems, thus ensuring comfort and efficiency in space use.

2) Artificial intelligence programs automate the algorithmic decision-making process in the stages of the architectural project, achieving the desired value faster, increasing productivity, reducing costs, improving the vital energy of the users of the space, which leads to the flow of energy in a smooth and continuous manner.

3) Interconnected and self-learning artificial intelligence systems provide designers with enough computing power to improve the architectural design process today by

automating repetitive mundane tasks, thus providing more time for thinking and creativity, which is reflected positively on the occupants of the building.

4) Biodynamic architecture seeks to create buildings and integrate them with modern technology and innovation in the design of spaces and furniture, which affects the extent of the impact of the energy emitted from them on human health and well-being.

5) Neglecting the biological dimension of design leads to an imbalance of energy in the human body, which has a negative impact on his health and activity.

Recommendations of the Research:

- Using AI applications to help the user control the design and integrate the principles of bioengineering and its sciences to avoid negative effects on the occupants of the spaces.
- Adding a new dimension to architectural design and artificial intelligence, namely the dimension of vital energy, which is regulated by the science of biogeometry.
- The research recommends the importance and necessity of including artificial intelligence learning and studying the use of its applications related to interior design within the curricula of design students.
- Attention to research and study in the field of energy sciences, especially the science of bioengineering and its relationship to architecture to achieve biobalance.

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