

## **The Role of Refik Anadol's Digital Art in Environmental Awareness throughout the visual artworks of the researcher**

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### **Abstract:**

While technology and art intersect often in our modern life, digital art has emerged as a product of the integration of the aesthetic and creative potentials of computers and the internet. Refik Anadol is one of the leading Turkish contemporary names in digital art, who built bridges between the physical and digital worlds using artificial intelligence data, elevating art to a new dimension. Anadol's presentation of research-based and informational art to the public has transformed the concept of digital art.

Anadol, who was born in 1985, was famous for his saying, "I am not just an artist who makes art; I am an artist who collaborates with machines." This research paper addresses the dilemma observed in Anadol's works between the concepts of sustainability and his artistic digital creations. Through an analysis of his artistic projects, the research illustrates how Anadol's methodology enhances public understanding of sustainability issues, promotes engagement, and stimulates collective efforts toward a more sustainable future. The findings also highlight that digital art can be a powerful means of promoting innovative solutions and raising awareness about pressing environmental challenges. Anadol's approach embodies transcending traditional boundaries and contributes to meaningful dialogues around sustainability.

The research is based on the author's experience of simulating three of Anadol's works and creating an artwork that blends artificial intelligence with conventional artistic tools while maintaining concepts of sustainability and adding contemporary, unconventional dimensions to visual arts. This new art stands at the intersection of art, science, and technology.

### **Keywords:**

art; contemporary; sustainability; digital.

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## introduction:

Refik Anadol's digital art has become a well-known media art force that transcends conventional limits and provokes deep contemplation about the relationship between art, technology, and nature.

This study explores the significant influence that Anadol's digital artworks have had on the international art scene in general and their influence on the research artworks, as the researcher's came from a traditional visual creations background. This study investigates how cutting-edge digital methods can effectively communicate messages about sustainability and ecological preservation, highlighting the transformative power of art in raising awareness and motivating action for a more peaceful coexistence with the environment. Through a thorough examination of the researcher's works that draw inspiration from Anadol's innovative style, this study seeks to highlight the critical role that modern digital art can play in influencing environmental conversations and fostering a greater understanding of the fragility and beauty of our world.

Throughout history, technology and art have always coexisted and impacted one another. Painters used traditional art supplies like canvas, paint, and brushes in the past. Today, artists frequently use computers, along with other gear and software, as their tools. According to Artut (2019: 774), this change is a reflection of the dynamic interaction between people and technology, where artistic creations can arise from mutual imitation. As technology transforms their methods and beliefs, an increasing number of artists are switching from traditional materials to digital tools as their primary medium.

One well-known artist who uses AI as a tool for artistic expression, similar to conventional tools like paint and brushes, is Refik Anadol. Refik Anadol effectively utilizes the knowledge that fuels artificial intelligence to create art, employing data as both his paintbrushes and paints (Anadol, 2021: YouTube). Using a “thinking brush assisted by artificial intelligence” (Artun, 2021: e-Skop), Anadol explains his method (Artun, 2021). He employs artificial intelligence (AI) and the data it generates as tools or materials for artistic expression in his data-driven paintings, sculptures, and installations.

### **Research Objective:**

- Research The study aims to investigate the interplay between digital art and environmental consciousness within the framework of Refik Anadol's artistic creations.
- The researcher aims to examine the visual artworks in connection with Anadol's themes and techniques.
- We aim to explore the efficacy of digital art as a fresh, eco-friendly approach.
- We aim to enhance our comprehension of Anadol's utilization of AI.

### **The importance of research:**

- This research can contribute to the existing body of knowledge by exploring how digital art, particularly inspired by Refik Anadol, can be used to promote environmental awareness.
- Understanding the impact of digital art on environmental awareness can be insightful for artists, researchers, and environmental advocates looking to leverage artistic expression for social causes.
- Given the increasing importance of environmental issues today, researching the role of digital art in promoting environmental awareness is crucial. Artists such as Anadol, who exhibits his artworks in architectural spaces and creates projects about the city's nature and urban environment, highlight the role of research institutions and incorporate these themes into his art projects. It sheds light on how art and technology intersect with contemporary environmental concerns.

### **Field of Research:**

Refik Anadol, a visual artist and director, created digital art based on data-driven art.

### **Research Methodology:**

The research method for this study incorporates a combination of literature review, artwork analysis, interviews with the artist, an examination of the environmental aspects of his artwork, and a visual and technical analysis of the artworks created by Anadol. This approach aims to enhance the researcher's understanding of the artist's creative process, enabling them to interpret the artist's techniques or ideas in the creation of their own practice art. We designed the method to capture both qualitative and quantitative data, thereby providing a comprehensive understanding of the topic.

### Previous studies:

- Anadol, R. (2022). Space in the mind of a machine: Immersive narratives. *Architectural Design*, 92(3), 28-37.

This paper outlines Anadol's methods for his project "Machine Hallucination," focusing on the environmental context and the advanced techniques used in the installation's creation. In my research, I emphasized the intellectual aspects of the project and explored how I replicated these elements in my own practice.

- Anadol, R., & Kivrak, P. (2023). Machines that Dream: How AI-Human Collaborations in Art Deepen Audience Engagement. *Management and Business Review*, 3(1-2), 101-107.

This paper focused on the positive impact of installations on viewers, enhancing their interest in art, while this study thoroughly evaluated the pros and cons of AI-generated art and data-driven art on both creativity and the environment.

### Introducing Refik Anadol:

He is a media artist and designer who works with a variety of AI models, including generative adversarial networks and neural networks, to create data sculptures and art installations.

Born in Istanbul in 1985, Anadol is a pioneering new media artist and director in the field of AI art. He holds a degree in photography and video from Istanbul Bilgi University and a master's degree in media arts from UCLA. Currently, he teaches at UCLA while leading Refik Anadol Studio and RAS LAB, where he explores innovative methods for data narratives and artificial intelligence. (Anadol R. , 2022)

### Anadols early career:

In the first stages of his career, Anadol developed the video mapping project Quadrature at Santral Istanbul Art and Culture Centre, a technique that was uncommon at the time. This project transformed the building's auditory and visual perception, proving how large-scale video projections can reshape and interpret spaces through a combination of sound and imagery.

As a first-generation innovator in this field in both Türkiye and Europe, he has inspired many worldwide. Quadrature is characterized by

a dynamic visual and auditory performance featuring moving monochromatic geometric shapes that align with the building's architectural design. A digitally generated soundscape complements this visual spectacle, creating an immersive experience that redefines the projected space. (Anadol R. , 2020)

### **How Anadol gets inspiration:**

The American sci-fi movie Blade Runner, which captivated Anadol as a child and never left his mind, served as the inspiration for his artwork. This movie had a profound effect on Anadol's artistic career, as a specific line of the movie kept playing over and over in his head: when the android girl realised that her memories were someone else's memories, look at figure no. (1). (TED, Aug 19, 2020)



**Figure (1) Scene of the American sci-fiction movie blade runner – showing the architectural vision of the future of Los Angeles.**

At Anadol Mind, a recurring inspirational question is: "What can a machine do with someone else's memories?" Or, to put it another way, what does it mean to be an AI in the art world of the 21st century?

### **Anadol's institution:**

He arrived in LA in 2012 for a graduate program in Design Media Arts; after that he established his institution in 2014, and he invited architects, computer and data scientists, neuroscientists, musicians, and even storytellers to join him in making his dreams come true.

### **Anadol using AI and programming as one of the artist tools:**

When I questioned an Egyptian expert about the technology Anadol uses to create his artworks, his response was as follows: "This work involves particles, and there are many programs that perform particle

system simulations." The most famous and best one is Houdini. Additionally, game engines such as Unreal Engine incorporate features like Niagara, a user interface that manages particle systems.

I think the previous analysis of Anadol techniques was based on the visual aspect, but because Anadol is creating artworks based on the idea of analyzing data where the idea is a core and a fundamental part in the visual aspect, he created his own technological methods, and he called it style Gen.

### **style Gen:**

Anadol's most featured works consist of the use of style Gen Nvidia, an American multinational corporation and technology company headquartered in Santa Clara, California, and incorporated in Delaware, developed the technology. He has a close partnership to make his art possible.

He has also worked with various programming languages and frameworks in order to train and manipulate AI models. His exhibitions and projects often use large amounts of data, such as photographs, videos, and audio recordings, as inputs to the AI models. Using these models, he creates experiences that delve into the relationship between humans and machines, memory and the unconscious, and the nature of perception and cognition in infinite space. Anadol presents a collection of works that explore contemporary art's ability to imagine infinity using machine intelligence, media, and architecture.

Anadol's art projects, rooted in machine hallucination, explore the realm of data aesthetics by utilizing machine intelligence and collective memories of natural and urban environments. His team employs advanced machine learning algorithms to process millions of digital images, revealing hidden layers of reality. This process culminates in a curated, multi-channel experience that fosters a new form of creativity through cybernetic serendipity, which Arctic House Studio collaborated on.

### **Anadol used architectural as a canvas by collaborating with Artechouse institution:**

Refik said, "As a team we are always asking how we can make art for anyone, any age, and any background, and I think AI or aesthetics in

general is one of the most inspiring ways of sharing art in different contexts.” (ARTECHOUSE, 18, 2023)

In 2019, Arctic House worked with Anadol to present his first solo exhibition in the United States. Over the years, Arctic House has collaborated on and presented four shows featuring Anadol's cutting-edge artwork, Infinite Space, at Arctic House. In 2019, Arctic House invited Anadol to open their new Arctic House New York City location in Chelsea Market. Anadol developed Machine Hallucination, which was updated and brought back due to popular demand in 202. See figure no. (2) for the mapping step as preparation for the installation.



Figure (2) Refik Anadol, Machine Hallucination, 2019-2020, the mapping process, New York, USA

Anadol thinks that what is special about working with ARTECHOUSE is being to be able to use architecture as a canvas, being able to step into the idea, being in the mind of a machine.

### **Machine Hallucination:**

Anadol posed two questions that inspired this artwork: Can a machine learn? The second question he posed was, "Can machines dream?" By addressing these two questions in this project, Anadol focused on narrating the invisible story of data. As a media artist and director, he collaborated with his team, utilizing data and algorithms. The invisible force of data challenged them, and as a media artist, he strongly believes in making the invisible visible. In this project, he represents one of the most exciting experiences for humanity, where we must be aware of and alert to the data we are surrounded by due to the technology we use every day. He consistently expresses his quest to uncover the poetry within datasets, aiming to create a new meaning that transcends the data's inherent meaning.

In machine hallucination art projects, the artist aims to push the boundaries of various fields, including media arts, technology, and science, while also reinventing cinema. This level of neuromas transformation is only seen in a science fiction movie, and for a visual artist, dreaming of such an idea and making it happen in front of you serves as the core inspiration and motivation behind Refik's studio.

What he was trying to do as an artist is find an algorithm that can narrate the moment of data, kind of make the invisible moment of machine understanding or learning the data visible. Enormous data sets inspire most of Anadol's art, and he uses machine intelligence and algorithms to create visualisations of what he calls data sculptures, like machine hallucinations. He started by finding 113 million images of New York online. As he let the machine learn from this entire corpus of data, he omitted humans from this data and only focused on the buildings, nature, and environments; that is a collective memory of New York. Once all the images of people were removed, Anadol was left with 10 million photos of New York look figure (3); he fed them through a machine learning algorithm that generates visual associations as it learns.

For example, when it sees multiple photos of the Statue of Liberty, taken from slightly different angles, the algorithm interprets information to help it create a moving image that represents the entire life cycle of the structure. Machines look at this information like a human being, but it's kind of more like collective memories than personal memories, because a building in New York can be explored by thousands of perspectives, from different angles, from different times of the year. It's more like an honest memory for a machine, because it feels more totalitarian, as a machine can feel everything and everyone, rather than just one person.



**Figure (3)Refik Anadol, Machine Hallucination,2019-2020, A/V Performance, Exhibition, Installation New York, USA**



Anadol covered the walls and the floor of a boiler room in a building in lower manhattan with the machine dynamic landscape. If you ask him, he will tell that the machine is dreaming, when a machine learns from output and memories like this, it can create an alternative reality.it look at the patterns of the trees look figure (4), the buildings, the nature, and every hidden inside this single image corpus. Seeing a machine giving a context of data and giving an hallucinative output was something very inspiring.



**Figure (4) Refik Anadol, Machine Hallucination, 2019-2020, A/V Performance, Exhibition, Installation New York, USA**

Machine hallucinations are not the only artworks made by Anadol; notable to be mentioned is one of his projects called Wind of Boston, as Andol is convinced that we as humans are reaching certain findings that transform the human race, as when humans discovered fire, they started cooking with it and creating communities with it, and with that same fire we can kill and destroy each other. Clearly, AI is one of humanity's discoveries that has the potential to make communities or destroy each other as well. Anadol finds data for his machine intelligence collaborations everywhere; when he knew that data was continuously collected at Boston Airport, he knew he'd find a gold mine. (Anadol R., 2017)

He turned it all into the wind of the Boston project, as nature is a main source of inspiration for Anadol: the wind, the water, the aspect of motion, theory, and life in general. So, from the data he collected, he used the wind as a pigment to create one of his projects. He took one year of data from Boston airport, which included the gust, speed, direction, and temperature of the weather. He fed all this wind data into a series of algorithms, and then he built custom 13-foot-tall LED screens to display the visualized data to visualize the pattern of invisible information and transform them into a poetic-like motion look figure (5).



Figure (5) Refik Anadol, Wind of Boston art project ,2017, Installation, Public Art, Boston, US,2017

### **disadvantages of Data-Driven Art:**

Before representing the research-based practice, let's represent some of the disadvantages of data-driven art made by Anadol, and let's start with the accessibility issues. We should admit that even up till now there are a huge number of people who are unfamiliar with these concepts or lacking the necessary technology, so advanced technology and complex data can make the art less accessible to those. Viewers may struggle to understand the meaning behind the data-driven art, potentially creating a disconnect with the audience. The integration of technology can lead to the perception that art is becoming commodified, diminishing its intrinsic value.

Another fundamental point that should be taken into high consideration is the environmental impact, where the technology used in digital art raises sustainability questions due to energy consumption and electronic waste. Many of the works are installations, which may result in a lack of permanence and memorability for viewers.

### **Practice -based research:**

In this part of the research after I gained more knowledge about how Anadol is creating his artworks, and it was really hard for me to imitate all the process, which has been made by a whole team of different technological experts, who used coding and programming to translate the extracted data into visual animations, so I started to look to his art work from an intellectual aspect and focus in creating a digital or media art from my traditional previous artworks, focusing on two aspects which are: the poetic part of the videos he is making, regardless of the data based created images and videos, and the meditative effect of his artworks by imitating the motions of nature elements such as wind.

As part of a video art project named "A Visual Symphony," I produced videos. Let's delve into the specifics:

The project is based on earlier artwork by the artists, where the brushstrokes resemble the particles found in Anadol's artwork, exemplified by figures (6) and 8. I have conducted an analysis of the traditional oils on canvas artworks created by the researcher, focusing on their themes, colours, and compositions. The intention behind this analysis is to extract data points from these works, such as color palettes, shapes, and textures, and use them to generate video art that reflects the original pieces while adding new dimensions.

This project explores the intersection of traditional art and digital media by transforming static artwork into dynamic video art pieces, such as in figures (7), (9), and (10), to investigate the relationship between static and dynamic forms of art. -To engage viewers with the concept of data visualisation as a form of artistic expression. To create video installations that evoke emotional and intellectual responses, Videos were created using Adobe Fresco software. I will demonstrate the original traditional artwork, and below I will show the number of the frames from the video art.



**Figure (6)** The researcher, mother earth, 2006, oil on canvas, 120X80 cm, Egypt



**Figure (7) The researcher, Visual Symphony1, 2024, video art**



**Figure (8) The researcher, the shift, 2016, oil on canvas, 120X80cm, Egypt**





Figure (9) The researcher, Visual Symphony1,2024, video art

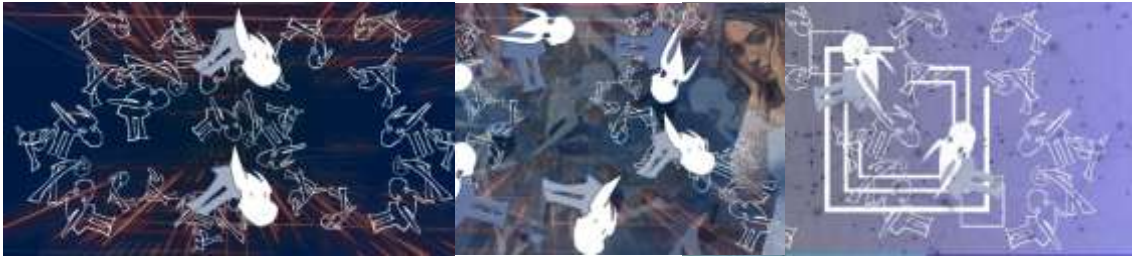


Figure (10) The researcher, Visual Symphony2,2024, video art

Evaluating the environmental effects of digital art versus traditional one, several aspects should be considered:

- **Digital art advantages:**

Digital drawing reduces the need for traditional materials such as paper, which helps decrease desertification. Although tablets require electricity and it is one of the most harmful industries to the universe, their energy consumption over time can be lower than the resources needed for paper and traditional art supplies. reusability of digital canvases, or, in other words, apps and software can be reused indefinitely without losing quality.

- **Digital art disadvantages:**

Tablets have a limited lifespan and contribute to e-waste when they become obsolete; manufacturing tablets and all types of electronics that can produce artistic outcomes involves mining metals and minerals, which can harm the environment.

### **Traditional art advantages:**

Traditional art created on surfaces such as canvas and paper can decompose and can be recycled, reducing its environmental footprint. Traditional art doesn't need energy during creation; as an example, drawing on paper does not consume electricity, except in the final stage where lighting is needed for displaying artwork.

- **Traditional art disadvantages:**

Paper production contributes to habitat ruins and deforestation. The process of making paper requires substantial water and energy. The overlap of several environmentally harmful industries in paper production remains one of the strong points.

In conclusion, it's clear that in the long run, digital drawing on a tablet is generally more eco-friendly, especially when considering the continuous use of digital resources compared to the ongoing need for paper and traditional supplies.

However, the environmental impact of each option can differ based on factors like electricity sources, paper production methods, and the frequency of upgrading electronic devices to keep up with what's new in the world of digital art.

one important point to keep in mind is that adopting sustainable practices, such as utilizing recycled paper or energy-efficient devices, can further enhance less damage for the environment.

While digital tablets offer advantages like flexibility, layers, and editing tools, they may lead to over-reliance, making it challenging to create art without these conveniences.

### **Conclusion:**

While all art materials impact the environment, conscious choices can help reduce environmental harm in both digital and traditional methods.

Traditional materials provide a single surface and limit editing options. This constraint encourages the development of skills and more decisive brush strokes and drawing, reducing the temptation to rely on digital corrections. Recommendations:

From my experience, starting with traditional media, using oil paints and watercolours, and then transitioning to digital tools. It will help the artist make every brushstroke valuable, reducing reliance on the undo function. And it reduces the consumption of materials and energy, making it more environmentally friendly.

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## دور الفن الرقمي للفنان رفيق أنادول في الوعي البيئي من خلال الاعمال الفنية البصرية

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### المستخلص

تمضي البشرية قدماً في عملية تطور حيث تتقاطع التكنولوجيا والفن. في العصر الحديث، إذ برز الفن الرقمي كنتاج لاندماج الإمكانيات الجمالية والإبداعية لأجهزة الكمبيوتر والإنترنت وما عليها من شبكة بيانات معقدة ومفصلة مع مفهوم الفن المعاصر، حيث قام الفنان رفيق أنادول Refik Anadol، أحد الأسماء المعاصرة الرائدة في الفن الرقمي في تركيا، ببناء جسور بين العالمين المادي والرقمي من خلال استخدام البيانات والذكاء الاصطناعي، ونقل الفن إلى بُعد جديد. غيرت أعمال أنادول مفهوم الفن الرقمي وقدمت فن ذو أبعاد بحثية ومعلوماتية في شكل بديل لكل أشكال الفنون للجسم.

أنادول المولود عام 1985، صاحب المقولة المشهورة "أنا لست مجرد فنان يصنع الفن؛ أنا أنا فنان أتعاون مع الآلات." تتناول الوقة البحثية الدليمة الملاحظة في أعمال أنادول بين مفاهيم أعماله التي تتسم بالاستدامة وبين التكنولوجيا الرقمية التي ينفذ بها أعماله الفنية، من خلال تحليل مشروعاته الفنية، يوضح البحث كيف تعزز منهجية أنادول الفهم العام لقضايا الاستدامة، وتعزز المشاركة، وتحفز العمل الجماعي نحو مستقبل أكثر استدامة. كما تسلط النتائج الضوء على أن الفن الرقمي يمكن أن يكون وسيلة قوية لتعزيز الحلول المبتكرة وزيادة الوعي حول التحديات البيئية الملحة. يجسد نهج أنادول كيف يمكن للفن تجاوز الحدود التقليدية، والمساهمة في حوارات ذات مغزى حول الاستدامة. كما يقوم البحث على تجربة الباحثة القائمة على محاكاة ثلاثة من أعمال أنادول وتشكيل عمل فني يمزج الذكاء الاصطناعي والأدوات المتعارف عليها للفن مع الحفاظ على مفاهيم الاستدامة وإضفاء الأبعاد المعاصرة وغير التقليدية على الفنون البصرية، وتقديم ذلك الفن الجديد الذي يقف عند مفترق طرق بين الفن والعلم والتكنولوجيا.

الكلمات المفتاحية: الفن المعاصر؛ الاستدامة؛ الرقمية.