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## USING ARTIFICIAL INTELLIGENCE IN PRODUCING ANIMATION ELEMENTS.

**ABSTRACT**

With the continuous increase in the use of artificial intelligence, design has become easier, faster, more accurate, and less time and effort, as these developments have enabled animation designers to perform their tasks and create the various elements used in animation, as these tools have become easy to use and access and produce design elements such as characters in a professional and creative way and do not require prior experience or complex training. However, artificial intelligence tools produce elements, characters and backgrounds with a creative and specialized character used in animation. Due to the widespread use of artificial intelligence tools, it has become necessary for animation designers to understand and practice such tools, especially in producing characters and backgrounds for use in their designs, as artificial intelligence in animation improves the quality of animation elements, details and ideas, which opens new horizons for creativity and excellence, and shortens the time and effort required to produce animation.

The research is based on the descriptive analytical approach, where the basic concepts related to animated designs and artificial intelligence tools will be identified. A random sample of motion design elements will be selected, redesigned using AI tools, and then the impact of these tools on the creative process will be measured through a content analysis form, to achieve the study objectives.

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### استخدام الذكاء الاصطناعي في إنتاج عناصر الرسوم المتحركة.

**الخلاصة:**

مع التزايد المستمر في استخدام الذكاء الاصطناعي أصبح التصميم امر أسهل وأسرع وأكثر دقة وأقل وقتاً وجهداً، إذ مكنت هذه التطورات مصممي الرسوم المتحركة من أداء مهامهم وإنشاء العناصر المختلفة التي تستخدم في الرسوم المتحركة، إذ أصبحت هذه الأدوات سهلة الاستخدام والوصول وتنتج عناصر تصميمية كالشخصيات بطريقة احترافية ومبدعة ولا تحتاج الى خبرات مسبقة أو تدريبات معقدة، ومع هذا فإن أدوات الذكاء الاصطناعي تنتج عناصر وشخصيات وخلفيات ذات طابع ابداعي ومتخصص تستخدم في الرسوم المتحركة.

ونظراً للانتشار الواسع لأدوات الذكاء الاصطناعي أصبح من الضروري على مصممي الرسوم المتحركة فهم وممارسة مثل هذه الأدوات خاصة بإنتاج شخصيات وخلفيات لاستخدامها في تصميماتهم، فالذكاء الاصطناعي في الرسوم المتحركة يحسن من جودة عناصر الرسوم المتحركة، وتفاصيلها، وأفكارها، مما يفتح آفاقاً جديدة للإبداع والتميز، ويختصر الوقت والجهد المطلوبين لإنتاج الرسوم المتحركة.

يعتمد البحث على المنهج الوصفي التحليلي، حيث سيتم تحديد المفاهيم الأساسية المتعلقة بالتصميمات المتحركة وأدوات الذكاء الاصطناعي. سيتم اختيار عينة عشوائية من عناصر التصميمات المتحركة، وإعادة تصميمها باستخدام أدوات الذكاء الاصطناعي، ثم قياس تأثير هذه الأدوات على العملية الإبداعية من خلال استمارة تحليل مضمون، وذلك لتحقيق أهداف الدراسة.

**1. Introduction**

New technologies are primarily designed to streamline certain processes by improving their simplicity, accuracy, speed, and cost-efficiency. Additionally, it empowers designers and animators to complete jobs or create concepts that were previously inaccessible.

The demand for animated designs has become crucial to have a greater impact on the recipient. Companies and institutions are constantly seeking to adopt dynamic designs that can effectively engage with various modern communication methods and effectively convey the intended message.

**1.1 Research Problem:**

Designers have widely used artificial intelligence tools to enhance the artistic elements of animation, despite significant obstacles. Although these technologies are becoming increasingly popular, it is crucial to understand their functionality and applications without disregarding human ingenuity or diminishing the designer's role in the creative process. This research primarily focuses on leveraging artificial intelligence tools to enhance creativity in the creation of animation elements, all the while adhering to the fundamental principles and guidelines of animation.

### **1.2 Research Objectives.**

1. The objective of this research is to identify various artificial intelligence technologies used in the production of animation elements, such as characters and backgrounds, and explore the possibilities to improve the creative animation design process.
2. The Objective of this research is to analyze and understand the challenges and opportunities that designers face as artificial intelligence is increasingly used. In addition, the aim is to determine how artificial intelligence might be involved in animation to enhance creative techniques.

### **1.2 Research Aims:**

The aim of this study is to use artificial intelligence techniques to improve efficiency and reduce animation designers' time and effort in creating animated design elements, including backgrounds and characters.

### **1.3 Methodology:**

The researcher uses a descriptive analytical method to clarify the fundamental principles of animation designs and artificial intelligence technologies. In addition, the researcher will select a random project of animation design elements and apply artificial intelligence techniques to redesign those elements. Additionally, the researcher will assess the impact of these tools on the creative process by conducting a content analysis using a specific form to accomplish the objective of the study. The impact of AI will be quicker to be experienced in creative fields than in

practically everywhere else, design, motion graphics, and animation are all seeing the impact of quickly evolving technology. The core principles of exceptional design, effective communication, and high production standards will remain crucial, especially as the world gets inundated with a great deal of motion graphics, avatars, animations, and videos in the upcoming years<sup>1</sup>.

In recent years, the field of animation has seen a substantial transformation because of the rapid advancements in artificial intelligence (AI) technologies. These technological breakthroughs have fundamentally transformed the way in which animation elements, particularly characters and backgrounds, are presented and interact with viewers on screens.

Artificial Intelligence Animation is a new concept, animation has significantly evolved since the era of traditional hand-drawn techniques. However, computers have revolutionized the practices of animators and motion designers and are becoming cutting-edge technology that has the capacity to transform the methods animators and designers use in their work. Moreover, the implementation of artificial intelligence (AI) in the workforce has become a subject of argument and disagreement in recent years. It facilitates increased speed and enhanced productivity<sup>2</sup>.

## **2. Artificial Intelligence.**

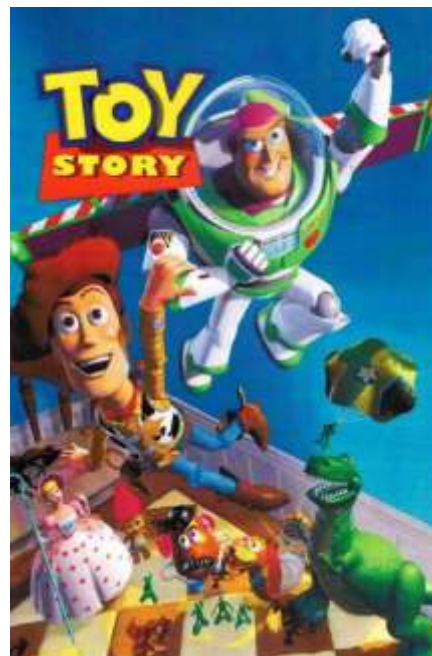
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<sup>1</sup> Whittingham, M. (2024, Jan). How Gen AI is transforming video, motion design, and the visual arts. Retrieved from LinkedIn: <https://www.linkedin.com/pulse/how-gen-ai-transforming-video-motion-design-visual-arts-whittingham-vovxf/>

<sup>2</sup> Lester, I. (2023, Feb). Exploring the role of Artificial Intelligence in Animation. Retrieved from Vox Pops International : <https://voxpops.com/news/animation/exploring-the-role-of-artificial-intelligence-in-animation/>

According to (Anantrasirichai & Bull, 2021, pp. 589-656)<sup>3</sup> “Artificial intelligence (AI) embodies a set of cods, techniques, algorithms and data that enables a computer system to develop and emulate human-like behavior and hence make decisions similar to humans”.

Before the development of artificial intelligence (AI), computers were programmed to generate diverse designs under the direct control of designers and have helped the creation of many artistic designs through the ability of equipment, websites, and design programs to generate fresh elements, backgrounds, and characters at a faster pace. John Lasseter directed the first type of CGI (computer-generated images) animation in the 1995 film Toy Story, as shown in **Figure 1**. Since then, animation has begun to achieve photo-realistic animation by combining high-level computer processing with advanced motion-capture, which has aided in the implementation of artificial intelligence in modern animation<sup>4</sup>. However, artificial intelligence has integrated into our everyday routines, simplifying and accelerating tasks, thereby reducing time and effort. It involves the power of computer systems to complete tasks typically carried out by humans, demanding intelligence<sup>5</sup>.



**Figure 1**

Toy Story Movie poster

<https://toystory.disney.com/>

The technological development of artificial intelligence has placed the animators and designers at the heart of the creative process; by managing the design process and coordinates the artistic elements in the creative aspects of the animation design and have enabled them to integrate many artistic means with each other, such as photography, drawing, and computer software, and has formed what is called Computer Generated Imagery (CGI).

### 3. Artificial intelligence Tools for animation production.

Animators and designers have access to a new artificial intelligence website and application, which continuously introduces new AI tools for a diverse range of users, offering numerous animation-related tools. The researcher will mention some artificial intelligence tools that are useful for animators in terms of character and background design in animation.

#### 3.1 Character.AI.

Is a “full-stack AI company with a globally scaled direct-to-consumer platform, that is uniquely centered around people, letting users personalize their experience by

<sup>3</sup> Anantrasirichai, N., & Bull, D. (2021). Artificial intelligence in the creative industries: a review. Artificial Intelligence Review, 589-656.

<sup>4</sup> Meroz, M. (2021). Animation For Beginners. Getting Started with Animation Filmmaking. London: Bloop Animation Studio.

<sup>5</sup> Copeland, B. (2022, NOV 11). artificial intelligence. Retrieved from Britannica: <https://www.britannica.com/technology/artificial-intelligence>

interacting with AI “Characters”” (AI, 2024)<sup>6</sup>.

### 3.2 Canva.

Is “an online design and visual communication platform with a mission to empower everyone in the world to design anything and publish anywhere” (Canva, 2024)<sup>7</sup>.

### 3.3 AI Image Creator.

Is “an advanced tool leveraging artificial intelligence to transform ideas into visual art. It interprets text prompts to generate unique, custom images, catering to creative needs across various domains. Ideal for designers, marketers, and artists” (Sarkar, 2024)<sup>8</sup>.

### 3.4 Leonardo AI.

Is “a free image creation tool that uses generative AI to create images on demand. Users can enter text and image prompts to generate multiple images at once” (Keary, 2024)<sup>9</sup>.

## 4. Animation & Animation Elements.

Artistic movements that emphasized movement and animation aimed to enhance the aesthetic appeal of moving artworks, creating emotional, cognitive, and sensory enjoyment, this had a profound impact on the viewer, as the interaction between the artwork and the observer depended on the nature of their engagement at a specific moment,

animation art thus became a medium of communication and connection, bridging the gap between the creator and the recipient.

Animation has allowed storytellers to present stories in unique and creative ways, where the fascinating and imaginative realms shown in animated films could bring back inspiration and recreate the magic of storytelling, regardless of one's age.

Animation is “The simulation of movement created by a series of pictures, Animation is a method of photographing successive drawings, models, or even puppets, to create an illusion of movement in a sequence. Because our eyes can only retain an image for approximately 1/10 of a second, when multiple images appear in fast succession, the brain blends them into a single moving image” (Maio, 2023)<sup>10</sup>.

The art of animation is in an ongoing process of development, presenting new possibilities for aspiring animators, artists, and practitioners to enter innovative forms of storytelling. This enables the creation of unique characters and illustration backgrounds with distinct styles. Given the broad impact of animation in global popular culture, computer-generated animation is closely linked to artificial intelligence, which includes many forms of animated figures, banners, and animated characters<sup>11</sup>. This perception is influenced by the frame rate, which refers to the number of consecutive images presented per second.

Animated characters have been an essential part of the modern world since their initial emergence on the screen during the early 1900s, courtesy of innovative animation firms such as Disney. Character animation is a distinct aspect of the animation process where animators provide static character designs

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<sup>6</sup> AI, C. (2024, Aug). Retrieved from Character AI: <https://character.ai/about>

<sup>7</sup> Canva. (2024, Aug). Retrieved from Canva: <https://www.canva.com/about/>

<sup>8</sup> Sarkar, R. (2024, Aug). Ai Image Creator. Retrieved from Chatgpt: <https://chatgpt.com/g/g-UfBJu5yk5-ai-image-creator>

<sup>9</sup> Keary, T. (2024, April). Leonardo AI. Retrieved from Techopedia: <https://www.techopedia.com/definition/leonardo-ai>

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<sup>10</sup> Maio, A. (2023, May). What is Animation — Definition, History and Types of Animation. Retrieved from Studiobinder: <https://www.studiobinder.com/blog/what-is-animation-definition/>

<sup>11</sup> Wells, P. (2006). The Fundamentals of Animation. Case Lausanne: AVA Publishing SA.

with dynamic movements and relatable personalities, resulting in unique watching experiences for the audience. Over the past few decades, there has been a growing use of character animations outside of the realm of entertainment, and several domains such as branded, corporate, charity, healthcare, and educational films demonstrate the business utility of this technology<sup>12</sup>.

Typically, animated characters are filmed using a technique called "on twos," where each image is displayed for two frames, resulting in a total of 12 drawings per second. A frame rate of 12 frames per second enables motion but may appear jerky. A frame rate of twenty-four images per second is frequently used in animation to provide fluid action<sup>13</sup>.

Animated characters often demonstrate a difference in numbers between how they are portrayed and the quantity of animators engaged in their production or manipulation. For instance, a single puppeteer may oversee the movement of many marionettes, while a team of animators might work together to animate a single character<sup>14</sup>.

On the other hand, in animation, the background refers to the outermost elements of the environment, such as mountains, clouds, trees, or stars in space, the distant

element validates the mid-ground's description of the environment, and its combination with the background can create a visually impactful effect, by combining these fundamental components and viewpoints, we generate a sense of complexity, where the organization of the elements holds equal significance to the content of a scene<sup>15</sup>.

## 5. The joining point between Artificial Intelligence (AI) & Animation.

Artificial intelligence has grown beyond just code and now functions as the mental focus of an artist in the digital realm, with its ability to analyze extensive datasets, recognize patterns, and make design choices, AI serves as a creative collaborator, providing valuable insights that enhance animations to the highest possible level<sup>16</sup>. However, the implementation of artificial intelligence in generating animation design elements benefits in time savings, as well as ensuring consistency and precision, and it has simplified the process of creating animations elements such as characters and backgrounds, making it easier for the creative visionary to direct.

Artificial intelligence (AI) is presently employed to assist designers in generating complicated designs by using AI platforms that can reply to designers' requests, such as "create a character with specific details." Therefore, the artificial intelligence system may propose multiple characters, and the designer selects the most optimal one based

<sup>12</sup> Howe, M. (2022, Jan). What is Character Animation and Why is it Great for Business? Retrieved from Kartoffel Films – Video Production Company: <https://kartoffelfilms.com/blog/what-is-character-animation-and-why-is-it-great-for-business/#:~:text=Character%20animation%20is%20a%20specialised,viewers%20with%20memorable%20viewing%20experiences>.

<sup>13</sup> Maio, A. (2023, May). What is Animation — Definition, History and Types of Animation. Retrieved from Studiobinder: <https://www.studiobinder.com/blog/what-is-animation-definition/>

<sup>14</sup> Stark, L. (2024). Animation and Artificial Intelligence. In *The 2024 ACM Conference on Fairness, Accountability, and Transparency* (pp. 1663-1671). Rio de Janeiro: FAccT '24.

<sup>15</sup> Backgrounds. (2024, Aug). Retrieved from Darvideo: <https://darvideo.tv/dictionary/background/#:~:text=Background%20in%20Animation%20is%20a,your%20drawing%20into%20a%20composition>

<sup>16</sup> Mograph, G. (2023, Sep). The AI Revolution: Transforming Motion Graphics. Exploring AI's Impact on the World of Motion Graphics. Retrieved from Medium: <https://medium.com/aimonks/the-ai-revolution-transforming-motion-graphics-e84c18811b3f>

on design criteria and its similarity to the intended design for implementation and usage, where the personality of the character is part of the design. Therefore, artificial intelligence can decrease the amount of time, effort, and financial resources required in the design process. Artificial intelligence has the potential to enhance performance and minimize design flaws<sup>17</sup>. AI can be utilized to assist artists by exploiting its capabilities to enhance the final output in ways that may not be financially viable with a restricted budget.

The integration of artificial intelligence systems in the design process has greatly facilitated various tasks for designers. By utilizing these systems, designers can enhance their creativity and innovation, utilize specialized programs, optimize user experience, effectively express and comprehend brand identity, and ultimately automate various processes<sup>18</sup>. However, animators and designers now can customize the process of producing animation according to the exact requirements or desires of the person who receives it, where the new artificial intelligence (AI) website allows viewers to choose the animation they receive and desire.

## 6. Samples and analysis.

After presenting the scientific material, studying and understanding animation and its relationship to artificial intelligence, the importance of artificial intelligence and its use and employment in animation has become

clear through the great interest shown by many artists and designers, with the artistic difference of each artist and his style. The artist or designer who designs animation must have the ability to see and transform ideas within a sequential scene governed by a specific time period displayed on modern multimedia in its various forms into harmonious scenes that have their aesthetic and artistic value and use the best media to reach the artwork in its final form that depends on absolute imagination and new ideas inspired or derived from the surrounding elements to be translated into an artwork.

After discovering the significant influence of artificial intelligence on animation, the researcher created several designs for essential animation elements. These designs featured well-known Arabic characters and backgrounds, such as Aladdin and the Magic Lamp and Sinbad the Sailor. Cartoonists and designers previously used digital drawing programs to create these characters and backgrounds. However, the researcher utilized modern artificial intelligence technology to create new proposals that replicate these characters and backgrounds. This section of the research will provide an explanation and analysis of these designs, focusing on factors such as the idea, creativity, shape, color, clarity and consistency of the character, proportions, shadow and light, and the programs utilized in their creation. The final design will be presented as an artistic experiment incorporating artificial intelligence.

### 6.1 Aladdin.

The characters Aladdin and the magic lamp and Sinbad the Sailor are part of the One Thousand- and One-Night's tales, which are considered a heritage mixture from the ancient and medieval ages, which in turn goes back to the historical, tragic, comedic, and

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<sup>17</sup> Hartaman, M. (2021, oct 10). *How Artificial Intelligence in Graphic Design Will Transform Our Workplace*. Retrieved from MEDIUM: <https://medium.com/@mirzahartaman/how-artificial-intelligence-in-graphic-design-will-transform-our-workplace-6a4ba58e00fe>

<sup>18</sup> MAWARED. (2023, 10 14). MAWARED . Retrieved from MAWARED PLATFORM : <https://mawaredplatform.com/career-path/artificial-intelligence-design/>



legendary legacy of the Arab, Persian, Indian, Egyptian, and Mesopotamian peoples<sup>19</sup>.

The researcher chose to compare the character of Aladdin, drawn by Disney in 1992 for an animated film, with a version of artificial intelligence drawn by the "Leonardo" website. The researcher wrote the following text: "Draw the Character of Aladdin with exceptional creativity in multiple poses to be used in an animation film," to provide several modern suggestions that mimic the previous version but in a more modern style, as shown in **Figure 2** and **Figure 3**.

When comparing the two images of Aladdin, the researcher found that the artificial intelligence's creativity in drawing the character mimics the previous character, but in a modern style, it matches old and modern ideas, balances colors, and draws the character anatomically. However, the well-achieved shadow and light allow the designer and animator to use the new character with ease and simplicity, this is what artificial intelligence currently achieves in terms of shortening time and effort.

## 6.2 Sinbad.

<sup>19</sup> AlJazeera. (2021, Nov). *سيرة رحالة عربي أم عمل مترجم فرنسي.. كيف تشكلت حكاية علاء الدين الأسطورية بين حلب وقصر فرساي؟*. Retrieved from Aljazeera: <https://www.aljazeera.net/culture/2021/11/12/%D9%85%D9%86-%D8%AD%D9%84%D8%A8-%D8%A5%D9%84%D9%89-%D8%A8%D8%A7%D8%B1%D9%8A%D8%B3%D9%83%D9%8A%D9%81-%D8%AA%D8%B4%D9%83%D9%84%D8%AA-%D8%AD%D9%83%D8%A7%D9%8A%D8%A9-%D8%B9%D9%84%D8%A7%D8%A1>

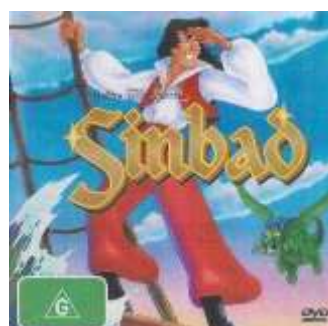
On the other hand, Disney drew the character of Sinbad, which was mentioned in the stories of One Thousand and One Nights, in an animated film in 1992 as shown in **Figure 4**.



**Figure 2**

Aladdin Character Drawn by Disney 1992

[https://disney.fandom.com/ar/wiki/%D8%B9%D9%84%D8%A7%D8%A1\\_%D8%A7%D9%84%D8%AF%D9%8A%D9%86\\_\(%D8%B4%D8%AE%D8%B5%D9%8A%D8%A9\)](https://disney.fandom.com/ar/wiki/%D8%B9%D9%84%D8%A7%D8%A1_%D8%A7%D9%84%D8%AF%D9%8A%D9%86_(%D8%B4%D8%AE%D8%B5%D9%8A%D8%A9))



**Figure 4**

Sinbad Character Drawn by Disney 1992

<https://www.imdb.com/title/tt0249960/releaseinfo/>

The "Leonardo" website created an artificial intelligence version of the character by writing the following text: "Draw the character of Sinbad with exceptional

creativity in multiple poses to be used in an animation film," offering several modern suggestions that imitate the previous version but in a modern style, as shown in **Figure 5**.



**Figure 5**

Sinbad Character Drawn by Artificial Intelligence "Leonardo. AI", Created by the researcher.

When comparing the two images of Sinbad, the researcher found that the artificial intelligence's creativity in drawing the character mimics the previous character, but in a modern style. It matches old and modern ideas, balances colors, and draws the character anatomically; the well-achieved shadow and light allow the designer and animator to utilize the new character with ease and convenience; this is what artificial intelligence currently achieves in terms of shortening time and effort.

The researcher also experimented with artificial intelligence to create backgrounds for the animated films Aladdin and Sinbad and discovered that artificial intelligence provides all the necessary foundations for animators to draw backgrounds, including depth and perspective, correct color scheme, shadow and light, composition, and the relationships between elements such as balance, rhythm, and mass and space. These backgrounds' ease of use and application not only saves time and effort, but also reduces the cost of producing animated films, as shown in **Figure 6** which shows artificial intelligence websites implemented an image

of the palace from the movie Aladdin. The palace appears in beautiful color groups that are harmonious between the warm and cold color groups, in a perspective with a single vanishing point towards the left, the palace appears in a wonderful size to give it an important quality, and the domes of different sizes, with Arabic calligraphy and drawings and engravings that follow the Islamic style of art, to be used in animation films.



**Figure 6**

A Palace background from Aladdin Movie drawn by artificial intelligence website, Created by the researcher.

**Figure 7** which shows artificial intelligence websites implement a background drawing from the movie Sinbad. Moreover, the background appears in harmonious and consistent color tones, combining the aesthetics of artistic perspective, aesthetic depth, and relationships between artistic elements in a way that simulates the reality of the new idea, to be used in animation films.





**Figure 7**

A Background from Sinbad movie which was drawn by Artificial Intelligence website, Created by the researcher.

Artists and designers have a passion for studying, analyzing, and understanding artificial intelligence websites and programs, which represent various aesthetic and artistic values through the relationships between the form and content of the elements, their creativity revolves around the formal and aesthetic richness of the results they achieve, and the developments of digital media, related to artificial intelligence software and websites, came to make the artworks and designs of animation pulsate with movement and dynamism and give them aesthetic and artistic values and the ability to communicate and interact in order to seek more attention from the recipient, so the arts of animation blended with the aesthetics of static design, creating new patterns for contemporary animation with its modern design characteristics, keeping pace with and matching the successive technological acceleration of artificial intelligence in animation.

## 7. Conclusion.

Many artists and designers have widely used modern AI technology, which has opened many possibilities in animation designs and

various artistic media, to create a vast array of still and moving artworks, these technologies undoubtedly serve all categories of art, its forms, and its techniques alike.

The need for animation designs only emerged to keep pace with the development in software and modern digital media: The whole world is in constant motion, and motion has become an essential element for the recipient to find his need in it, adapt to it, and express his feelings with it<sup>20</sup>.

The genre of animation is commonly used in many different digital media formats. In animation movies, both characters and backgrounds play an important part, these elements possess distinct characteristics, such as reliance on stereotypes, obscuring human labor, and manipulating audience emotions, analyzing and appropriately responding to interactive AI technologies and the exaggerated assertions made by their advocates can be facilitated by understanding these animation traits.

Artists and designers have become sufficiently capable of preparing animation according to the techniques and technology of artificial intelligence available through modern design websites and programs and provide with many designs that take many moving digital forms. Artificial intelligence software advancements have infused artworks and animations with movement and dynamism, enhancing their aesthetic and artistic qualities and enabling them to communicate and interact, thereby capturing the attention of the viewer.

The arts of animation have blended with the aesthetics of artificial intelligence, creating new patterns for contemporary animated designs with their modern design characteristics, keeping pace with and matching the successive technological acceleration of multimedia.

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<sup>20</sup> Warc. (2024, Aug.). Retrieved from Warc: <https://www.warc.com/>

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