

# Application research of virtual fashion shows

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**Abstract.** Virtual fashion has developed from QQ show dressing and Virtual dressing games. With the development of VR and AR technology, the rise of metaverse, virtual Try-On, and virtual fashion shows are also gradually rising. This paper reviews the development of virtual fashion shows, summarizes the form and definition of virtual fashion shows, and analyzes the characteristics and bottlenecks of virtual fashion shows by combining different cases. Starting from the social attribute of virtual fashion shows, this paper puts forward the optimization strategy to promote the sustainable development of virtual fashion shows and enhance its economic benefit.

**Keywords:** virtual fashion show, virtual fashion, fashion show.

## 1. Introduction

In the late 19th and early 20th centuries, fashion designers in Paris, France, invited European and American clients to fashion salons in their fashion houses.[1]Then, The designer sets up rows of seats, mirrors, and small stages inside the fashion store, where real models walk with number tags and introduce their outfits. This way of showing clothes became a social and creative experience, and Fashion Parades developed and became popular worldwide [2]. In 1908, Department stores in Philadelphia and New York held fashion shows, known as the "Department Store Show", watching fashion shows became a symbol of high taste, and by 1920, fashion shows had become mainstream, Europe began to hold fashion shows on fixed dates, two design collections per year, laying the foundation for the formation of fashion week. In 1943, America called on the world's fashion media to participate in an event similar to the fashion show, which was the first Media Week and is also considered the first official Fashion Week in history. It led to the European ready-to-wear industry's development and other fashion weeks' emergence. [3] France's Chambre Syndicale de la Haute Couture began requiring designers to publish seasonal collections[4]. Fashion Shows have transitioned from fashion salons to fashion week. Fashion week has become a social window for fashion brand image communication and leading fashion trends, and has been developing ever since. The outbreak of Corona Virus Disease 2019(COVID-19) impacted the development of the fashion industry, forcing the cancellation of fashion week and offline fashion shows, and the mode of traditional fashion week could not adapt to the mode of people's lives under the background of COVID-19. As a result, COVID-19 has accelerated the digital transformation of fashion brands. After 2020, the fashion industry has produced many digital attempts, such as virtual clothing, virtual models, and virtual fashion shows in the metaverse. H&M is combining virtual fashion and gaming with a virtual fashion show in the game *Animal Crossing*. In 2023, Shanghai Fashion Week and Tmall launched the Global Cloud Fashion Week together. In addition, various forms of virtual fashion shows, such as venue exhibitions, story-based games, and AR filters, have been launched successively.

There are many differences between virtual fashion shows and physical fashion shows in the form of expression, technology, and methods. Therefore, this paper first studies the application status of virtual fashion shows. Secondly, Analyze the types and characteristics of virtual fashion shows through different case studies. Finally, the bottleneck of virtual fashion shows is summarized, and the optimization suggestions are put forward.

## 2. Application status of virtual fashion shows

In 1990, the MIRALAB Laboratory in Switzerland presented the first 3D image of Marylin in virtual clothing. In 2003, Tencent released the original virtual image system QQ show. In 2007, Italian brand Diesel used 3D front-projected holographic display to transform the show field into an underwater world at its spring/summer fashion show in Florence. In 2010, Burberry partnered with Sky Television to stream live 3D videos of London Fashion Week shows to venues in New York, Paris, Dubai, Tokyo, and Los Angeles, so that audiences could also experience the atmosphere of London shows. The birth of Google Glass in 2012 made the fashion field focus on VR/AR technology, Diane von Furstenberg used Google Glass in the 2013 New York Spring/Summer fashion Week show, models and guests wear Google Glass and can shoot from the first perspective. It was made into the fashion short film *DVF Through Glass*[4]. In 2015, Dior launched Dior Eyes, which allows the public to visit the backstage of the show with the virtual reality technology. In 2018, Carlings launched the world's first digital clothing line, Neo-ex. Digital designer Cat Taylor transformed NIKE's Fall/Winter Tech Pack collection into a virtual clothing model through 3D modeling technology to achieve a virtual show. In 2018, The Fabricant, the world's first digital fashion brand, was established. All of its clothing is made using 3D virtual technology and does not have physical counterparts. In 2019, Tommy Hilfiger achieved 100% digital design through its 3D design platform. Dapper Labs collaborated with The Fabricant to design the world's first purely digital garment that exists only on the blockchain - the Iridescence Dress. It was sold for \$9,500 in cryptocurrency at the Ethereum conference. In 2019, Trashy Muse held the world's first virtual fashion show. The clothing, models, and show background were all created using digital technology and were played in the form of a video on the LED screen on the outer wall of the EP Gallery in Paris. In 2020, the Auroboros launched a biomimetic virtual clothing series named *Biomimicry*, marking the first appearance of a virtual clothing series at London Fashion Week. During the ANGUS CHIANG 2021 AW fashion show, attendees experienced a virtual world through a VR escape game before entering the show venue. After entering, they could scan the clothing on the models using the ANGUS REALITY APP and interact with the emerging animations. In May 2020, Hanifa's founder, Anifa Mvuemba, used airborne virtual clothing in her fashion show. There were no models inside the clothing. The virtual garments walked successively against a black background, and the live broadcast garnered millions of fans. Additionally, in 2020, the game *Animal Crossing: New Horizons* became popular online, allowing users to design virtual clothing for their characters and host fashion shows within the game. H&M, PRADA, LOEWE, CHANEL, and LV vied to collaborate with it. H&M combined virtual fashion with gaming and held a virtual fashion show in the game "Animal Crossing." [5] Furthermore, in 2020, both Shanghai and Guangdong Fashion Weeks launched online fashion weeks. The sales conversion rate from live broadcasts reached 26% in Shanghai Fashion Week. The total viewership of Guangdong Fashion Week reached 31.48 million, with the highest single-event sales reaching 1.36 million yuan[6]. In 2021, Balenciaga collaborated with Fortnite on game skins, launched a corresponding physical clothing series, and established a metaverse department. Republique became the world's first purely digital luxury fashion brand. In 2022, Gucci announced that it would build a virtual world on The Sandbox platform. Decentraland (the first metaverse platform on Ethereum) hosted the world's first metaverse fashion week. Givenchy Beauty became the first luxury beauty brand to create a virtual space on the gaming platform Roblox[7].

Tracing the development of virtual fashion, we can find that at its inception, virtual fashion served as an accessory within games or social platforms, allowing users to select and change the clothing combinations of virtual characters. Subsequently, independent products such as virtual fashion KOLs and virtual clothing brands emerged in the market. With the advancement of digitalization and the impact of COVID-19, virtual clothing and platforms rapidly developed in 2020, and clothing creation in virtual games garnered user attention. Fashion brands entered the stage of digital and virtual transformation. In the past two years, purely digital fashion products have developed rapidly. Fashion brands have collaborated with metaverse platforms through virtual fashion weeks and other means, not only releasing virtual individual items and fashion products but also exploring metaverse digital

games and social interactions more deeply. Fashion shows have also transformed from a marketing strategy and exploration of artistic forms into a platform that integrates interaction, environmental protection, entertainment, self-expression, and personality display.

### **3. Connotation, types and characteristics of virtual fashion shows**

#### **3.1. Connotation of virtual fashion and virtual fashion shows**

Virtual fashion emerges alongside interchangeable virtual digital appearances for virtual characters or items in games, serving as an accessory for users' virtual avatars. Therefore, Qin Lanjun believes that virtual fashion refers to the cultural and industrial phenomenon of changing the virtual digital appearance of virtual characters in games, which is a product of the cross-border integration of fashion and games [8]. However, with the development of digital technology, virtual fashion has also emerged as a form that is independent of games and becomes an independent product. Therefore, Lou Tiantian proposes that virtual fashion refers to the new virtual concepts generated by the application of digital virtual technologies such as Virtual Reality (VR), Augmented Reality (AR), and CG special effects in the fashion industry, such as virtual fashion, virtual show, and virtual idols. By combining fashion visual effects with virtual digital technology, it provides an effective solution for sustainable fashion [9]. This concept emphasizes the technologies and methods used in virtual fashion and highlights its significant advantage of reducing material consumption, carbon emissions, and possessing strong environmental protection properties. However, the essence of this definition is the introduction of digital means and virtual technology into the production, manufacturing, and marketing of the physical fashion industry for innovation, which is difficult to call fully virtual fashion. Therefore, this paper argues that virtual fashion is fully digital, with its digital appearance being purely digital clothing, accessories, or other fashion-related elements designed and created through digital means. Designers leverage digital technology to break the boundaries of reality in a virtual environment, produce fashion products for the virtual world, collaborate with games or metaverse platforms to host virtual fashion shows and release and sell virtual fashion products, and establish connections and interactions with users through virtual fashion shows and fashion products, thereby promoting the sustainable development of fashion. This concept includes the digital tools used in the design process, user communication, and service experience in virtual fashion shows, emphasizes the pure digitization, openness, and social attributes of virtual fashion, and expands the involvement of blockchain and virtual currencies.

#### **3.2. Types of virtual fashion conference**

By examining the development process of virtual fashion shows, we can identify three main types. The first type relies on virtual reality technologies. It features runway shows conducted in physical exhibition halls, captured and produced using 360-degree panoramic photography. Combined with tools like VR glasses, it creates an immersive virtual show venue. Viewers can not only experience a fantastical and captivating show environment but also interact with clothing and patterns by wearing VR glasses or related devices and scanning relevant apps. However, this type is not a fully virtual fashion show. its essence remains a traditional fashion show, with the use of VR and other technologies serving primarily as a marketing strategy. The second type involves creating virtual models and virtual clothing using 3D modeling and utilizing computer graphics to build a virtual runway or showcase newly released digital appearances in a physical exhibition hall. For example, the Angel 2020 Autumn/Winter series show, themed "Rebirth of Light and Shadow," combined traditional runway presentation with CG technology-produced scenes to construct five futuristic virtual settings. Trashy Muse launched its first virtual fashion show in 2019 in the form of a video, where the models, the clothing they wore, and the scenes were all virtual. The third one is to combine with games and the metaverse. Relying on games, a virtual fashion show can be held. For example, in 2020, Balenciaga presented its 2021 autumn new product launch as VR game named *Afterworld: The Age of Tomorrow*[10]. The game is set in 2031, where players can choose a virtual avatar to enter

the game. After entering the game, players start from Balenciaga's store and travel through different scenes such as future districts. Passers-by in different scenes are dressed in Balenciaga's suits. Players can choose different scenes for an adventure and pick out their favorite clothes for understanding. For example, they can click on passers-by to learn about the material and other information about the Balenciaga suit worn by the passer-by. In this fashion show, the audience is not just a spectator, they can selectively interact with the clothing, models and environment. Moreover, numerous fashion brands like H&M and Tommy Hilfiger collaborated with Animal Crossing: New Horizons, providing virtual clothing for the characters in the game. They also held fashion shows in the game's virtual environment, integrating virtual fashion shows into the game's plot and opening pop-up stores to sell clothing through shopping codes. This form breaks away from the boring and stereotyped process of traditional fashion shows, enhancing the interaction between fashion brands and users. With the rapid development of consumption among Generation Z, virtual fashion shows can easily draw closer the distance between brands and Generation Z consumers, making brand promotion integrate into their daily lives.

### **3.3. Characteristics of a Virtual Fashion shows**

With the continuous maturity of blockchain technology and the rise of the metaverse, virtual fashion has been endowed with more possibilities and higher economic value. Along with the development of the Generation Z consumer group, virtual fashion shows with social and interactive attributes have become a bridge between fashion trends and Generation Z consumers. Generation Z is a group that grew up with mobile internet, mobile games, animation, and other trends. Virtual concepts such as QQ avatars, game costumes and equipment, NFT digital collectibles, anime, and the metaverse have integrated into their lives. They value experience, interactivity, and their "social circles." While offline physical fashion shows are still held with great enthusiasm, fashion brands have discovered that fashion communication through virtual fashion shows can strengthen the emotional connection between Generation Z consumers and the brand. Therefore, virtual fashion shows remain a development trend in the fashion industry.

Traditional fashion shows create a fashionable atmosphere through lighting, sound, and stage design, with real-life models showcasing the clothing and demonstrating the characteristics of the garments, while designers interpret their fashion show. During a fashion show, audience members wearing the brand's clothing sit in the viewing area, enjoying the visual experience, and then take photos in the photo zone. However, there is hardly any in-depth interaction between the audience and the brand. Therefore, this paper argues that virtual fashion shows possess strong interactivity, sociality, openness, and environmental friendliness, revolutionizing the communication methods of traditional fashion shows and possessing stronger dissemination power and a wider dissemination range.

First, regarding the strong interactivity and sociality. Some fashion brands collaborate with games, holding fashion shows in the game or developing the fashion show into a mini-game. In the game, users can choose their favorite virtual models, dress them up with clothing, accessories, and other fashion items, and select scenes. Within different scenarios, fashion brands can design varying storylines. For instance, users can attend a fashion show. Users can also team up with other users to collect plants needed for clothing production in the forest and participate in the production of raw materials for clothing in the factory. Users manipulate the mouse to understand the brand's essence and the ideas it wants to convey. In a virtual fashion show, users can click on a piece of clothing to learn about its material and immerse themselves in the sensation of the fabric. Users can try on virtual clothes through AR, and virtual avatars will display how they would look in virtual clothes. If users like the costume, they can scan the code to buy it, post a photo of themselves wearing the virtual costume, and receive in-game rewards. The virtual fashion shows enhance user participation and diversify the user experience. The audience of a traditional fashion show can only have a sensory experience, while a virtual fashion show increases the emotional experience and cognitive experience. When users dress up their favorite virtual models, they form an emotional connection with them. Some scholars believe that users may perceive the virtual models as another version of themselves.

The storyline allows users to discover and explore the brand's philosophy within the game. The virtual fashion show is more vivid than text or images, making it easier to resonate with users and deepen their brand recognition and loyalty.

Secondly, virtual fashion shows are open. It breaks the threshold for ordinary people to participate in fashion shows. Traditional fashion shows usually invite specific guests to attend. The ordinary people have no chance to attend fashion shows. However, the virtual fashion shows combined with the game or metaverse is open to everyone, breaking the restrictions of time and region. At any place and any time, users can participate in any activities of the virtual fashion show by simply registering, and logging in to the platform. In March 2022, Decentraland held its first Metaverse Fashion Week in a virtual world. Users entering the designated area of the virtual space can watch brand shows, patronize brands' online flagship stores, and buy fashion NFT, which eventually attracted 108,000 users to watch[11]. If traditional fashion is an experience that only a few elites in society can enjoy, and traditional fashion shows highlight the identity and influence of the invitees, then virtual fashion shows gain a broader and more diversified audience by eliminating obstacles such as invitation, identity, region, and time.

In other words, virtual fashion shows may change the fashion's connotation and communication methods. Traditional fashion is far from the lives of ordinary people. Traditional fashion is designed by a few fashion designers and released through fashion shows. Fashion editors summarize the next fashion trends by finding commonalities among these shows. Consumers learn about these trends through fashion videos, magazines, and celebrity outfits. Therefore, traditional fashion is defined by a small group of people and communicated from top to bottom, from the few to the general public in a one-way manner. However, virtual fashion shows have given ordinary people the opportunity to participate in the production and dissemination of fashion knowledge. Currently, many companies are focusing on building virtual fashion design sharing platforms, where ordinary people can design virtual clothing, open pop-up stores to sell virtual clothing, and hold fashion shows. In virtual fashion, fashion is not solely defined by authorities. Any creative creator can use this platform to release new fashion trends. In other words, virtual fashion shows makes fashion no longer concentrated in a few authorities, so that more people's aesthetic recognition. The ordinary creators become producers, publishers and disseminators of fashion content. This transformation makes the communication of virtual fashion shows faster, wider, and more explosive, accelerating the pace of fashion change. It also allows fashion brands to establish a friendly image among Gen Z consumers, disseminate brand ideas more quickly, and enhance the recognition and influence of fashion brands. Therefore, virtual fashion shows are an effective way to achieve interaction and connection between brands and users.

In addition, virtual fashion shows possess the characteristics of environmental protection, which aligns with the concept of sustainable development. Fast fashion and the clothing industry are highly energy-intensive, and the production, transportation, and disposal of clothing generate significant carbon emissions. For example, the production of a single pair of jeans requires 7,500 liters of water and emits 33.4 kilograms of carbon throughout the entire production process. As audiences' aesthetics and demands constantly change, designers continuously introduce new designs, leading to an accelerated frequency of clothing design and production. Therefore, it will also lead to overcapacity. In 2019, H&M revealed that it had accumulated \$4.3 billion in inventory in 2017 and burned 60 tons of brand-new unsold clothes from 2013 to 2019[12]. Burberry was also exposed for destroying its clothing, accessories, and cosmetics worth 28 million pounds in 2017[13]. Virtual fashion shows utilize 3D models and computer technology to create runway scenes. Unlike traditional textile raw materials, digital resources are highly reusable and shareable, and a certain digital asset can be used by multiple designers at the same time, which will reduce the carbon emissions generated in the preparation process of traditional fashion shows and reduce the cost of people attending fashion shows. People just need to turn on computers and mobile phones to participate through games or videos. Therefore, virtual fashion shows are the new form of green, low carbon and environmental protection.

#### 4. Conclusion

As described above, the virtual fashion shows are interactive and social, enriching the user's experience, and aligning with the concept of sustainable development. The appearance of virtual fashion shows expands the connotation of fashion, changes the traditional fashion communication mode, and enables ordinary creators to have a voice in fashion. These characteristics will bring new economic growth points for fashion enterprises. However, its development still has bottlenecks. The development of digital technology is a prerequisite for the development of virtual fashion, therefore, the breakthrough of VR, AR and other technologies is an important influencing factor for the continuous change of virtual fashion shows. Additionally, the resources of virtual fashion shows held by different fashion companies cannot be shared, and there is poor connectivity and compatibility between different virtual fashion shows. For example, users who have purchased virtual clothing from Company A's virtual fashion show are unable to use it in the virtual spaces of other companies. Therefore, how to continuously attract users' attention to virtual fashion shows, rather than just a temporary hype, has become a problem that needs to be solved. Virtual fashion shows need to give users more rights, give designers more space to show their creativity, and highlight their social attributes, and form sticky interactions between users and users, users and brands. The functions of virtual models are constantly developed to form a strong emotional accumulation and resonance between virtual models and users. By setting a reward mechanism, users are encouraged to continue to try various styles of virtual clothing and stimulate users' desire to buy. By establishing circles and mechanisms, users can spontaneously launch virtual fashion conferences and publicize virtual fashion products to form a rift communication effect.

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