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# Innovation Pathways in Fashion Design Through AIGC Technology

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**Abstract:** With the deep penetration of AI technology, profound changes have taken place in all links from fashion design, advertising promotion to production sales in the fashion industry. This study examines the reshaping of the creative process in the fashion industry by the AIGC technology. By systematically analyzing the application of AIGC in design inspiration generation, pattern creation, virtual fitting experience, personalized customization, and sustainable fashion initiatives. The deep learning algorithms and diffusion models of AIGC technology have been applied to the field of UI design, making our design efficiency have made an extremely large increase, the barrier to creativity has significantly lowered, and enabling the users to implement high-quality, efficient iteration of multiple design ideas. Virtual try-on technology is more developed now, and the online shopping experience is more interactive, so the online shopping return rate has gone down. However, the application of AIGC in fashion Design faces multiple challenges in terms of creative originality, data quality requirements, and a human-AI cooperation framework. Based on typical case studies from home and abroad, this paper presents strategic recommendations for the in-depth integration of AIGC technology and fashion design, providing both theoretical reference and practical guidance for the digitalization of the fashion industry.

**Keywords:** AIGC technology; Fashion design; Digital innovation; Virtual try-on; AI; Sustainable fashion

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## 1. Introduction

It's becoming to modern digital economy environment with the rate of development that has never been achieved by AI Technologies by penetrating into the industry. Fashion design as an important sector in the creative industry go deep into digital transformation. The appearance of AIGC technology brings a new creative paradigm and tool support for fashion design practice [1]. After the breakthrough appearance of chatbot ChatGPT in 2022 and the widespread use of image generation tools such as Midjourney, Stable Diffusion, and so on, AIGC technology has shown great value in the field of visual creation.

China is still the world's biggest clothing producer and consume place is has 170 000body family value production manufacture companies, accounting for 4. 25% in China's full kind of sensitive produce [2]. Nevertheless, the traditional fashion design sector has long been facing persistent problems such as a slow creative iteration cycle, a prolonged production period, and large inventory pressure. Against the background of consumption upgrades and the rise of

personalized demands, using new technologies to improve the efficiency of design and meet the diversified market demand has become an important transformation agenda of the industry. AIGC technology brings new ideas for solving these problems, such as garment style generation, trend prediction, and virtual try-on experience, which are currently reshaping various links of the industry chain.

This research has carried out systematic research on the current situation and development trend of the application of AIGC technology in fashion design, carried out an analysis on the innovation path and practical significance of technology, as well as explored the problem and strategic response of technology in the implementation process. The apparel industry's smart upgrade. Using a method of combining literature research with case study methods, this study will conduct an in-depth study of representative application cases from both home and abroad to reveal the internal mechanism and development law by which AIGC technology is applied to fashion design.

# 2. Overview of AIGC technology and its development in fashion

## 2.1. Core principles of AIGC technology

AIGC stands for Technologies for automatically generating textual, visual, audio and video information by using AI. Core technologies: GAN, VAE, Diffusion models, and LLM [3]. In terms of fashion design, AIGC mainly relies on the image generation technology, which has learned and mastered characteristics through the huge amount of data of the fashion design, such as stylistic elements, color matching, pattern structure, and then makes design suggestions that meet certain needs.

Diffusion models have become the dominant technology for AIGC image generation, and they realize the generation of high-quality images from random noise through the gradual restoration of image details. Open source models such as Stable Diffusion have been applied in Fashion design due to their excellent generative performance and flexible, adjustable characteristics [4].

## 2.2. Development history of AIGC in the fashion industry

Artificial intelligence exploration in the area of fashion design extends quite a bit into history. As early as 2019, there was already a garment design auxiliary system - DeepVogue, under the name of DeepBlue Technology, that had obtained second prize in the 13th China International Fashion Design Innovation Competition, reflecting the possibility for AII in the area of fashion creation [5]. Subsequently, domestic enterprises such as Zhiyi Technology and Style3D successively launched AI design tools oriented towards the apparel industry, promoting technological commercialization. Since 2023, after the breakthrough in generative AI technology, AIGC applications in fashion have entered a period of rapid development (**Table 1**).

**Table 1.** Overview of AIGC technology applications across fashion design stages

| Application Stage | Technology Format | Representative Tools/Platforms |
|---|---|---|
| Inspiration Generation | Text-to-Image Generation | Midjourney, DALL-E |
| Style Generation | Fashion-Specific Generative Models | FASHION DIFFUSION |
| Virtual Try-on | AR/VR + Diffusion Models | TryOnDiffusion, Zeekit |
| Trend Forecasting | Big Data Analytics + Machine Learning | Zhiyi Technology, Centric PLM |
| Intelligent Pattern Making | Image Recognition + Automated Pattern Making | Style3D, Huayiyi |

According to the reports released at the China AIGC Industry Summit, it is projected that the scale of China's AIGC market may be as large as 17 billion yuan in 2023, and it may reach more than one trillion yuan by 2030 [6]. AIGC is a

major application scenario of the fashion industry, which has been comprehensively transformed in assisted Design to intelligent Manufacturing at all links of the industry chain. The principal applications of AIGC technology in different stages of fashion design are shown in Table 1.

# 4. Innovative applications of AIGC technology in fashion design

## 4.1. Design inspiration generation and style creation

AIGC technology gives designers new means to get inspiration. Through the tools of DALL-E and Midjourney, designers just need to input simple textual descriptions and can quickly obtain a large number of visual references to overcome the time limitations of traditional material collection. Fashion Diffusion is developed by Zhiyi Technology and is an intelligent tool oriented to fashion design. It can intelligently produce diversified style images based on the user's customized parameters, such as fabric color and style, at the same time, correlate similar market styles and provide sales data and social media performance reference for business decisions [7].

During Shanghai Fashion Week's 2025 Autumn/Winter season, several brands presented their AI-assisted design outcomes. Designers got creative inspiration through AI like DeepSeek and used mechanical parts and future aesthetics to make the proposal. Wanshili silk brand released an AI pattern interaction agent, which can extract the aesthetic pattern from the huge pattern database through the AI algorithm to enrich the design of creative supply [8]. Human-AI collaborative Design mode is becoming the new normal within the circle of fashion. Designers no longer work alone but work hand in hand with AI, design scope has been greatly expanded.

## 4.2. Virtual try-on and consumer experience enhancement

Virtual try-on is the important development direction of AIGC technology in the field of fashion retail under the background of fashion retail. Traditional online clothing buying has one big issue that you cannot see and touch the clothing yourself so out of those reasons, 42% of people say the pictures don't match the real thing [9]. In response, some virtual try-on solutions based on AR / VR and AI technology have emerged, offering consumers an immersive shopping experience. Google's TryOnDiffusion function uses a diffusion model to generate try-on pictures, and the test results show that the effectiveness of the function is better than the traditional method in 92.72 percent of the cases. This function has been launched on multiple well-known e-commerce websites.

Tommy Hilfiger domestic brands, such as those that have deployed AR virtual try-on functions within WeChat mini-programs, use high-performance human body feature point tracking technology to allow virtual garments to fit the body shape of users as they move. Virtual try-on technology application makes consumers have confidence in buying, reduces returns, and also helps the brand save a lot of logistics costs and operating costs. **Figure 1** shows the typical application process of virtual try-on technology, which includes key steps such as user image acquisition, body modeling, garment rendering and effect display.

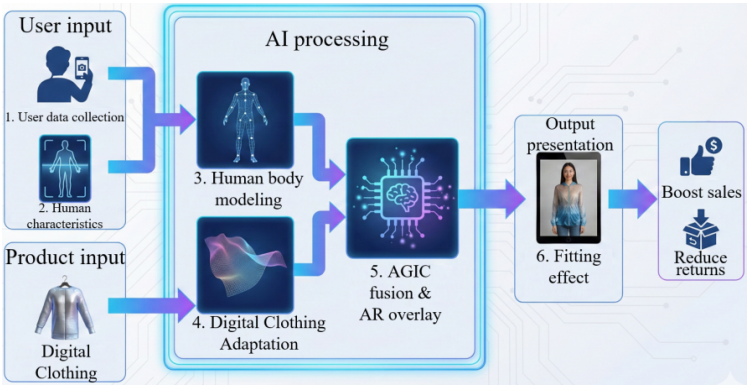


**Figure 1.** Virtual try-on technology application workflow diagram.

### 4.3. Personalized customization and intelligent manufacturing

AIGC technology provides new technical pathways for personalized clothing customization. Dayang Group, through the industrial internet platform, connects 1,600 retail stores and 2,300 fabric suppliers, using AI technology to achieve intelligent resource allocation for measurement data, material stockpiling and other resources, and custom-made suits can be completed in just a few working days from order to delivery [10]. C2M (consumer to manufacturer) model is changing the traditional clothing manufacturing method from mass production to mass customization. The Style3D company's Style3D AI industry model, which is built based on industry data and has functions such as AI style analysis, AI pattern generation, AI version piece generation and AI material generation, and realizes full digitalization from design to production. Huayiyi, as an AI fashion Design software attempt to increase the pattern-making procedure with artificial intelligence, with the ability of the system to transform flat drawing to 3D manufacturing solutions via scanning the designer's draft and adjusting parameters, which greatly increases production effectiveness and lowers labor costs.

## 5. Representative case studies

To understand the practical application effects of the AIGC technology in fashion design in depth, this study selects two typical cases in China and abroad, respectively, for analysis.

(1) Case 1: CALA Platform's AI Design Services. As the first apparel platform using OpenAI's DALL-E2 API services, CALA offers designers full-service apparel solutions. After the user selects the garment type, by providing textual prompts such as design style, materials and decorative characteristics for the garment Design, the system can output design images in photorealistic or flat sketch style. Designer might choose suitable results to proceed with AI regeneration, or modify the generated design. Such tools significantly reduce the threshold of entry for designers, and for experienced designers, it provides a lot of creative references.

(2) Case 2: GAP's AR Try-On Application. Following the sales decline in 2017, GAP promoted virtual try-on technology. In 2017, the company introduced the Dressing Room AR try-on app and acquired the virtual try-on company Dapr in 2021, continuously increasing its technological investment. Utilize virtual fitting room experiential advantages to eliminate obstacles for consumers of online garment selection, virtual fitting rooms that increase sales volume and the number of times users engage, help the brand to achieve self-rescue. Table 2 Comparison of characteristics and effects of two different AIGC application types.

**Table 2.** Comparative analysis of AIGC fashion design application cases

| Comparison Dimension | CALA Platform | GAP AR Try-on |
|---|---|---|
| Application Type | Design-End: AI-Assisted Design Generation | Retail-End: Virtual Fitting Experience |
| Core Technology | DALL-E2 API Image Generation | AR Augmented Reality + 3D Modeling |
| Target Users | Fashion Designers, Independent Brands | End Consumers, Generation Z Groups |
| Primary Effects | Lowering Design Barriers, Enhancing Creative Efficiency | Improving Shopping Experience, Reducing Return Rates |

## 6. Conclusion

This study aims to explore the innovative path in the fashion design field by field systematic study on the application path of AIGC technology. Research results show that AIGC technology is currently reshaping the apparel industry in the field of design inspiration generation, style image creation, virtual try-on experience, personalized customization, and intelligent manufacturing. Technology application can also increase design efficiency, reduce creative barriers, and give

consumers a new shopping experience. However, the application of AIGC in fashion design is still in the stage of rapid development, and there are still problems, such as the lack of creativity in works, the quality of data, and the framework of collaboration between humans and AI. Recommendations for the promotion of technological applications in the industry include several contents: strengthening the construction of industry data standards and creating high-quality training data sets; Promoting innovation in human-AI collaborative Design model, giving play to the complementary advantages of AI efficiency and human creative value; Integrating sustainable development concepts into technological applications to drive green transformation of the fashion industry. With the continuous progress of technology and the expansion of application scenarios, AIGC will continue to change the fashion design industry, helping Chinese fashion step into the world.

## Disclosure statement

The authors declare no conflict of interest.

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