

Generative Fashion Design Web Platform

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Abstract: *The emergence of generative design technologies and artificial intelligence (AI) has transformed multiple industries, including fashion. A new paradigm in fashion design involves creating personalized clothing experiences by leveraging face and body shape customization. This paper introduces a web platform that allows users to input their face images and adjust body shapes to simulate and try on new dresses. The platform combines generative fashion design algorithms, machine learning, and 3D rendering technologies to generate realistic fashion visualizations. This paper discusses the platform's architecture, the technological innovations behind it, the challenges of personalization, and the potential impact of this technology on the fashion industry, consumer behavior, and sustainable design practices*

Keywords: Generative design, fashion technology, AI-driven customization, personalized fashion, virtual try-on, body shape simulation, machine learning, web platform.

I. INTRODUCTION

The fashion industry has undergone significant transformations in recent years due to technological advancements. The integration of AI, machine learning, and 3D modeling has opened new doors for personalization and virtual experiences. One such innovation is the ability to offer highly personalized fashion solutions using generative design algorithms. These systems can generate clothing that adapts to a person's unique physical features, allowing consumers to visualize how different outfits will look on them based on their facial features and body shape.

Traditional fashion retail often involves limited personalization, leaving customers to either choose from a small set of pre-made designs or rely on standard size categories. With the rise of virtual try-ons and AI-based customization, however, consumers can now experience a more tailored shopping journey. In this paper, we explore a web platform that enables users to upload their face images, adjust their body shapes, and try on new dresses or outfits generated by AI. This platform represents a significant advancement in how clothing is designed, sold, and consumed.

II. LITERATURE SURVEY

The idea of virtual try-ons and fashion customization has been explored in various research papers and commercial applications. For example, platforms like **Fashwell** and **Vue.ai** use AI to recommend outfits based on user preferences and body measurements. However, these platforms often focus on visualizing clothes on a standard mannequin model or a static avatar, without offering real-time body shape adjustment or face-based styling.

More advanced virtual fitting rooms have emerged, using technologies like **Augmented Reality (AR)** and **Mixed Reality (MR)**, where users can try on clothes virtually by superimposing outfits over their own bodies using a smartphone or computer camera. However, many of these systems still fall short in providing fully customized design recommendations that consider individual body dimensions and facial features in generating clothing patterns and styles.

Our platform introduces a novel approach by combining **generative design** with face image recognition and body shape modification, allowing users to upload their face images and tailor their body shapes to simulate a variety of outfits that fit their individual profiles.

III. SYSTEM ARCHITECTURE

The web platform is built upon three main technological pillars:

Face Image Input and Body Shape Customization

Users begin by uploading their face image and entering their basic body parameters (height, weight, and desired adjustments such as waist size, shoulder width, etc.). The platform utilizes facial recognition algorithms to extract key features, including face shape, skin tone, and facial expressions, which can influence clothing design (e.g., neckline styles, collar shapes).

Generative Fashion Design Algorithm

The core of the platform is powered by a generative design model that uses machine learning to create new outfits based on the user's body shape and facial features. These algorithms are trained on large datasets of fashion images, body types, and style preferences. The system then generates clothing patterns that are not only aesthetically suitable but also tailored to the user's unique measurements.

Virtual Try-On and 3D Rendering

Once a design is generated, the system renders it onto a 3D model of the user's body. This virtual try-on feature allows the user to view how the dress or outfit looks from multiple angles and lighting conditions. Advanced simulation techniques, including physics-based fabric draping, ensure that the virtual clothing behaves naturally, enhancing realism.

IV. METHODOLOGY

4.1. Facial Analysis

The platform uses computer vision algorithms to analyze the uploaded face image, identifying key features such as skin tone, face shape, and unique characteristics. This analysis guides the design of apparel that complements the user's appearance.

4.2. Body Customization

Users interact with a graphical interface to specify body dimensions, either manually or using predefined templates. Advanced machine learning algorithms ensure that the generated avatars accurately reflect these customizations.

4.3. Generative Design Process

A GAN-based model is used to generate apparel designs tailored to the user's specifications. The generator creates designs that align with the user's style preferences, while the discriminator ensures quality and realism. Training data includes diverse fashion styles, fabrics, and patterns to promote inclusivity.

4.4. Virtual Try-On

The platform integrates 3D modeling to create a realistic avatar of the user. This avatar serves as a digital mannequin, allowing users to preview designs and make adjustments before finalizing.

V. FUTURE DIRECTIONS

While the platform is currently in its initial phase, future developments could include:

Integrating **social media platforms** to enable users to share their virtual try-ons and receive feedback from peers.

Implementing **augmented reality (AR)** to allow users to try on clothes in real-time using their smartphones.

Expanding the system's capabilities to incorporate **gender-neutral fashion** and offer designs that go beyond binary body types.

Refining the **AI algorithms** to provide more accurate and diverse clothing recommendations based on user preferences.

VI. CONCLUSION

The generative fashion design web platform represents a significant step forward in personalizing the shopping and clothing design experience. By combining face image recognition, body shape customization, and generative design algorithms, this platform offers users a powerful tool for trying on clothes virtually, which could revolutionize the way fashion is designed and consumed. Although there are still challenges to address, the potential impact on consumer behavior, sustainability, and fashion innovation is immense.

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