

A Survey on Fashion AR using Hand Gesture

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Abstract: Fashion AR using hand gestures is a dynamic fusion of technology and style that is reshaping the fashion industry. This innovative concept employs augmented reality and gesture recognition to enable users to virtually try on clothing and accessories, fostering a highly interactive and personalized shopping experience. By making intuitive hand movements, users can mix and match outfits, visualize how different styles complement their unique body shapes. Through the use of computer vision and gesture recognition, individuals can effortlessly navigate and manipulate digital wardrobes. By employing intuitive hand gestures, users can select, mix, and match virtual outfits, enabling them to experiment with diverse styles and discover their unique fashion preferences. This interactivity not only fosters a greater sense of engagement with fashion but also reduces the uncertainties associated with online shopping by providing a more accurate representation of how different clothing items fit and look on one's body. Furthermore, this technology is reshaping the landscape of fashion retail. It reduces the need for physical store visits, making shopping more convenient and accessible while minimizing the environmental footprint of the industry. AR fashion with hand gestures is an exciting and promising development that promises to democratize fashion, encourage sustainability, and redefine the way we express ourselves through clothing and accessories.

Keywords - *Virtual Try, Unity, Augmented Reality, image processing, hand gestures*

I. INTRODUCTION

The use of technology in the field of fashion design is currently growing rapidly. The development of technology has become something interesting in technological progress. Of course, also in the world of fashion. Fashion is a popular term for clothing. Fashion AR using hand gestures leverages computer vision and gesture recognition to enable users to interact with virtual garments and accessories in real-time. By simply moving their hands, users can select, mix, and match outfits, virtually trying on various clothing items without physically donning them. Augmented reality (AR) is an interactive experience of the real world environment where objects that are in the real world are enhanced by computer-generated perception information, sometimes crossing various sensory modalities, including visual, auditory, haptic, somatosensory, and olfactory.

Customers or potential buyers sometimes want to try clothes that are in an online store but the store does not have an offline store so customers or potential buyers cannot try on the clothes they want. Furthermore, fashion brands are increasingly incorporating AR and hand gesture interaction into their marketing strategies. Interactive AR campaigns allow users to engage with a brand's story or product line through immersive experiences triggered by

hand gestures. Whether it's unveiling a new collection through a virtual runway show or allowing users to interact with 3D holographic representations of products, this technology opens up avenues for brands to create memorable and shareable experiences that transcend the limitations of traditional marketing channels.

The intuitive nature of gestures provides a user-friendly interface, enabling those with mobility challenges to engage with virtual fashion elements effortlessly. This inclusivity aligns with the evolving ethos of the fashion industry, emphasizing diversity and representation. This technology also opens up new horizons for online shopping, making it more engaging and reducing the need for physical store visits. In this fashion-forward digital landscape, AR fashion using hand gestures is not just a novelty but a revolutionary step toward a more sustainable, individualized, and interactive fashion future.

1.1 Augmented Reality

The Augmented Reality (AR) is a revolutionary technological concept that seamlessly integrates digital information and virtual elements with the real-world environment, enhancing the user's perception and interaction with their surroundings. At its core, AR overlays computer-generated sensory input such as images, sounds, or data onto the physical world in real-time. Unlike virtual reality, which immerses users in entirely computer-generated environments, AR aims to augment and enrich the real-world experience by blending the virtual and physical realms.

The concept of augmented reality dates back to the early 20th century, but the term itself gained popularity in the 1990s. One of the pioneers often credited with the development of AR is Boeing researcher Tom Caudell. In the early 1990s, Caudell coined the term "augmented reality" to describe a digital display system used by Boeing assembly line workers. This system helped workers visualize and understand complex wiring diagrams and assembly instructions by overlaying digital information onto their field of view.

Augmented Reality (AR) stands at the forefront of technological innovation, promising a transformative impact on how we perceive, interact with, and experience the world. This revolutionary concept seamlessly blends the digital and physical realms, offering users an enriched and immersive encounter with their surroundings. As we delve deeper into the layers of AR, it becomes evident that its potential extends far beyond the realms of entertainment and gaming, permeating various industries and shaping the future of human-computer interaction.

1.2 AR Fashion

Augmented Reality (AR) has ushered in a new era for the fashion industry, marking a significant departure from traditional norms and introducing a wave of innovation that seamlessly integrates technology and style. AR fashion, an exciting convergence of technology and style, revolutionizes the traditional fashion experience by integrating augmented reality into the industry. This innovative approach allows users to seamlessly blend the physical and digital worlds, particularly evident in virtual try-ons where individuals can visualize how different garments look on them in real-time. This transformative technology eliminates the need for physical fittings, offering a more convenient and interactive way for consumers to explore and select clothing items.

This transformative technology allows users to visualize garments on themselves in real-time, providing an interactive and dynamic alternative to traditional in-store try-ons. Through the lens of AR, users can experiment with various styles, colors, and sizes, all within the digital realm. This not only streamlines the decision-making process but also addresses concerns related to sizing and fit, ultimately enhancing the overall shopping

experience. The convenience and accessibility offered by AR fashion in this context signify a paradigm shift in how consumers interact with fashion, making the exploration of personal style more intuitive and enjoyable.

Brands can leverage AR to transcend the limitations of physical runway shows, offering audiences a front-row seat to fashion events from the comfort of their own space. The incorporation of AR into fashion presentations not only democratizes access to high-profile events but also allows brands to experiment with creative concepts, blurring the lines between reality and fantasy. This immersive storytelling through AR establishes a more profound and personalized connection between brands and consumers, as individuals become active participants in the narrative rather than passive observers.

This democratization of AR tools enhances accessibility, allowing users to engage with AR fashion experiences using devices they already possess, such as smartphones or tablets. As AR technology continues to evolve, its seamless integration into daily life is poised to redefine not only how we shop for clothes but also how we perceive and express our personal style. This trend has the potential to redefine the storytelling aspect of fashion, creating a more engaging and personalized connection between brands and consumers. Ultimately, AR fashion not only elevates the shopping experience but also opens up new creative possibilities, pushing the boundaries of expression and redefining the landscape of the dynamic and ever-evolving fashion industry.

1.3 Hand gesture

Hand gestures are a fundamental aspect of non-verbal communication, playing a crucial role in expressing thoughts, emotions, and intentions. These movements involve the coordinated motions of the fingers, hands, and arms, conveying meaning through a language that transcends cultural and linguistic barriers. Human beings naturally use hand gestures to complement spoken language, emphasizing certain points, clarifying ideas, or adding emotional nuances to their communication. The universality of some gestures, such as waving for greeting or pointing to indicate direction, highlights their innate and cross-cultural significance.

In the tapestry of human history, hand gestures have been an integral part of storytelling, rituals, and cultural ceremonies. From the subtle movements that accompany an orator's speech to the ceremonial gestures that punctuate religious rituals, the significance of hand movements as a vehicle for expression is woven into the very fabric of our societies. It is a language that predates spoken words, connecting people across time and geography through shared symbols and expressions.

The evolution of technology has brought forth a fascinating intersection between ancient forms of expression and the digital age. In recent years, there has been a remarkable integration of hand gestures into human-computer interaction, opening up new dimensions of control and communication. Gesture recognition technology has emerged as a groundbreaking development, allowing individuals to navigate and manipulate digital interfaces through the intuitive language of hand movements.

Beyond their communicative function, hand gestures also play a pivotal role in human interaction and expression. They can convey a wide range of emotions, from joy and excitement to frustration and anger. In social settings, gestures contribute to the richness of conversations, making communication more dynamic and engaging. Additionally, hand gestures are integral to certain cultural practices and rituals, often serving as a form of expression or symbolizing specific meanings within a community.

II. LITERATURE SURVEY

An augmented reality based Virtual dressing room using Haarcascades Classifier [1]

AUTHORS: Nauman Zafar Hashmi, Aun Irtaza Wakeel Ahmed, Nudrat Nida (2020)

This paper presents a new approach to virtual dressing rooms using augmented reality and Haarcascades classifier. This model uses a web cam to acquire input video and allows users to experience virtual dress fitting. The algorithm includes face, skin, and lower body detection, as well as dynamic distance estimation for precise virtual reality. The system overcomes the constraints of Kinect sensors and is computationally inexpensive. The paper also includes a comparison of the proposed model with existing applications and references to related work in the field of virtual dressing rooms and augmented reality in retail and online shopping.

AI Assisted Fashion Design: A Review [2]

AUTHORS: Ziyue Guo, Zongyang Zhu, Yizhi Li, Shidong Cao, Hangyue Chen, and Gaong Wang (2023)

The paper explores the integration of enhanced personalization and seamless multimodal interfaces in the field of fashion design and recommendation. It discusses the increasing demand for personalized fashion experiences and the potential of multimodal interfaces in facilitating effective communication between designers and users. The review covers traditional methods to deep learning techniques, showcasing recent research trends in AI technologies within the fashion domain. It also presents future research directions, emphasizing the importance of open-source datasets and real-time fashion synthesis, as well as the need for further research in multimodal integration and interpretability/ explainability of AI models.

An enhanced virtual room fitting using deep neural network [3]

AUTHORS: I.C.S. Ileperuma, H.M.Y.V. Gunathilake, K.P.A.P. Dilshan, S.A.D.S. Nishali, A.I. Gamage, Y.H.P.P. Priyadarshana (2020)

This paper explores a new virtual fitting room system that uses deep neural networks to provide a more realistic and user-friendly experience. The system uses two web cameras to capture the customer's body and then uses a convolutional neural network (CNN) to detect the customer's body pose and segment the different body parts. The system also uses a generative adversarial network (GAN) to generate a realistic image of the customer wearing the chosen clothing item. The system has been tested with a small number of users and has been found to be accurate, realistic, and user-friendly. The authors believe that the system has the potential to revolutionize the way people shop for clothes.

3D Dynamic Fashion Design: Development, Potential, and Future Prospects in Online Platforms [4]

AUTHORS: Kyung-Hee Choi (2022)

This paper explores the development, potential, and future prospects of 3D dynamic fashion design in online platforms. It emphasizes the use of digital technologies like 3D virtual simulation systems and their collaboration with artists and designers to create garments with changeable styles, colors, and patterns. The research suggests positive social and industrial possibilities for 3D dynamic garments, including co-design and customization on online platforms. Future prospects highlight the potential for dynamic garments in the fashion and gaming industries, while emphasizing the need to address challenges like the uncanny valley effect and ensuring wearability and sustainability.

An Augmented Reality-based Fashion Design Interface with Artistic Contents Generated Using Deep Generative Models [5]

AUTHORS: Asangika Sandamini; Chamodi Jayathilaka; Thisara Pannala; Kasun Karunanayaka; Prabhash Kumarasinghe; Dushani Pere (2022)

This paper proposes an Augmented Reality (AR) based fashion design system named ARGAN that utilizes deep generative models to generate new dress designs from sketches and theme images. ARGAN integrates a Controllable Generative Adversarial Network (CGAN) to effectively control the design process and generate realistic and artistic clothing designs. This system significantly reduces the time and effort required for designers to visualize and fit their creations onto the human body, offering a valuable tool for enhancing the creative process in fashion design.

AR In Fashion Industry [6]

AUTHORS: Dwaj Ranka, Ranvir Mehta, Pratham Chopra (2022)

This paper explores the use of augmented reality (AR) in the fashion industry, specifically focusing on the creation of a virtual trial room that allows users to simulate cloth movement in real-time. The paper highlights the limitations of earlier applications that used static images and introduces a new approach that leverages OpenCV and a webcam to identify the user's body and background, enabling dynamic cloth simulation. This technology offers a more realistic and engaging virtual try-on experience compared to existing solutions.

Perceptions of Using Augmented Reality Features on Online Shopping Fashion Platforms Based on Technology Acceptance Model [7]

AUTHORS: Tangkas Udiono, Maryani (2021)

This paper is about measuring consumer perceptions of the Augmented Reality (AR) feature on an online shopping platform for fashion products online shopping. However, there are many consumers who still feel worried when shopping online because they feel that the products they get are not suitable with their expectations. The study was aimed at 200 respondents who had used the Zara App with the age range of 17–24 years or generation Z because they grew up in the internet era and socially interacted a lot through social media. The result shows that consumers' perceptions of AR feature in virtual shopping can provide convenience, benefits, and pleasure when adopting AR, as well as to create engagement with consumers.

Robust Hand Gesture Recognition Based on RGB-D Data for Natural Human–Computer Interaction [8]

AUTHORS: Jun Xu, Hanchen Wang, Jianrong Zhang and Linqin Cai (2022)

The paper presents a robust hand gesture recognition algorithm based on RGB-D data for natural human-computer interaction. It uses a multimodal feature vector for static hand gestures and an improved dynamic time warping (IDTW) algorithm for dynamic hand gestures. Extensive experiments were conducted to test and verify the recognition algorithm, achieving an average performance of 97.4% for static gestures and 96% for dynamic gestures. The system enables low-cost real-time application of natural interaction with virtual environments by hand gestures.

Effects of 3D Virtual “Try-On” on Online Sales and Customers’ Purchasing Experiences [9]

AUTHORS: Hyunwoo Hwangbo, Eun Hie Kim, So-Hyun Lee, Young Jae Jang(2020)

The paper explores the impact of 3D virtual "try-on" (VTO) technology on online sales and customers' purchasing experiences. It involves creating a virtual body model, 3D garment modeling, and interactive try-on and mix-and-match of garments. The study found that women with concerns about garment fit and size are more likely to adopt VTO, and the mix- and-match feature can lead to a positive attitude in online responses. The research has implications for understanding the relationship between VTO, actual sales, and customer experience.

Development of Augmented Reality Application for Online Trial shopping [10]

AUTHORS: S Balamurugan; K.J. Ganesh; M. RohithReddy; S. Aadarsh Teja; M J Suganya (2022)

This paper addresses the challenges of online shopping, where customers often face dissatisfaction due to inconsistent product sizes or colors. It proposes a solution: an augmented reality (AR)-based virtual try-on application built with Unity. This innovative tool allows users to virtually "try on" clothes before purchasing, potentially reducing dissatisfaction and improving the overall user experience on e-commerce platforms. The paper outlines a simple yet powerful AR technique that utilizes face tracking to superimpose clothing onto the user's body, offering a more immersive and personalized shopping experience.

III. CONCLUSION

A system has been created to offer a distinctive purchasing experience. The clothing system was created with the ability to digitally try it on and buy the item after the user is satisfied. In order to facilitate consumers' clothing searches, appearance can take the shape of two-dimensional photos, three-dimensional dimensions, with the use of webcam, and different fashion models in a range of sizes. There are certain challenges involved. Limitations on one's own performance or that of other users, such as ignorance of the work process, incompatibility of the mirror or monitor with the body and the items being tried on, and issues with textile, size, and color.

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