IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

## IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 4, April 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 4, April 2024 ||

DOI: 10.15680/IJIRCCE.2024.1204186 |

# A Mixed Reality Virtual Clothes Try-On System

**Prof. Suvarna Bahir, Ajay Gaikwad, Anjali Khadse, Sahil Janolkar and Omkar Londhe**

Department of Computer Engineering, Trinity Academy of Engineering, Pune, India

**ABSTRACT:** Virtual try-on of clothes has received much attention recently due to its commercial potential. It can be used for online shopping or intelligent recommendation to narrow down the selections to a few designs and sizes. In this paper, we present a mixed reality system for 3D virtual clothes try-on that enables a user to see herself wearing virtual clothes while looking at a mirror display, without taking off her actual clothes. The user can select various virtual clothes for trying-on. The system physically simulates the selected virtual clothes on the user's body in real-time and the user can see virtual clothes fitting on the her mirror image from various angles as she moves. The major contribution of this paper is that we automatically customize an invisible (or partially visible) avatar based on the user's body size and the skin color and use it for proper clothes fitting, alignment and clothes simulation in our virtual try-on system. We present three scenarios: i) virtual clothes on the avatar, ii) virtual clothes on the user's image and iii) virtual clothes on the avatar blended with the user's face image. We have conducted a user study to evaluate the effectiveness of these three solutions from the end user's perception of quality attributes, cognitive attributes and attitude towards using. The user study shows that among these three scenarios, the second one is most preferred by the users and for 50% of them the experience they had with our system was sufficient to make the purchase decision for the outfits they virtually tried-on.

**KEYWORDS:** 3D-2D alignment, body customization, mixed reality, skin color matching and real-time cloth simulation, virtual try-on.

## I. INTRODUCTION

PHYSICAL try-on of clothes is a time consuming procedure in retail shopping. It takes try-on of several clothes before the shopper can make decision on design, color and size of the apparel that satisfies her. Virtual try-on can help to speed-up the process as the shopper can see the clothes on her body without actually wearing them, or narrow down her selections before physical try-on. Furthermore, it can enhance the user's shopping experience through new features, such as side-by-side comparison of various clothes and simultaneous viewing of outfits from different angles. Interactive virtual.

Some earlier systems using image processing techniques have been reported in literature. Hilsmann and Eisert described a dynamic texture overlay method from monocular images for real-time visualization of garments in a virtual mirror environment [1]. Subsequently, they proposed a method to segment the user's clothes and retexture them using extracted shading and shape deformation information [2]. The system presented in [3] took a user's picture in minimum clothes and covered it with those segmented from a picture of a model wearing target clothes. In [4], fiducial markers were used to change the texture of a user's shirt. In [5], a pre-generated 3D human model in target clothes was superimposed on a user's 2D picture. [6] presented a virtual clothing system, in which a user is scanned and registered to the system once, and then clothes can be simulated on the reconstructed model. The research in [7] enables a user to load his/her own 3D model, select 3D clothes from a catalogue and superimpose them on the model by interactive positioning.

## II. LITERATURE SURVEY

The advent of online shopping has ushered in an era where consumers demand immersive and interactive experiences. Virtual Try-On (VTO) technology has emerged as a pivotal tool to address this demand, fundamentally changing the way consumers shop online. The early roots of VTO can be traced back to eyewear brands. Pioneers in the industry began leveraging VTO systems to allow customers to virtually sample different eyewear styles using userprovided photos (Chittaro and Ranon, 2007). This initial experiment with virtual try-ons found a receptive audience, spurring interest in its broader applications. As online shopping burgeoned, the apparel sector recognized the potential of VTO. A transition from 2D to 3D representations marked a significant

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 4, April 2024 ||

DOI: 10.15680/IJIRCCE.2024.1204186 |

advancement in the field. The 3D VTO systems, as studied by Wang and Salusso (2006), offered a more lifelike representation of clothing, capturing detailed fits, and replicating realistic fabric drapes. This evolution not only added depth to the visual experience but also increased consumer trust in online shopping, potentially reducing the likelihood of product returns. The integration of Augmented Reality (AR) with VTO further amplified its appeal. Huang et al. (2018) explored this integration, showcasing how AR could superimpose virtual clothing onto realtime video feeds of users. This dynamic interplay elevated the VTO experience, allowing users to visualize clothing from multiple angles and in various poses, almost mimicking the traditional in-store trial room experience. Deep learning's foray into VTO, particularly in areas like pose estimation, opened avenues for even more seamless and realistic try-ons. These machine learning models could adapt and mold virtual garments according to user movements, ensuring accurate representation irrespective of the user's pose. However, the technology's success isn't without challenges. As Peng et al. (2019) discussed, while VTO offers several advantages like reduced return rates, its widespread adoption hinges on user trust. If the system's portrayal diverges from real-life appearance, it might deter potential users. Lee et al. (2017) further highlighted this sentiment, indicating that an authentic VTO experience could indeed bolster consumer confidence and drive online sales. In summary, VTO technology stands at the intersection of e-commerce and technological innovation. While it has come a long way from its nascent stages, the journey ahead promises even more immersive and realistic virtual shopping experiences. The potential inclusion of tactile feedback and advances in real-time rendering might soon blur the boundaries between offline and online shopping.

## III. PROPOSED SYSTEM

In the ever-evolving fashion industry and the increasing prevalence of e-commerce, a significant challenge persists: the inability for customers to physically try on clothes prior to making a purchase. This limitation results in less-than-ideal online shopping experiences characterized by high return rates and customer dissatisfaction. To address this challenge, we propose the development of a Mixed Reality Virtual Clothes Try-On System. This innovative solution harnesses the capabilities of mixed reality technology to provide users with an immersive and lifelike means to try on clothing items in a virtual setting, effectively bridging the divide between traditional in-store experiences and online shopping. The foundation of our proposed solution is rooted in a comprehensive conceptual framework that seamlessly integrates augmented reality (AR) and virtual reality (VR) technologies to craft a mixed reality experience. Within this framework, users are enabled to engage with a digital representation of themselves within a virtual space while donned in virtual clothing items, creating an experience that closely simulates trying on physical garments. Key components of this framework encompass a diverse virtual clothing catalog, user interaction methods, and real-time rendering. The virtual clothing catalog encompasses a wide range of clothing items, each meticulously digitized and rendered in high fidelity to ensure an authentic and lifelike appearance. Users will have the flexibility to select and customize these items according to their preferences, with interaction facilitated through a combination of gestures, voice commands, and controller inputs.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 4, April 2024 ||

DOI: 10.15680/IJIRCCE.2024.1204186 |

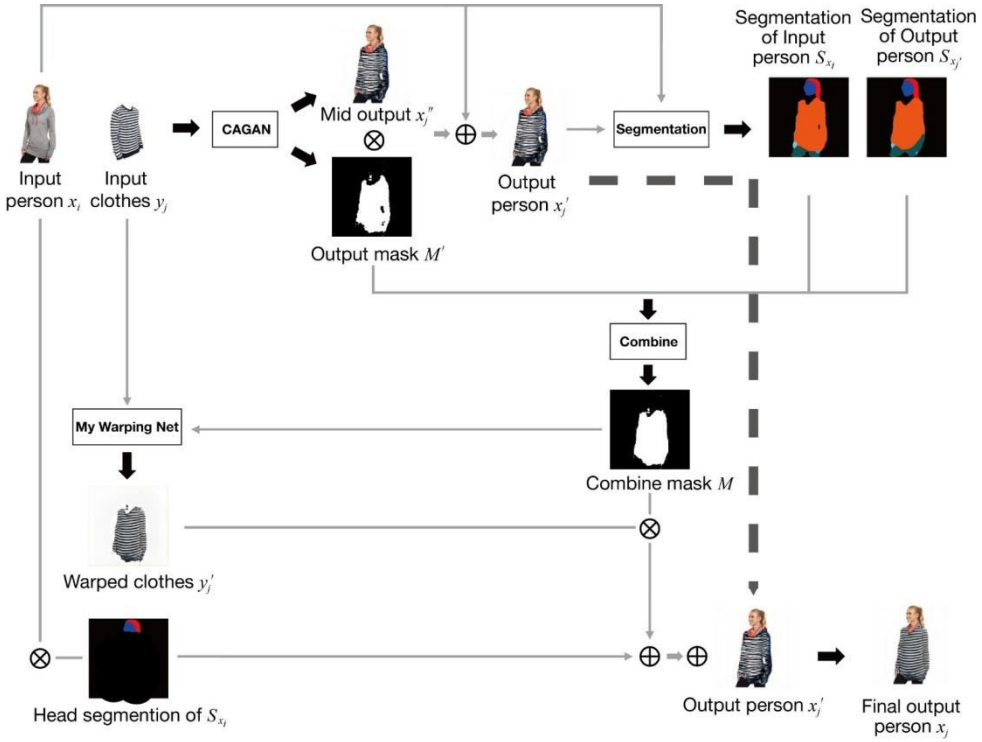


**Fig.3.1**

The Mixed Reality Virtual Clothes Try-On System represents a revolutionary fusion of fashion and technology. With the traditional in-store shopping experience becoming less accessible and the shift towards online retail, the need for a virtual solution that enables customers to try on clothing items has become more pressing than ever. In this section, we delve into the system's design, exploring the conceptual framework, hardware and software resources, and the critical elements that make it a pioneering solution in the fashion industry.

At the heart of the system's design lies a sophisticated conceptual framework that artfully combines augmented reality (AR) and virtual reality (VR) technologies. This framework is the cornerstone of the system, which transforms the user's environment into a mixed reality space. Within this digital realm, users can interact with a lifelike digital representation of themselves while wearing virtual clothing items. The experience offered by this conceptual framework closely simulates the act of trying on physical garments, bridging the gap between online shopping and the tactile experience of trying on clothes in a store.

However, creating a system that delivers on this promise requires a robust selection of hardware resources. The Mixed Reality Virtual Clothes Try-On System mandates a potent, multi-core processor, such as an Intel i5 or a more advanced variant. This processor is pivotal in handling the system's computational demands, ensuring that the virtual clothing items are rendered seamlessly and in real-time. To guarantee a smooth and responsive user experience, a minimum clock speed of 2.4 GHz is necessary. Such speed underpins the system's ability to provide instant feedback as users interact with virtual garments.

Equally crucial is the system's memory capacity. A minimum of 8 GB of RAM is a prerequisite to facilitate efficient multitasking, enabling users to interact with the system's virtual clothing catalog while maintaining real-time rendering of clothing items. In addition, the system necessitates a solid-state drive (SSD) with a minimum capacity of 256 GB. The SSD not only ensures fast data access but also accommodates the extensive storage requirements for the vast array of virtual clothing assets.

User interaction is enabled by standard input devices, including a keyboard and a multi-button mouse. These familiar tools facilitate precise control and navigation within the mixed reality environment. The visual aspect of the system, equally important for the user's immersive experience, requires a high-resolution LCD or LED

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 4, April 2024 ||

DOI: 10.15680/IJIRCCE.2024.1204186 |

monitor. Such a display must have support for augmented and virtual reality features. Alternatively, users can opt for an augmented/virtual reality (AR/VR) headset, which elevates the experience to another level, effectively transporting them into a threedimensional digital realm.

## IV. CONCLUSION

In summary, the Mixed Reality Virtual Clothes Try-On System marks a notable progression in the domain of online fashion retail, providing consumers and retailers alike with a heightened, more immersive, and tailored shopping encounter. Through ongoing innovation and fine-tuning, it stands poised to redefine the landscape of fashion e-commerce, fueling heightened sales, enhanced customer contentment, and greater inclusivity within the digital marketplace.

Virtual Try-On System is a technology that uses augmented reality (AR) and computer vision to change the way consumers purchase clothing. This new system allows users to try on the right clothes without having to try them on in person in the store.

**Scope of Work**

The scope of work for implementing a Mixed Reality Virtual Clothes Try-On System encompasses several key components. Firstly, it involves the development of a robust software platform that integrates advanced computer vision and machine learning algorithms to accurately simulate clothing items on a user's body in real-time. This includes creating a user-friendly interface for seamless interaction and customization.

Additionally, the system requires the integration of mixed reality hardware, such as augmented reality glasses or virtual reality headsets, to deliver an immersive try-on experience. This involves compatibility testing and optimization for various devices to ensure widespread accessibility.Moreover, the scope includes building a comprehensive database of clothing items with detailed 3D models, textures, and sizing information to support virtual try-ons across a diverse range of garments and styles.

Furthermore, it entails implementing algorithms to adapt virtual garments to different body shapes, sizes, and movements, enhancing the accuracy and realism of the try-on experience.Quality assurance and testing are critical aspects of the scope, involving thorough validation of the system's functionality, performance, and user experience across different scenarios and demographics.

Finally, the scope encompasses ongoing maintenance, updates, and enhancements to keep the system aligned with evolving technology trends and user preferences, ensuring its continued effectiveness and relevance in the dynamic landscape of fashion e-commerce.

## REFERENCES

1. He Huang, Philip S. Yu and Changhu Wang, “An Introduction to Image Synthesis with Generative Adversarial Nets,”17 Nov 2018.
2. Han, X., Wu, Z., Wu, Z., Yu, R., Davis and L.S., “Viton: An image-based virtual try-on network. In”, the IEEE Conference on Computer Vision and Pattern Recognition (CVPR). (2018).
3. Wang, B., Zheng, H., Liang, X., Chen, Y., Lin, L., Yang and M., “Toward characteristic preserving imagebased virtual try-on network,” In: The European Conference on Computer Vision (ECCV). (2018).
4. M. Minar, T. Tuan, H. Ahn, P. Rosin, and Y. Lai, ‘‘CP-VTON+: Clothing shape and texture preserving image-based virtual tryon,’’ in Proc. CVPRW, 2020.
5. Dong, H., Liang, X., Shen, X., Wang, B., Lai, H., Zhu, J., Hu, Z., Yin and J., “Towards multi-pose guided virtual try-on network,” In: The IEEE International Conference on Computer Vision (ICCV). (2019).
6. Yu Liu, Wei Chen, Li Liu and Michael S. Lew., “SwapGAN: A Multistage Generative Approach for Persontо-Person Fashion Style Transfer,” IEEE Transactions on Multimedia (Volume: 21, Issue: 9, September 2019)
7. Raj, A., Sangkloy, P., Chang, H., Lu, J., Ceylan, D., Hays and J., “Swapnet: Garment transfer in single view images,” In: The European Conference on Computer Vision (ECCV). (2018) .
8. Ruiyun Yu Xiaoqi Wang Xiaohui Xie., “VTNFP: An Image-based Virtual Try-on Network with Body and Clothing Feature Preservation,” Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV), 2019, pp. 10511-10520.
9. Yuan Chang, Tao Peng , Ruhan He, Xinrong Hu, Junping Liu, Zili Zhang, Minghua Jiang, “DP-VTON: TOWARD DETAIL-PRESERVING IMAGE-BASED VIRTUAL TRY-ON NETWORK,” Published in: ICASSP 2021 - 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)
10. Bin Ren , Hao Tang , Fanyang Meng , Runwei Ding , Ling Shao , Philip H.S. Torr5, Nicu Sebe, “Cloth Interactive Transformer for Virtual Try-On,” arXiv:2104.05519v1 [cs.CV] 12 Apr 2021

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 4, April 2024 ||

DOI: 10.15680/IJIRCCE.2024.1204186 |

11. Assaf Neuberger Eran Borenstein Bar Hilleli Eduard Oks Sharon, “Image Based Virtual Try-on Network from Unpaired Data,” Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2020, pp. 5184-5193
12. Stefan Hauswiesner; Matthias Straka; Gerhard Reitmayr, “Virtual Try-On through Image-Based Rendering,” Published in: IEEE Transactions on Visualization and Computer Graphics (Volume: 19, Issue: 9, September 2013)
13. Suvarna Bahir, Shivani Shedage, "Image-Based Virtual Try on Clothes" International Journal of Advanced Research in Science, Communication and Technology (IJARSCT) (Volume 2, Issue 1, November 2022)

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INNO SPACE SJIF Scientific Journal Impact Factor

doi crossref

निस्केयर NISCAIR

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

## IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details