iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH
IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 Issue: V Month of publication: May 2023

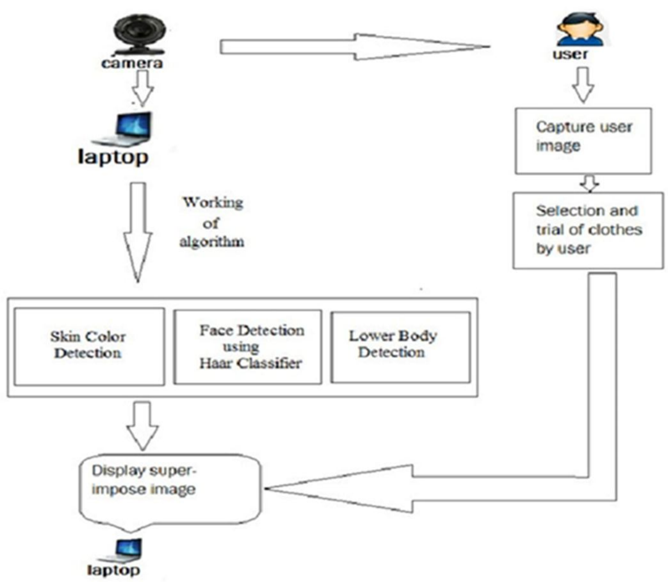
DOI: https://doi.org/10.22214/ijraset.2023.52362

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
*Volume 11 Issue V May 2023- Available at www.ijraset.com*

# Virtual Dressing Room System using Deep Neural Networks

Vishal R[1], Praneet V K[2], Suvidha Manjunath Naik[3], Varun S Raju[4], Bhanujyothi H C[5]
*[1, 2, 3, 4]Student, Dept. of Computer Science Eng., SCE, Bangalore-560057, India*
*[5]Professor, Dept. of Computer Science Eng., SCE, Bangalore-560057, India*

***Abstract:** In earlier twenty first century, fashion trends has evolved into a way of life. Depending on skin tone, physical stature, gender, as well as social and geographic factors, the amount and style of clothes which we worn might vary significantly. For the huge chunk of population, the in-store buying experience ( buying in the shops ) is still what comes to mind when they think of shopping. The customers can try on clothing in real time, but this process takes too long when there will not be enough trial rooms in the dressing store. The goal here is to create an engaging, interactive, involving and incredibly realistic virtual system that allow the users or customers to select from a wide variety of clothing designs before simulating those outfits on the people or customers virtually. In this study, we have proposed a system that aids in the synchronization of daily attire of the people. The Virtual styling room using live video feed may alter how a person will shop for and tries on new clothing. Customers or people can try on a wide range of clothing items without a need to actually wear them by making use of the idea of "Virtual Reality". The benefit of doing things in this way is that it would take less time and effort of the people or customers to physically try the garments on. The project we did also aids in market management, reducing the requirement for customers to try on each and every article of clothing in clothing store. Additionally, retailers can save time, money, and space by not keeping a large inventory on hand (in store). This project aims at transferring a target clothing image onto a reference person. Generative adversarial network involves three modules semantic generation, cloth wrapping and try on module.*
***Keywords:** Virtual styling room, Virtual reality, Wide range of clothing designs.*




Architecture of Virtual Dressing Room

## I. INTRODUCTION

Real world and virtual world are the two worlds. When humans first discovered computers, they began to operate digitally. Human has been making trouble to easily integrate the digital and virtual worlds. Numerous technologies were developed in trouble to close the gap between the virtual and physical worlds. Virtual reality, stoked reality, and mixed reality are three exemplifications of software that connects the virtual and real worlds. This gave rise to a cornucopia of bias that enables users to contemporaneously witness virtual and real worlds.

Smart technologies that streamline our conditioning have a significant impact on our diurnal lives as a result of the technology development assiduity's rapid-fire growth. For illustration, online purchasing developed snappily. People are getting more habituated to using internet stores, online deals, etc., to buy the effects they're interested in. This kind of sale has taken over as the most popular bone and offers guests a ton of convenience. Currently the Virtual Trial Room have been used in colorful shopping promenades and stores. As now the technologies have bettered so Virtual reality have been used in order to know the connections between the virtual world and real world. Also by using extended results guests have to be veritably particular while trying the clothes. By using virtual reality we also make sure that the users like to select the clothes and buy them if they love it as they enhance their shopping experience. This is also called as Virtual- try- on requirements.

### *A. Background*

A technology-based tool known as a virtual dressing room enables customers to digitally try on clothing without actually donning it. The technology often applies images of clothing to the user's body using augmented reality (AR) or virtual reality (VR) to let them view how the apparel looks and fits without actually putting it on. Although the idea of a virtual changing room has been around for a while, it has recently been more well-known because of rising smartphone usage and developments in AR and VR technologies. Early in the new millennium, the first virtual dressing rooms were created, but they had few features and were not extensively used. Yet, as e-commerce and internet purchasing have grown, virtual changing rooms have emerged. Here we use the try-on and geometric modeling modules, to create a virtual dressing room. Customers can use a virtual dressing room with a try-on module and a geometric matching module to try on clothing and see how they would appear without really trying them on. Here is how it could go: Try-on Module: Using augmented reality technology, the try-on module would place a virtual representation of the item of clothing on the customer's body. By doing so, the consumer would be able to visualize how the garment will fit and appear on their body without actually donning it. Geometric Matching Module: The geometric matching module would assess the customer's body size and shape using computer vision techniques, and then match.

### *B. Problem Statement*

In this paper a solution is identified for reducing human time and making their online shopping better by designing a virtual styling room using live video feed it also Provides a virtual room to try apparel through ecommerce websites before buying it. The virtual dressing rooms is centered around the challenge of creating a shopping experience that is both engaging and efficient for customers, while also providing valuable insights and benefits for fashion retailers. In addition to these technical challenges, virtual dressing rooms must also provide value for fashion retailers, by providing insights into customer behavior and preferences that can inform future product development and marketing strategies. Overall, the problem statement for virtual dressing rooms is to create a technology that can revolutionize the online shopping experience for fashion customers, while also providing valuable insights and benefits for fashion retailers.

Virtual dressing rooms seek to address these challenges by providing customers with a realistic and engaging way to try on clothes virtually, without the need for physical try-ons. However, to create an effective virtual dressing room, several challenges must be overcome, including accurately modeling the customer's body, creating realistic and natural-looking virtual clothes, and providing a seamless and intuitive user experience.

### *C. Objectives*

This mainly focuses on the following objectives:

Describe the cutting-edge tools and methods used in virtual changing rooms in general, with an emphasis on those that involve machine learning.

Highlight the advantages and disadvantages of each machine learning method by contrasting different algorithms' results in virtual changing rooms.

Examine the elements, such as lighting conditions, body shapes, clothing textures, and camera quality, that have an impact on the accuracy and dependability of virtual dressing rooms.

Discover the various 3D scans, images, and video formats that can be used to train algorithms for virtual changing rooms.

Examine how machine learning can be utilized to enhance personalization, increase realism, and reduce processing time to improve the user experience of virtual changing rooms

## II. LITERATURE SURVEY

In [1], this paper the author Hsiao proposes an Image- predicated virtual try-on system that aims to transfer decided target clothes onto a person, which has attracted the increased attention of multitudinous people. The former styles are heavily predicated on accurate parsing results. It still remains a big challenge for generating largely realistic try-on images without a mortal parser. To resolve this issue, they proposed a new Parser-Free Virtual Try-On Network (PF-VTON), which is suitable to induce high-dimensioned try-on images without leaning on a mortal parser. Compared to the former styles, they introduced two pivotal inventions. One was the foreword of a new geometric matching module, which warps the pixels of the decided target clothes and the features of the primary depraved clothes to attain the final depraved clothes with realistic texture and robust alignment. The other they designed is a new U- Transformer, which is largely effective for generating largely-realistic images in a try-on emulsion.

In [2], they investigated the virtual try-on under arbitrary acts has attracted lots of hunt attention due to its huge eventuality operations. However, being styles can hardly save the details in clothing texture and facial identity( face, hair) while fitting new clothes and acts onto a person. In this paper, they proposed a new multi-stage frame to synthesize persons in periods, where rich details in salient regions can be well preserved. Specifically, a multi-stage frame is proposed to putrefy the generation into spatial alignment followed by a coarse-to-fine generation. To save the details in salient areas similar to apparel and facial areas, they proposed a Tree- Block( tree dilated emulsion block) to harness multi-scale features in the creator networks. With end-to-end training of multiple stages, the whole frame can be concertedly optimized for results with significantly better visual dedication and richer details. demonstrate that our proposed frame achieves the state of- the-art performance, especially in conserving the visual details in apparel texture and facial identity.

In [3] it remains a big challenge to induce print-realistic try-on images when large occlusions and mortal acts are presented in the reference person. To address this issue, they proposed a new visual try-on network, the videlicet Adaptive Content Generating and Preserving Network( ACGPN). In particular, ACGPN first predicts the semantic layout of the reference image that will be changed after try-on (e.g., long sleeve shirt → arm, arm → jacket), and also determines whether its image content needs to be generated or saved according to the predicted semantic layout, leading to print-realistic pass- on and rich vesture details. ACGPN generally involves three major modules.

First, a semantic layout generation module utilizes semantic segmentation of the reference image to rashly predict the asked semantic layout after try-on. Alternatively, the clothes-warping module warps vesture images according to the generated semantic layout, where an alternate-order difference constraint is introduced to stabilize the torturing process during training. Third, an inpainting module for content conflation integrates all information(e.g., reference image, semantic layout, and demoralized clothes) to adaptively produce each semantic part of the mortal body.

In paper [4] they proposed Image- rested virtual pass-on (VTON) approaches there were numerous several challenges regarding different mortal acts and attire styles. First, attire torturing networks constantly induce largely misshaped and deranged demoralized clothes, due to the incorrect attire agnostic mortal representations, mismatches in input images for attire-mortal matching, and the incongruous regularization transfigures parameters. Second, blending networks can fail to retain the remaining clothes due to the wrong representation of humans and incongruous training loss for the composition-mask generation. Hence, they proposed a CP-VTON( Clothing shape and texture Conserving VTON) to overcome these issues, which significantly outperforms the state-of-the-art styles, both quantitatively and qualitatively. [5] Image style transfer is an underdetermined problem, where a large number of results can satisfy the same constraint ( the content and style). Although there have been some sweats to ameliorate the diversity of style transfer by introducing an indispensable diversity loss, they've confined conception, limited diversity, and poor scalability. In this paper, they have attacked these limitations and proposed a simple yet effective system for diversified arbitrary style transfer. The crucial idea of our system is an operation called deep feature anxiety( DFP), which uses an orthogonal arbitrary noise matrix to undo the deep image point charts while keeping the original style information unchanged. Our DFP operation can be fluently integrated into numerous WCT( whitening and coloring transfigure)- grounded styles, and empower them to induce different results for arbitrary styles. Experimental results demonstrate that this literacy-free and universal system can greatly increase diversity while maintaining the quality of stylization. In [6], The first image-based full-body generative model of persons wearing garments is presented in this study.

And avoid the requirement for high-quality 3D scans of dressed persons as well as the frequently employed complicated graphics rendering pipeline. It produces a semantic segmentation of the body and attire first. The second step is to apply a conditional model to the obtained segments to produce realistic visuals. The entire model can be differentiated based on position, shape, or colour. As a result, there are examples of people wearing many kinds of attire. The suggested model has the ability to create completely unique persons wearing actual attire.

The model may be biased as a result of this dataset, which might not be representative of the broader population. Although the model can produce a wide range of clothing designs, the authors admit that it might have trouble producing some styles of clothes, such as those with intricate patterns or textures. The suggested model has a number of intricate parts, such as a body form model, a clothing model, and a texture transfer technique. Because of this, scaling the model to bigger datasets or real-time applications could be challenging.

Automatically generated clothing designs from the model might not always match user requirements or preferences.

The paper [7] presents the first semantic image synthesis model that can generate photorealistic outputs for a variety of scenarios, including interior, outdoor, landscape, and street scenes, and is produced as a result of the suggested normalization. Despite the diversity of the created garment designs, they might not always appear realistic or organic. This is especially true for complex or intricate clothing designs, which the suggested method might not be able to simulate effectively. The model concentrates on creating garments at a high degree of abstraction, which could leave out little elements like folds or wrinkles. This might cut down on how realistic the created clothes designs can be. The main goal of the suggested method is to produce garment designs for computer graphics and virtual try-on systems. It may not be as applicable to other fields, like fashion design or clothing production.

Paper [8] The authors demonstrate how deep neural network features that have been taken from large-scale image classification projects can be utilized to predict human evaluations of image quality. They specifically show that human perception variations between two images are closely correlated with the distance between their deep feature distances. The authors demonstrate that their method beats conventional image quality measurements, such as PSNR and SSIM, in terms of their association with subjective evaluations of image quality. They compare the performance of their deep feature metric with these metrics. Additionally, the authors show how their deep feature metric may be used in a variety of image processing tasks, such as image denoising, image inpainting, and picture style transfer. The fact that this study is restricted to natural photographs and might not be applicable to other types of visual content, such as graphics, text, or films, is one of the paper's potential flaws. In their publication, the authors accept this restriction and propose that additional study is required to apply the findings to these other fields.

The study's restriction to a particular set of deep neural network characteristics that were trained on the ImageNet dataset is another potential weakness. These traits may not be the best for all perceptual tasks, even if they have been demonstrated to be useful for picture classification tasks. Future studies may need to look into the application of more deep feature types or architectural frameworks for various perceptual tasks.

[9] In order to initiate actions within an electronic marketplace on behalf of the user, a method and system were provided to facilitate recognition of the body based on gestures that represent commands to initiate actions. Such that, by using the first set of spatial data, a model of the user body is generated. Then, a second model is generated by the action machine based on the second spatial dataset received. In [10] a virtual dressing room application using Kinect sensors was introduced. The proposed approach was based on extracting the user from a video stream, as well as skin color detection and alignment of models. In order to align the 2D cloth models with the user, the 3D locations of the joints were used for positioning, scaling, and rotating. In [11] a new framework, GAN based on Generative Adversarial Networks (GAN), to study the visual features and properties that underlie high-level cognitive attributes. We focus on image memorability as a case study, but also show that the same methods can be applied to study image aesthetics and emotional valence.

In [12] garment modeling which is based on creating virtual bodies by using standard measurements was presented. The 3D reconstruction methods focus on recovering the actual 3D shape of a captured garment alone, the body shape of a subject wearing the garment, or both simultaneously. Method utilizing controlled RGB and RGB-D images have been presented, that select and refine 3D garment templates based on image observations. In paper [13] a new augmented reality concept for dressing rooms was introduced. It enables the customers to combine easy simulated try on with a tactile experience of the fabrics. The dressing room has a camera and a projection surface instead of a mirror. The customers put visual tags on their clothes. Facial image manipulation is an important task in computer vision and computer graphic, enabling lots of applications such as automatic facial expressions and styles (e.g. hairstyle, skin, color) transfer.

In [14] paper while Physics- Grounded Simulation (PGS) can directly trim a 3D garment on a 3D body, it remains too expensive for real- time operations, similar as virtual try- on. By contrast, conclusion in a deep network, taking a single forward pass, is important and faster. Taking advantage of this, they proposed a new method to fit a 3D garment template to a 3D body. Specifically, upon the recent progress in 3D point pall processing with deep networks to prize garment features at varying situations of detail, including point wise, patch-wise and global features. They fused these features with those uprooted in parallel from the 3D body, so as to model the cloth- body relations.

The performing two- sluice armature, which they called it as GarNet, is trained using a loss function inspired by physics- grounded modeling, and delivers visually presumptive garment shapes whose 3D points are, on average, lower than 1 cm down from those of a PGS system, while running 100 times faster. also, the proposed system can model colorful garment types with different cutting patterns when parameters of those patterns are given as input to the network.

In [15] they have proposed Tailor Net, a neural model which predicts apparel distortion in 3D as a function of three factors pose, shape and style( garment figure), while retaining wrinkle detail. This goes beyond previous models, which are moreover specific to one style and shape, or generalize to different shapes producing smooth results, despite being style specific. The thesis is that ( indeed on-linear) combinations of exemplifications smooth out high frequency components similar as fine- wrinkles, which makes learning the three factors concertedly hard. At the heart of fashion is a corruption of distortion into a high frequency and a low frequency element. While the low- frequency element is prognosticated from disguise, shape and style parameters with an MLP, the high- frequency element is predicted with a admixture of shape- style specific disguise models. The weights of the admixture are reckoned with a narrow bandwidth kernel to guarantee that only prognostications with analogous high- frequency patterns are combined. The style variation is attained by calculating, in a canonical disguise, a subspace of distortion, which satisfies physical constraints similar a sinter-penetration, and draping on the body. Tailor Net delivers 3D garments which retain the wrinkles from the Physics grounded simulations (PGS) it's learned from, while running further than 1000 times faster. In discrepancy to classical PBS, Tailor Net is easy to use and completely differentiable, which is pivotal for computer vision and literacy algorithms. Several trials demonstrate Tailor Net produces more realistic results than previous work, and indeed word generates temporally coherent distortions on sequences of the AMASS( 34) dataset, despite being trained on static acts from a different dataset. To stimulate further rehunt in this direction, they used a dataset conforming of 55800 frames

In [16], we present a simple yet effective system to automatically transfer textures of apparel images ( front and back) to 3D garments worn on top SMPL( 42), in real-time. We first automatically cipher training pairs of images with aligned 3D garments using a custom-rigid 3D to 2D enrollment system, which is accurate but slow. Using these dyads, we learn a mapping from pixels to the 3D garment face. Our idea is to learn thick correspondences from garment image outlines to a 2D- UV chart of a 3D garment face using shape information alone, fully ignoring texture, which allows us to generalize to the wide range of web images. Several trials demonstrate that our model is more accurate than extensively used nascence's similar as thin-plate-spline screwing and image-to-image restatement networks while being orders of magnitude briskly. Our model opens the door for operations similar to virtual try- on, and allows for the generation of 3D humans with varied textures which is necessary for learning.

## III. METHODOLOGY

### A. Pose Estimation

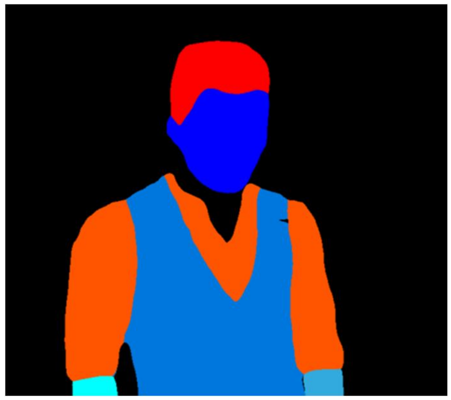
Human pose estimation can be done by using a pre-trained model. Using Deep learning it detects the 18 points on the human body. This point helps to create skeleton of the human body. These points are facial, neck, shoulder, elbow, wrist, hips, knees, ankles etc. Once the pose of the customer has been estimated, virtual clothes can be overlaid onto the 3D model of the customer's body. The clothes can be adjusted and manipulated to fit the customer's body shape, allowing them to see how the clothes would look and fit in real life. Pose estimation in virtual dressing rooms has the potential to revolutionize the way people shop for clothes, making it easier and more convenient to try on clothes and find the perfect fit.

### B. Human Parsing

This will highlight the human body by separating the background. Back ground subtraction is used to highlight the human body. we are using different colors to identify the different parts of the body. To implement human parsing in a virtual dressing room, a deep learning model can be trained to recognize different parts of the human body and to segment them in real-time as the customer moves around. This can be done using a dataset of labeled images and videos that show different people in various poses and clothing. Once human parsing has been applied to the customer's body, the virtual clothes can be overlaid onto the segmented parts of the body, ensuring that the clothes fit and align with the different parts of the customer's body. This can give the customer a more realistic and accurate representation of how the clothes would look and fit in real life. Human parsing in virtual dressing rooms can enhance the virtual try-on experience and make it easier for customers to see how clothes would look on their body, without the need for physically trying them on. It can also help retailers to reduce the number of returns due to clothes not fitting properly, as customers can get a more accurate representation of how the clothes would look on them before making a purchase. The model is trained to recognize different patterns and features in the input data that correspond to different body parts and clothing items.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Human parsing is a challenging problem in computer vision, as it requires the model to accurately recognize and segment complex shapes and patterns in the input data. However, recent advances in deep learning have led to significant improvements in human parsing performance, enabling more advanced applications that rely on accurate body segmentation.



Result of human parsing

### *C. Semantic Generating Module*

The semantic generation module (SGM) is proposed to separate the target clothing region as well as to preserve the body parts (i.e., arms) of the person, without changing the pose and the rest human body details. With the idea being to localize the face and understand the skin color of the model from the face image to be able to divide an image into hair, clothes, skin, and background.

### *D. Cloth Wrapping Module*

Once we have the clothing segment, we can now geometrically compare this clothing segment to the in-shop clothing. Our goal is now to be able to learn transforms on the in-shop clothing to make it as geometrically similar to the model clothing.

### *E.* Try-On Module

The instinctive approach to imposing the new clothing now is to simply paste it over the image, but as one can see this will cause problems due to overlap with hair and hands, and the previous clothing stays, making it look very unrealistic. The solution to this was the try-on module, where we implement an encoder-decoder network to smoothen out the image. This gives a smoothened image that looks much more realistic then the results we would have if we were to paste the image over the model. The instinctive approach to imposing the new clothing now is to simply paste it over the image, but as one can see this will cause problems due to overlap with hair and hands, and the previous clothing stays, making it look very unrealistic. The solution to this was the try-on module, where we implement an encoder-decoder network to smoothen out the image. This gives a smoothened image that looks much more realistic then the results we would have if we were to paste the image over the model. The article has avoided any in-depth description of the work done and for a thorough description of the model and training strategy.

## IV. VIRTUAL STYLING ROOM

A virtual styling room is an interactive, digital platform that allows customers to experiment with different clothing and styling options in a virtual environment. Similar to a virtual dressing room, a virtual styling room typically uses computer vision technologies such as augmented reality and human parsing to create a realistic representation of the customer's body and allow them to try on clothes virtually.

The key elements of VSR are:

1) *Clothing and Accessories:* A virtual styling room should have a wide selection of clothes and accessories for customers to choose from. This can include different styles, colors, and sizes, and may be updated regularly to reflect the latest fashion trends.
2) *Realistic Body Representation:* To create a realistic virtual try-on experience, a virtual styling room should use computer vision technologies such as human parsing and augmented reality to accurately represent the customer's body in the virtual environment. This can help customers to see how clothes would fit and look on their body, without the need for physically trying them on.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
*Volume 11 Issue V May 2023- Available at www.ijraset.com*

3) *Styling Tools:* A virtual styling room should include tools that allow customers to experiment with different styling options, such as changing the color of a shirt or adding accessories to an outfit. These tools should be easy to use and intuitive, allowing customers to quickly and easily create different looks.
4) *Customization Options:* A virtual styling room should allow customers to customize their virtual self, such as by changing their hair color or skin tone. This can help to create a more personalized and engaging experience for the customer.
5) *Sharing and Saving Options:* A virtual styling room should allow customers to save their virtual outfits for later or share them on social media. This can help to increase customer engagement and generate buzz around the brand.

Implementation of Virtual Styling Room

## V. VIRTUAL REALITY

In a VR-based virtual dressing room, customers can typically use a VR headset to enter a virtual environment that simulates a physical store or dressing room. They can select clothes and accessories from a virtual catalog, and see themselves wearing them in real-time. The VR environment can also include realistic lighting and mirror effects, allowing customers to view themselves from different angles and in different lighting conditions.

One of the main advantages of using VR in a virtual dressing room is that it can create a more engaging and interactive experience for the customer. By simulating a physical environment and allowing customers to fully immerse themselves in the experience, VR can help to create a more memorable and enjoyable shopping experience.

Overview of Virtual Reality

## VI. DEEP NEURAL NETWORKS

Deep neural networks play a crucial role in the development and functioning of virtual dressing rooms. Virtual dressing rooms are digital platforms or applications that allow users to try on clothes virtually without physically wearing them. Deep neural networks enable the creation of realistic and interactive virtual dressing experiences by leveraging computer vision and machine learning techniques.

Deep Neural Networks as follows in Virtual Dressing Room

1) *Body Detection and Segmentation:* Deep neural networks are used to detect and segment the user's body from the input images or videos. This process involves identifying the human body's key joints, such as the shoulders, elbows, and hips, and creating a 3D representation of the user's body shape and posture. Convolutional Neural Networks (CNNs) are commonly employed for body detection and segmentation tasks.
2) *Clothing Item Recognition:* Deep neural networks are trained to recognize and categorize different types of clothing items. This allows the virtual dressing room to understand the characteristics and attributes of each garment. CNNs or variants like ResNet or InceptionNet are often used for clothing item recognition tasks. The networks learn to classify clothes based on features like color, pattern, texture, and shape.
3) *Clothing Virtual Fitting:* Deep neural networks are employed to simulate the fitting of virtual clothes onto the user's body. By utilizing computer vision techniques and generative models, such as Variational Auto Encoders (VAEs) or Generative Adversarial Networks (GANs), the networks learn to generate a virtual representation of the user wearing the selected clothing item. These models take into account the body shape, size, and pose of the user to generate realistic simulations.
4) *Style Recommendation:* Deep neural networks can assist in recommending clothing items based on user preferences and style. By analyzing user data, such as previous purchases, browsing history, or social media preferences, recommendation systems powered by deep learning algorithms can suggest clothes that align with the user's tastes. Deep neural networks can learn intricate patterns and correlations between users' preferences and make personalized recommendations.
5) *Real-time Interaction:* Deep neural networks can enable real-time interaction and responsiveness within virtual dressing rooms. They can quickly process and update the virtual representation of the user as they try on different clothes, ensuring a seamless and immersive user experience. This real-time interaction is achieved through efficient inference and optimization techniques applied to the neural networks.

### *A. Proposed Algorithm*

We propose an Algorithm which is a DNN-based approach. The actions performed can be controlled and co-ordinated. The main steps of Algorithm are as follows:

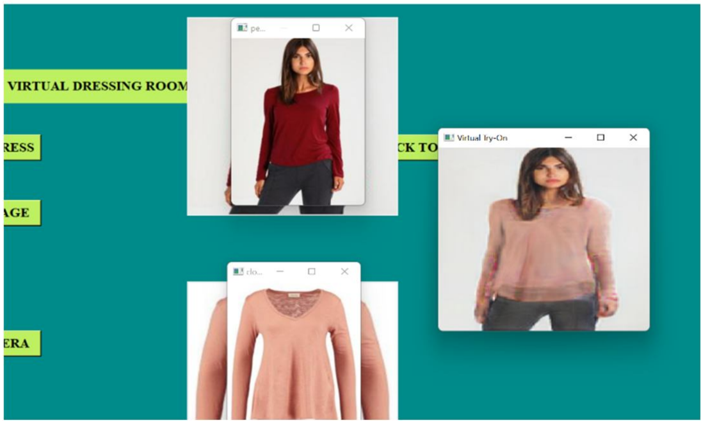
1) Image Acquisition: The algorithm starts by acquiring an image or video feed of the user.
2) User Detection and Segmentation: The algorithm needs to identify and isolate the user's body from the background. Techniques like image segmentation and object detection are commonly employed for this task.
3) Clothing Item Detection: The algorithm needs to recognize and understand the available clothing items. This can be done by training a deep learning model on a large dataset of clothing images, enabling it to identify different types of garments such as shirts, dresses etc
4) Clothing Item Matching: Once the clothing items are detected, the algorithm needs to find the best matching options for the user. The algorithm might utilize recommendation systems or similarity metrics to suggest suitable options.
5) Clothing Item Overlay: The selected clothing items are superimposed onto the user's body silhouette, aligning them with the detected body landmarks. Techniques like image warping and morphing can be used to deform and adjust the clothing items.
6) Realistic Rendering: To provide a realistic and immersive experience, the algorithm can apply advanced rendering techniques like shading, lighting, and texture mapping. This helps create the illusion that the virtual clothes are actually worn by the user, accounting for factors such as fabric texture and wrinkles.
7) Display and Interaction: Finally, the algorithm displays the virtual dressing room output to the user, typically on a screen. The user can interact with the virtual clothes and even simulate movements or poses.

## VII. RESULTS

The results of using Deep Neural Networks (DNN) in virtual dressing rooms have been very promising. By using DNN models for human parsing, virtual dressing rooms can accurately model the customer's body and allow them to try on virtual clothes in a realistic and natural way.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

One of the main benefits of using DNNs in virtual dressing rooms is their ability to accurately identify and segment different parts of the human body, such as the arms, legs, and torso. This can help to create a more realistic and natural-looking virtual environment, allowing customers to see how clothes would fit and look on their body. Several studies have shown that virtual dressing rooms using DNNs can lead to increased customer engagement and satisfaction. For example, a study by researchers at the University of Tokyo found that a virtual dressing room that used a DNN-based human parser led to higher levels of customer satisfaction compared to a traditional virtual dressing room that used simpler computer vision techniques.




In addition to improving the customer experience, using DNNs in virtual dressing rooms can also provide valuable insights for fashion retailers. By tracking customer interactions with the virtual environment, retailers can gain a better understanding of customer preferences and behaviors, which can help to inform future product development and marketing strategies.

Overall, the use of DNNs in virtual dressing rooms represents a significant advancement in the field of computer vision and has the potential to revolutionize the way customers shop for fashion online. As the technology continues to evolve and improve, we can expect to see even more innovative applications and use cases for DNNs in virtual dressing rooms and other related fields.

## VIII. ACKNOWLEDGEMENT

Any achievement does not depend solely on individual efforts but on the guidance, encouragement and co-operation ofintellectuals, elders and friends. We extend our sincere thanks to Head of the Department of Computer Science and Engineering, Sapthagiri College of Engineering, and our guide, Professor, Department of Computer Science and Engineering, Sapthagiri College of Engineering, for constant support, advice and regular assistance throughout the work. Finally, we thank our parents and friends for their moral support.

## IX. CONCLUSION

The popularity of online shopping and people's desire to fully utilize it possible when buying clothes justifies the necessity to create an algorithm that digitally dresses them in the chosen clothing. The requirement to spend hours physically trying on a range of outfits is a regular issue clients run into when shopping for clothing. The time available might not be enough, and this might be exhausting.

The human body's nodes and points are plotted using the pose estimation module, and this information is then utilized to create an image of clothing over the user's body, obviating the need for actual fittings and saving time and effort.

Online buyers would greatly appreciate the ability to check out themselves in many different outfits with fewer limits which is the main advantage of this technology.

We came to the conclusion that this exercise really saves time. It doesn't demand extra work. Anyone who is not technically advanced can use this virtual dressing room. It doesn't call for a lot of technical expertise. It is hence accessible to everyone. Therefore, it is the perfect addition for a cloth liking person. Overall, the suggested virtual dressing room appears to be a great option for precise and speedy virtual cloth fitting. While virtual dressing rooms are still a relatively new technology, they have already shown significant potential in improving the online shopping experience for fashion customers. As the technology continues to evolve and improve, we can expect to see even more innovative applications and use cases for virtual dressing rooms in the future. Ultimately, virtual dressing rooms represent a powerful tool for bringing the world of fashion online and creating a more engaging and interactive shopping experience for customers around the globe.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
*Volume 11 Issue V May 2023- Available at www.ijraset.com*

## REFERENCES

[1] W. L. Hsiao, I. Katsman, C. Y. Wu et al., “Fashion++: Minimal edits for outfit improvement,”. in IEEE. International Conference on Computer Vision, pp. 5047-5056, 2019
[2] J. Wang, W. Zhang, W Liu et al., “Down to the Last Detail: Virtual Tryon with Detail Carving,”. 2019
[3] H. Yang, R. Zhang, X. Guo et al., “Towards Photo-Realistic Virtual TryOn by Adaptively Generating-Preserving Image Content,”. in IEEE/CVF Conference on Computer Vision and Pattern Recognition, pp. 7850-7859, 2020.
[4] M. R. Minar, T. T. Tuan, H. Ahn et al., “CP-VTON+: Clothing Shape and Texture Preserving Image-Based Virtual Try-On,”. in IEEE International Conference on Computer Vision Workshops. 2020.
[5] L. Liu, H. Zhang, X. Zhao et al., “Yan Collocating clothes with generative adversarial networks co-supervised by categories and attributes: a multi-discriminator framework,” in IEEE TNNLS, 2019..
[6] C Lassner, G Pons-Moll and P. V. Gehler, “A generative model of people in clothing,”. in IEEE International Conference on Computer Vision, pp.853-862, 2017.
[7] T Park, M. Y. Liu and T.C. Wang, “Semantic image synthesis with spatially-adaptive normalization,”. in IEEE Conference on Computer Vision and Pattern Recognition, pp.2337-2346, 2019.
[8] R. Zhang, P. Isola, A. A. Efros et al., “The unreasonable effectiveness of deep features as a perceptual metric,” in IEEE conference on computer vision and pattern recognition, pp. 586-595, 2018.
[9] Y. Jo and J. Park, “SC-FEGAN: Face Editing Generative Adversarial Network with User's Sketch and Color,”. in IEEE International Conference on Computer Vision, pp.1745-1753, 2019.
[10] C. H. Lee, Z. Liu, L. Wu et al., “Maskgan: Towards diverse and interactive facial image manipulation,”. in IEEE/CVF Conference on Computer Vision and Pattern Recognition, pp.5549-5558, 2020.
[11] Virtual Dressing Room Application Aladdin Masri Computer Engineering Department An-Najah National University Nablus, Palestine masri@najah.edu Muhannad Al-Jabi Computer Engineering Department An-Najah National University Nablus, Palestine mjabi@najah.edu 2019.
[12] J. Johnson, A. Alahi and L. Fei-Fei, “Perceptual losses for real-time style transfer and super-resolution,”. in European conference on computer vision. Springer, Cham, pp.694-711, 2019.
[13] 2020 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Learning to Transfer Texture from Clothing Images to 3D Humans Aymen Mir1 Thiemo Alldieck1, 2 Gerard Pons-Moll1 1 Max Planck Institute for Informatics, Saarland Informatics Campus, Germany 2020.
[14] C. Patel, Z. Liao, G. Pons-Moll, “TailorNet: Predicting Clothing in 3D as a Function of Human Pose, Shape and Garment Style,”. in IEEE Conference on Computer Vision and Pattern Recognition. 2020.
[15] E. Gundogdu, V. Constantin, A. Seifoddini et al., “GarNet: A Twostream Network for Fast and Accurate 3D Cloth Draping,”. in IEEE/CVF International Conference on Computer Vision (ICCV). 2019.
[16] A. Mir, T. Alldieck, G. Pons-Moll, “Learning to Transfer Texture from Clothing Images to 3D Humans,”. in IEEE Conference on Computer Vision and Pattern Recognition. 2020.