



An Enhanced Virtual Try On Space Using Virtual and Augmented Reality with Machine Learning

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Abstract : The Virtual Styling Room, which offers an immersive and interactive virtual experience, seeks to revolutionise the way people shop for clothing. It uses live video feed. With the help of a live video stream, this system will enable users or customers to select from a large selection of outfit designs and digitally mimic those outfits on virtual models in real-time.

Both customers and retailers can benefit from the system in a number of ways. Customers can save time and effort by not having to physically try on each piece of apparel. Instead, people don't need to leave their houses to swiftly and simply imagine how an outfit will look on them. The virtual experience can also be tailored to the customer's preferences and previous purchases, offering recommendations and ideas. The method can help retailers manage their markets by removing the requirement for physical trial rooms and vast inventories. Without having to physically have all of those goods in stock, retailers may display a greater range of clothing patterns and styles. As a result, merchants can reduce their overhead expenses related to inventory and space needs.

IndexTerms – Virtual Reality, Machine Learning, Face Detection, Video Feed.

I. INTRODUCTION

Different technologies that enable users to simultaneously experience both the physical and digital worlds have been developed as a result of the fusion of these two realms. This connection is being used in a variety of fields, including the fashion sector, where virtual dressing rooms are being created to replicate the visual component of dressing.

Trying on clothes at a physical store takes time, and in the case of internet buying, it may not be possible at all. Here's where virtual dressing rooms come in handy. The accessibility and time efficiency for trying on garments can be considerably enhanced by constructing a virtual changing room scenario. Users can swiftly change their clothes or try on gowns without having to wait in long queues or worry about hidden cameras.

Aligning the user and the clothing models with accurate location, scale, rotation, and ordering presents one of the large to obstacles in the creation of virtual changing rooms. To address this problem, however, a number of techniques for identifying body parts and evaluating posture have been proposed in the literature. Web cameras, for instance, can be used to assist consumers in budgeting while they virtually put on clothing.

Customers' shopping experiences could be drastically altered by the introduction of virtual changing rooms. It does away with the need to physically try on garments, which can take a lot of time and energy. Instead, virtual dressing rooms let customers easily and quickly see how an outfit will appear on them, making for a quick and easy purchasing experience.

II. METHODOLOGY

Retailers frequently employ virtual try-on technology to give customers a more dynamic and interesting shopping experience. This technology simulates how a certain makeup, outfit, purse, or accessory would seem on the customer for both in-store and online shopping. Major businesses utilise this technology to provide their customers virtual changing rooms so they can preview how clothes will appear on them before buying. Additionally, the technology is utilised to show marketing and promotional material and to inform buyers about the products.

Computer vision, face identification, and face tracking technologies are typically used to power virtual mirrors and changing rooms. To gather, examine, and draw conclusions from data from one or more photos, algorithms are utilised.

With webcams scanning the body to build a 360-degree 3D model, which can be used to put on virtual clothing or accessories, augmented reality. Some fitting rooms utilise artificial intelligence and machine learning to produce 3D models of each shopper's entire physique. Others utilise RFID, or radio frequency identification, to scan things and overlay them on a 3D model, allowing customers to see what items look like without having to try them on.

Algorithms are used to gather and analyse data from one or more photographs of the user in order to construct a virtual fitting room. A 360-degree 3D model of the user's body is created using this information and can be used to digitally try on garments or accessories. Virtual fitting rooms frequently use augmented reality to let users see how an item will appear on their body in real time.

Fully-body 3D models of each customer can also be made using artificial intelligence and machine learning. Using this technology, algorithms are trained to identify and map out the various bodily components, which may be utilised to produce a more precise 3D model. This strategy may be helpful for businesses that wish to offer specialised goods or services because it can give each user a more personalised experience.

The technology known as radio frequency identification, or RFID, is another one that can be applied in virtual changing rooms. Radio waves are used in RFID technology to identify and track items. A virtual fitting room can scan apparel or accessories using RFID tags and then superimpose the items on a 3D model of the user's body. This enables the user to virtually try on clothing without having to physically put it on and see how it fits.

Light detection and ranging (LiDAR) is a remote sensing technology that measures the distance between objects by using light in the form of a pulsed laser. LiDAR technology can be utilised in fitting rooms to provide a more exact evaluation of product fit. The technique can produce a 3D model of the body with great accuracy by scanning it with a LiDAR sensor, allowing for a more exact fit analysis. This is especially important in businesses like fashion, where the fit of garments has a significant impact on client happiness and return rates.

Overall, virtual try-on technology makes shopping more interesting and interactive for customers because they can try on products online without having to physically put them on. Customers can make more informed purchasing selections as a result of saving time and effort. This technology also benefits retailers by increasing customer engagement and revenue.



Figure 1 : A Virtual Fitting Room Perspective

III.IMPLEMENTATION

A customer might buy hardware or software during the implementation process and need help configuring the system. User rules, system integration, customisation, scope analysis, and delivery are all possible forms of help.

Careful design, talented developers, and the use of proper development tools are necessary for effective deployment. To ensure that end users can utilise the new system properly, user education and training may also be a part of the implementation process.

A . Segmentation Module

Segmentation, as used in the context of virtual changing rooms, is the technique of dividing an image into various segments or regions according to its content. To extract useful information from an image, such as the location of particular items or regions of interest, segmentation is used. In the instance of the segmentation method as stated, the emphasis is on localising the face and comprehending the model's skin tone. Because it enables precise placement and portrayal of clothing items on the model's body, this is a crucial stage in virtual fitting.

Robust image processing techniques are applied to accomplish this. Edge detection, colour thresholding, and morphological procedures are a few examples of these methods. Additionally, the algorithm may employ machine learning strategies to enhance accuracy of the segmentation, such as neural networks.

Following segmentation, the image is split into various areas according to their contents. The regions in virtual changing rooms could be hair, clothing, skin, and background. These areas can then be further analysed and used to accurately and realistically depict clothing items on the model's body.

B. Human Parsing Module

A computer vision approach called "human parsing" involves locating and separating various body parts of a person in a picture or video. Human parsing can be used in the context of virtual fitting rooms to precisely measure a person's body proportions and produce a virtual image of their body that can be used to virtually try on items.

Advanced 3D modelling and rendering techniques are used in virtual fitting rooms to provide lifelike images of apparel and people. The virtual changing room can precisely capture a person's body shape and size as well as the shape and size of the apparel they want to try on by employing human parsing.

Once the human parsing is complete, the virtual fitting room can use the resultant data to generate an accurate and realistic 3D representation of the person's physique. This model can then be used to replicate the appearance of clothing on the individual, allowing them to digitally try on different clothing items and see how they would look without having to physically try them on.

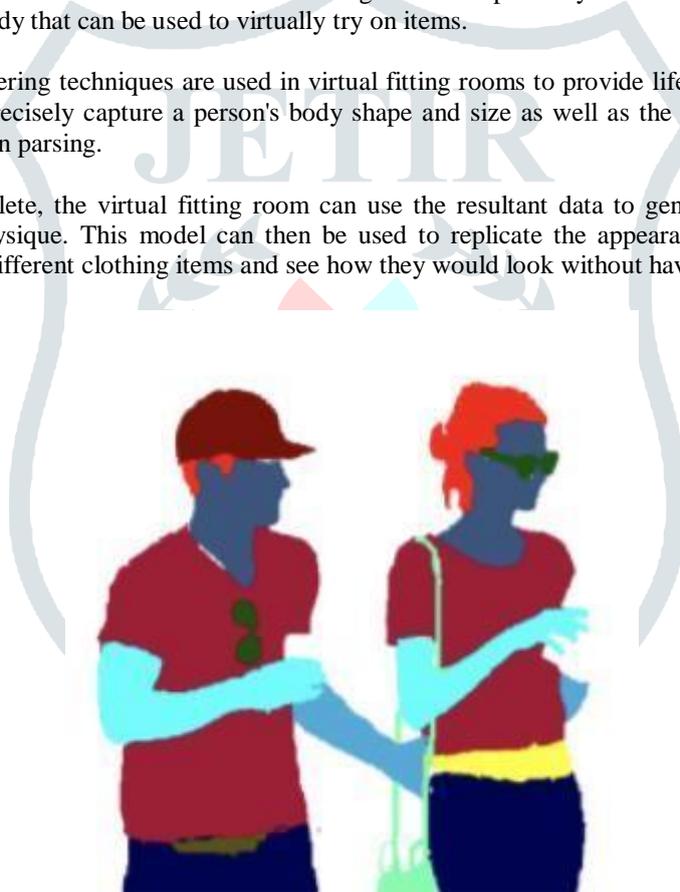


Figure 2 : Example of usage of Human Parsing

C. Pose Estimation Module

Pose estimation can be used in virtual fitting rooms to precisely track a person's motions and poses as they try on different clothing items virtually. Virtual fitting rooms frequently use augmented reality to let users see how an item will appear on their body in real time.

Pose estimation involves identifying and locating important body joints in an image or video using computer vision algorithms. The pose estimation model, which is used in virtual changing rooms, takes a person's processed camera image as input and produces data on the locations of important body joints such the elbows, wrists, knees, and ankles.

With the use of this data, a 3D model of the subject's body is produced, allowing for the precise simulation of the subject's look when moving and adopting various poses while wearing clothing. The virtual fitting room may give the user a more realistic and dynamic experience by employing pose estimation to track their movements and positions in real-time.

Pose estimation can be used to precisely measure a person's body measurements, such as the length of their arms, legs, and torso, in addition to recording body motions. Based on the person's unique body shape and size, this information can subsequently be utilised to suggest clothing products that are a better fit.

Pose estimation is a key strategy for virtual fitting rooms because it enables more precise tracking of body motions and poses, which can result in a more engaging and realistic experience. Pose assessment can help customers identify clothing items that fit better and improve their overall virtual shopping experience by precisely assessing body proportions.



Figure 3. Example of usage of Pose Estimation

IV. CONCLUSION

With the growing popularity of online shopping, many people are seeking for ways to make the process as simple and effective as possible. One of the most difficult aspects of online apparel buying is the inability to try on garments before purchasing them. This can be a time-consuming and aggravating process, particularly if the things do not fit or appear as planned. A virtual style room or virtual dressing room can be utilised to solve this problem. This method maps the nodes and points of the human body using a live video stream and a Kinect sensor. Using this data, an image of clothes is then made over the user's body so they can see how it would appear and fit without actually trying it on.

This technology is accessible to everyone, regardless of technical expertise, and can be used by anyone who wants to try on clothes virtually. The virtual dressing room is a convenient and time-saving solution for online shoppers because it eliminates the need for physical fittings and allows customers to try on multiple outfits with ease.

This technology is available to anybody, independent of technological expertise, and may be utilised by anyone who wishes to electronically try on garments. Because it eliminates the need for real fittings and allows customers to easily try on several outfits, the virtual dressing room is a simple and time-saving solution for online shopping.

The virtual dressing room is an excellent choice for precise and quick virtual apparel fitting. It saves time and is easily accessible, making it a useful tool for both online customers and clothes sellers.

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