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# Virtual Dressing Room Using OpenCV

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**ABSTRACT:** Today, with the advancement of technologies, the usage of online shopping which is also known as e-shopping has been growing rapidly nowadays. This advancement in e-shopping had driven the shopping revolution in which the customers are able to purchase the costumes anywhere and at any time. Besides its advantages of online shopping, it also has disadvantages which includes that it is difficult for the customers to try the items one specially when it comes to clothing. Hence, a virtual dressing room using AR is developed to allow the customers to visualize how the selected attire or costume fits their body without wearing physically. This is aimed to improve customers shopping experience by allowing them to visualize different costumes to check for size, fit or style. In the development of Augmented Reality, the human body detection and motion tracking and are integrated in order to fit the selected costume on to the user body virtually by tracking the user's body movements through the camera which is attached to the laptop. The body skeleton-joint positions are recognized, detected and tracked using the pose estimation model. In addition to it the body and the garment measurements are also analysed and interpreted to help in seamless fitting the selected costume on to the human body.

**KEYWORDS:** Virtual Dressing, Machine Learning, Virtual, Deep Learning, OpenCV.

## I. INTRODUCTION

Stores for the most part have huge and different choices for garments. With most of the things shifting to virtual mode and competitors trying to get ahead of one, other textile industries took a hit during these tough times. With a Virtual Dressing Room, every small textile shops can help their customers to an online trial Room without being afraid of contracting the disease. The advantage of using this method would be the reduction of time and effort spent in trying out the clothes physically. So, our main objective is to build an interactive and highly realistic virtual machine on which the user can try clothes without wearing it actually and reduce the effort from both the assistant and the customer. The problem is trying the clothes and getting an idea of how it fits while shopping. The person will search and choose the clothes and takes help of the assistant to assist how the selected one fits him. After selecting the cloth, he/she manually tries it in trial room and seeks the help from the assistant to judge how the selected one fits. This is time consuming and effort consuming job for the user as well as for the assistant. Furthermore, some of the customers may prefer to shop in-store in order to buy clothes so that they can know whether the clothing fits them or not. However, in popular clothing stores, the trial rooms are usually full and there will be a long queue. Customers have to wait for a long time to try on clothes. In fact, customers may choose online shopping or instore shopping depending upon their demands. However, both the ways are unable to achieve the goal of the customer to check whether the selected costume fits or not. Therefore, a virtual dressing room is proposed in this project in order to help the customers to fulfill their shopping goals.

## II. RELATED WORK

*Online Virtual Trial Room Implementation using OpenCV:*

Amit Thakur, Suraj Virkar, Prof. Jyoti Gaikwad are the authors of this paper. In this paper [1], they have built an Online Trial Room Application. In this, they have used the device camera to take a video of the user and then it divides the video into individual frames from which it extracts the user's body. And then they used functions to extract information on the placement of joints in the body and to transform, rotate, and scale the wearable image onto the user in real-time. To implement the project, they have used Flask Web application with OpenCV. This application works on devices with an inbuilt or attached camera, internet, and web browser.



*Virtual Trial Room :*

Saurabh Botre, Sushant Chaudhari, Shamla Mantri are the authors of this paper. In this paper[2], they have proposed a system which helps in coordination of every fashion. The system “Virtual Dressing Environment” is online equivalent of the near-ubiquitous in-store changing room. It enables shoppers to try on clothes of any size, fit or style, but virtually rather than physically. It has been evident that when customers are unable to try, most will not buy. Recently, Virtual try-on of clothes has received much attention due to its commercial potential. This virtual environment can be very useful for online shopping or intelligent recommendations to narrow down the selections to a few designs and sizes. The entire process initiates from simply the alignment of the user and the cloth models with accurate position, scale, rotation and ordering. The detection of the user and the body parts is one of the main steps in the creation of the system.

*Virtual Dressing Room Implementation Using Body Image –Clothe Mapping :*

Ahmad al-Qerem is the author of this paper. In this paper[3], their approach concentrated on how the selected garment fitted the user’s body and how it will appear as if he/she in the real world. This was carried out by identifying critical points on garment and user’s body dimensions using image processing techniques. In this paper, an application for mitigating the virtual dressing room was designed, implemented and tested.

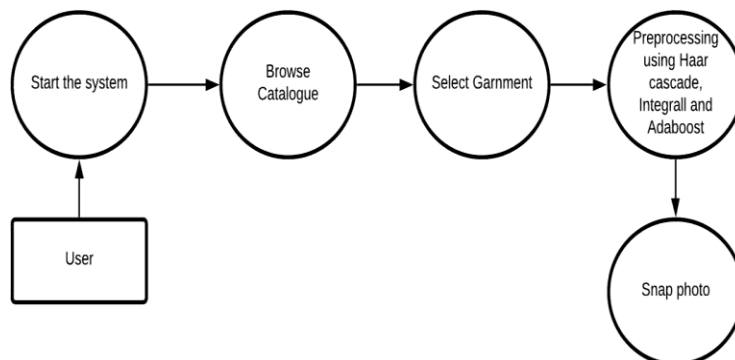
**III. METHODOLOGY**

The proposed system is a web application for Virtual Dressing Room. In this we need to detect body parts of target human body and we need to transfer things according to suitable body parts. So, for body part detection we were used Haar cascade dataset. Using the cascade trainer GUI its value of feature is computed using concept of integral images (it would select best value of feature among this by using AdaBoost classifier). They are like convolution kernels. Haar features are relevant feature for object detection and non-relevant features are discarded by AdaBoost algorithm. There are steps involved in the process of training Haar cascade. The body and garments measurements are also analysed and interpreted to help in seamlessly fitting the virtual garments to the body. The superimposed virtual garments movements will be detected and tracked to follow the real-time human body movements through camera. The virtual garments are superimposed over the human body to create an illusion of wearing clothing, display on the laptop. The algorithm automatically generates mask image without user interaction that contains only text regions to be in painted.

**IV. EXPERIMENTAL RESULTS**

**1. Detecting and Sizing the Body:**

The first step in the proposed Online Virtual Trial Room is to find out the shape, head or neck depending on what you wear to identify points. The terms used are used to determine where they can display a particular fabric or decoration. To determine body composition, we used a number of techniques: i) Delay filtering, Haar Cascade algorithm and ii) Movement detection or bone detection in which multiple frames were analyzed for any movement. However, the results were unreliable and insufficient to obtain reliable points of wear. The idea is to set the user in front of the camera and hold him at the beginning at a predetermined distance.



The algorithm extracts points from the shoulders and abdomen. To measure the distance between these points and to know the distance from user to camera, user size can be determined. When an image (video frame) is detected, the Haar Cascade algorithm is used only to detect body image. Haar Cascade algorithm is an Object Detection Algorithm that is used to identify the image in real-time image or video. Object Detection using Haar feature-based cascade classifiers is an effective object detection method proposed by Paul Viola and Michael Jones in their paper, "Rapid Object Detection

using a Boosted Cascade of Simple Features" in 2001. It is also known as Viola-Jones object detection framework. It can be trained to detect a variety of object classes; it was motivated primarily by the problem of face detection. This algorithm is implemented in OpenCV as cvHaar Detect Objects ().

There are three methods, they are

1. Robust object detection rates in real times:
  - a. "Integral Image" representation allows fast feature computation
  - b. AdaBoost (adaptive boosting) -based classifier training classifier training procedure
  - c. Classifier cascade allows fast rejection of non-face images
2. Use rectangular features instead of pixels:  
Features = Weak Classifiers
3. Each round selects the optimal feature given:  
– Previous selected features, Exponential Loss

Three major contributions/phases of the algorithm:

Feature extraction, Classification using boosting, Multi-scale detection algorithm, Feature extraction and feature evaluation. Rectangular features are used, with a new image representation their calculation is very fast. Classifier training and feature selection using a slight variation of a method called AdaBoost. A combination of simple classifiers is very effective. As shown in the figure (a)



(a)

### 1.1 Face Detection:

When a user comes to the front of the screen, finding the user can understand able structure that will be face-to-face. So, to get a face, we use Haar class-class Cascade classifiers. In haar differentiation instead of using pixel values of intensity, it uses a change in comparative values between adjacent pixel groups. Thereafter a distinct contrast between the pixel groups is used to determine the light associated with the dark areas in the image. It is a method of machine learning. Therefore, the efficiency of the algorithm cascade function is trained from many negative and constructive images. Many negative images (facial images) and positive images (facial images) are displayed in the separator to train us so that we can extract features from it. The purpose of using OpenCV makes it easy as it comes with pre-programmed items for faces, eyes, smiles etc. It comes with a trainer and a detector; we can train it with our classifier easily to get any object discovery. When it finds a match, it returns the Rect (x, y, w, h) which means left, top, bottom and right link. As shown in the figure (c)

### 1.2 Image Masking:

In this case the hidden image has some of its pixel values set to zero. In an image where the pixel intensity is zero automatically the pixel size of the hidden image to be set will be set to a background value of normally zero. Or define the mask the ROI of each slide used. If necessary, the face mask can be controlled by a slide-over slide on the basis of ROI tools. In the ROI toolkit, masking performance does not affect a piece other than ROI. Using image as a mask: In this simply the image masked has some of its pixel intensity values set to zero. In the image wherever the pixel intensity value is zero automatically the pixel intensity of the resulting masked image will be set to the background value which is normally zero. Using ROI as a mask: To define the mask the ROIs for each slice is used. If required,



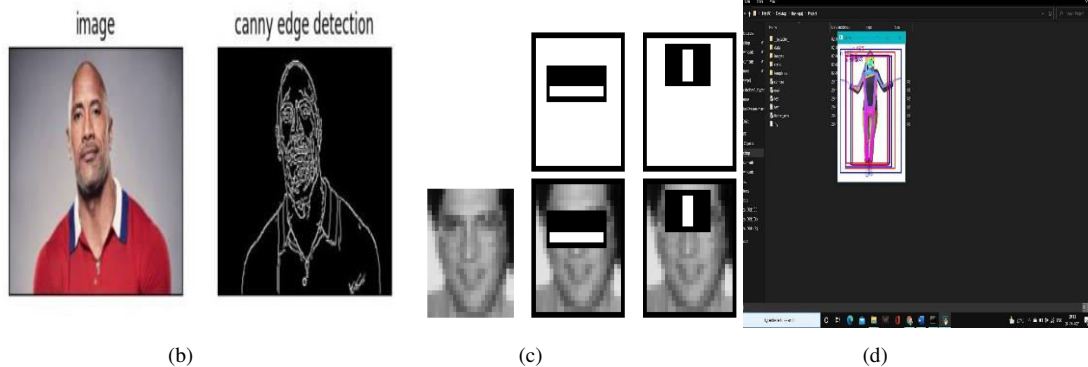
masking can be controlled on slice by slice basis in ROI toolkit. In ROI toolkit, masking operations does not affect a slice without ROI.

**1.3 Edge Detection:**

There are various ways to get an edge, in this project we have used the Canny Edge detection process. To make this method of finding the edge using Gaussia filters. These filters cut sound from digital image to prevent any false detection by the processor. This does the job of smoothing out and minimizing the noise effect in the processor's image performance. With this image stabilization gradients are not available. The edges of the image can point to various shapes such as horizontal, vertical and diagonal edges, so this algorithm uses four filters to find all sorts of edges in a blurred image. After this procedure a non-high pressure is applied to make the edge thinner. This pressure causes the edge pixels to be accurate towards the actual edges. Also, some pixels can be caused by noise, and with such pixels we apply a double limit to it.As as shown in the figure (b)

**1.4 Scaling of Attire:**

Scaling means increasing image size depending on the conditions. As when the user is walking in front of the screen, he has to change the size of the garment and place it on the body accordingly. When the user is straight to the screen the image size should be increased depending on the user but the actual dimensions of the garment should not increase. Suppose a person tries on an S-size line, as when walking in front of a screen the size of the screen should not change M or L. This is done by measuring.



**1.5 Proposed Application**

The application is built with the Python Flask Web Application Interface. The user can view clothing and other clothing items on the website and choose to purchase or try on clothing. If the user wants to try the wearable online, they will have to click on the 'Switch View' button. This will run the Tryon script. With OpenCV the video is captured with the device's camera and a photo of the garment is inserted neatly into the user's body in real time. If the user likes the costume, then they can choose to buy it or continue to look for more wearable on the website as an offline store.as shown in the figures (e)(f)(g)





### Result Analysis

#### Detect body skeleton joint positions in simple background:

The system displays the detected body skeleton joint positions based on the pose estimation result returned by the pose estimation model. Based on the real-time video of body in simple background, the application is able to recognize, detect and track the body. In this case, it proves that the model has a good accuracy in recognizing, detecting and tracking body skeleton joint positions

#### Fit Dress onto User body on Virtual:

The system superimposes the virtual garment over the body after successfully extracted the body skeleton joint positions. Based on the real-time video of body in simple background, the application is able to fit the virtual garment onto the detected body in an appropriate way. In this case, it proves that the application succeeds in presenting the visualisation of wearing garment for user. the body is surrounded with other different objects, the application is still able to superimpose the virtual garment over the detected body in a correct way. As a result, it proves that the application is successful in enabling user to be virtually appeared like wearing clothing on the camera preview interface.

### V. CONCLUSION

The problem is trying and wearing clothes while shopping. One should look for and choose clothes and keep in mind that the helper will help him. After choosing a dress, she will try inside the changing room to make her decision. This requires time and effort on both the assistant and the client. The suggested solution to this problem is to use Virtual Routes that serve as a virtual dressing room. It is used to find a person's body and this data is then used to give a picture of clothes on the user's body, thus eliminating the need for physical effort on clothes thus helping to save time. We conclude that this is a very time-consuming task. This visual aid is used by any non-technical person. It does not require a lot of technical knowledge. Therefore, it is useful. So a nice addition to the fabric store. All in all, a well-designed dressing room seems to be a great solution for a quick and accurate experiment of fabrics almost.

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