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Augmented Reality using Hand Gesture Recognition System and its use in Virtual Dressing Room

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ABSTRACT: E shopping is a system that permits a customer to submit online orders of products which they desire to buy .In e shopping system helps in serving both walk-in-customer and online customers.
In this project we are using augmented reality for e shopping which will help in better human interaction with the products which the company is serving online. In this concept we will be setting up virtual dressing rooms for the fashion industry and digital entertainment applications aim at creating an image or a video of a user in which he or she wears different garments than in the real world. Such images can be displayed, for example, in a magic mirror shopping application or in games and movies. Current solutions involve the error-prone task of body pose tracking
We suggest an approach that allows users who are captured by a set of cameras to be virtually dressed with previously recorded garments in 2D. By using image-based algorithms, we can bypass critical components of other systems, especially tracking based on skeleton models. We rather transfer the appearance of a garment from one user to another by image processing and image-based rendering. Using images of real garments allows for photo-realistic rendering quality with high performance.

KEYWORDS: Augmented Reality, Hand Gestures, E-Shopping.

1 INTRODUCTION

A virtual dressing room (also often referred to as virtual fitting room and virtual changing room) is the online equivalent of the near-ubiquitous in-store changing room – that is, it enables shoppers to try on clothes to check one or more of size, fit or style, but virtually rather than physically.Having begun to emerge from 2005,fit technologies started to be widely reported from 2010,but are now available from an increasing variety of providers and are in use by a growing number of prominent retailers in their webstores. A fit technology may be categorised according to the problem that it resolves (size, fit or styling) or according to the technological approach.

Virtual dressing rooms for the fashion industry and digital entertainment applications aim at creating an image or a video of a user in which he or she wears different garments than in the real world.

We suggest an approach that allows users who are captured by a set of cameras to be virtually dressed with previously recorded garments in 2D. By using image-based algorithms, we can bypass critical components of other systems, especially tracking based on skeleton models. We rather transfer the appearance of a garment from one user to another by image processing and image-based rendering. Using images of real garments allows for photo-realistic rendering quality with high performance.

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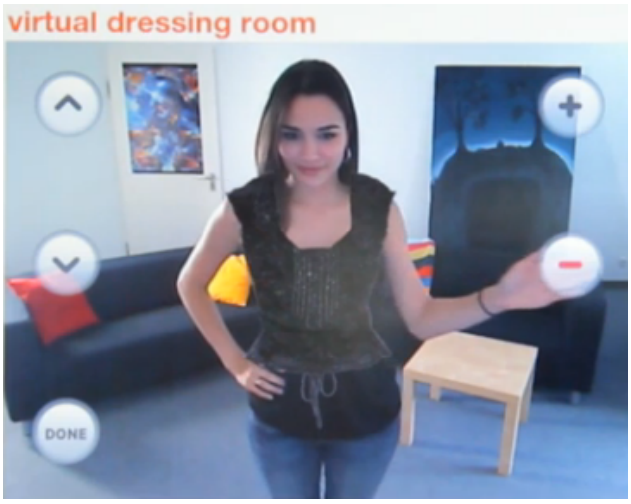
2 PROPOSED SYSTEM

We proposed a system where users are willing to buy any product are expected to be computer users with minimal computer knowledge. However, the user interface of the system is made very simple and user-friendly to the customer.

The customer is provided with the option of either presenting his/her physical measurements or to select the body type that best matches with his/her body type. The selected body type is mounted with the face and is presented with the clothing or apparel choosen. Thus, they can have the feel of real time purchase.

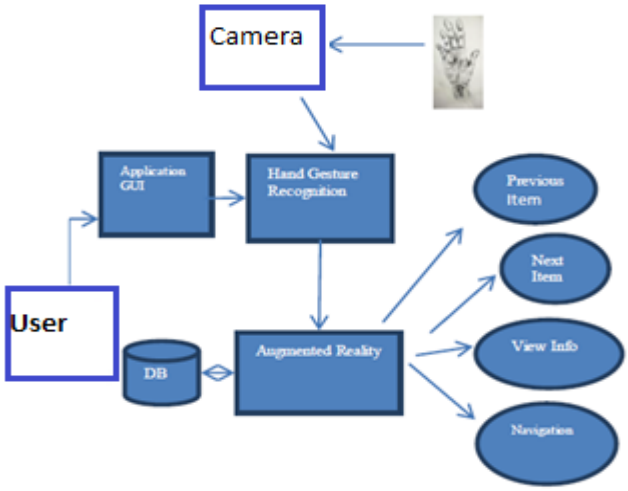
The user interface is designed to facilitate the above shopping tasks. These tasks are combined into menu system as the Augmented Reality window .Through these menu, users can access full description which is designed for Augmented Reality.Through the Webcam, hand gesture is recognized, product associated with that is selected. Product from the database is loaded on the Screen and the Users can pick one of virtual products from all and manipulate it, User can move or rotate the model, and also see the Inner view of the product and view all specific information about that product, such as Product name, it's price, size of it, and lots of thing that help to customer make their purchasing decision in more reliable way.



3 SYSTEM ARCHITECTURE

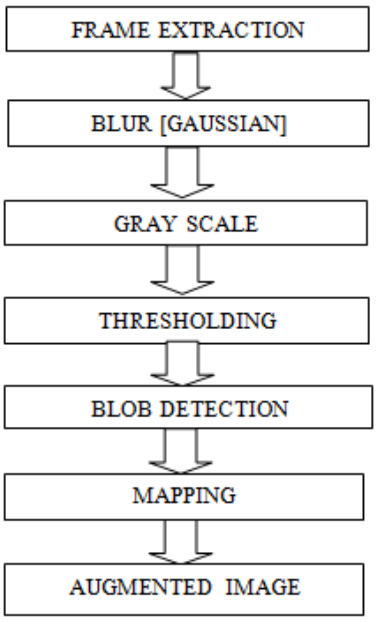
Our proposed system includes hand detection and recognition and the data is retrieved from the database as highlighted in Figure 1. Each user can easily use the system, control the system, view the previous and next Product and obtains all information regarding that product.

At First user accesses the Application GUI, the webcam will start the process of Hand detection and Recognition. User just needs to use hand to access the system within the Screen zone, and when the user uses hand gesture to choose the different options the system acquires the information from the database. After accessing all information from the database, the required information is visible on the screen or the display.



At first, the hand gesture movement is captured by Webcam as video feed. From the video feed, frames are captured and send for processing. In processing all captured images are blurred for better detection and from these images all are converted into HSV color model for obtaining accurate color. Next, thresholding for converting image into binary images are carried out. From these blobs, gesture is recognized. The last step is pre-processing the recognized gestures and according to that gesture command associated with that is send to system and then information regarding to product which user demands is then retrieved from database. When user chooses any option through hand movements, and from these option, the system will get all information and finally display it on the screen.

4 HAND GESTURES DETECTION AND RECOGNITION



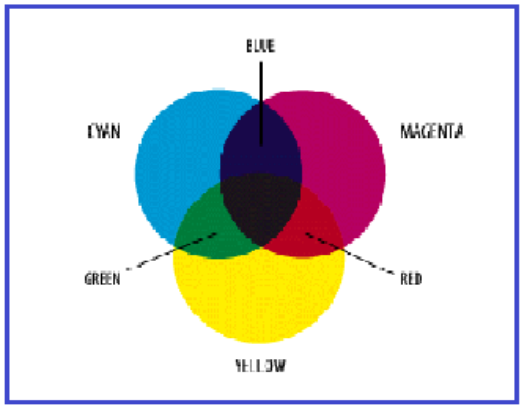
4.1 COLOR MODELS

4.1.1 RGB COLOR MODEL

The RGB colour model relates very closely to the way we perceive colour with the **r**, **g** and **b** receptors in our retinas. RGB uses additive colour mixing and is the basic colour model used in television or any other medium that projects colour with light. It is the basic colour model used in computers and for web graphics, but it cannot be used for print production.

The secondary colours of RGB – cyan, magenta, and yellow – are formed by mixing two of the primary colours (red, green or blue) and excluding the third colour. Red and green combine to make yellow, green and blue to make cyan, and blue and red form magenta. The combination of red, green, and blue in full intensity makes white.

In Photoshop using the "screen" mode for the different layers in an image will make the intensities mix together according to the additive colour mixing model. This is analogous to stacking slide images on top of each other and shining light through them.



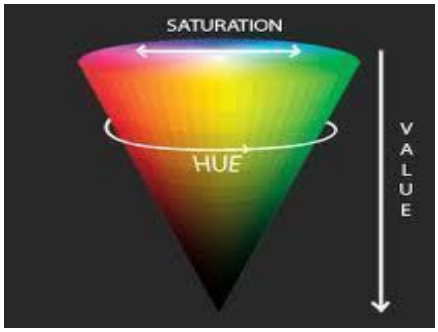
4.2 RGB COLOR MODEL

4.2.1 HSV COLOR MODEL

Hue - In HSV, hue represents color. In this model, hue is an angle from 0 degrees to 360 degrees.

Saturation - Saturation indicates the range of grey in the color space. It ranges from 0 to 100%. Sometimes the value is calculated from 0 to 1. When the value is '0,' the color is grey and when the value is '1,' the color is a primary color. A faded color is due to a lower saturation level, which means the color contains more grey.

Value - Value is the brightness of the color and varies with color saturation. It ranges from 0 to 100%. When the value is '0' the color space will be totally black. With the increase in the value, the color space brightness up and shows various colors.



4.3 STEPS FOR IMAGE PROCESSING

4.3.1 BLURRING

The Gaussian blur is a type of image-blurring filters that uses a Gaussian function (which also expresses the normal distribution in statistics) for calculating the transformation to apply to each pixel in the image.

4.3.2 RGB TO GREYSCALED COVERSION

- Traverse through entire input image array.
- Read individual pixel color value (24-bit).
- Split the color value into individual R, G and B 8
- bit values.
- Calculate the grayscale component (8-bit) forgiven R, G and B pixels using a conversion formula.
- Compose a 24-bit pixel value from 8-bit grayscale value.
- Store the new value at same location in output Image.

A) Color Image

B) Grey Scaled

4.3.3 SKIN SEGMENTATION

- The precision and the probability of a pixel to be a skin can be further increase by this method.
- To achieve this, an Adaptive Thresholding process is applied.
- Initially a threshold is set and, the skin segmented region is separated from non-skin region.
- This value is further decreased to see the rate at which pixels belong to skin segmented region.
- After a keen observation of the decreasing threshold, there is a point reached when the increase in segmented region will decrease to minimum and further change in the threshold would make the skin region increase with unexpected rise. This is called optimal threshold and the region obtained just before the optimal threshold is the skin segmented region.
- The skin segmented pixels are assigned with binary value 1 and to other with 0.

4.3.4 THRESHOLDING

- Traverse through entire input image array.
- Read individual pixel color value (24-bit) and convert it into gray scale
- Calculate the binary output pixel value (black or white) based on current threshold.
- Store the new value at same location in output image.

B) Grey Scaled

C) Threshold Image

5 CONCLUSION AND FUTURE WORK

The online shopping system has become an indispensible part of ecommerce world today. The investors realizing this huge markets, are always finding ways to improve the shopping experience of customer and always find innovative ways to lure them. This will give a clear picture about the apparel he or she is going to buy and leave no ambiguity on how it will look on them irrespective of their body type. Also, more options to pay will provide ease and assurance about the money being spent. A lot more development can be done in the existing system by incorporating dynamic augmented reality i.e.the view of the customer varies in the virtual view as he or she moves in reality which is also the future scope of this system.

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