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# **Suggestion Based Outfit Selection Using Skin Tone Detection in Augmented Reality**

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**Abstract**— Clothing is a necessity. Ancient humans used animal skin to protect themselves against weather. But today clothing is not just related to functionality, it has transformed into an element of lifestyle, it defines who you are. Fashion as we see today is a healthy industry. People try different clothes before choosing a particular one. Today, e-commerce has led to a huge change in this direction. People who shop online have no option to try them on. Advancements in consumer empowering technology are going to change the fashion industry too. Therefore, we came up with a solution that uses Augmented Reality for outfit selection. As per the Present Growing technology, this application is a boon to the clothing and fashion industry. Outfit selection using Augmented Reality allows user to choose clothes virtually. This application software simulates an apparel dressing room, by the implementation of a virtual mirror, portraying an augmented view of the user with virtual superimposed clothes. Unlike the technologies that use 3D imaging, our system relies on 2D imaging, thus being cheap and more user-friendly. This Application, of trying clothes virtually, is one of the most efficient processes in the modern world and it has multiple benefits including great results and satisfaction. It is fascinating to see such application actually works which gives appropriate results to its imagination and approach. The method suggested is beneficial to the customer and to the online retailer also. For the retailer it reduces strain on logistics and provides better user database. And for the customer, satisfaction and ease of the process are key factors. Commercially, later we will keep the cost as low as possible. “Virtual Dressing Environment” involves virtually trying out different clothing models which is done by mining of the user image, alignment of clothes and size recommendation system which offers the shopper a suggested size, based on a combination of factor.

**Keywords**— 2D image, Augmented Reality, RGB, Virtual Reality

## **I. INTRODUCTION**

A Suggestion based outfit selection is also, often, referred to as virtual fitting room or virtual trial room or virtual dressing room although they do, on Examination, perform different functions which makes this application work as per the requirement. It enables shoppers to try on clothes to check one or more sizes, fittings or styles, but virtually rather than physically, this is done using Augmented Reality.

**Augmented reality** is a type of virtual reality that aims to duplicate the world's environment in a computer. An augmented reality system generates a composite view for the user that is, the combination of the real scene viewed by the user and a virtual scene generated by the computer, that augments the scene with additional information. The goal of Augmented Reality is to create a system in which the user cannot tell the difference between the real world and the virtual augmentation of it. Today Augmented Reality is used in entertainment, military training, engineering design, robotics, manufacturing and other industries.

Due to the growing interest in Augmented Reality, the idea of virtual clothes is not new [5], [6].

Our working field of the project is basically image processing and augmented reality is merely a part of image processing. Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them.

It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines, too. This technology has been to emerging since 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 web stores.

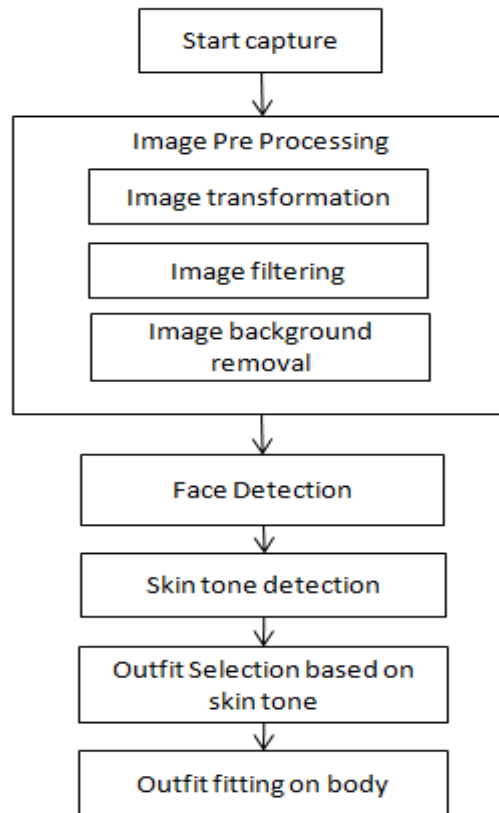
The set of steps to be followed to achieve the goal are different as per the requirement, some of the approaches are as follows: Initially starting with the Face Detection which is done with different methods such as HAAR classifiers [1],[4] and Alignment with the user's position[2] which is User Tracking. Mapping of Out Fit on Body is done Using Body Parameter Recognition [3].

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### A. Proposed System

1) *Pre-Processor*: Pre-Processor is the basic module, which includes basic image processing functions like background removal, joining two images. This module also includes the basic image processing functions like image filtering, image transformations and color space conversions etc.

2) *Video Capture*: Video capture includes video codecs, image and video capturing capabilities, and other simple user interface capabilities. We are designing GUI using swing class available in JAVA. This module also handles image manipulating functions like image resizing inside the video.



3) *Skin Tone Detection*: The goal of skin color detection is to build a decision rule that will discriminate between skin and non-skin pixels. This is usually accomplished by introducing a metric, which measures distance (in general sense) of the pixel color to skin tone. The type of this metric is defined by the skin color modeling method.

4) *Explicitly Defined Skin Region*: One method to build a skin classifier is to define explicitly (through a number of rules) the boundaries of skin cluster in some color space.

(R, G, B) is classified as skin if:

$R > 95$  and  $G > 40$  and  $B > 20$  and

$\max\{R, G, B\} - \min\{R, G, B\} > 15$  and (10)

$|R - G| > 15$  and  $R > G$  and  $R > B$

The obvious advantage of this method is simplicity of skin detection rules that leads to construction of a very rapid classifier. The main difficulty in achieving high recognition rates with this method, is the need to find both good colorspace and adequate decision rules empirically. Recently, there has been proposed a method that uses machine learning algorithms to find both, suitable

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colorspace and a simple decision rule that achieve high recognition rates.

5) *Object Detection*: This module analyses the video captured by video capturing device. This module mainly has object tracking algorithms. The object detection includes object detection and recognition algorithms for standard objects like human face. (Here we are using frontalface.xml file for face detection).

6) *Outfit Selection*: This module selects outfit depend on the various criteria. We have two criteria for outfit selection; first, depends on User Skin tone and second, previous outfit selection history of the user.

### II. CONCLUSION

As we already know that online shopping is a tedious task, because of the related disadvantages of size and clothing material. This paper considers a unique approach that can be implemented in order to overcome certain disadvantages of both online and real time shopping. From this paper, we suggest an approach that is best suited to be implemented as the solutions to the respective problems related to virtual trial rooms. This implementation paper solves recurring cost problem as well as the time consumed in the process of online shopping is reduced giving the users an appropriate real time experience in online shopping.

### III. FUTURE WORK

Various problems still remain with Virtual Trial Room being fully functional and available to the users, also providing the best results. In future, it is essential to incorporate various enhancements in the existing system. Background light conditions can affect both the skin tone detection and suggestion, that is a major issue which needs to be addressed. Also, the clothing material provided by the online stores still remains a mystery unless the clothes are delivered to the user. Such issues require attention and work in order to overcome the disadvantages of online shopping.

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