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Simulation and Visualization of Virtual Trial Room

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ABSTRACT

The busy life spent in today's world has put limitations to humans and time has become the most precious of all. Due to this matter the process of purchasing a suitable apparel consumes huge amount of time and energy with a lot of other difficulties to be faced. The implemented system introduced an advanced methodology which is presented for the purchase of clothing through a virtual fit on platform, which consumes far more less time than the normal process, making it easier for the both seller and customer. This provides a realistic behaviour for the suitability of the garment's details. The whole process starts from an image of the user which is captured from the system which then and there provides an environment of a virtual dressing room. Customers are able to select clothing designs from a range of different garments as they prefer and those can be tried onto the image which allows them to experience a live view of the outfit as if it worn on their own body. The primary aim of this project was to build up a compelling, interactive and highly realistic shopping experience via a desktop application providing the user a reliable and accurate service to access an environment of a virtual try on sytem.

KEYWORDS: *Virtual TryOn, Visualization, Virtual fitting, Body shape estimation, Skin tone matching,Body custamization,Virtual Clothing.*

I. INTRODUCTION

A lot of shoppers have encountered a lot of problems while shopping at a high-end place for readymade garments, especially during peak hours, such as weekends. Tiresome lines, numerous restrictions, enormous crowds make it quite an unpleasant experience. Huge number of customers, and minimum numbers of trial rooms results in quite a lot of waiting time for customers, ultimately resulting in dissatisfaction. Due to security reasons, there is also a restriction on the number of garments that can be taken at one instance of time for trial. It increases the overall shopping time due to multiple trips from the shelves to the trial rooms.

Virtual try-on applications have become popular in re- cent years because this helps users to quickly judge whether they like a garment or not, and also garment is fit or not which in turn allows retail shops to sell more in less time. User can see themselves from arbitrary viewpoints. The system therefore needs to capture and render the user at inter- active rates while augmenting his or her body with garments.

The Architecture of the system is showed in the fig.[4] RGBD camera is used for real time input.camera detects the users body as well as it detects the user body parts.This inputs i.e users size,heghtwidth are used by the application.Applicaton uses this input for measuring the body size. camera detects the users body in real time which helps for detecting users various poses.Frames are used for detecting the clothes for the user .The system converts the frames in to appropriate text format .This text file is compared with the database .According to the result from database the cloths are virtually stimulated on the user's body.

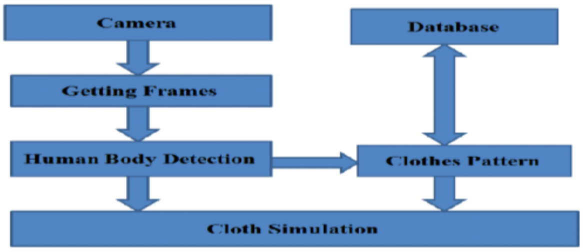


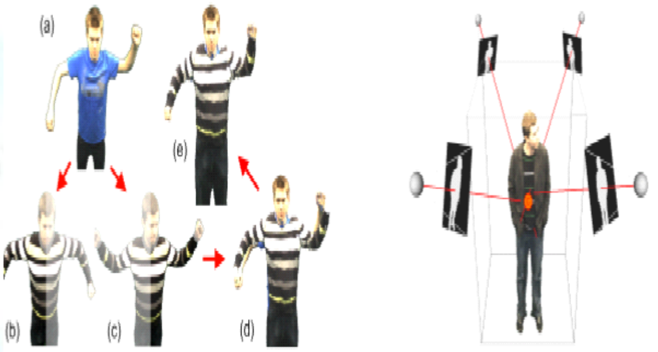
Fig.User Friendly Virtual Clothes System Architecture

Virtual try-on of clothes has received much attention recently due to its commercial potential. It can be used for online shopping or intelligent recommendation to narrow down the selections to a few designs and sizes T e user can select various virtual clothes for trying-on. The system physically simulates the selected virtual clothes on the users body in real-time and the user can see virtual clothes fitting on the her mirror image from various angles as she moves.

II. Related Work

A. Motion capture:

Motion capture, or human pose tracking, is the task of determining the user's body pose. It usually involves a pose and shape model that is fitted to sensor data and therefore comprises a model-based tracking problem Pose tracking from multiple video streams [3], [4], [5] was used for animating and rendering people. Recent GPUbased implementations adapt pose and shape in real time [6]. A system for markerless human motion transfer [7] was suggested to transfer motions from one person to another. Another system can modify the user's body shape [8] in a virtual mirror. Recent developments in sensor technologies have enabled the acquisition of depth images in real-time, which opened up new possibilities for pose tracking with a single camera. [9] have shown how to track full body motions using a time-of-flight camera. The more recent Microsoft Kinect device allows for real-time recording of color and depth images at a very low cost, as well as highquality real-time human pose estimation [10].



Extendingtheposespacebycombiningtwoposes into a new pose. (a) shows the current user's pose. (b) and (c) show the best fitting poses for each image half. The result is a rendered image of the two halves without (d) and with non-rigid registration (e).

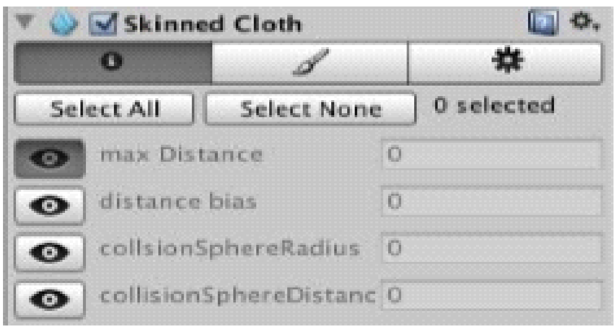
B. Shirt Segmentation and Image Preprocessing

During the Detection Mode the algorithm searches for the shirt in the image using the apriori knowledge of the color of the shirt and the assumption that it contains a rectangular highly textured region. Additionally, in this mode the mesh that is used as motion model to estimate the deformation of the texture in the 2D image plane is initialized. During the Tracking Mode we segment the shirt region in order to give it a new color. Assume that if the shirt is in the image, it is the largest area of that color and all parts of the shirt are connected. With these assumptions we can use a very simple but efficient approach to detect and segment the shirt in the image that is robust against illumination changes and changing background.

First, transform all pixels in the image into the normalized RGB-color space which is more invariant to changes of surface orientation relatively to the light source.Find the largestblobby evaluatingthe normalizedpixelvalues andfill all holes in that region. Using this very general method for segmentation ensures that all parts of the shirt are segmented, including dark shadows or highlighted regions. During the Tracking Mode use this segmentation mask to recolor the untextured part of the shirt. In the Detection Mode we proceed further by searching for a highly textured region in the detectedgreenregiontoinitialize themesh usedfortracking.Then findandsamplethe contours of the texture defining the positions of thebordermesh vertices and interpolate all inner vertex position points . By this method assure that if the texture is already deformed in the model frame,get an idea about the deformationat the beginning knowing the rectangular shape of the undeformed texture. The mesh and the texture in this frame are used as model in the optical-flow-based tracking method .

B. (i) Skinned cloth

The skinned cloth component adds cloth simulation to a skinned mesh. The bone structure is taken and each vertex in the mesh is tied to one or more of the bones with a certain weight. When a transformation is applied to one of the bones, it is also applied to each of the vertices connected to the bone scaled by the corresponding weight. A volume of space is defined for each vertex using a set of co-efficient which determines how freely the simulated cloth can move.



C. User's Body Detection

Camera is used for detecting the body parts, capturing the real time views ,it also used to recording the 360 degree video.cameraBy using camera its easy to detect the physical movements of users. For detection of body parts user have to stand in T-pose. After this users's body parts are detected which is then used for cloth simulation of the user's body .User can now see how he/she looks in the clothes and they even can compare the clothes.

D. Size Estimation

Size Estimation[5][7] method was indroduced by ShreyaKamani et al. when the user calibrates himself/herself to the Kinect sensor[10], his/her size and girth is estimated. This information is used to achieve a better fit of the virtual clothing. The length of each limb is taken by computing the distance between each joint from the skeleton. The size of the body is taken by estimating[the girth of the chest on a number of points.The girth of the user can be measured by two methods:

1. Computing the distance between each point on the line .
2. Taking 3 points (outer left, center and outer right) and compute the distance.

E. Real-Time Full Body Pose Reconstruction from Camera

In recent years, camers have different sensor type that captures depth images at realtime frame rates. Even though recent approaches have shown that 3D pose[10] estimation from monocular 2.5D depth images has become feasible, there are still challenging problems due to strong noise in the depth data and selfocclusions in the motions being captured. System present an efficient and robust pose estimation framework for tracking full-body[7] motions from a single depth image stream. The data-driven hybrid strategy that combines local optimization with global retrieval techniques, we contribute several technical improvements that lead to speed-ups of an order of magnitude compared to previous approaches. In particular, introduce a variant of Dijkstra's algorithm to efficiently extract pose features from the depth data and describe a novel late-fusion scheme based on an efficiently computable sparse Hausdorff distance to combine local and global pose estimates.

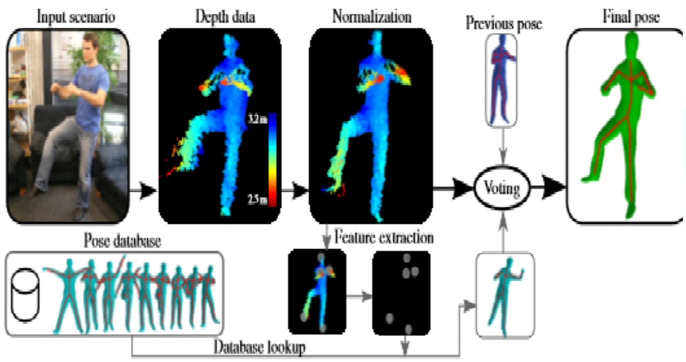
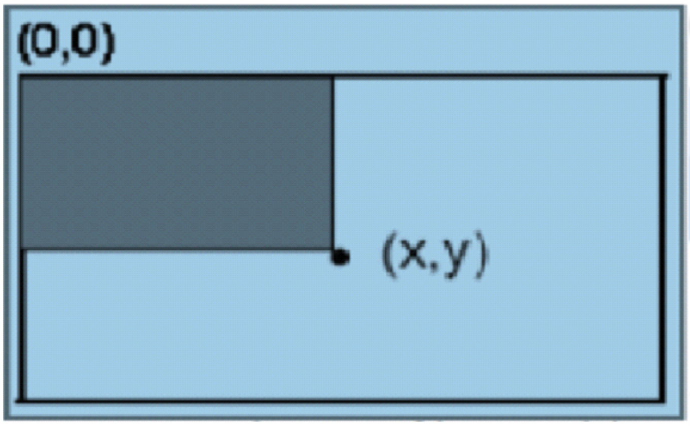


Figure 1. Overview of our proposed pose estimation framework.

F. Integral Image

The simple rectangular features of an image are calculated using an intermediate representation of an image, called the integral image [9]. The integral image is an array containing the sums of the pixels' intensity values located directly to the left of a pixel and directly above the pixel at location (x, y) inclusive [10][9]. So if A[x,y] is the original image and AI[x,y] is the integral image then the integral image is computed.



G. Multi-modal head tracking

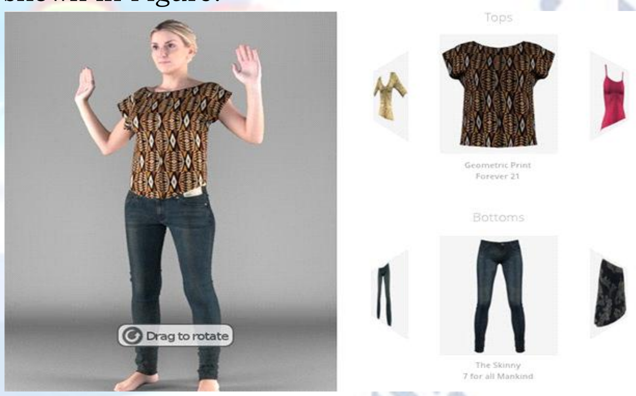
There are three primary vision modules to track a user's head position: depth estimation, color segmentation, and intensity pattern classification. Figure shows an overview of how the modules are integrated. Depth information is estimated from multiple fixed cameras and allows easy segmentation of the user from other people and background objects .An intensity-invariant color classifier detects regions of flesh tone on the user and is used to identify likely body part regions.

Finally a face detection moduleis used discriminate head regions from hands, legs, and other body parts. Knowledge of the location of the user's head in 3D [10]is passed to the application. Figure shows the output of the various vision processing modules on a scene with a single person present.

H. Alignment of Clothing

The first attempt at Virtual Trial Room focused on alignment of the user, rather than its reverse. In this very primitive application, just a fixed static rendering of clothing was displayed on the screen. In order to gain a visual experience of the wearing the garment, the user had to align himself to the clothing image.

A more appropriate technique to align the clothing would be to adjust the position, rotation and scale[11] of the garment to the tracked user. With the use of hand-held markers by the user, and combining video tracking and image identification techniques, it was possible to receive some 3D information from RGB [12][13]images using a normal webcam. Position, rotation and scale were adjusted by moving the marker, as shown in Figure.



I. Photo-realistic Visualisation of Clothes

The high-quality photo-realistic visualization[1][13]and the three-dimensional rendering of the cloth and the virtual customer is the end part of the process chain. Special care is taken of the simulation of the physical correct reflection properties of the material surfaces. The customer should get the *Look & Feel* of the material just by looking at the rendering. Furthermore, it is important to incorporate real-world illumination conditions, e.g. the conditions at the point-of-sale (POS) or under bright sunlight.

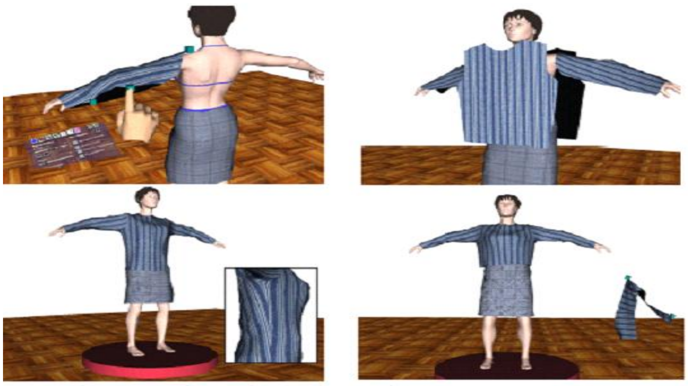


Fig. Viirtual Dressmaker: Sme stages of a virtual design process.

III. Proposed Method

The following modules have been used in our Virtual Dressing Environment:

a) highgui:

Highgui provides simple user interface capabilities, video codecs, image and video capturing capabilities,handling track bars, manipulating image windows and mouse events and etc. If we use User Interface frameworks like Qt, WinForms, etc we need more advanced User Interface capabilities.

b) video:

It is a video analysis module which has object tracking algorithms and background subtraction algorithms etc.

c) objdetect:

The objdetect includes object detection and recognition algorithms for standard objects.

BACKGROUND REOMVAL : The cloth models downloaded from web usually have a white background. To view the cloth models on the user, we need to avoid the occlussions of the cloth models with the user's body parts. For this purpose, we have used a technique called Background Removal. In this technique we make the pixels with RGB values ranging between 230 and 255 as transparent by anding the rgb value with 0x00FFFFFF.

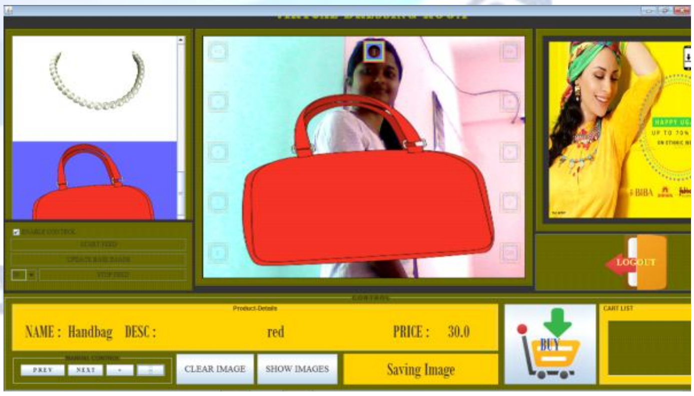
Virtual shopping assistant: we can make a virtual shopping assistant by adding hand gersturing interaction to give some advice. For example, the information of garments (price and sailing record), fashion tips and fitness of garments (you look gorgeous, a little bit tight or loose) will be very helpful for customers.

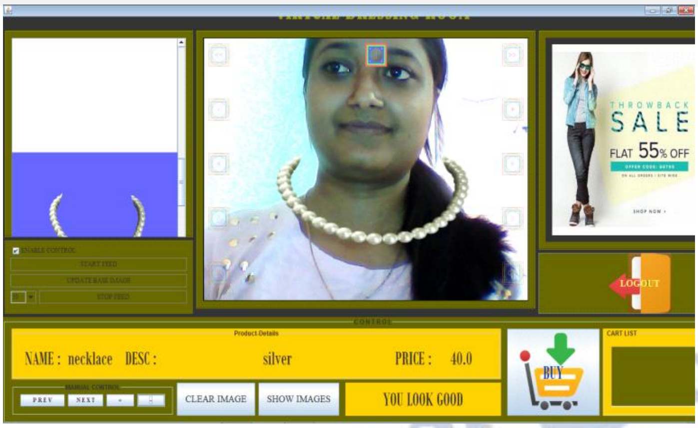
In the last section the tests were executed, also discussing the output, the appearance and the interaction with the Virtual Dressing Environment.

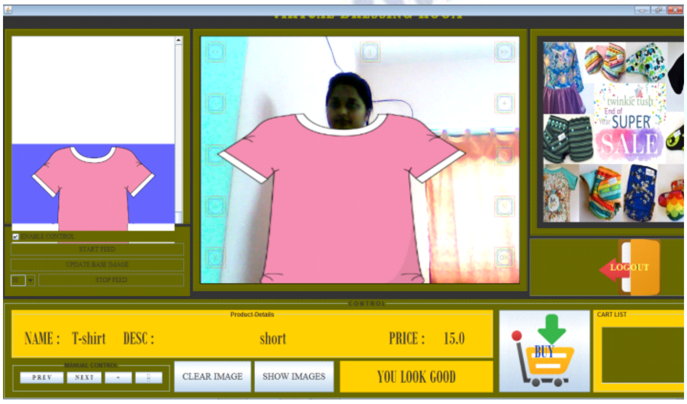
Overall, the presented Virtual Dressing Environment seems to be a good solution for a quick, easy and accurate try-on of garment. In this system compared to other technologies like augmented reality markers or real-time motion capturing techniques no expensive configurations and time-consuming build-ups are required. From this point of view it is an optimal addition for a cloth store and online as well as offline shopping.

IV. Results

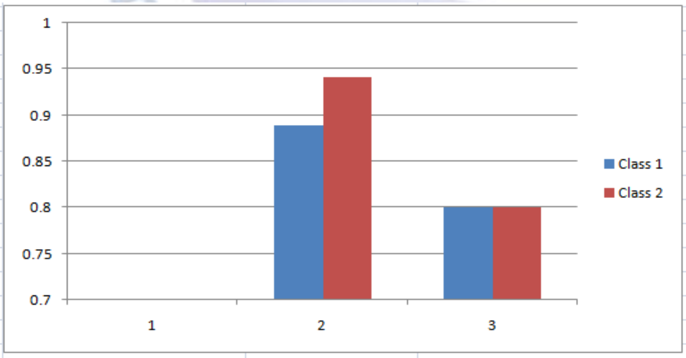
The experimental results of the proposed method are shown in Figures







	Precision	Recall
CLASS 1	0.8888888889	0.8
CLASS 2	0.941176471	0.8
TOTAL	0.91503268	0.8
ACCURACY PERCENTAGE	0.8	



The visual comparison shows that the method of Khan, Reinhard depends greatly on the original shirt colour, whereas the proposed method does not depend on the original colour or texture of the shirt. However, the state-of-theart method fails to produce realistic results when the original colour of a shirt is dark and does not have much changes in colour intensity, it results in images where the texture colour is almost uniform and does not have any visible shadows on the garment. The visual results clearly show that the proposed method performs better than the other state-of the-art method and in various conditions it produces more stable results, it is clear that the proposed method can effectively be used to perform realistic retexturing

V. CONCLUSION

In this paper, we describe a dynamic texture overlay method from monocular images for real-time visualization of garments in a virtual mirror environment. Similar to looking into a mirror when trying on clothes, we create the same impression but for virtually textured garments. The mirror is replaced by a large display that shows the mirrored image of a camera capturing e.g. the upper body part of a person.A virtual mirror system is designed for the purpose of cloth changing room. Our motivation here is to increase the time efficiency and improve the accessibility of clothes try-on by creating a virtual dressing room environment. The system exchanges the colour and the texture of a shirt while the person wearing the shirt can move freely in front of the mirror and even perform elastic deformations of the cloth like stretching and bending or move toward or away from the camera.

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