

Try on Application for Virtual ornamental Room

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ABSTRACT: This paper exhibits an image processing methodology for virtual ornamental room (VOR) applications that run on the personal computer. The proposed user friendly application requires user image to be pre-processed followed by three-step algorithm: Key focus extraction on the user image using SURF algorithm, Face detection algorithm to plot a rectangle around the face, Mid width tracing of both consumer image and ornamental image. Considering the above extracted key points augmented reality markers are used to superimpose the ornaments over the buyer's picture. Contrasted with other existing try on application, key distinction is the absence of any restrictive equipment or peripherals. Proposed VOR is software based and implemented using OpenCV built in functions.

KEYWORDS: Virtual Ornamental Room, Key point, augmented reality, Superimposition.

I. INTRODUCTION

Shopping being most cherished interest of various people grows sales from year to year, with the technological advancement like 4G mobiles, lots of memory and internet options, online shopping also increase sales along with offline shopping. Purchaser's fight in online shopping is how well it fit them and how well it suits them [1]. Ornamental shopping is not an exception for that case people often want try before they purchase. An in-store purchaser can't explore different avenues regarding each jewel available in shop especially in wedding and festivity season and an online customer settle on selection of jewel by attempting on models, jewel that suits a model may not suits buyer [2]. Purchaser wish is to attempt all jewels open in dataset on them and in like manner share those photos on social media to get recommendation. Try on application is the best response to help purchaser to find their optimal choice by virtually wearing them rather physically and help shop owner to keep enrichment secured, untouched and furthermore support rate of exchange by staying away from return of products.

Virtual ornamental room is an area under augmented reality [3] that structures recreated environment by constantly supplementing reality with new PC delivered replication and makes our cerebrum thinks that's reality. It requires an image and merges that image with new information as demonstrated by customers require. Thomas Caudell designed the term augmented reality in 1990. Another variety of augmented reality is virtual reality that uses software applications to create graphical images that contain voice and graphics instead it won't work in real time images, images can only be altered and saved.

The main aim of this paper is to build up a model for try on application that virtually display ornaments on buyer's image, which need to identify the size and state of the neck to fit any ornament available in image database. It should encourage on neck of different people depending upon their neck estimations [10]. This will be one of the essential challenges since key points of adornments should precisely fit key points taken on neck of buyer's picture, augmented reality marker should be utilized to superimpose the jewel on the neck of purchaser picture.

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II. RELATED WORK

Since try on application for virtual ornaments resembles virtual fitting room application for articles of clothing and fabrics, experiments are done by using hardware components and expensive infrared sensors, our aim is to develop a software system that virtually display ornaments.

The following are the few existing try on application for fabric and ornament.

- 3D construction of clothes and customer body using Asus Xtion sensor along with simulation of clothes to display clothes.
- JCPteen a VFR application gets a photo of the customer, use adobe streak player to demonstrate the clothing, it exhibits a shadow on the screen where customers require to remain in that shadow. Besides, customer can pick any material showed up with the help of customer friendly interface. In this system, if customer is moving, thing won't take after or track him.
- Zugara also an VFR application that works similar to JCPteen
- Styku is a model used to catch body measurement. It is body scanners that use infrared Microsoft kinect v2 sensors. The model has camera and rotatable stand where people can stay on them with their arm isolated. Required measurement data removed in around 30 seconds to get the estimation of body which is 75% more correct than the estimations taken by professional tailors.
- VOR application are also exist using depth segmentation to separate background and foreground pixel along with face detection to display ornaments
- Ray-ban uses virtual mirror that helps purchaser to virtually try sunglasses of different frame to endeavour on the latest Ray-Ban glasses, gives you different opportunity to endeavour on match of glasses as you simply sit before your webcam and arranging your face on the screen and look through the collections.

III. SYSTEM REQUIREMENTS

To be used gainfully, all PC programming needs certain gear fragments or other programming resources for be accessible on a PC. These basics are known as (PC) structure necessities and are used very often rather than a level out standard. Most programming portrays two game plans of system essentials: slightest and recommended. With extending enthusiasm for higher taking care of compel and resources in additional cutting-edge variations of programming, structure essentials tend to increase after some time.

Function	Function that Virtually shows a ornament using try on application
Depiction	Detects the consumer from the picture superimposes a ornament on the client's neck.
Input	Information Images containing faces
Source	Source Images containing the consumer
Output	Yield ornament superimposed on the consumer's body
Requires	Image dataset of ornaments
Pre-condition	Images should contain faces
Post-condition	None
Action	Ornament superimposition

Figure 1: The above figure tells about the software requirements of the project

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IV MODULE DESCRIPTION

The work in this paper is divided in 4 stages:

Pre-processing of input images: Input image consisting of background image and frontal image, where background image contain just background part of the image and frontal image contain both object and background. Smoothing is done as a primary step to remove the noise from images followed by background subtraction, which is done by taking the absolute difference between the RGB values of both frontal image and background image. Morphological open and close operations are done to get the closed contour on the client picture.

Key point extraction using SURF algorithm: Once contour image is obtained, Key points on the contour picture is acquired by applying Speeded up Robust Features (SURF) calculation. SURF is a general key point marker and descriptor algorithm, descriptors can be used to discover and identify objects, people, to make 3D scenes, to track addresses and to focus purposes of intrigue. Key points are the focuses in the photo that does not change for any picture transformation like revolution, differentiation, high scale see and some more.

To start with, picture is transformed into points of coordinates, using the multi-scale pyramid framework, to make a copy of the given picture with a similar size however with diminished transmission limit utilizing Pyramidal Gaussian or Laplacian Pyramid shape. Square channels are used to smoothing. SURF uses Hessian structure to find key core interests. Hessian structure is a square matrix of second-order fractional subordinates of a scalar-esteemed capacity. It depicts the close-by shape limit of various factors. The determinant of the Hessian system is used as a measure of adjoining change around the point and centres are picked where this determinant is maximal.

$$= \begin{bmatrix} \frac{\partial^2 f}{\partial x_1^2} & \frac{\partial^2 f}{\partial x_1 \partial x_2} & \dots & \frac{\partial^2 f}{\partial x_1 \partial x_n} \\ \frac{\partial^2 f}{\partial x_2 \partial x_1} & \frac{\partial^2 f}{\partial x_2^2} & \dots & \frac{\partial^2 f}{\partial x_2 \partial x_n} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{\partial^2 f}{\partial x_n \partial x_1} & \frac{\partial^2 f}{\partial x_n \partial x_2} & \dots & \frac{\partial^2 f}{\partial x_n^2} \end{bmatrix}$$

Figure 2: The above figure shows the second order derivative of square matrix

$$\begin{aligned} |A| &= \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = a \begin{vmatrix} e & f \\ h & i \end{vmatrix} - b \begin{vmatrix} d & f \\ g & i \end{vmatrix} + c \begin{vmatrix} d & e \\ g & h \end{vmatrix} \\ &= aei + bfg + cdh - ceg - bdi - afh. \end{aligned}$$

Figure 3: The above figure shows how Determinant of hessian framework can be calculated

Face Detection: Face detection is done to draw a rectangle around the face that assist as reference to superimpose the ornament. Face detection is done using haar-cascade classifier. Algorithm needs a bulk of positive (pictures of countenances) and negative (pictures without appearances) to prepare the classifier. At that point we have to extract highlights from it. For this, haar components appeared in below picture are utilized. They are much the same as our

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convolution portion. Every component is a solitary esteem acquired by subtracting whole of pixels under white rectangle from aggregate of pixels under dark rectangle.

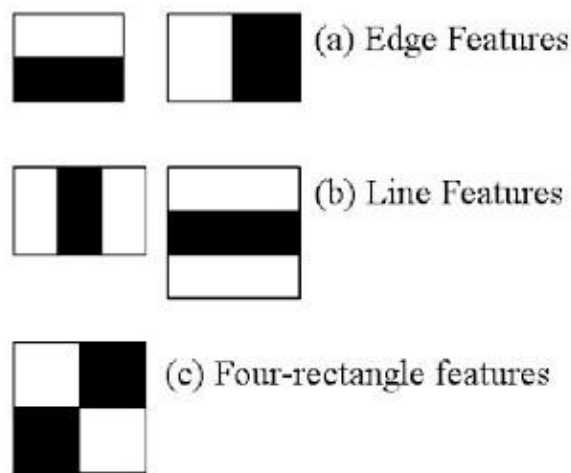


Figure 4: Above figure shows the representation of Haar component used in Haar cascade classifier to detect the face

Mid width tracing of both client image and ornamental image: Mid width of ornamental picture and purchaser picture are required to plot the ornament more absolutely on buyer neck, by centralizing ornamental picture mid width with shopper picture mid width. Mid width of image is obtained by first converting image into matrix form then finding the midpoint at each row and taking the aggregate of that. Using all the above reference point augmented reality is used to superimpose the ornament on the purchaser neck.



Figure 5: The above figure shows the ornamental dataset used to perform the VOR application

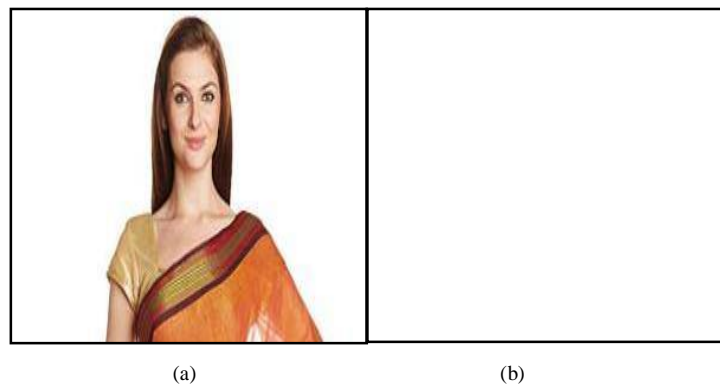
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V. EXPERIMENTAL RESULTS



Above figures explain the experimental result of the try on application for the virtual ornamental room application by extracting reference point and each of the figure below shows the result of individual reference point. Figure (a) and (b) are input images to virtual ornamental application. Frontal and background images are depicted in figure (a) and figure (b) respectively



Figure c: Above snapshot shows the stepwise outcome of the paper. In the first step background extraction is done to obtain contour image which provide the boundary around the buyer's image as shown in the figure (c).



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Figure d: Key point extracted on the contour image using SURF algorithm which is used superimpose the ornaments precisely on the buyer's neck as shown in the figure above.

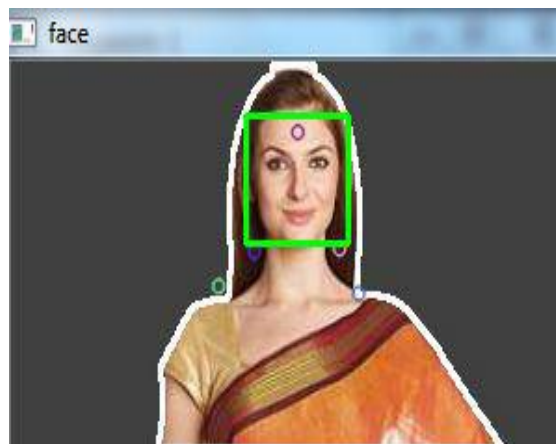
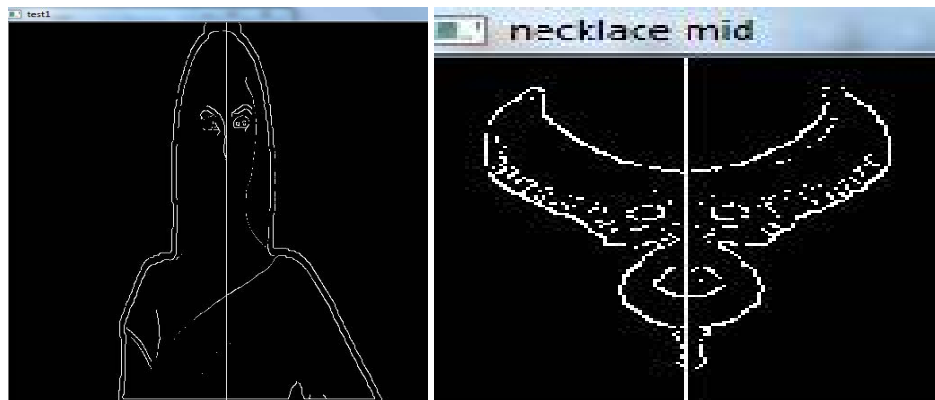


Figure e: Above figure shows the next step of reference point, which detect the face using Haar cascade classifier and draw a rectangle around the face keeping that as reference to plot the ornament.



(a)

(b)

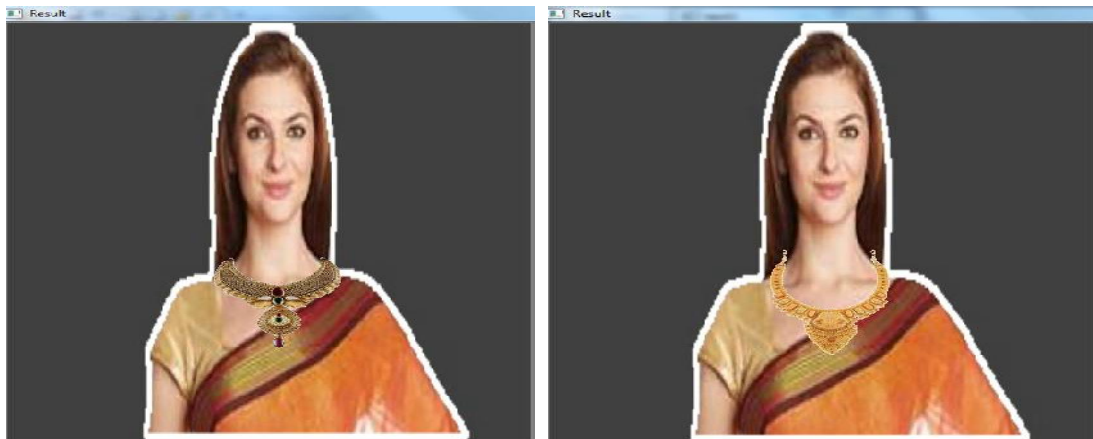
To perform the precise plotting of ornaments on the buyer's neck mid width of both the ornamental image and buyer's image are taken as shown Below Figure (a) and Figure (b) shows mid width of frontal image and ornamental image respectively

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(1)

(2)

Above Figure 1 and Figure 2 are final outcome of the paper with the ornament in the dataset are superimposed on the buyer's neck which only performed with the software peripherals.

VI. CONCLUSION

In this study we have implemented Virtual Ornamental Room that virtually display ornaments available in the image dataset on the purchaser image without using hardware components and expensive sensors. It seemed to be a perfect answer to the problems faced during online and offline shopping of ornaments and also help shop owner to keep their ornaments safe and untouched.

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