Smart Virtual Dressing Room

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Abstract

"Virtual Dressing Room" is designed on the concepts of Virtual reality and is one of the most interesting aspects of online or e-shopping. In recent time VR/AR has become more prevalent and their capabilities will continuously emerge in the coming years. VR/AR technology plays a major role in consumer's purchasing decisions by providing them with greater satisfaction with the help of a virtual trial room experience on their PC, mobile devices. The basic idea behind this research is to detect the user's face from the live video stream through webcam and important human's body landmark using appropriate algorithms and try to superimpose the selected items which might be clothes, earrings, goggles, and so on the detected body parts. The aim of a project is to implement an application with a user interface is used to check different types of clothes and other accessories on the user. Users can select and purchase a dress or fashion kit via the user interface. Alignment of the user standing in front of the camera with the selected items with proper positioning and scaling is the major issue faced here. Python is used for implementing this project because it has an abundance of in-built features and also it has huge active community support.

Keywords: - Haar Classifier, Virtual reality, Python, e-shopping.

Biographical notes

Dr. Abhishek M B obtained BE in Electronics and Communication from Kammavari Sangha Institute of Technology (KSIT), Bengaluru, India and MTech from Dayananda Sagar College of Engineering (DSCE), Bengaluru, India in Digital Electronics and Communication under Visvesvaraya Technological University (VTU). I obtained PhD as a Full Time Scholar in Electronics and Communication from National Institute of Technology (NITK),Karnataka, India. Presently working as Assistant Professor in DSCE-Bangalore from Jan 2019. Earlier, I was with the Honeywell Technology, Bangalore, India, holding the position of Project Trainee and also worked as Intern in IISc, Bengaluru, India and also in Kumamoto University, Japan.

My research interests are in the broad areas of Cyber physical system (Industry 4.0) and Communications, including Modeling, Networking, Computation and Actuation. Presently looking into Machine learning for Computation unit and Virtual Reality. Manasa R, Vibha T G. and Bindu H M are working as Assistant Professor in DSCE- Bangalore.

I. INTRODUCTION

On line Shopping or e-shopping is a very tedious task and most of the time consumers will be very confused about whether a particular item will suit their personality or not. Also during online shopping, physically trying-on clothes is very difficult. Once the user has felt about how a particular product will look on him after trying in the virtual dressing room it largely influences the client's decision about buying that product.

During offline shopping a customer finds it difficult to get the best suited clothes for themselves even though there is a store assistant to help him out. From the vendor's viewpoint, reorganizing all of the garments or other things that the buyers requested to try before making a final selection takes too much time and effort. Virtual dressing room proves helpful for those vendor's in this scenario. During on-line or e-shopping, customers have no choice but to settle for something which they find attractive only by referring to the available 2D images of a cloth dressed upon models to persuade the customers into buying that product. This is where virtual dressing rooms gives an edge to the customers by providing them with the option to try-on the products

Virtually in their devices which might be a PC or a mobile device. This gives the customers the ability to select the best-suited products for them in lesser time and not be tricked into buying unnecessary items. The presence of a virtual dressing room on a website increases customer's interest in it and motivates them to purchase the product as depicted by many studies done earlier. From our work we can conclude that the concept of a "Virtual Dressing Room" is a great addition to any e-shopping website and adds to the user's delight.

II. LITERATURE SURVEY

Virtual Reality has an unconvincing ability to imagine the reality with great visualizations by granting virtual permission to objects and places so we can reach the real world. According to Malvika et al (2020), Alenazi et al (2019), with the original movements, the thinking of E dressing using VR and because of the COVID-19 pandemic, the request for virtual environments will rise Masri et al (2019).

Higgins, K [US PATENT] Higgins et al (2018) , He made an on-line cloth fit rendering System figured to operate on a special server which is linked to the internet or network using with the help of web services where at least jpg, peg image formats are displayed. The system consist a server-side cloth with parameters for every clothes are chosen from the pile that include a cloth piece parts list, piece and its properties, its mechanical parameters, storage capability includes many clothes, in the field of classification and searching information Alenazi et al (2019) .

Virtual dressing room it uses AR tech to make it efficient solution. Shopping by masking the 3D model of a user with the sensor Debailleux et al (2018).The superimposed three dimensional picture of user then transformed using 3D hard changes and bound to the movements of the user so it looks as the user is wearing the dress in the live video, Habert et al (2019),Luigini et al (2021), and Isikdogan et al (2012).

In martin et al (2012), a virtual room based on mobile devices was given by them. A mobile camera was taken as the sensor because a mobile phone has limited storage and processors. The ability to create real-time 3 Dimensional simulation is difficult to achieve to a certain level. Hashmi et al (2020) Used several cameras to build this dressing room, which does not require the user to be in a specific position or stance to connect with the system. Single camera is not enough for implementation. GPU is based on effective algorithms are used to develop the system, which allows real time processing.Mok, K.W. et al (2018) Designing a AR dressing room where 3D dresses are masked with the RGB image from the camera to get the function of a mirror. As a result, the consumer is able to go on to determining whether or not the dress is right for them. The project was done with help of Unity 4 Pro with the Microsoft Kinect 2 so that it can track the body .It was Basiliata Innovazione under the agreement "Studio di8 fattibilit'a finalizzato allo Sviluppo di una Vetrina 3D basata sulla Realt'a Aumentata" Kusumaningsih et al (2017), Mok, K.W. et al (2018).

Virtual dressing room with the help of Microsoft Kinect sensor. It extracts the user's body from the video by using depth camera and user's data given by the Kinect sensor, registers the cloth with the Kinect skeletal tracking which has a pre database, and it detects skin to adjust the layer's order Bindu et al (2020). The average percentage of overlap between the person and the cloth is around 83.97Kjaerside et al. proposed a tag-based AR dressing room, which is required to stick visual tags for tracking the motion. Using a Microsoft Kinect sensor and Shotton et altechnique,.'As a real-time AR dressing room application was developed without the usage of tags. After its initial release in 2010, Microsoft Kinetic quickly became a popular depth sensor on the market. This was proposed by FIsik dogan and G. Kara Isikdogan et al (2012)

III. Block diagram with detailed description

With Virtual Dressing Room, you can dress yourself virtually in augmented reality by using your webcam to capture the image of yourself and using it as input. The footage is searched for the presence of human bodies and faces utilizing body and face detection algorithms. A mask is applied to the photographs of the products. Superimposed on top of the customer's image is a disguised image (user)

Figure 1 depicts how you can try on various outfits and accessories after viewing photographs of them on others. In our project, we will make a website using
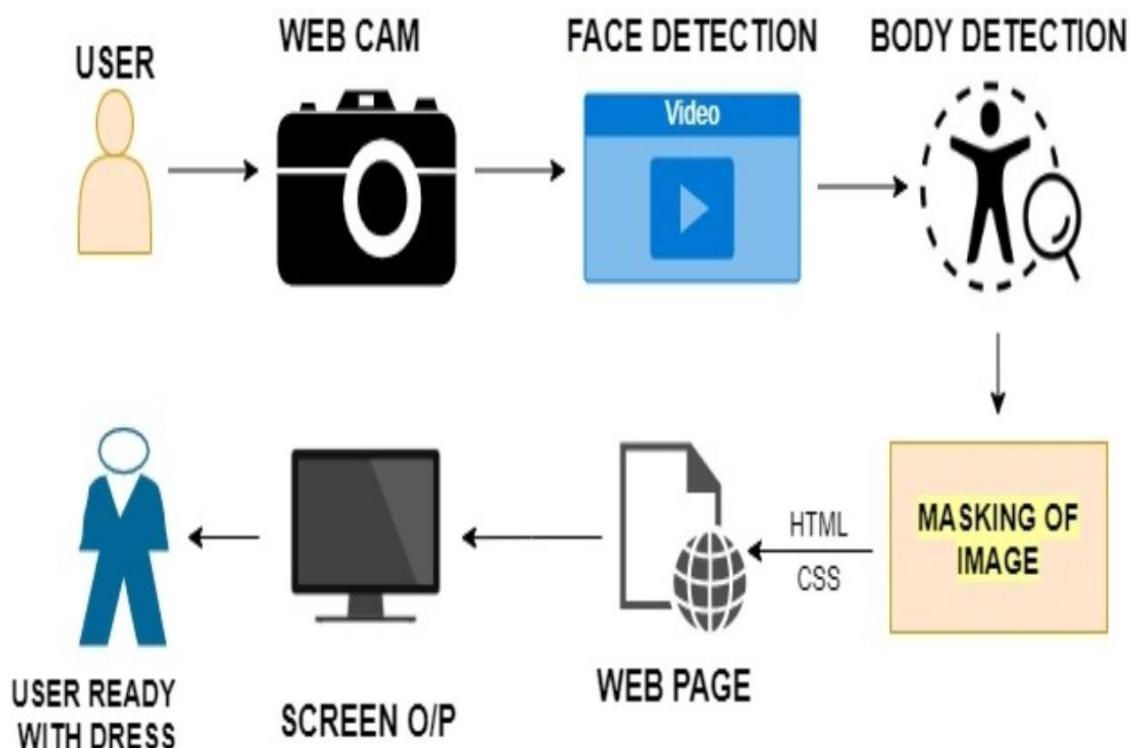
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Figure 1 Block Diagram

HTML, CSS and apply the virtual try on algorithm using python. Steps involved in project is shown in Figure 1 are listed below

- Extracting the information of the user through video capture.

- Detection of Face (nose,ears,eyes) and Body Part of User(upper body part and lower body part).

- Positioning of 2D cloth, goggles,earrings,Accessories by using the skeletal tracker and coordinates.

- Creating the web page using css and html and generating the link.

  • Integrating link with the source code.

  • Selecting the accessories of user choice.

  • Output is seen on the screen of selected material.

3.1 System Model

3.1.1 HARR Classifier Facial Detection

HARR Classifier Facial Detection is done using pre trained module called dlib. dlib library identifies the facial coordinates then it detects the facial part. In Fig 2 coordinates

from 0-16 represents - cheek, 17-26 eyebrows, 27-35 nose and so on. Then it creates the boxes around the different facial parts as shown in Figure 2

The main thing of this step is to determine whether human faces are appears in a given image and check its location and position. So Viola Jones Algorithm is used. Viola Jones used to detect a variety of different object classes, its main function to detect face of human face detection as shown in Figure 3.

3.1.2 Skeleton API Skeleton API

Skeleton API Skeleton API (Application programming interface) gives the information of the location of the user standing in front of the camera, gives the orientation and the position information as shown in Fig 4. Basically it calculates the coordinates of important points of the body (knee, hip, shoulder, and feet) i.e. x coordinate and y coordinate that help in conversion of 3D body into 2D model.

3.1.3 Back end: Python language:

Using Python language as a user friendly language. Other programming languages are like dynamically typed and interpreted programming languages are known to be slow in process like in execution speed so they are not suitable for real time graphics applications. We used dynamically typed scripting language to overcome the drawbacks and we decided to implement it through a new framework with the help of a language such as scripting language. As Python has a very clear syntax.It has OOPS(object oriented programming system) , and it is platform independent, and simple to extend with custom binary modules, so we decided to implement web application core framework of TINT entirely in python language.

OpenCV: In Python we use OpenCV is to detect a circle-shaped like objects in a webcam Video stream. It is necessary to separate back-end and front-end in order to make it reusable so that we can use it again. In a real-world application we could write the front-end part in different platform like Unreal Engine, Blender or, Unity to make it look attractive and nice. The front-end of browser is the easiest to implement. It should work on every possible configuration that exist. Python back-end with OpenCV: OpenCV will detect the image through webcam video stream and open many windows with camera image after passing it through many filters to ease debugging part and give us a little imformation about what the circle detection algorithm actually sees. Output of this part will have only 2D coordinates and diameter of the detected circle.

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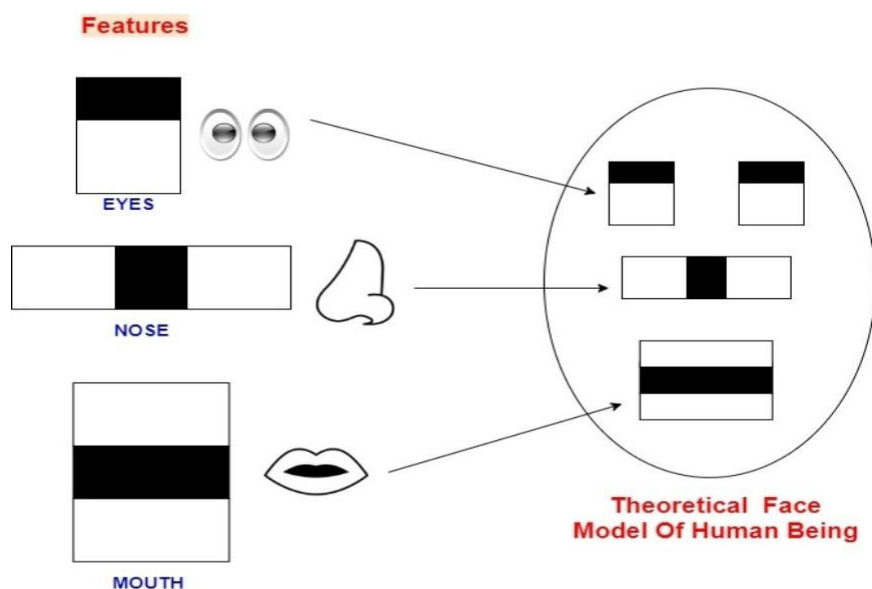**Figure 2**   Facial Detection using HAAR classifier

Figure 3 Viola Jones

4.1.1   Front end: HTML:

HTML stands for Hyper Text Markup Language and is a standard language for almost every Web browsers. HTML helps you to create and design our own Website. Web browser like Chrome, Opera,Safari
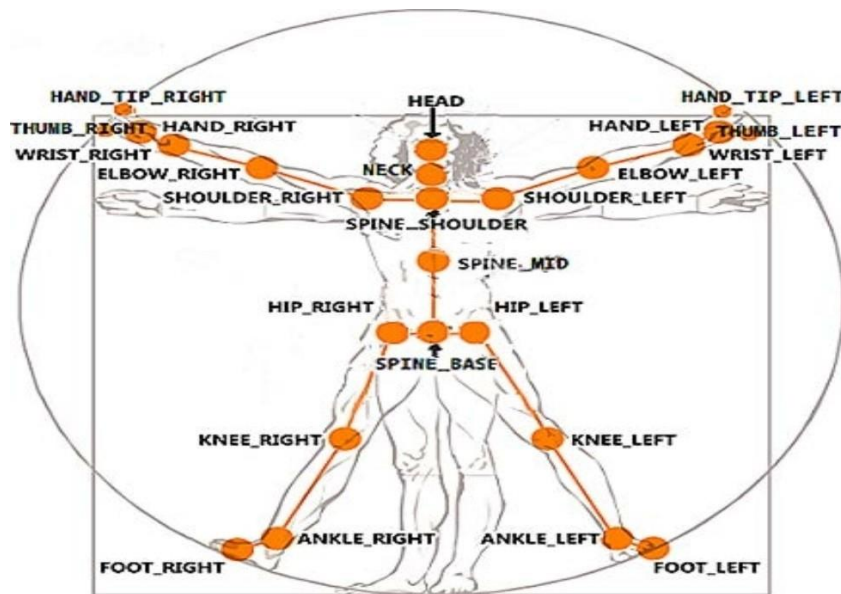,Edge, Firefox, helps to understand and read HTML

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Figure 4 Body mapping

(HyperTextMarkupLanguage) documents and display them correctly on screen Abhishek et al (2019), Abhisheket al (2018).

- HTML Images: In HTML, images are defined with the ¡ img ¿¡ /img ¿ tag with attributes as src for source file, alt for alternative text, height and width.

- HTML Documents: All HTML documents starts with a declaring a syntax : ¡! DOCTY PEhtml ¿. After the document declaration HTML starts with
¡ html ¿ then followed by ¡ body ¿ and ¡ header
¿ tags and then ends with ¡ /html ¿. Header tag contains Meta data while the visible part of the HTML document is kept between as a body part for main content¡body¿ and ¡ /body ¿. Abhisheket al (2019), Abhishek et al (2021).

4.1.2 Cascading Style Sheets

CSS18 stands for Cascading Style Sheets, which is a kind of HTML. CSS is the language i.e. used to style a basic HTML document for creating Web page. It helps in describing that how the HTML elements will be displayed. The Fundamental HTML elements are used for haeder , body, title, paragraph, tables, forms, buttons, images, etc which can be styled in good way. It also enhanced and linked with extensible classes with the help of CSS. CSS can govern the layout of numerous web pages at the same time, which saves a lot of work. Abhishek et al (2021) It is used to define styles for most of the web pages which basically includes the design part, layout part and some little variations in display fordevices with different screen sizes.

4.1.3 Website

Modern websites, as well as web pages for a variety of purposes, can be built with Bootstrap, a strong front-end framework that provides a free collection of tools. With HTML, CSS, and JavaScript components Bootstrap is easier to set up and master as it makes front- end development faster and also responsive, for mobile devices as its responsive CSS is designed to adapt to different devices ensuring consistency, eliminating cross- browser issues and so on The main characteristic of bootstrap is it is open source free to use as well as user friendly. Bootstrap features numerous HTML and CSS based design template for UI interface elements such as carousels, forms, tables, navigation, modals, buttons, image and many others including optional JavaScript plugins.

IV. RESULT

As shown in Fig 5, our first objective of designing the website using HTML and CSS has been completed. In the next phase we will try imposing virtual try on algorithms using python to superimpose the selected items which might be clothes, earrings, goggles and so on the detected body parts.

V. CONCLUSION

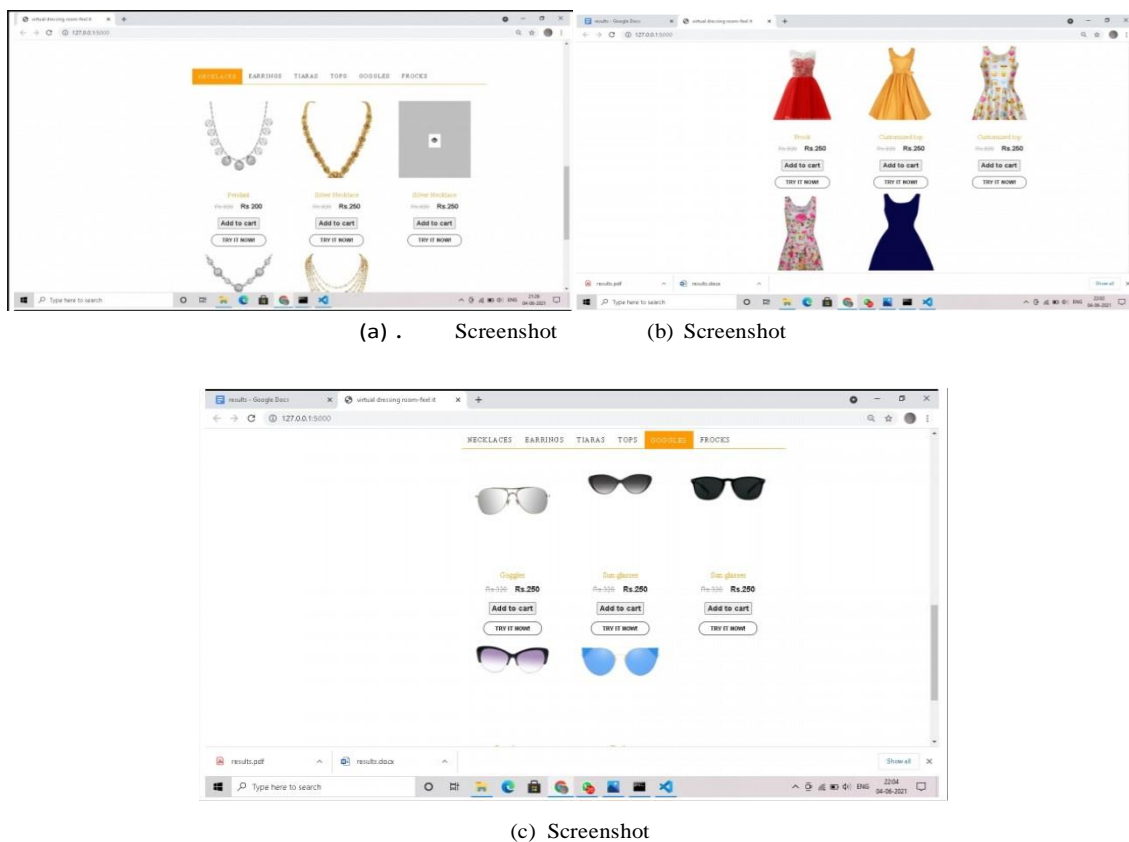User will be able to choose his favorite clothes according to his size
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(a). Screenshot   (b) Screenshot

(c) Screenshot

Figure 5 Website of our project

- It will be a "user friendly" application so that he/she can try it virtually.

- An easy navigable,user friendly Web app for the user to use.

- A person travelling to shop and then buying clothes is a tedious task in this COVID-19Pandemic.

- Overall, the provided virtual dressing room appears to be an excellent option for virtual clothing try-ons that are rapid and precise.

VII. FUTURE WORK

The development of a web application that can detect clothing after buying is one of our future objectives for this project. We will try to use it to detect pants, shoes, and other clothing items like jewelry, hats, and other accessories as well.We want to make sure that our study serves as a foundation for future research on Virtual and Augmented reality. We will also aim to incorporate an On-line Virtual Lab.

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