A

Major Project

On

Virtual Trial Room

(Submitted in partial fulfilment of the requirements for the award of Degree)

BACHELOR'S OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING

By

Narla Krishna Lekha (187R1A05G9)

Neeraj Kumar Karnati (187R1A05H0)

Siripuram Akhila (187R1A05H6)

Under the Guidance of

A. Uday Kiran

(Assistant Professor)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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Kandlakoya (V), Medchal Road, Hyderabad-501401.

2018-22

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that the project entitled "**Virtual Trial Room**" being submitted by **Narla Krishna Lekha (187R1A05G9), Neeraj Kumar Karnati (187R1A05H0)** & **Siripuram Akhila (187R1A05H6)** in partial fulfillment of the requirements for the award of the degree of B. Tech in Computer Science and Engineering to the Jawaharlal Nehru Technological University Hyderabad, is a record of bonafide work carried out by him/her under our guidance and supervision during the year 2021-22.

The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.

Mr. A. Uday Kiran
Assistant Professor
INTERNAL GUIDE

Dr. A. Raji Reddy
DIRECTOR

Dr. K. Srujan Raju
Head of Department

EXTERNAL EXAMINER

Submitted for viva voice Examination held on _____

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Narla Krishna Lekha (187R1A05G9)

Neeraj Kumar Karnati (187R1A05H0)

Siripuram Akhila (187R1A05H6)

ABSTRACT

By utilizing depth cameras like the Microsoft Kinect, it becomes possible to track the movements of a body, extract body measurements and furthermore create a virtual mirror withthe corresponding video stream. The video image can be merged with a piece of clothing frameby frame. The clothes are adapted to the body of the user in front of the Kinect during runtime. Furthermore, trying on clothes in front of different backgrounds and surroundings (e.g., at night) shall be possible. Artificial environment created with software. Online equivalent of an in-store changing room. Enables shoppers to try on clothes virtually. First application known as WSS developed by Zugara. WSS is known as a fitting room or magic mirror.

LIST OF FIGURES

LIST OF SCREENSHOTS

LIST OF CONTENTS

LIST OF CONTENTS

1. INTRODUCTION

1. INTRODUCTION

1.1 PROJECT INTRODUCTION

This project is titled as “Virtual Dressing Room”. This web application provides a facility to try the garment virtually. This project detects the body of the user and assigns the points over the body. The images of the garments are masked on the user using these points and the user is then given with the masked output.

1.2 PROJECT PURPOSE

The purpose of the project is to reduce the tedious process of going to the physical stores and trying the garment. This project helps to check whether the garments are suitable for him or not. This way we can reduce the burden of the user. This project tries to save a lot of time of the user and helps him choose the right garment for him.

1.3 PROJECT FEATURES

The main feature of this project is that the user can try the garments virtually. The user can select his favorite garment and try it and make sure the product is suitable for him. The garments provided online cannot be verified whether it is suitable for him or not. This project facilitates the user to check the garments and try them on at their own home virtually.

2. SYSTEM ANALYSIS

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SYSTEM ANALYSIS

System Analysis is the important phase in the system development process. The System is studied to the minute details and analysed. The system analyst plays an important role of an interrogator and dwells deep into the working of the present system. In analysis, a detailed studyof these operations performed by the system and their relationships within and outside the system is done. A key question considered here is, “what must be done to solve the problem?” The system is viewed as a whole and the inputs to the system are identified. Once analysis is completed the analyst has a firm understanding of what is to be done.

2.1 PROBLEM DEFINITION

A detailed study of the process must be made by various techniques like Image processing, feature recognition etc. The data collected by these sources must be scrutinised to arrive at a conclusion. The conclusion is an understanding of how the system functions. This system is called the existing system. Now the existing system is subjected to close study and problem areas are identified. The designer now functions as a problem solver and tries to sort out the difficulties that the enterprise faces. The solutions are given as proposals. The proposal is then weighed with the existing system analytically and the best one is selected. The proposal is presented to the user for an endorsement by the user. The proposal is reviewed on user request and suitable changes are made. This is a loop that ends as soon as the user is satisfied with the proposal.

2.2 EXISTING SYSTEM

Currently lenskart uses augmented reality for the virtual trail of the spectacles or goggles. Other goods require the physical presence to try them and this existing system requires a lot of effort to reach the concerned place and try the goods. This requires a lot of time for the customers to try the goods.

2.2.1 LIMITATIONS OF EXISTING SYSTEM

- Going to the malls and trying the goods is a tedious process.
- It takes a lot of time to try the goods.

To avoid all these limitations and make the working more accurate the system needs to be implemented efficiently.

2.3 PROPOSED SYSTEM

The aim of the proposed system is to develop a system of improved facilities. The proposed system can overcome all the limitations of the existing system. The proposed system is to createa virtual dress trial room where people can try the online goods such as clothes, googles, and other accessories. These days online shopping has grown tremendously and people or customerswill not be able to try them. Our proposed system eliminates that problem and customers can try the online goods by sitting in front of the system.

2.3.1 ADVANTAGES OF THE PROPOSED SYSTEM

The system is very simple in design and to implement. The system requires very low system resources and the system will work in almost all configurations. It has got following features.

- The proposed system helps the customers by saving a lot of time in trying the goods.
- It reduces the effort of trying the goods in confined places.

2.4 FEASIBILITY STUDY

The feasibility of the project is analysed in this phase and a business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. Three key considerations involved in the feasibility analysis are:-

- Economic Feasibility
- Technical Feasibility
- Social Feasibility

2.4.1 ECONOMIC FEASIBILITY

The developing system must be justified by cost and benefit. Criteria to ensure that effort is concentrated on a project, which will give best, return at the earliest. One of the factors, which affect the development of a new system, is the cost it would require.

The following are some of the important financial questions asked during preliminary investigation:

- The costs conduct a full system investigation.
- The cost of the hardware and software.
- The benefits in the form of reduced costs or fewer costly errors.

Since the system is developed as part of project work, there is no manual cost to spend for the proposed system. Also, all the resources are already available, it gives an indication that the system is economically possible for development.

2.4.2 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

2.4.3 BEHAVIOURAL FEASIBILITY

This includes the following questions:

- Is there sufficient support for the users?
- Will the proposed system cause harm?

The project would be beneficial because it satisfies the objectives when developed and installed. All behavioral aspects are considered carefully and conclude that the project is behaviorally feasible

2.5 HARDWARE & SOFTWARE REQUIREMENTS

2.5.1 HARDWARE REQUIREMENTS:

Hardware interfaces specify the logical characteristics of each interface between the software product and the hardware components of the system. The Following are some hardware requirements.

- Processor : Intel i5, Ryzen 7
- Hard disk : 20 GB
- RAM : 8GB / 16GB / 32GB
- Input Devices : Keyboard, Mouse, SmartPhone (Android,IOS)

2.5.2 SOFTWARE REQUIREMENTS:

Software Requirements specifies the logical characteristics of each interface and software components of the system. The following are some software requirements,

- Operating System : Wind.ows 10, Linux
- Programming language : Python
- Tools and frameworks : Opencv, vs code, mediapipe
- Backend : flask

3. ARCHITECTURE

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3.1 PROJECT ARCHITECTURE

This project architecture shows the procedure followed for Virtual Dressing Room. The user either use a web cam or uploads the photo of his choice. Using the photo, it detects the full body and capture the points. The image is masked and then it is sent to the webpage. The outputis shown on the output screen of user.

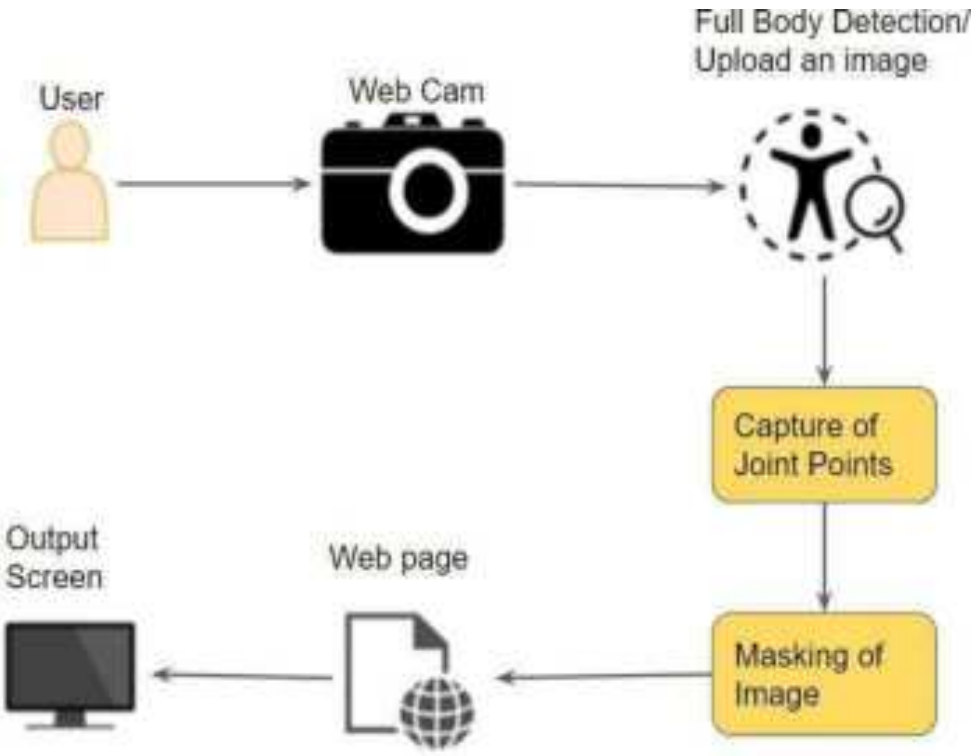

Figure 3.1: Project Architecture

3.2 MODULES DESCRIPTION

Modules

- user
- Detection
- Masking
- Output

3.2.1 User:

Through the interface the user can view the garment and choose the garments of their choice. They can add to the cart their favourite items into the cart.

3.2.2 Detection:

The detection module detects the body joints using the framework called mediapipe.
This detection of body joints helps in masking the video feed given to the system.

Figure 3.2: Face Detection Points

Figure 3.3: Body Detection Points

3.2.3 Masking:

In this masking module, the garments that the user chose are masked on the userusing the body joints detected in the detection module.

3.2.4 Output:

Output module provides the user with the masked video feed. The masked videofeed is a real time. The masked video feed takes the reference of the user's eye feed.

3.3 USE CASE DIAGRAM

In the use case diagram, we have a user as an actor who can browse Garment catalogue, view Garments, try garments and save the snapshot. In try garments on module, it involves capturing body skeleton joints and masking the garment on the user's captured image or uploaded image.It is then sent to the user as a snapshot.

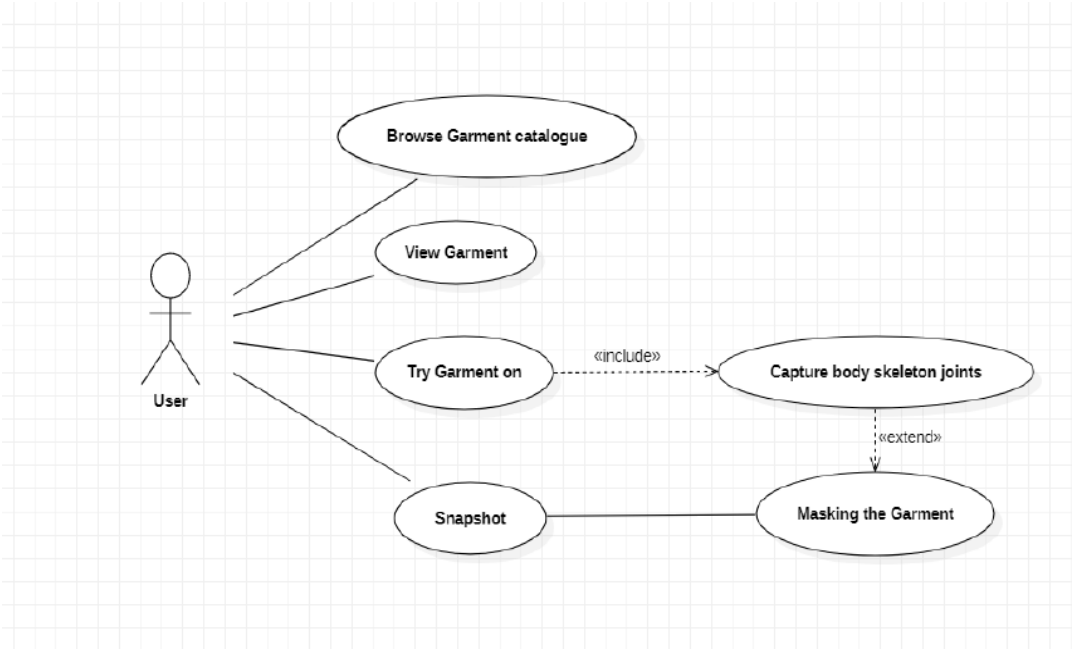

Figure 3.4: Use Case Diagram for User

3.4 CLASS DIAGRAM

Class Diagram is a collection of classes and objects. This project consists of a user class with objects such as browse the catalogue, try garments and add to cart. The detection class performs the capturing of body joints with camera feed or input image given to it as input. The masking class performs masking of the garments where the selected garment is placed or masked according to the captured body joints. The output class helps the user to save the snapshots using savesnap operation.

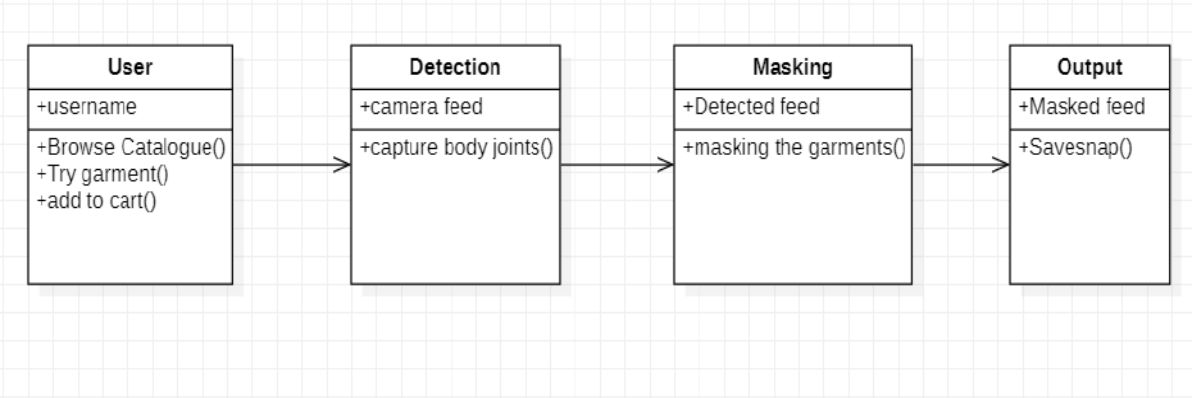

Figure 3.5: Class Diagram

3.5 SEQUENCE DIAGRAM

User Sequence Diagram:

The user object interacts with the browse garment object which interacts with the view garment object which invokes the try on garment object which displaces the user with a masked image. If the user likes it, he interacts with the save snapshot else he will continue browsing the garments.

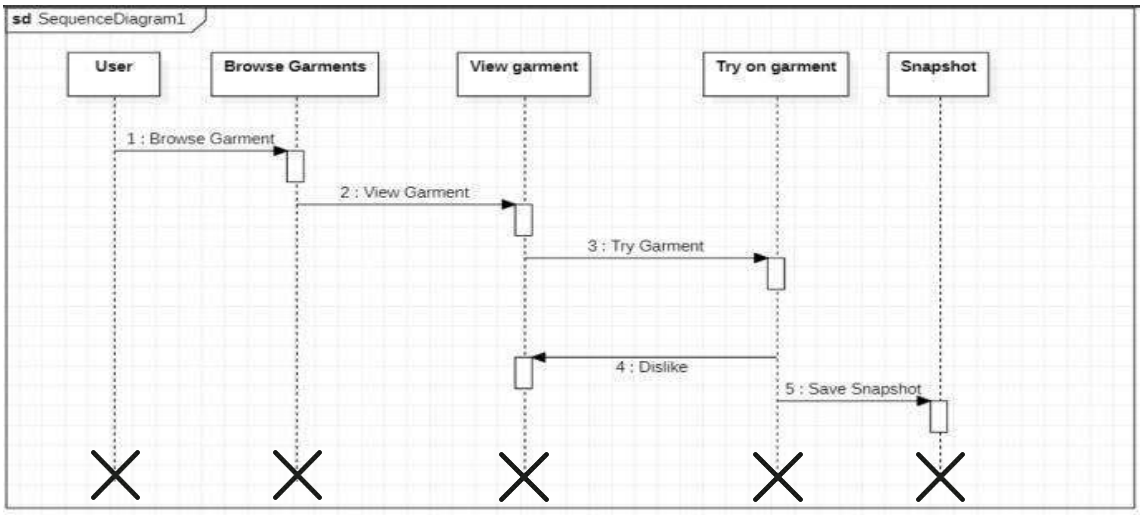

Figure 3.6: Sequence Diagram of User

Detection Sequence Diagram:

The detection module will initialize the detection process if the appropriate distance is followedby the user. The detection module interacts with capture joints object which upon successful capture interacts with masking which masks the image on the user. The masked image is givento the user as a snapshot.

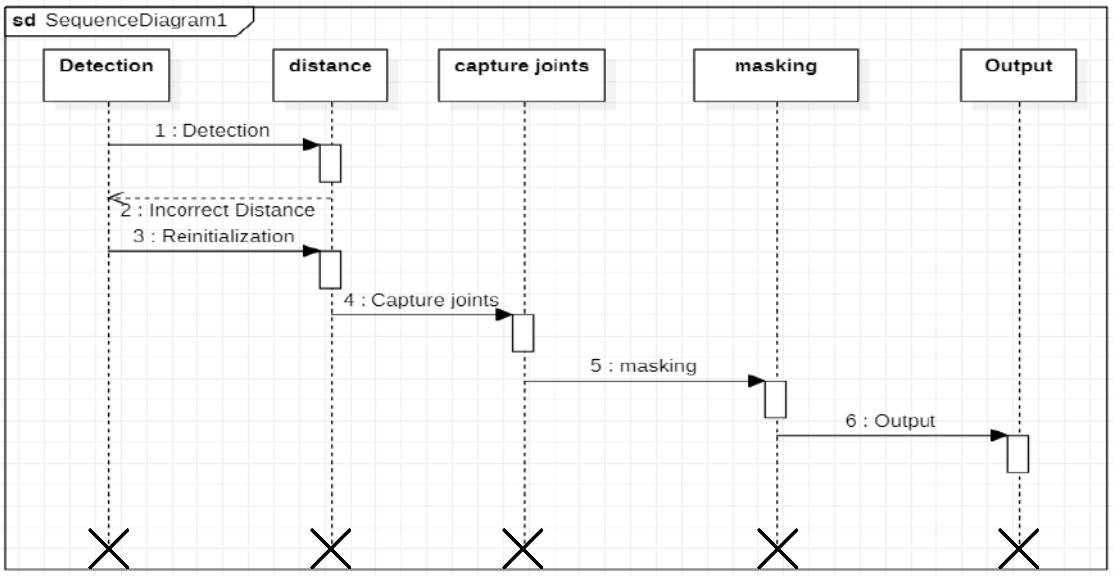

Figure 3.7: Sequence Diagram of Detection.

3.6 ACTIVITY DIAGRAM

It describes the flow of activity states. The different activity states are start, browse garments, view garments, try on garments, initialize capture, if correct distance is maintained capture joints, else reinitialize the capture, output the snapshots.

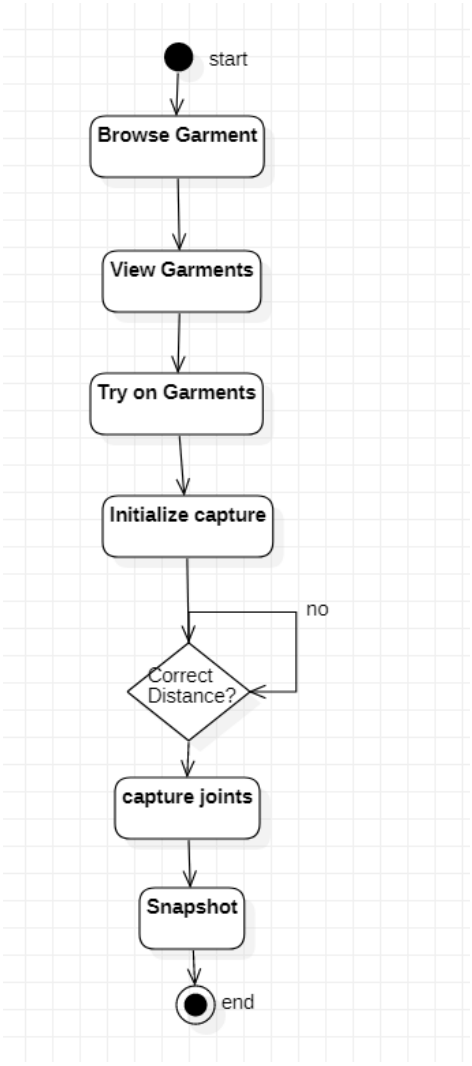

Figure 3.8: Activity Diagram.

4. IMPLEMENTATION

4. IMPLEMENTATION

4.1 SAMPLE CODE

```
from tkinter import *

from PIL import Image

from PIL import ImageTk

import sys

import cv2, threading, os, time

from threading import Thread

from os import listdir

from os.path import isfile, joinimport dlib

from imutils import face_utils, rotate_bound

import math



def put_sprite(num): global SPRITES, BTNS

    SPRITES[num] = (1 - SPRITES[num])

    # if SPRITES[num]:

    #      BTNS[num].config(relief=SUNKEN)# else:

    #      BTNS[num].config(relief=RAISED)


def draw_sprite(frame, sprite, x_offset, y_offset): print("sprite>>>>>>>", sprite.shape ,"type=",

    type(sprite.shape))
```

```
    (h,w) = (sprite.shape[0], sprite.shape[1])
    (imgH,imgW) = (frame.shape[0], frame.shape[1])

    if y_offset+h >= imgH:
        sprite = sprite[0:imgH-y_offset,:,:]

    if x_offset+w >= imgW:
        sprite = sprite[:,0:imgW-x_offset,:]

    if x_offset < 0:
        sprite = sprite[:,abs(x_offset)::,:]
        w = sprite.shape[1]
        x_offset = 0

    for c in range(3):
        try:
            frame[y_offset:y_offset+h, x_offset:x_offset+w, c] =  \
            sprite[:,:,c] * (sprite[:,:,3]/255.0) +  frame[y_offset:y_offset+h, x_offset:x_offset+w, c]
* (1.0 - sprite[:,:,3]/255.0)
        except Exception as e:
            print(e)
            pass
    return frame

def adjust_sprite2head(sprite, head_width, head_ypos, ontop = True):
```

```
    (h_sprite,w_sprite) = (sprite.shape[0], sprite.shape[1])
    factor = 1.0*head_width/w_sprite
    sprite = cv2.resize(sprite, (0,0), fx=factor, fy=factor)
    (h_sprite,w_sprite) = (sprite.shape[0], sprite.shape[1])

    y_orig = head_ypos-h_sprite if ontop else head_ypos
    if (y_orig < 0):
        sprite = sprite[abs(y_orig)::,:,:]
        y_orig = 0
    return (sprite, y_orig)


def apply_sprite(image, path2sprite,w,x,y, angle, ontop = True):
    sprite = cv2.imread(path2sprite,-1)
    sprite = rotate_bound(sprite, angle)
    (sprite, y_final) = adjust_sprite2head(sprite, w, y, ontop)
    image = draw_sprite(image,sprite,x, y_final)

def calculate_inclination(point1, point2):
    x1,x2,y1,y2 = point1[0], point2[0], point1[1], point2[1]
    incl = 180/math.pi*math.atan((float(y2-y1))/(x2-x1))
    return incl


def calculate_boundbox(list_coordinates):
```

```
    x = min(list_coordinates[:,0])
    y = min(list_coordinates[:,1])
    w = max(list_coordinates[:,0]) - x
    h = max(list_coordinates[:,1]) - y
    return (x,y,w,h)

def detectUpperBody(image):
    cascadePath = 'data/haarcascade_upperbody.xml'
    result = image.copy()
    imageGray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)
    cascade = cv2.CascadeClassifier(cascadePath)
    Rect = cascade.detectMultiScale(imageGray, scaleFactor=1.1, minNeighbors=1,
minSize=(1,1))
    if len(Rect) <= 0:
            return False
    else:
            return Rect

def get_face_boundbox(points, face_part):
    if face_part == 1:
        (x,y,w,h) = calculate_boundbox(points[17:22])
    elif face_part == 2:
        (x,y,w,h) = calculate_boundbox(points[22:27])
    elif face_part == 3:
        (x,y,w,h) = calculate_boundbox(points[36:42])
```

```
    elif face_part == 4:
        (x,y,w,h) = calculate_boundbox(points[42:48])
    elif face_part == 5:
        (x,y,w,h) = calculate_boundbox(points[29:36])
    elif face_part == 6:
        (x,y,w,h) = calculate_boundbox(points[0:17])
    elif face_part == 7:
        # (x,y,w,h) = calculate_boundbox(points[48:68]) #mouth
        (x,y,w,h) = calculate_boundbox(points[1:5])
    elif face_part == 8:
        (x,y,w,h) = calculate_boundbox(points[12:16])
    return (x,y,w,h)

image_path = ''

def  add_sprite(img):
    global image_path
    image_path = img
    print("rsplit of imgpath>>>>>>>",img.rsplit('/',1))
    print(">>>>>>>>>>>",int(img.rsplit('/',1)[0][-1]))
    put_sprite(int(img.rsplit('/',1)[0][-1])) #here it will return the integer value from 1 to 6,
which will denotes that which catagory is the apparel belongs to i.e either frock or tops or etc.

#Principal Loop where openCV (magic) ocurs
# Face detection starts from here
```

```
def cvloop(run_event):
    global panelA
    global SPRITES
    global image_path
    i = 0
    video_capture = cv2.VideoCapture(0) #read from webcam
    (x,y,w,h) = (0,0,10,10) #whatever initial values

    #Filters path
    detector = dlib.get_frontal_face_detector()

    model = "data/shape_predictor_68_face_landmarks.dat"
    predictor = dlib.shape_predictor(model) # link to model:
http://dlib.net/files/shape_predictor_68_face_landmarks.dat.bz2

    while run_event.is_set():
        ret, image = video_capture.read()
        gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY) #converting the colour image to
gray
        faces = detector(gray, 0)

        for face in faces:
            (x,y,w,h) = (face.left(), face.top(), face.width(), face.height()) #reading the coordinates
in sequence
```

```
            shape = predictor(gray, face)
            shape = face_utils.shape_to_np(shape)
            incl = calculate_inclination(shape[17], shape[26]) #inclination based on eyebrows

            # condition to see if mouth is open
            is_mouth_open = (shape[66][1] -shape[62][1]) >= 10 #y coordiantes of landmark
points of lips

            if SPRITES[0]:

                apply_sprite(image,image_path,w,x,y+40, incl, ontop = True)



            if SPRITES[3]:#Tiara
                apply_sprite(image, image_path,w+45,x-20,y+15, incl, ontop = True)

            #Necklaces
            if SPRITES[1]:
                (x1,y1,w1,h1) = get_face_boundbox(shape, 6)
                apply_sprite(image, image_path,w1,x1,y1+110, incl,  ontop = False)

            #Goggles
            if SPRITES[6]:
                (x3,y3,_,h3) = get_face_boundbox(shape, 1)
```

```
            apply_sprite(image, image_path,w,x,y3-10, incl, ontop = False)


        #Earrings
        (x0,y0,w0,h0) = get_face_boundbox(shape, 6) #bound box of mouth
        if SPRITES[2]:
            (x3,y3,w3,h3) = get_face_boundbox(shape, 7) #nose
            apply_sprite(image, image_path,w3,x3-40,y3+30, incl,ontop=False)
            (x3,y3,w3,h3) = get_face_boundbox(shape, 8) #nose
            apply_sprite(image, image_path,w3,x3+30,y3+75, incl)


        # if SPRITES[5]:
        #     apply_sprite(image,image_path,w,x,y, incl, ontop = True)


        #Frocks
        if SPRITES[5]:
            (x1,y1,w1,h1) = get_face_boundbox(shape, 8)
            apply_sprite(image, image_path,w1+590,x1-300,y1+70, incl,  ontop = False)


        #Tops
        if SPRITES[4]:
            # (x,y,w,h) = (0,0,10,10)
            # apply_sprite2feature(image, IMAGES[7][ACTIVE_IMAGES[7]], fullbody, w//4,
2*h//3, h//2, True, w//2, x, y, w, h)
            (x1,y1,w1,h1) = get_face_boundbox(shape, 8)
            apply_sprite(image, image_path,w1+300,x1-205,y1+40, incl,  ontop = False)
```

```
        image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
        image = Image.fromarray(image)
        image = ImageTk.PhotoImage(image)
        #image = ImageTk.PhotoImage(image.resize((500,500))) #this is for photo mode
        panelA.configure(image=image)
        panelA.image = image

    video_capture.release()

# Initialize GUI object
root = Tk()
root.title("Virtual trial room")
this_dir = os.path.dirname(os.path.realpath(__file__))
btn1 = None

def try_on(image_path):
    btn1 = Button(root, text="Try it ON", command = lambda:add_sprite(image_path))
    btn1.pack(side="top", fill="both", expand="no", padx="5", pady="5")
panelA = Label(root)
panelA.pack( padx=10, pady=10)

SPRITES = [0,0,0,0,0,0,0]
BTNS = [btn1]
```

```
print(">>>>>>>>>>>>>>>>>>>>",sys.argv[1])

try_on(sys.argv[1]) #here sys.argv will return the path of apparels.

run_event = threading.Event()

run_event.set()

action = Thread(target=cvloop, args=(run_event,))

action.setDaemon(True)

action.start()


def terminate():

    global root, run_event, action

    run_event.clear()

    time.sleep(1)

    root.destroy()


root.protocol("WM_DELETE_WINDOW", terminate)

root.mainloop()
```

5. SCREENSHOTS

5. Screenshots

Figure 5.1: USER INTERFACE 1 (Basic Design)

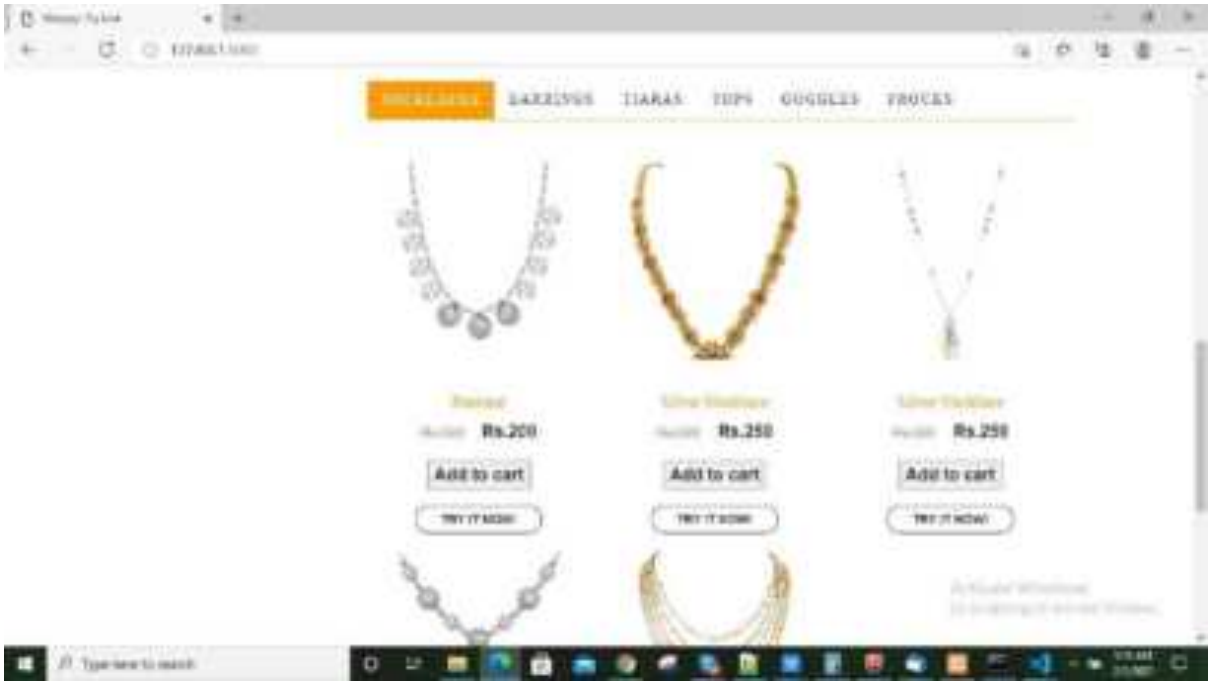

Figure 5.2: Browse Necklaces (User Interface)

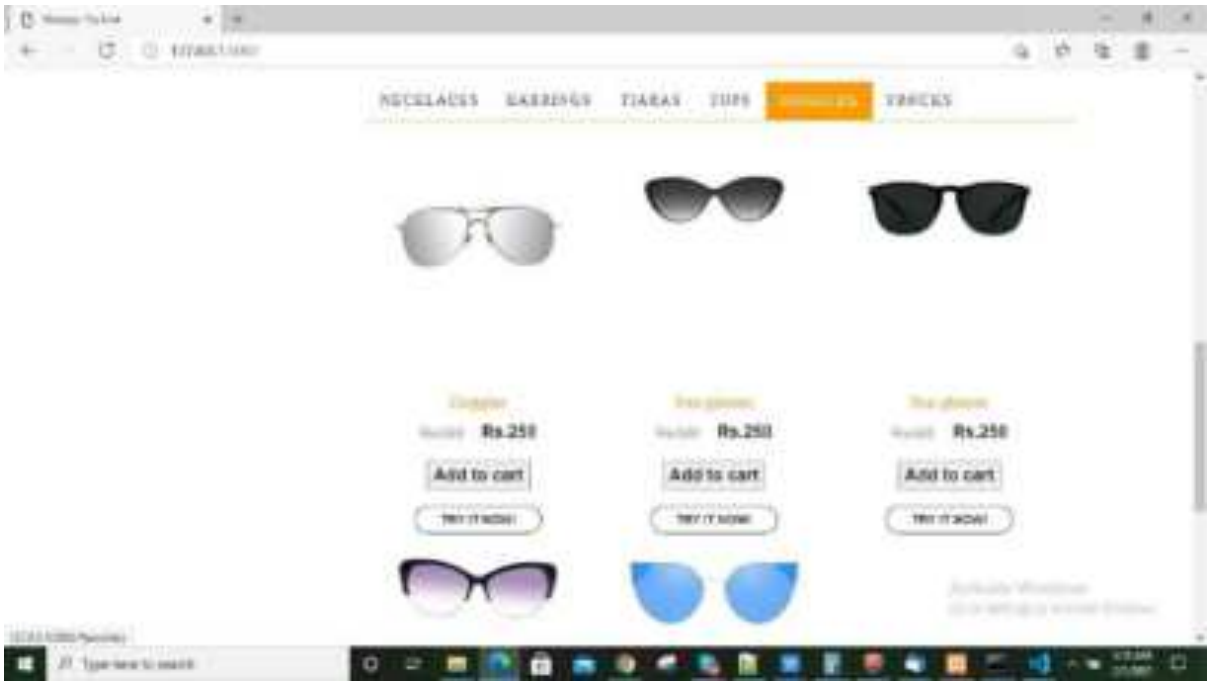

Figure 5.3: Browse Googles (User Interface)

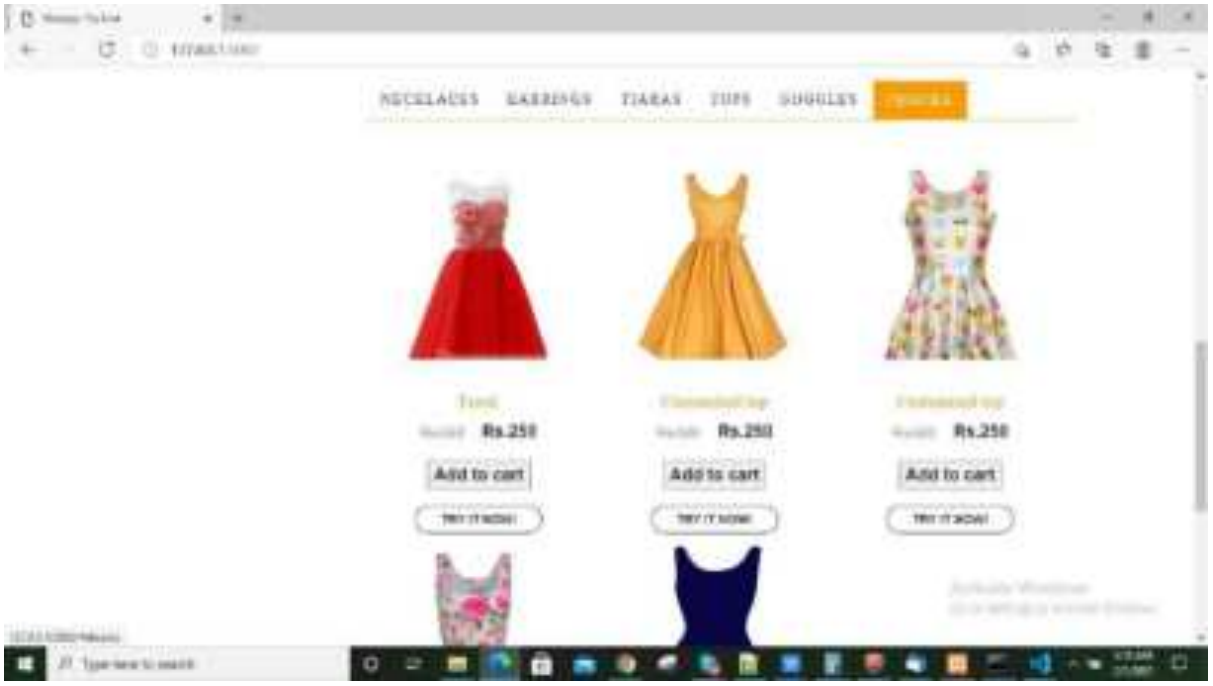

Figure 5.4: Browse Frocks (User Interface)

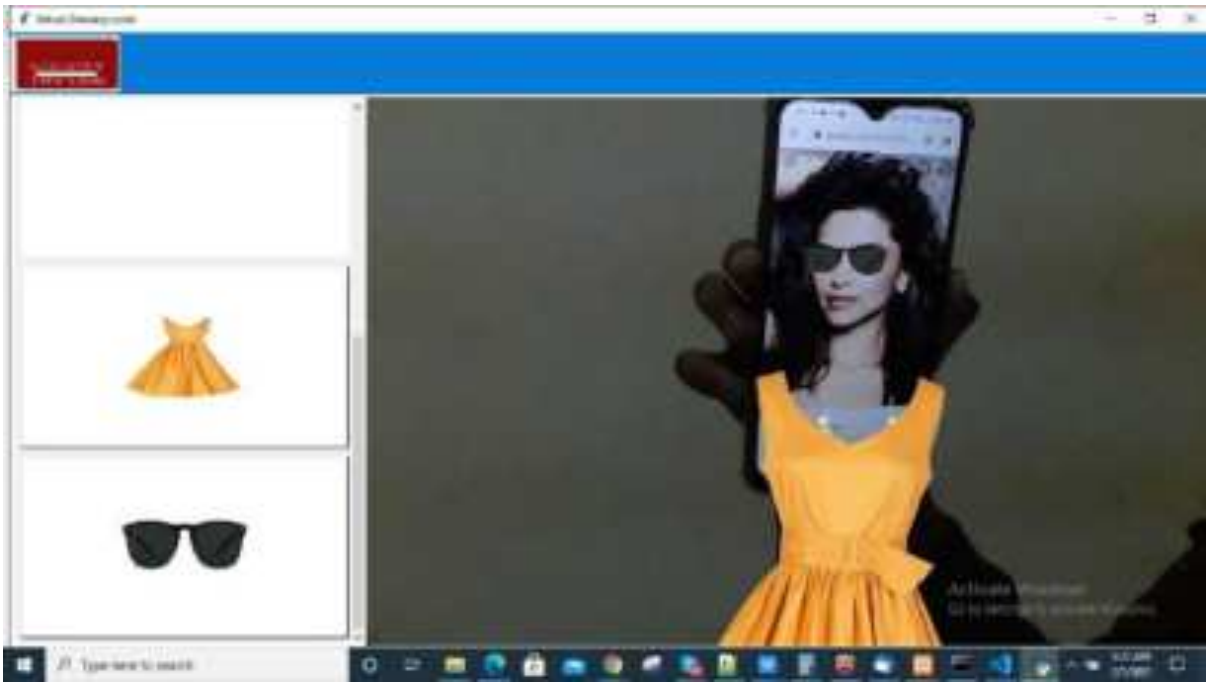

Figure 5.5: Output 1 (Detection and Masking)

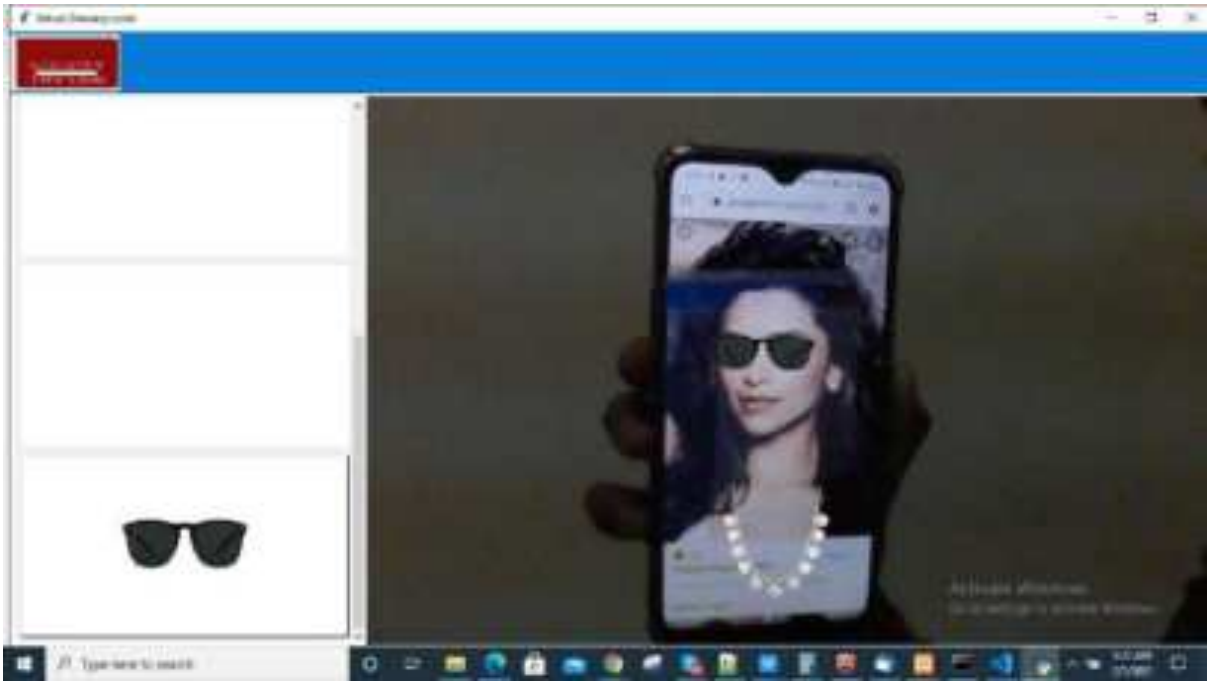

Figure 5.6: Output 2 (Detection and masking)

6. TESTING

6. TESTING

6.1 INTRODUCTION TO TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, subassemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of tests. Each test type addresses a specific testing requirement.

6.2 TYPES OF TESTING

6.2.1 UNIT TESTING

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .It is done after the completion of an individual unit before integration. This is a structural testing that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

6.2.2 INTEGRATION TESTING

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfactory, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

6.2.3 FUNCTIONAL TESTING

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must beexercised.

Systems/Procedures : interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, orspecial test cases. In addition, systematic coverage pertaining to identifying Business process flows; data fields, predefined processes.

6.3 TEST CASES

6.3.1 Browse garments

Test case ID	Test case name	Purpose	Test Case	Output
1	Users browse the garments through GUI	To browse the content and view the desired products	The user browses the garments and view the garments	The garments are successfully displayed

6.3.2 Try Virtually

Test case ID	Test case name	Purpose	Input	Output
1	Try desired garments virtually	To try the desired garments virtually	User tries the desired garments virtually using the camera(User live feed)	The desired garments are virtually projected on user live feed

7. CONCLUSION

7. CONCLUSION & FUTURE SCOPE

7.1 PROJECT CONCLUSION

A person travelling to shop and then buying clothes is a tedious task. In our work, User will be able to choose his favourite clothes according to his size without going outside. It will be a “user friendly” web- application so that he/she can try it virtually. An easy navigable, user-friendly Web app for the user to use. Overall, the presented virtual dressing room seems to be a good solution for quickly and accuratelytrying on clothes virtually.

7.2 FUTURE SCOPE

1. By using a Microsoft Kinect or azure Kinect, which can detect the image stream, depth stream. Thiscan detect the body and face points more precisely and accurately.
2. We can create a smart mirror using this project, where the customers can get a real experience.
3. We can create a 3d model for the user based on the user complete picture and we can make the garmentsprojected on their avatars.

8. BIBLIOGRAPHY

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8.1 GITHUB REPOSITORY LINK

1. https://github.com/neeraj2000-kt/Virtual_Trial_Room
2. https://github.com/Narlakrishnalekha/Virtual-Trial-Room
3. https://github.com/Akhila-Siripuram/Virtual-Trail-Room

8.2 REFERENCES

[1]. Higgins, K. R., Ferraro, E. J., Tapley, J., Manickavelu, K., & Mukherjee, S. [2016]. U.S. PatentNo. 9898742. Washington, DC: U.S. Patent and Trademark Office.

[2]. S. Malathi Professor, Department of Computer Science and Engineering, Panimalar EngineeringCollege, Chennai, India [2018].

[3]. K. Seo and A. M. Fiore, "Effect of the fitting room environment on older clothing shoppers,"Journal of Retailing and Consumer Services, ELSEVIER, pp. 15- 22, 2018.

[4]. Eko Mulyanto Yuniarni; Mochammad Hariadi Department of Electrical Engineering, InstitutTeknologi Sepuluh Nopember, Surabaya, Indonesia [2019].

[5]. Aladdin Masri, Muhannad Al-Jabi,-2020 Jordan International Joint Conference on Electrical andInformation technology[JICEIT]-[2020]

9. JOURNAL

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Virtual Trial Room

A. Uday Kumar[1], Narla Krishna Lekha[2], Neeraj Kumar Karnati[3] and Siripuram Akhila[4]

[1] *Associate Professor, Department of Computer Science and Engineering , CMR Technical Campus, Medchal, Telangana, India.*
[2] *UG Student, Department of Computer Science and Engineering , CMR Technical Campus, Medchal, Telangana, India.*
[3] *UG Student, Department of Computer Science and Engineering , CMR Technical Campus, Medchal, Telangana, India.*
[4] *UG Student, Department of Computer Science and Engineering , CMR Technical Campus, Medchal, Telangana, India.*

ABSTRACT:
The pandemic has changed the way a person lives from focusing on the Virtual stores more than the Physical stores and few major reasons are one will not be affected with the health issues, less cost, Variety of options, Different portfolios at one place and goes on. Since the usage of online buying selling is increasing more user-friendly developments are been made in the industry which is changing every minute todays update may be available with more advanced version the next day. So, in this paper we are concentrating on the changes, updates, technology that has changed the way Online Garment shopping works. As per a survey almost a person suffers online shopping applications for almost seven hours. The increase in the virtual life had created one best and game changing opportunity for the Fashion Business which is not just concentrating on the Brand promotion and online stores but much more advancement one such advancement is Virtual Trail Room which is nothing but a digital version of the Trail/Changing room in the shopping malls. For this project we are using the Microsoft Kinect Sensor which gives the user label data by extracting from the user video stream using the depth than based on the information the cloth is register along with the skin detection so has to adjust the order of layers by Kinect skeletal tracking data. Surprisingly the overlap between the cloth models and person is 84.76%.

Keywords: *Augmented Reality, Clothing, Microsoft Kinect Sensor, Human- Computer Interaction, Virtual*

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I. INTRODUCTION

Today people are showing interest more on buying online than offline and is giving a good amount of satisfaction in the fields of Books, Electronics, Tickets, Basic home goods etc and the reason behind this is all we need to know the basic features of it but when it comes to online shopping like Garments, Jewelry it becomes bit difficult to understand because of the measurements and the color difference hence advancement were started taking slowly to overcome as many issues as one can. Few such advancements started from online catalogue like Flipkart, Amazon, Myntra etc to live online assistance in shopping like 3Liveshop, Magic Room by WSS etc. Trying clothes in stores is generally more amount of time taking and will definitely have the physical contact. And after such a pandemic effect people are now scared to give such a try but can't stop themselves from buying clothes so has to make the satisfactory with the product that they have purchased we are proposing a simple yet effective method that is virtual trial room which is similar to a changing room in a shopping mall but we can try as many clothes as we want without any physical contact which in turn reduces the time, cost and easily accessible. [1]In this proposed method we are using the Microsoft Kinect sensor to track the measurements, Movement so as to create a virtual mirror with a video streaming later which each frame will have a cloth registered which will be merged with the video streaming. Other added advantage of this method is we can change the backgrounds and environment. Here the sensor detects the body and assign few points based on the points garment's images are masked. Hence in this paper, we will start with the explanation on current and proposed system along with the system analysis, its architecture, implementation process, results that we had obtained and conclusion, future scope.

II. SYSTEM ANALYSIS

Before we develop a solution to an issue one needs to know what is the current method its advantages disadvantages fields that is being used and what will be the consequences post updating or what can we do more in order to resolve the issues or the problems or the more better way all these can be understood by the process called system analysis. This process helps to understand the complete in and out of a system from which one will be able to understand on to how can we proceed further what all changes we can imbibe in order to make it better which in turn reduces the wastage in cost and helps in building more appropriate solution with most accurate results.

III. EXISTING SYSTEM

In the existing system in order to shop for any garment we will first try and then we will choose it and in the mean time it is time consuming to reach those places, physical contact will definitely happen and we may not be satisfied with the products we try every time. Currently Lenskart is using Augmented reality to try the Spectacles and Goggles. And for other fields like fashion business a physical appearance is needed as the measurements from one person to other person varies and lots of effort is required in order to overcome this issue.

IV. PROPOSED SYSTEM

The proposed system will be one of the perfect solutions for the issue where we are proposing for a virtual trial room where a person can try the model, he/she needed with the perfect measurements and in the color, they wish to along with the change in the background and the environment they are into. This reduces the amount of time they spent in travelling and changing, it doesn't require any physical contact and will have multiple options to customize which is generally not possible in the existing system. [2] It also helps the users to not limit them selves to one particular shop or area they can visit any shop in the world and try the garments to check if they will fit or not.

V. REQUIREMENTS

For any system requirements plays a major role because that gives us an idea of how much cost it is going to cost for along with the size of manufacturing it. Requirements can be classified into Hardware and Software where Hardware requirements give us the understanding on the interface and logical understanding whereas software requirements gives us understanding of the code, software to be used and below are the detail requirements for this proposed project.

- Processor : Intel i5, Ryzen 7
- Hard disk : 20 GB
- RAM : 8GB / 16GB / 32GB
- Input Devices : Keyboard, Mouse, SmartPhone (Android,IOS)
- Operating System : Windows 10, Linux
- Programming language : Python
- Tools and frameworks : Opencv, vs code, mediapipe
- Backend : flask

VI. ARCHITECTURE

The architecture of this virtual trail room consists of a user, web camera, few sensors, web page and output screen. The process starts with the user either uses the web camera or uploading one of their Photos. From these the sensors identify and capture the points than the image is masked with the cloth frame that is sent to the webpage and then the output is shown in on the output screen. [3][5] For this complete process we are using the Microsoft Kinect which had gained lots of interest in recent days because of the depth image sensor. Apart from these we will be using the frame work like OpenNI along with the Microsoft Kinect SDK. Kinect SDK is mostly used because of the ability of its to capture real time skeletal body tracker

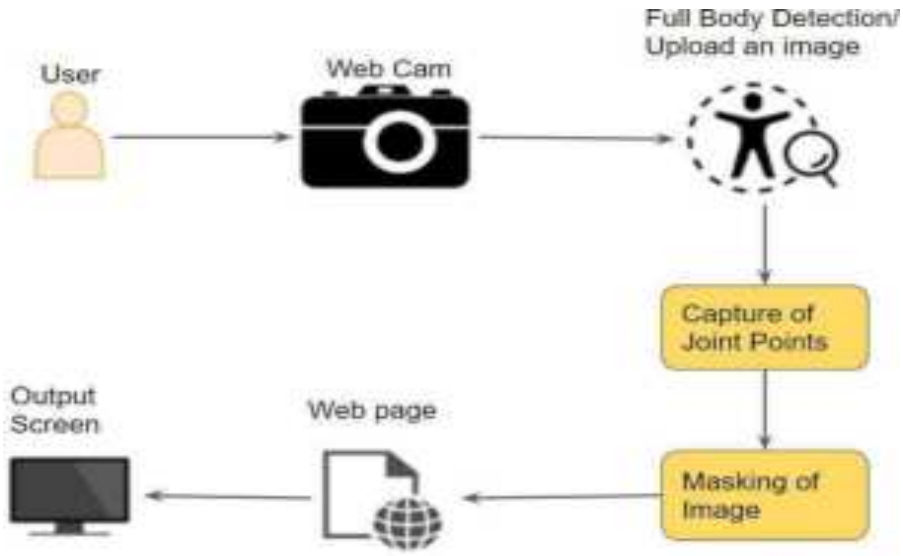

FIG -1 Architecture of the Virtual Trail Room

VII. MODULES DESCRIPTION

In terms of modules, we will be concentrating the below listed ones:

- User
- Detection
- Masking
- Output

a. User:

Through the user interface one will be able to choose the type of garment, color, style of their choice and will be able to add them to cart or as a favorite.

FIG-2 The User Interface Representation

b. Detection:

The detection module uses a framework called Mediapipe which helps in the detection of body points which helps in masking the video feed for a given system.

FIG-3 Face Detection Points

FIG-4: Body Detection Points

c. Masking:

This module helps in masking the garments to the user using the body joints that are detected from the detection module

d. Output:

Output module provides the output of the user after the masking is done from the video feed and the masked video feed is a real time masking.

VIII. USE CASE, SEQUENCE, & CLASS DAIGRAM

These diagrams give a picture of the detail process we follow from capturing the image to the displaying the output.[4]

i. Use case Diagram:

In this Diagram user can browse the Garment catalogue, view different types of garments try them and save the snapshot. In this module the first step is capturing the body skeleton joints and masking the garment on the users image or uploaded image and then the sent to the user as a image that will be saved as a snapshot.

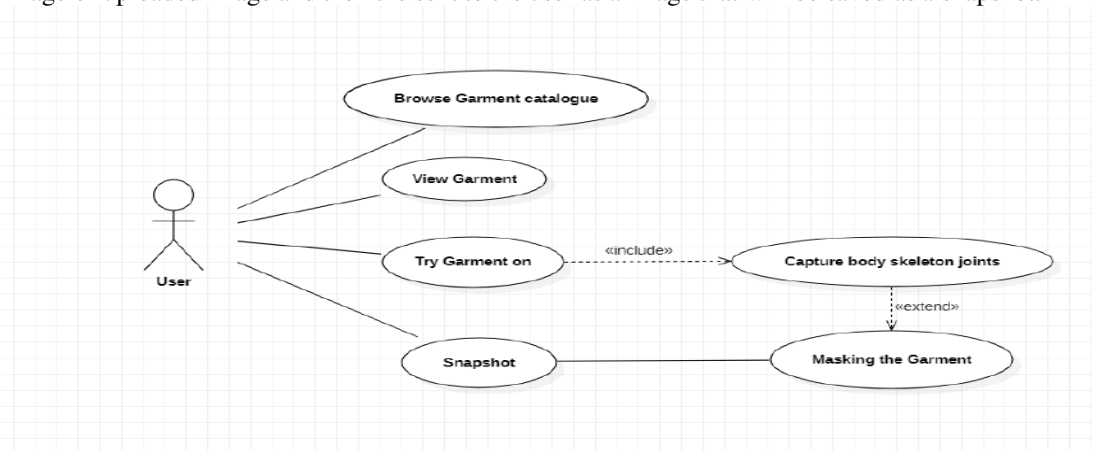

FIG -6 Use Case Diagram for User

ii. Class Diagram:

This diagram collects the class and objects which has the browse catalogue, try and add to cart options post which the input is taken from the input image or the image captured from the camera in the form of body joints and than proceeds to masking class which will mask the selected garments on the person based on the body joints and the output class will save the image using the Savesnap operation.

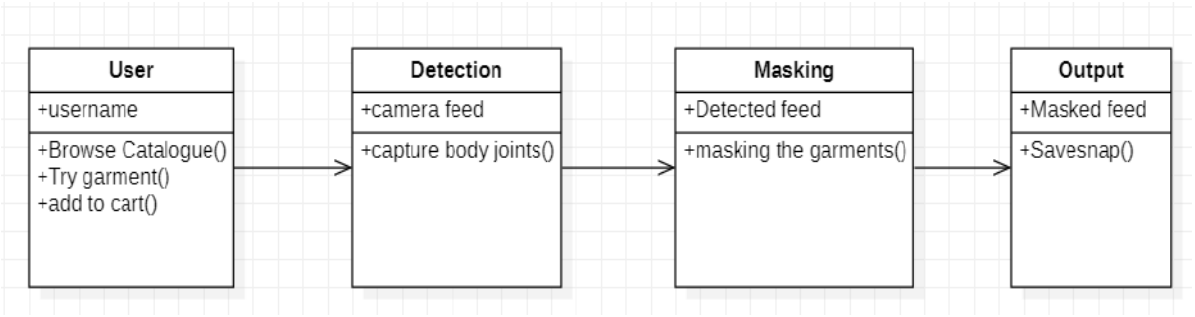

FIG – 7 Class Diagram

iii. Sequence Diagram

The sequence diagram has the two cases user and detection sequence where user sequence detection user will be able to browse the garments and if he/she likes than they will save and will get the output in the form of snapshot if not they will browse other garments of their choice.

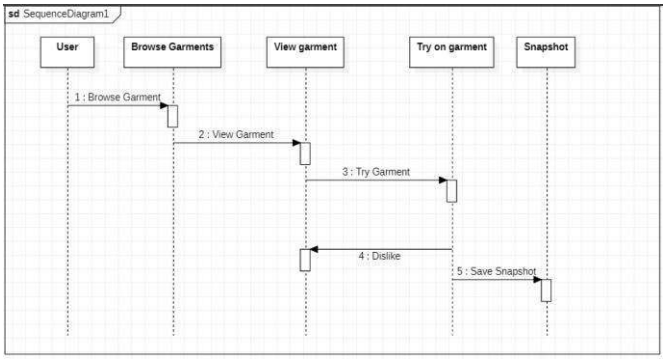

FIG -8 Sequence Diagram of User

The Detection module used when there is some distance between the user and the camera and the module interacts with the joints upon capturing and then interacts with the image to mask the garments and the final masked output is given to the person in the form of snapshot.

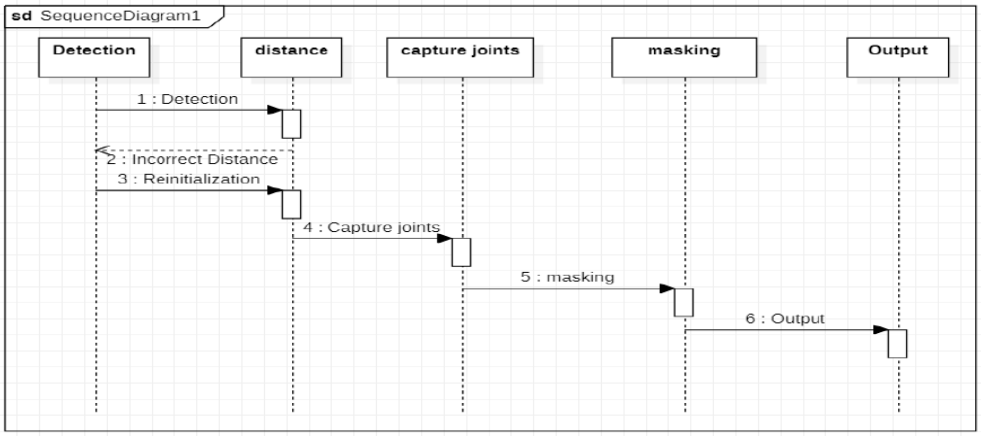

FIG – 9 Sequence Diagram of Detection

iv. Activity Diagram

It gives the flow from capturing input to the final output. It starts with the browsing, viewing, trying the initializing the capture if it has corrected distance than it will capture the joints and snapshot is provided if not distance is adjusted and then captured.

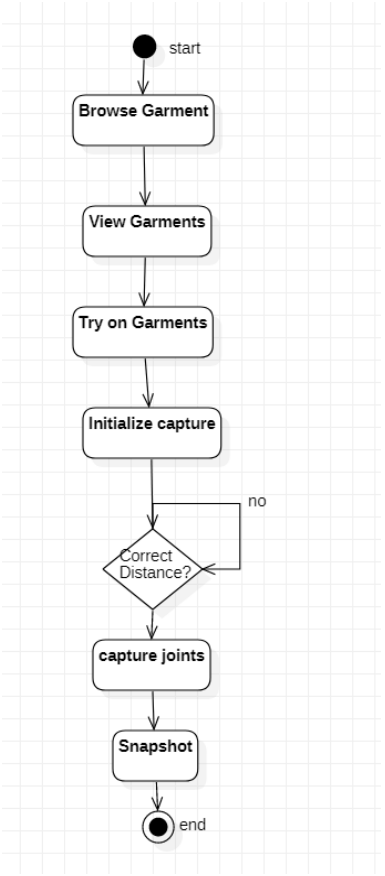

FIG -10 Activity Diagram

IX. TESTING

The purpose of testing to find the final errors or to know what else we can do in order to improve the solution. There are different types of tests which has a specific requirement.

a- Unit testing: This test is used to test the internal configuration each one individually it makes sure that the requirement is performed as expected and contains clearly defined inputs and expected results.

b- Integration Test: This test is used to check the integration with different system i.e., the connection between one module to another module it might be within same system and different module or different system and different module.

c- Functional Testing: These tests help in understanding the valid/invalid parameters which function to be used what should be the output when an input is given along with the systems that has to be invoked when a parameter is given.

Browse garments

Test case ID	Test case name	Purpose	Test Case	Output
1	Users browse the garments through GUI	To browse the content and view the desired products	The user browses the garments and view the garments	The garments are successfully displayed

Try Virtually

Test case ID	Test case name	Purpose	Input	Output
1	Try desired garments virtually	To try the desired garments virtually	User tries the desired garments virtually using the camera(User live feed)	The desired garments are virtually projected on user live feed

X. RESULTS

FIG -11: USER INTERFACE 1 (Basic Design)

FIG-12: Browse Necklaces (User Interface)

FIG -13: Browse Googles (User Interface)

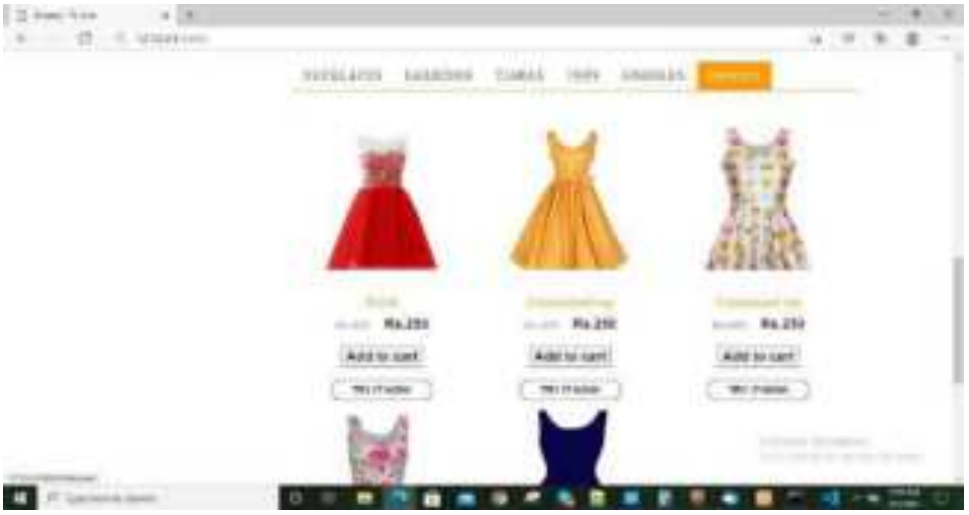

FIG - 14: Browse Frocks (User Interface)

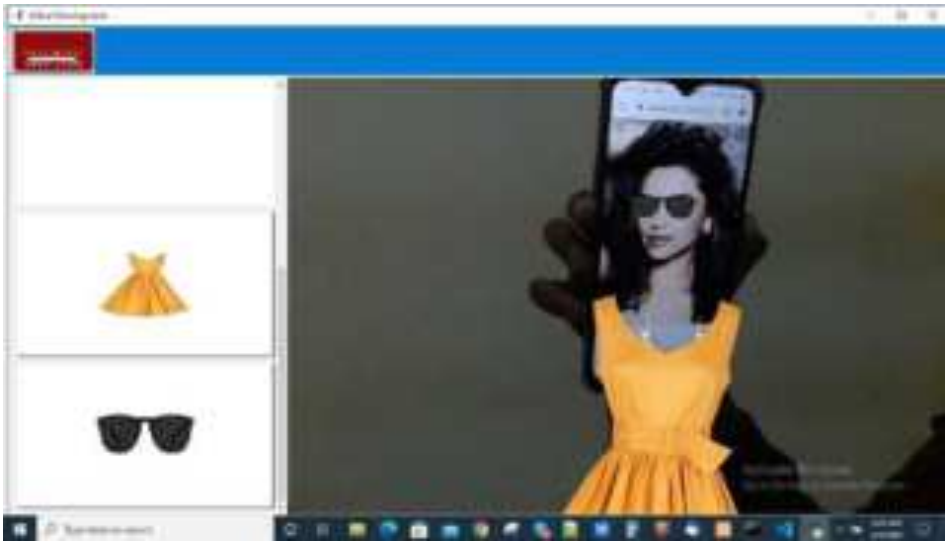

FIG - 15: Output 1 (Detection and Masking)

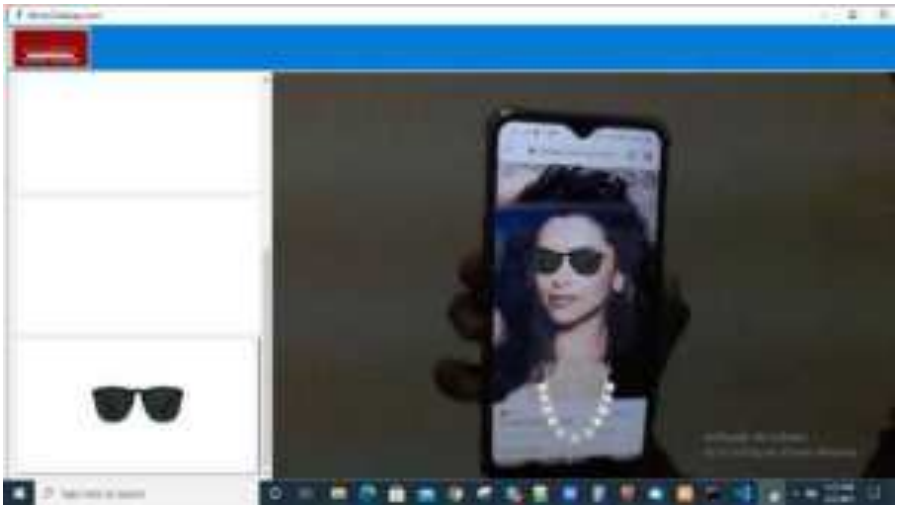

FIG – 16 : Output 2 (Detection and masking)

XI. CONCLUSION & FUTURE SCOPE

From this proposed system we will be able to overcome many factors such as one can save time without travelling to the shop, one can reach many brands from one place, one can try n number of garments without any problem and can be of their choice and color, type they can also design based on the environment and the background. Since the navigation is user friendly one will be able to use it very easily. Overall, this solution helps in reducing time, improving the selection process and in current pandemic the physical contact is also not there. In future we can develop more options into it like adding similar products search, more customization options and all the matching to be shown once a garment in selected, we can take it to 3D Level where user can get more user friendly snap shot of how it looks when they choose a particular garment.

REFERENCE

[1]. Higgins, K. R., Ferraro, E. J., Tapley, J., Manickavelu, K., & Mukherjee, S. [2016]. U.S. Patent No. 9898742. Washington, DC: U.S. Patent and Trademark Office.
[2]. S. Malathi Professor, Department of Computer Science and Engineering, Panimalar Engineering College, Chennai, India [2018].
[3]. K. Seo and A. M. Fiore, "Effect of the fitting room environment on older clothing shoppers," Journal of Retailing and Consumer Services, ELSEVIER, pp. 15- 22, 2018.
[4]. Eko Mulyanto Yuniarni; Mochammad Hariadi Department of Electrical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia [2019].
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