MINOR PROJECT REPORT

For

Virtual Try-On

Submitted By

Specialization	SAP ID	Name
AIML	500086695	Mouli Bhardwaj
AIML	500087530	Nagma Siddiqui
AIML	500087764	Om Agarwal
AIML	500087406	Prabal Pratap Singh

Department of Informatics

School of Computer Science

UNIVERSITY OF PETROLEUM & ENERGY STUDIES,

DEHRADUN- 248007. Uttarakhand

Dr. Ajay Prasad
Project Guide

Dr. Thipendra P.Singh
Cluster Head

Under the guidance of
Dr. Ajay Prasad
Professor
SCHOOL OF COMPUTER SCIENCE
University of Petroleum and Energy Studies

Table of Contents

1. Abstract

Virtual try-on technology has become increasingly popular in recent years, as people are always looking for more convenient and accessible ways to shop for clothing and accessories. With virtual try-on, customers can simply upload a photo or use their device's camera to see what a particular item would look like on them, without ever having to leave their home.

However, there is still room for improvement in the accuracy and realism of virtual try-on technology. Currently, the virtual try-on experience may not always accurately reflect how a garment would fit or look on an individual's unique body type or skin tone. Additionally, the lighting and background of the photo or video being used for virtual try-on can also affect the accuracy of the simulation.

If advancements can be made in virtual try-on technology to accurately simulate how a garment would fit and look on a particular individual, it would revolutionize the way people shop for clothing and accessories. This technology could potentially eliminate the need for in-person shopping and reduce the number of returns and exchanges, ultimately creating a more seamless and convenient shopping experience for consumers.

2. Introduction

Virtual try-on technology has the potential to revolutionize the way people shop for clothing and accessories. With the advancement of this technology, users can easily see how a particular item would look on them without having to leave their homes, saving them time and effort.

One potential application of virtual try-on technology is in the fashion industry, where designers and retailers can use it to create more personalized and customized customer experiences. By analysing a customer's body type and style preferences, virtual try-on technology could recommend clothing items that would look great on them and suggest additional accessories to complete the look.

Another potential application of virtual try-on technology is in the beauty industry, where users could try on different makeup looks and hairstyles virtually to see which ones would look best on them. By incorporating augmented reality elements, users could see how different makeup products and hair colours would look on them in real time, creating a more interactive and engaging shopping experience.

Virtual try-on technology could also have applications in the healthcare industry, where patients could use this technology to try on different medical devices and prosthetics virtually before deciding. By providing patients with a more accurate representation of how a particular device would fit and function on their body, virtual try-on technology could help improve patient satisfaction and overall healthcare outcomes.

Overall, the potential applications of virtual try-on technology are vast, and as this technology continues to evolve, we can expect to see even more innovative uses and benefits in the future.

3. Problem Statement

Designing a virtual try-on system enables customers to try on shoes virtually and accurately determine the fit, style, and overall look before purchasing. The system should be user-friendly and provide a seamless virtual experience, incorporating 3D modeling, augmented reality, and real-time data analysis to provide accurate sizing and fit recommendations. Additionally, the system should integrate with existing e-commerce platforms, enabling customers to seamlessly make purchases directly from the virtual try-on experience.

4. Literature Survey

Several models and research have been already developed in this area.

The authors of [1] developed Virtual try-on for clothes as customers can not have an accurate sense of style, size, and color of online clothes. A 2D virtual try-on system attaches garment images to 2D human bodies while a 3D virtual try-on system provides better and more realistic 3D cloth simulations. The author used the Auto-skinning algorithm is put forward to reduce

the generation time of dynamic garment models and to reduce the computing cost. Real-time local cloth simulation and transparent textures which solve cloth penetration are applied to reduce simulation calculation and improve the simulated effect for 3-D try-on.

The authors in [2] extend the Faster R-CNN object detection framework with ResNet 101 and ROI-align with modifications like pruning mechanism and additional clothing attributes branches parallel to the category branch.

The authors in [3] proposed a method based on Conditional Generative Adversarial Networks (GANs) to minimize an adversarial loss so that samples generated from a generator are indistinguishable from real ones as determined by a discriminator, conditioned on an input signal but are unable to generate graphic details and accommodate geometric changes To address these limitations They employ a multi-task encoder-decoder network to generate a coarse synthetic clothed person in the same pose wearing the target clothing item, and a corresponding clothing region mask.

5. Existing System Issue

The problem that our virtual try-on project aims to solve is the lack of an accurate and convenient method for online shoppers to visualize how a product would look on them before making a purchase. Despite the growth of e-commerce, online shopping still presents several challenges for customers, including:

● Difficulty in determining the right size and fit of a product: Online shoppers often face difficulties in determining the correct size and fit of a product, which can lead to frustration and return costs.

● Inaccurate product representation: Product images online may not accurately represent the color, texture, or fit of a product, leading to disappointment and dissatisfaction with the purchase.

● Lack of interactivity: Shopping online can be a passive experience, lacking the interactivity and engagement that customers often experience when shopping in-store.

Our virtual try-on project aims to address these challenges by providing a more accurate and interactive shopping experience for customers. By allowing customers to virtually try on a product using augmented reality technology, we aim to help customers make informed purchase decisions with confidence. Our virtual try-on system will offer a more engaging shopping experience, reducing the need for physical fitting rooms and try-on sessions, and ultimately increasing customer satisfaction with online shopping.

6. Proposed System Design

A) Live imaging of the human model, resizing of the live cam window:

1. The system would use a camera to capture live videos of the user.

2. The captured video would be displayed in a resizable window in the user interface.

3)The user would be able to resize the window to their preference using the user interface tools.

B) Images of T-shirts, reading the image according to their formats, resizing of input image:

1)The system would contain a database of T-shirt images in various formats (JPEG, PNG, etc.).

2)The system would be able to read and import the T-shirt images from the database.

3)The imported T-shirt images would be resized to fit the virtual model using advanced image processing techniques.

C) Extraction of body landmarks using PoseDetector, overlapping the clothing image on a live human model using OpenCV2, final try-on output:

1)The system would use a PoseDetector algorithm to extract body landmarks from the live video of the user.

2)The system would use these body landmarks to generate a virtual model of the user.

3)The T-shirt images would be overlapped onto the virtual model using OpenCV2, taking into account the size and orientation of the T-shirt and the position and orientation of the virtual model.

The system would render the final try-on output in real-time, using advanced 3D modeling and animation techniques to ensure that the T-shirt appears realistic and accurate on the virtual model.

The user would be able to view the final try-on output in the resizable window of the user interface and make adjustments to the T-shirt and virtual model as desired.

Overall, the proposed system design for a virtual try-on system would aim to provide a seamless and intuitive user experience, while also leveraging advanced technology and algorithms to ensure accurate and realistic visualizations of clothing items on a virtual model. The system would allow for flexibility and customization, while also providing valuable data and insights for improving the system in the future.

7. Algorithm Discussed

Object Detection: Object detection algorithms can be used to detect the user's body in the captured images.

Image Segmentation: Image segmentation algorithms can be used to extract the user's body region from the background in the captured images.

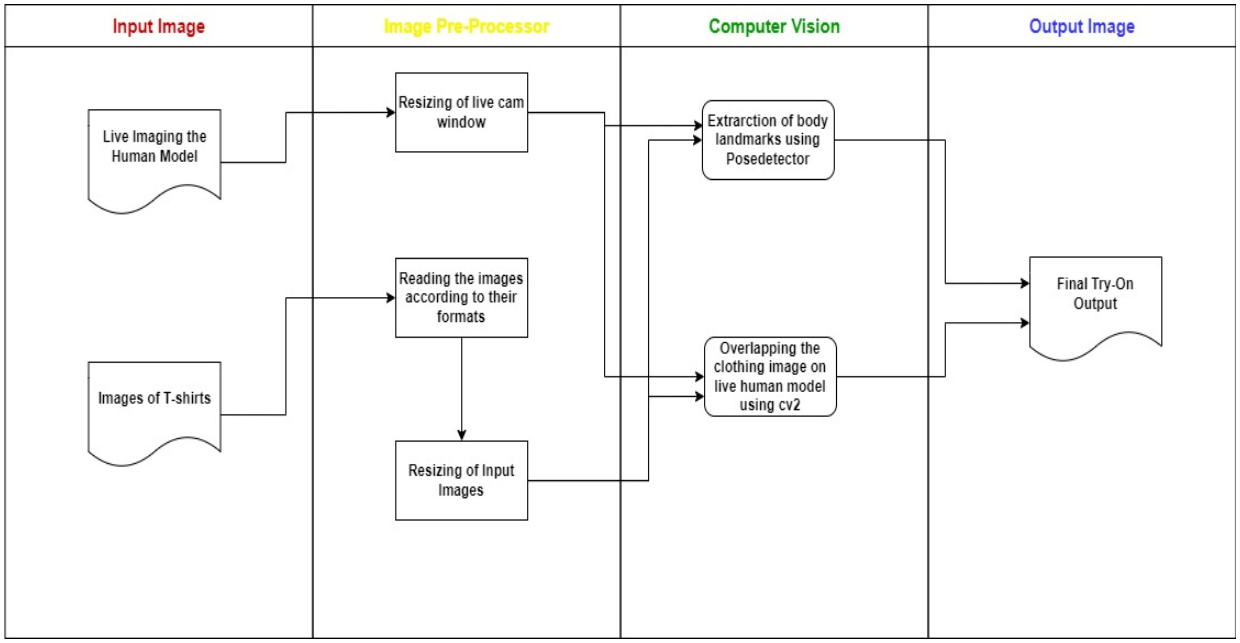
Feature Extraction: Feature extraction algorithms can be used to extract relevant features of the user's feet, such as the length, width, and curvature.

3D Modeling: 3D modeling algorithms can be used to create a 3D model of the user's feet from the captured images.

Augmented Reality: Augmented Reality (AR) algorithms can be used to render 3D models of the selected shoes onto the user's body.

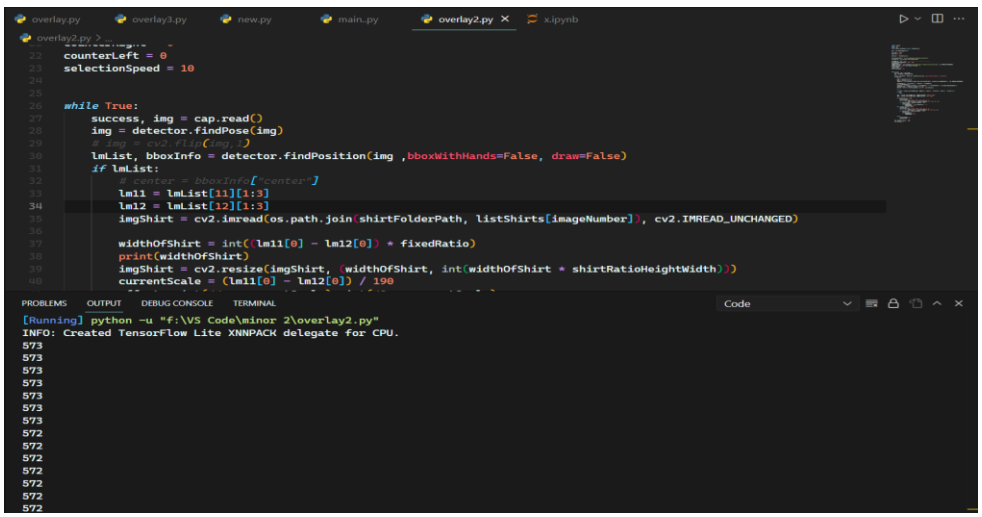
Deep Learning: Deep Learning algorithms can be used to improve the accuracy of the virtual try-on system. For example, Convolutional Neural Networks (CNNs) can be used for object detection and image segmentation, while Recurrent Neural Networks (RNNs) can be used for generating personalized shoe recommendations based on user data.

8. UML Diagram



9. Result and Discussion

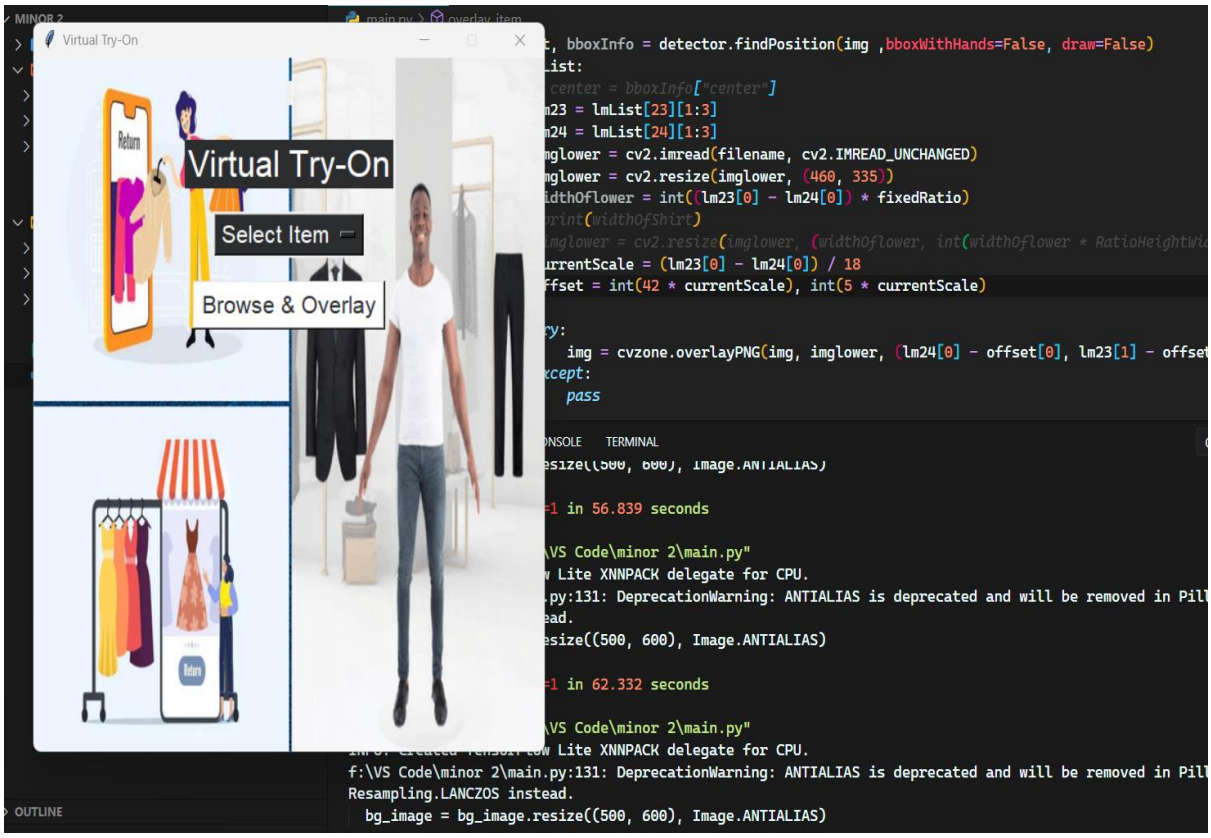
Code with terminal output:

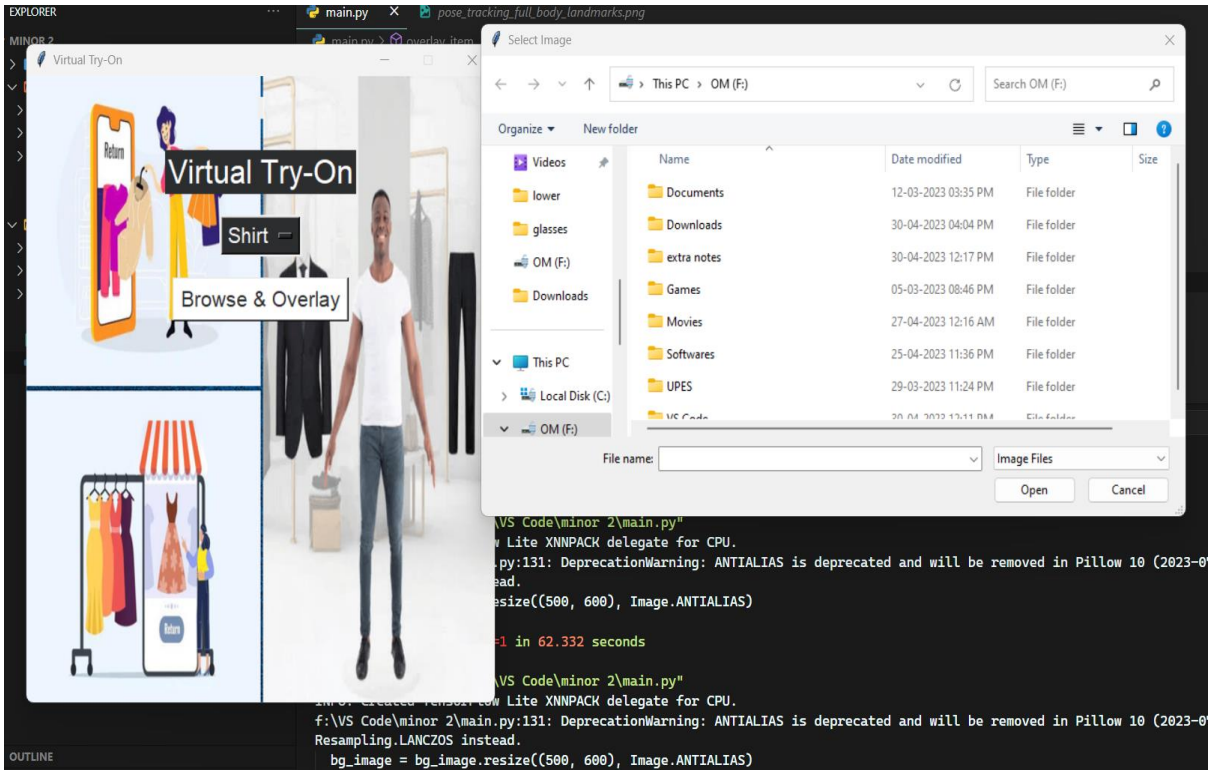


We can overlay 3 items t-shirts, lowers, and glasses.

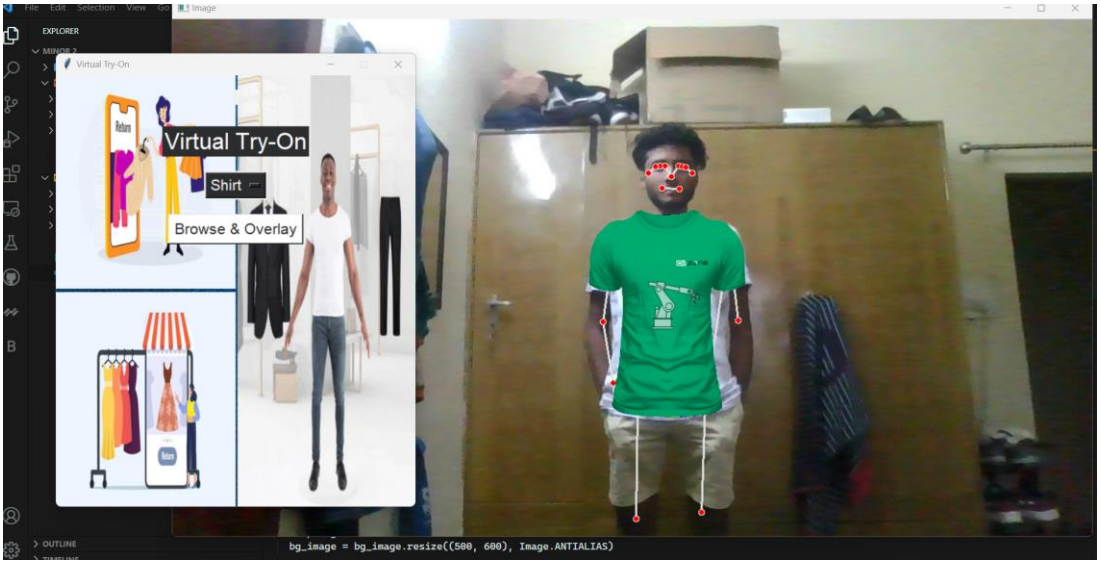
The accuracy of fitting the clothing items is still a required improvement.

Some screenshots of outputs of landmarks detection and image overlaying:

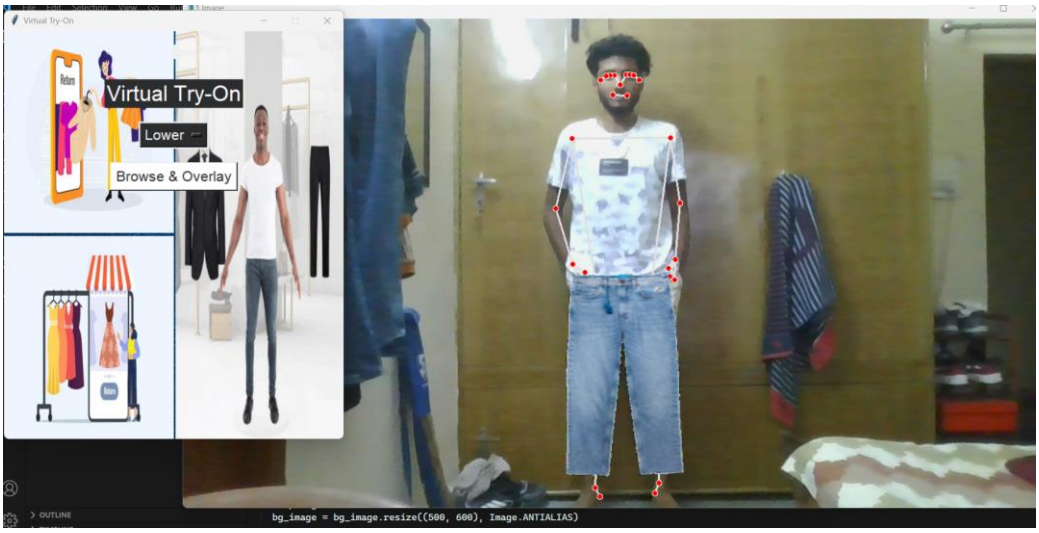




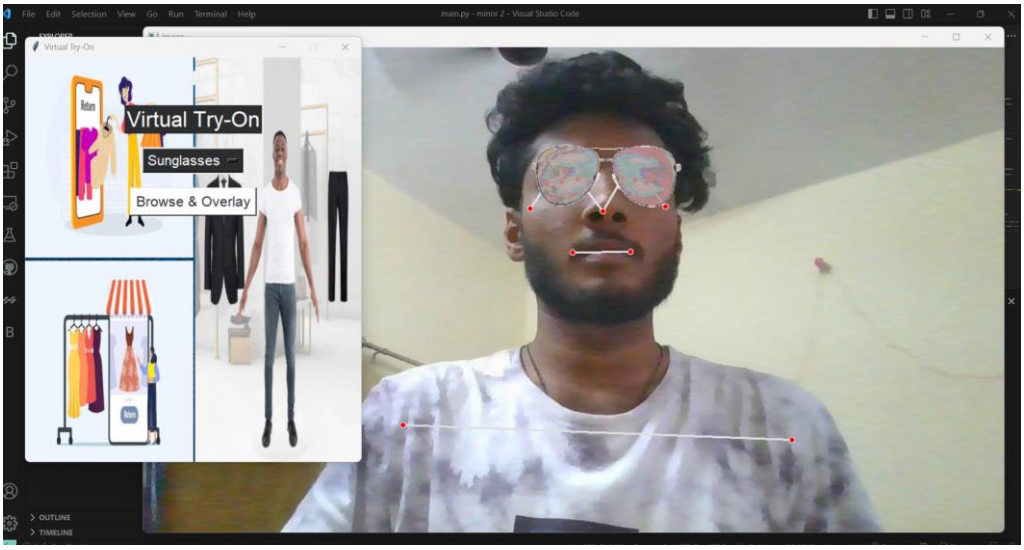
Try-on for T-shirt



Try-on for Lower



Try-on for glasses



10. Conclusion

The field of virtual try-on technology is still relatively new, and researchers are still exploring the best techniques and methods for accurately simulating the appearance of clothing on a virtual model. One of the main challenges is accurately capturing the shape and movement of clothing, which can vary greatly depending on the material, cut, and style.

Moreover, there are also challenges in accurately simulating the appearance of clothing on different body types and skin tones, which requires a large and diverse dataset of virtual models.

However, virtual try-on technology has great potential to revolutionize the fashion industry and improve the online shopping experience for consumers. By enabling users to see how clothing looks on a virtual model before making a purchase, it can reduce the need for returns and improve overall customer satisfaction.

To improve the accuracy of virtual try-on technology, researchers can work on developing more advanced 3D modeling and animation techniques. They can also collect more diverse and comprehensive datasets of virtual models to ensure that the technology works well for a wide range of users. Additionally, embedding virtual try-on technology into e-commerce platforms and mobile apps can make it more accessible and convenient for users, leading to broader adoption and usage.

11. Future Work

Improving accuracy: Developing better algorithms for fitting clothing to virtual models, improving fabric physics simulations, and using more advanced 3D scanning technologies to gather precise measurements.

Expanding product catalogs: Expanding the range of products that can be tried on virtually, including accessories and other types of apparel.

Augmented Reality: Utilizing augmented reality technologies to allow users to see themselves in virtual clothing in real-time, using their smartphone cameras.

Virtual Styling: Developing tools that use machine learning algorithms to suggest clothing items and styles that complement the user's body shape, skin tone, and other physical attributes.

Virtual showrooms: Creating virtual showrooms that allow users to explore and interact with the products in a more immersive and engaging way.

Virtual fashion events: Creating virtual fashion events that allow users to try on the latest fashion designs in real time, using virtual reality technologies.

12. References

[1]https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8719115

[2] https://arxiv.org/ftp/arxiv/papers/1810/1810.10148.pdf

[3]https://openaccess.thecvf.com/content_cvpr_2018/papers/Han_VITON_An_Image-Based_CVPR_2018_paper.pdf

[4] https://www.youtube.com/watch?v=6C7R24-Ze10

13. Plagiarism Statement

This project was written by me and in my own words, except for quotations from published and unpublished sources which are clearly indicated and acknowledged as such. I am conscious that the incorporation of material from other works or a paraphrase of such material without acknowledgement will be treated as plagiarism, subject to the custom and usage of the subject, according to the University Regulations on Conduct of Examinations. The source of any picture, map or other illustration is also indicated, as is the source, published or unpublished, of any material not resulting from my own experimentation, observation or specimen-collecting.

(Name) (Signature)