"Virtual Mirror -A Hassle-Free Approach to Trial Rooms"

A PROJECT REPORT

Submitted in partial fulfillment for the award of the degree of

BACHELOR OF TECHNOLOGY

Submitted to

Dr. Babasaheb Ambedkar Technological University, Lonere.

Submitted By

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CERTIFICATE

This is to certify that the Project entitled " Virtual Mirror - A Hassle-Free Approach to Trial Room" submitted by Miss. Darshana Vinod Katre , Miss. Dhanashri Sanjay Kate, Miss. Saniya Firoz Sayyad , Miss. Samiksha Suresh Raut is a record of the bonafide work carried out by them, under my guidance, and it is approved for the partial fulfillment of requirement of Dr. Babasaheb Ambedkar Technological University, Lonere for the award of the degree Bachelor of Technology (Computer Science and Engineering).

Mr. Ketan Jadhav	**Dr. S. V. Balshetwar**	**Dr. P. R . Badadapure**
Guide	**HOD**	**Principal**
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(External Examiner)

Place:- Satara

Date:-

Declaration by Student(s)

This is to declare that this report has been written by us. No part of the report is plagiarized from other sources. All information included from other sources has been duly acknowledged. We aver that if any part of the report is found to be plagiarized, we shall take full responsibility for it.

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CONTENTS

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We take this opportunity to express my sincere thanks to my guide **Mr. Ketan Jadhav** for her guidance, support, encouragement and advice. We will forever remain grateful for the constant support and guidance extended by our Guide, in making this mega project work.

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Last but not the least, We would like to thank all our Friends and Family members who have always been there to support and helped us to complete this mega project work in time.

ABSTRACT

The Virtual Mirror - A Hassle-Free Approach to Trial Room project aims to provide a virtual clothing try-on system that eliminates the need for physical fitting rooms. Using deep learning and computer vision, the system captures the user's body shape and posture in real-time and overlays clothes on their image to show how garments will fit. This technology is designed for both retail stores and online shopping platforms, offering a more convenient and accurate shopping experience.

By allowing customers to virtually try on clothes, the system reduces the time spent in stores and lowers return rates due to size and fit issues. Future improvements could include augmented reality (AR) for a more immersive experience, and AI for personalized recommendations. Ultimately, the system aims to improve customer satisfaction and streamline the shopping process, revolutionizing both online and in-store shopping experiences.

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Chapter 1

Introduction

The "Virtual Mirror" project introduces a cutting-edge solution aimed at transforming the traditional shopping experience. As e-commerce continues to grow and retail spaces innovate, the need for efficient and engaging ways to try on clothes has become critical. This system allows customers to virtually try on outfits without needing a physical fitting room, using advanced deep learning techniques to ensure realism and accuracy. By capturing the customer's image, the Virtual Mirror overlays digital representations of various clothing items in real time, adjusting for the user's body shape, size, and posture.

Designed for implementation in retail stores and online platforms, this system seeks to bridge the gap between physical and digital shopping. The project prioritizes a user-friendly interface and realistic garment visualization, accommodating a wide range of clothing types such as tops, pants, dresses, and accessories. Additionally, the integration of augmented reality (AR) is explored to offer a more immersive, interactive experience, making shopping not only convenient but enjoyable.

This innovative solution addresses critical challenges like lengthy fitting room queues, frequent returns in online shopping, and the inefficiencies of traditional trial rooms. By enabling faster decision-making, improving customer satisfaction, and enhancing store efficiency, the Virtual Mirror has the potential to redefine modern retail. It represents a step forward in combining deep learning and augmented reality to create a seamless and hassle-free shopping journey for customers and retailers alike.

CHAPTER 2

Literature Survey

Chapter 2

Literature Survey

1. 3D Grid-Based Virtual Trial Room

Authors: Feng Lu, Xiaojing Huang, and Ming Lei.

This paper a digital environment that allows users to virtually try on clothes, accessories, or other products using a 3D interface. These virtual trial rooms are a significant advancement in e-commerce, providing an immersive and interactive experience for online shoppers. The technology behind 3D gridbased systems enables the visualization of products in three-dimensional space, enhancing the accuracy and engagement of the virtual fitting room experience. The literature on this topic explores various facets, from the technological frameworks and algorithms used to design such systems to their impact on consumer behavior and retail industries.

2. Snapwear: A Snapchat AR Filter for the Virtual Try-on of Real Clothes

Authors: Konstantinos Oikonomou, Elisavet Chatzilari, Spiros Nikolopoulos

The Snapwear paper examines the use of augmented reality (AR) filters in Snapchat for virtual clothing try-ons. It integrates machine learning with AR technology to offer real-time, realistic clothing simulations, enhancing the online shopping experience. The paper builds on previous research (Zhao et al., 2020; Zhou et al., 2021) on AR and GANs for virtual try-ons. By enabling users to visualize clothes directly on their bodies, it addresses limitations in traditional fitting rooms and e-commerce. This approach aligns with the growing trend of using AR for interactive, immersive retail experiences (Choi et al., 2020; Yu et al., 2022).

3.A Review on Virtual Reality for 3D Virtual Trial Rooms

Authors: Debangana Ram, Bholanath Roy, Vaibhav Soni

The paper A Review on Virtual Reality for 3D Virtual Trial Rooms explores the use of virtual reality (VR) in creating immersive 3D environments for virtual try-ons, aiming to enhance online shopping experiences. It reviews various techniques for body measurement, garment fitting, and accurate 3D model rendering. Key topics include VR's potential in creating personalized, interactive shopping experiences, using machine learning to improve garment fitting, and overcoming challenges such as ensuring realistic clothing simulation and user immersion. The paper examines existing VR

solutions and their effectiveness, contributing to the development of advanced virtual trial rooms for both retail and consumer applications

4. Deep Learning in Virtual Try-On: A Comprehensive Survey

Authors: Tasin Islam, Alina Miron, Xiaohui Liu, and Yongmin Li.

The paper "Deep Learning in Virtual Try-On: A Comprehensive Survey" provides an extensive review of the current landscape of virtual try-on (VTO) systems, particularly those based on deep learning. The literature survey discusses various deep learning models used in virtual try-on systems, categorizing them into three main types: image-based, multi-pose, and video-based models. Each of these models is explored in terms of their functionality, dataset requirements, and the specific challenges they address in garment fitting and image synthesis. Previous studies have leveraged generative adversarial networks (GANs) and other deep learning architectures to create realistic clothing simulations, but challenges remain in areas like maintaining clothing characteristics, texture mapping, and ensuring accurate garment fitting. Research has also highlighted issues like dataset bias, especially in terms of gender and model diversity, which affect the generalizability of these systems across different body types and environments.

5. Image-to-Image Attire Transfer for Virtual Trial Rooms

Authors: S. Sanzam, S. G. Das, Sifat-Ul-Alam, M. I. Jubair, and M. F. Ahmed.

The paper "Image-to-Image Attire Transfer for Virtual Trial Room" discusses the use of image-to-image translation techniques, specifically applying them to virtual trial rooms for clothing visualization. The literature survey in the paper reviews various approaches to virtual try-ons, primarily focusing on image processing and generative models like Generative Adversarial Networks (GANs) to superimpose clothes onto a user's image. Previous studies in the field have explored methods like 3D body modeling, pose estimation, and the integration of augmented reality (AR) to improve the accuracy and realism of virtual trials (Zhao et al., 2020; Zhou et al., 2021). This paper emphasizes the challenges in achieving realistic clothing simulation, especially in terms of texture, lighting, and fit across different body types. Image-to-image translation models have been shown to provide high-quality results in style transfer applications, but challenges like maintaining clothing realism during movement and fitting remain. Research has also indicated the importance of user body shape recognition and image synthesis for more interactive, immersive shopping experiences (Yu et al., 2022; Saito et al.,

2020).proposal, the design concept showed potential abilities of empowering users with travelling on their own. The proven concept initiated a start of a series of future work for possible implementations.

6. Smart Virtual Trial Room for the Apparel Industry

Authors: Soltani, Zarzour, and Babahenini.

The paper "Smart Virtual Trial Room for the Apparel Industry" reviews various technologies and approaches to creating virtual fitting rooms that enhance customer experiences in online shopping. The literature survey highlights advancements in augmented reality (AR), machine learning, and 3D modeling, emphasizing their roles in virtual try-on systems. Previous studies have focused on solving key challenges, such as body shape recognition, accurate garment simulation, and improving realism in virtual environments (Zhou et al., 2021; Zhao et al., 2020). Research by Choi et al. (2020) and Yu et al. (2022) has shown how pose estimation and personalized fitting can lead to more immersive, interactive retail experiences. Additionally, data analytics is explored as a way for retailers to track customer preferences and optimize inventory management.

7. Virtual Trial Room using Deep Learning

Authors: Sangareddy B Kurtakoti, Kavana V, Manasa T Y, Mayuk Gowda A.

The paper virtual trial rooms using deep learning emphasizes various methods for realistically simulating clothing fit. Early approaches like VITON use image-based techniques to simulate outfits on a person’s body, eliminating the need for 3D modeling. More advanced systems, such as Multi-Garment Net, combine 3D garment meshes with body pose information for more accurate clothing representation. Techniques like body segmentation, depth estimation, and real-time pose adaptation have been explored to improve realism. Additionally, augmented reality (AR) is being integrated into virtual trial systems, offering an immersive and interactive shopping experience that enhances convenience and satisfaction for users. These advancements aim to bridge the gap between online and in-store shopping by making virtual fitting rooms more accurate, accessible, and engaging.

CHAPTER 3

System Specification

Chapter 3

System Specification

Software Requirements:

- ➢ Operating system : Windows 10 and above
- ➢ Fr ont End : HTM L/CSS
- ➢ Back End : Python/Flask
- ➢ Tool : Visual Stud io 2022.3.1

Hardware Requirements:

- ➢ Process : Intel I3 3.80 GHz
- ➢ Hard Disk : 1 TB
- ➢ Monitor : 15 VGA Color
- ➢ Ram : 8 GB

CHAPTER 4

Block Diagram

Chapter 4

Block Diagram

Block Diagram:

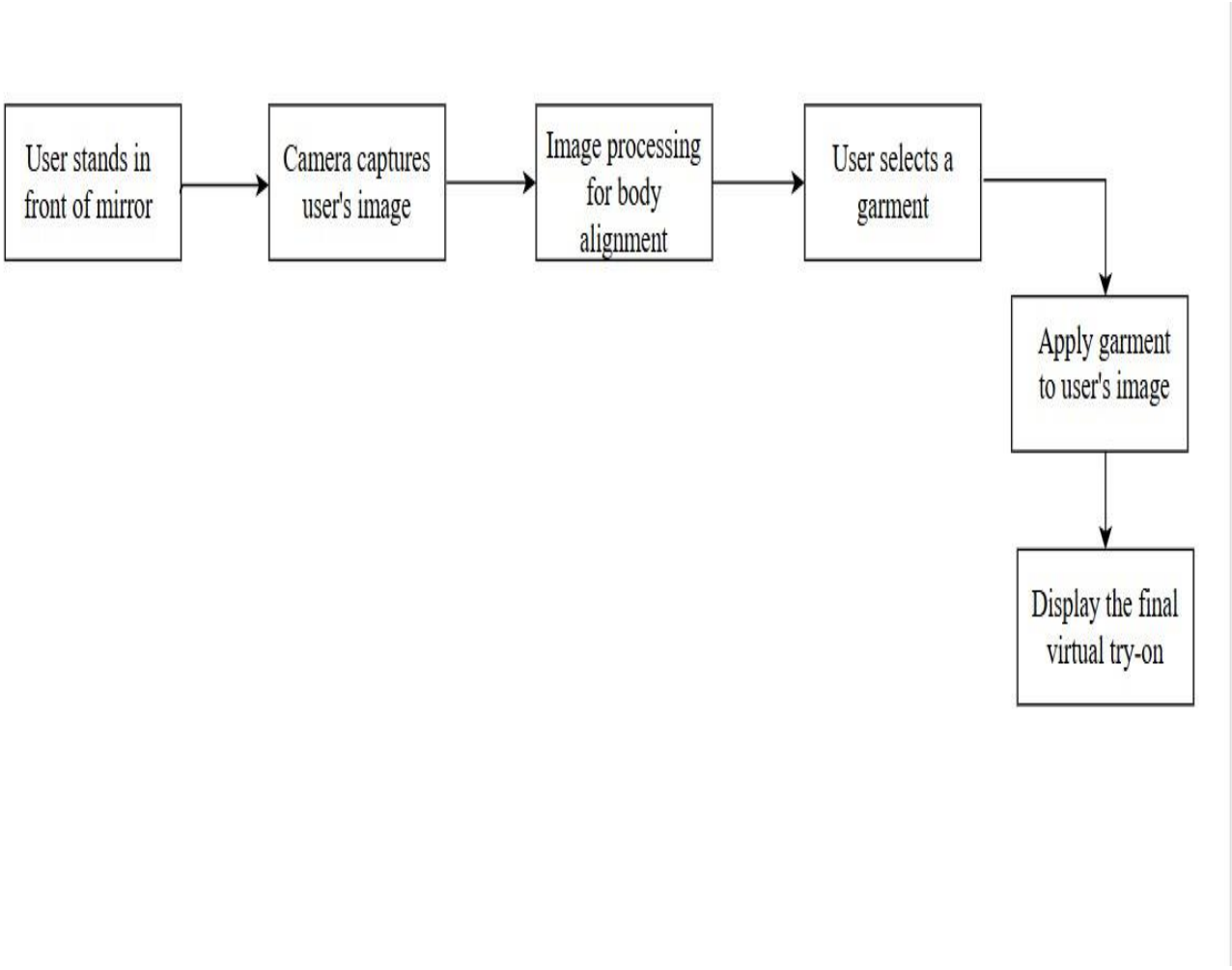

Figure 4.1: Block diagram

CHAPTER 5

System Design

Chapter 5

System Design

DFD:

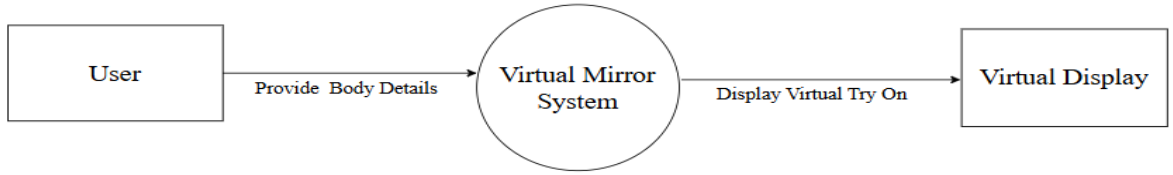

Figure 5.1: Level 0 Data flow diagram

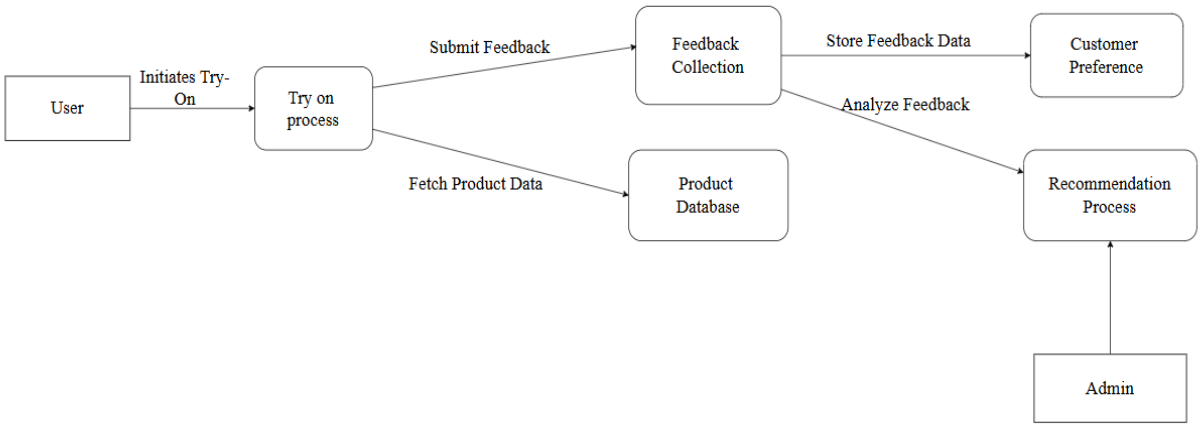

Figure 5.2: Level 1 Data flow diagram

Flow Diagram:

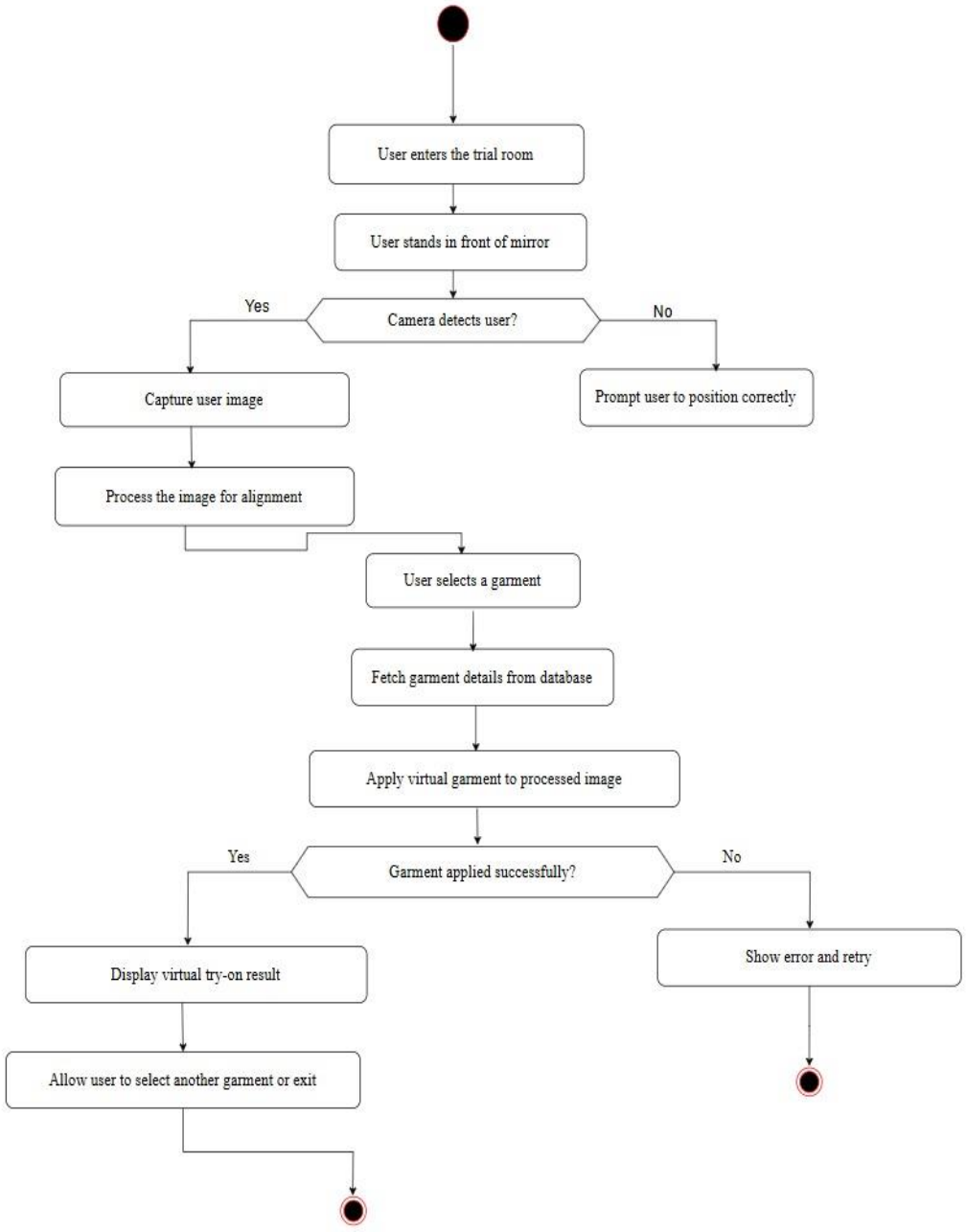

Figure 5.3: Flow diagram

UML diagram:

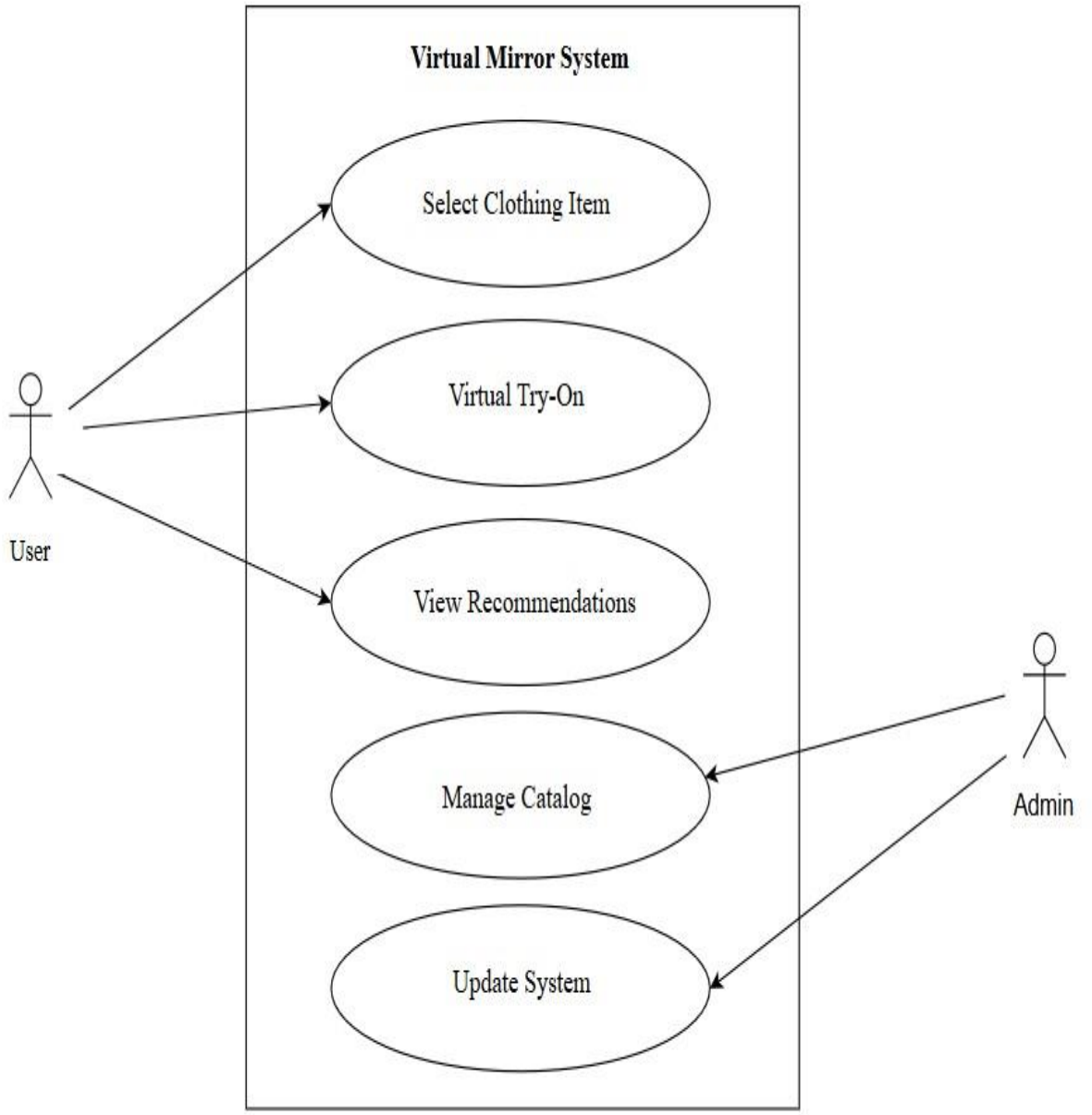

Figure 5.4: UML diagram

CHAPTER 6

Software Development

Chapter 6

Software Development

Problem statement:

Virtual Mirror - A Hassle-Free Approach to Trial Room addresses the challenges of traditional shopping, such as the inconvenience of physical fitting rooms and the difficulty of visualizing clothing in online shopping. These issues often lead to customer dissatisfaction and high return rates. This project proposes a solution by developing a virtual system that uses deep learning to allow customers to try on clothes virtually. By providing realistic and accurate outfit visualizations, it enhances the shopping experience, making it faster, more convenient, and satisfying for customers.

Proposed work**:**

The proposed work for Virtual Mirror - A Hassle-Free Approach to Trial Room involves developing a system that allows customers to try on clothes virtually using deep learning algorithms. The system will capture the user's body shape, size, and posture in real-time and overlay chosen outfits for accurate visualization. It will feature an intuitive interface for easy interaction and include augmented reality (AR) to enhance realism. Designed for both retail stores and online shopping platforms, the system aims to improve the shopping experience by eliminating the need for physical fitting rooms, reducing return rates, and enhancing customer satisfaction.

Future Scope:

1. **Advanced Body Measurements**: Enhance the system to provide precise measurements for personalized size recommendations and custom tailoring.

2. **Multi-User Interactions**: Enable real-time feedback from friends, family, or stylists during virtual try-on sessions.

3. **E-Commerce Integration**: Seamlessly connect with online retail platforms to bridge the gap between physical and virtual shopping experiences.

CHAPTER 7

Troubleshooting / Debugging

Chapter 7

Troubleshooting / Debugging

Activation Failure:

Issue: The virtual trial room system fails to activate or display the mirror functionality..

Debugging Steps:

Check Camera Connection: Ensure the camera is properly connected and recognized by the system. Test with different cameras if necessary.

Verify Camera Access Permissions:
Ensure the app or web platform has the correct permissions to access the camera.
Test Camera Feed: Use a standalone camera test app to verify that the camera feed is clear and functional before it is integrated into the trial room system.

Image Quality Issues:

Issue: The image quality in the virtual mirror appears blurry, pixelated, or distorted.

Debugging Steps:

Check Camera Resolution: Ensure that the camera is set to an appropriate resolution (1080p or higher) and that the feed is clear before processing.

Verify Image Preprocessing: Check if any image preprocessing techniques (e.g., noise reduction, sharpness) are correctly applied to enhance the clarity of the video feed.

Test in Different Lighting Conditions: Ensure that lighting is sufficient and balanced, as poor lighting can degrade image quality..

CHAPTER 8

Conclusion

Chapter 8

Conclusion

The Virtual Mirror - A Hassle-Free Approach to Trial Room provides an innovative solution to modern shopping challenges by allowing customers to try on clothes virtually. Using deep learning and augmented reality, it enhances convenience, reduces the reliance on physical fitting rooms, and improves customer satisfaction. This project bridges the gap between online and in-store shopping, offering a seamless and engaging experience. With potential for further advancements, it sets the stage for transforming retail practices in the fashion industry.

CHAPTER 9

References

REFERENCES

A] Papers & Conference:

1. X. Han, Z. Wu, Z. Wu, R. Yu and L. S. Davis, "Viton: An image-based virtual try-on network", Proceedings of the IEEE conference on computer vision and pattern recognition, pp. 7543-7552, 2020.
2. Lens studio 3d body tracking, 2021
3. F. Isikdogan and G. Kara, “A Real Time Virtual Dressing RoomApplication using Kinect”, Cmpe537 Computer Vision Course Project, Bogazici University, January2019
4. Islam, T., Miron, A. D., Liu, X., and Li, Y. (2024). Deep Learning in Virtual Try-On: A Comprehensive Survey. IEEE Access, 12, 29475-29502
5. N. Palanivel et al., “Recommendation System Based Smart Shopping Cart”, International Journal of Emerging Technologies and Innovative Research, ISSN:2349-5162, Vol.7, Issue 5, page no.908-914, 2020
6. Cabrera Maria E1, Novak Keisha2, Foti Daniel2, Voyles Richard3 and Wachs Juan P1 1 School of Industrial Engineering, Purdue University, West Lafayette, IN. USA 2 Department of Psychological Sciences, Purdue University, West Lafayette, IN. USA 3 Engineering Technology, Purdue University,
7. Thibaut Issenhuth, Jer´emie Mary, and Cl ´ement Calauz ´ enes. ` Do not mask what you do not need to mask: a parser-free virtual try-on. In Proceedings of the European Conference on Computer Vision, 2020.
8. Lizhen Wang, Xiaochen Zhao, Tao Yu, Songtao Wang, and Yebin Liu. Normalgan: Learning detailed 3d human from a single rgb-d image. In Proceedings of the European Conference on Computer Vision, 2020.
9. Han Yang, Ruimao Zhang, Xiaobao Guo, Wei Liu, Wangmeng Zuo, and Ping Luo. Towards photo realistic virtual try-on by adaptively generating preserving image content. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, pages 7850–7859, 2020.
10. J.-Y. Zhu, T. Park, P. Isola and A. A. Efros, "Unpaired image-to-image translation using cycle-consistent adversarial networks", Proceedings of the IEEE international conference on computer vision, pp. 2223-2232, 2021.

Web Sites:

1. https://ijisrt.com/assets/upload/files/IJISRT23MAY1372.pdf
2. https://ieeexplore.ieee.org/document/9585808/references#references
3. https://ieeexplore.ieee.org/document/10690570/authors#authors
4. https://ijrar.org/papers/IJRAR22B2233.pdf
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7. https://www.researchgate.net/profile/Malhar_Bangdiwala/publication/371879709_ML-Based_Retail_Innovations_Virtual_Fitting_Scanning_and_Recommendations/links/64a50282c41fb852dd513002/ML-Based-Retail-Innovations-Virtual-Fitting-Scanning-and-Recommendations.pdf?origin=publication_detail