# VIR-TRIAL

## {virtual trial room}

A Capstone Project report submitted

in partial fulfilment of requirement for the award of degree

**BACHELOR OF TECHNOLOGY**

in

**SCHOOL OF CS&AI**

by


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# CERTIFICATE

This is to certify that this project entitled **“VIR-TRIAL**" is the Bonafide work carried out by **Kusuma. Suhani, Appala. Deepthi, Fariha Maheen, Thipirishetty. Saipallavi, Chavanaboyina. Nikitha** as a Capstone Project for the partial fulfillment to award the degree **BACHELOR OF TECHNOLOGY** in **School of Computer Science and Artificial Intelligence** during the academic year 2024-2025 under our guidance and Supervision.

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# TABLE OF CONTENTS


| S.NO | TITLE | PAGENO |
|---|---|---|
| 1 | Abstract | 1 |
| 2 | Introduction | 2 |
| 2.1 | Problem Statement | 2 |
| 2.2 | Objective | 2 |
| 2.3 | Existing System | 2-3 |
| 2.4 | Proposed Solution | 3 |
| 2.5 | System Architecture | 3-6 |
| 3 | Literature Survey | 7 |
| 4 | Software Requirements Specification | 8 |
| 4.1 | Purpose | 8 |
| 4.1.1 | Problem/Requirement Analysis | 8 |
| 4.1.2 | Requirement Specification | 8 |
| 4.2 | Scope | 8 |
| 4.3 | Functional Requirements | 8-9 |
| 4.3.1 | Detecting and Sizing the Body | 9 |
| 4.3.2 | Face Detection | 10 |
| 4.3.3 | Edge Detection | 10-11 |
| 4.4 | Software Requirements | 11 |

| | | |
|---|---|---|
| 4.5 | Hardware Requirements | 11 |
| 4.6 | Feasibility Study | 11 |
| 4.6.1 | Technical Feasibility | 12 |
| 4.6.2 | Economical Feasibility | 12 |
| 5 | Result, Conclusion, Future Scope & References | 13-18 |

# List of Figures


| FIGURE NO | NAME | PAGE |
|---|---|---|
| 2.1 | Architecture Diagram | 5 |
| 2.2 | Block Diagram of Developer Processing | 5 |
| 2.3 | Block Diagram of User Flow | 6 |
| 4.3.1 | Detecting and Sizing the body | 9 |
| 4.3.2 | Face Detection | 10 |
| 4.3.3 | Edge Detection | 11 |
| 5.1 | Home page | 13 |
| 5.2 | Women and Men page | 13 |
| 5.3 | Men page | 14 |
| 5.4 | Accessories page | 14 |
| 5.5 | Add to cart | 15 |
| 5.6 | output frame of user trying different clothes | 15 |

# 1.ABSTRACT

Online shopping is fast growing business all over the world but in some cases, users refund products because of lack of clarity about product (i.e., how they look after wearing them). Cloth shopping can be very tricky in online since you can't try on and check whether the outfit suits you or not before you buy. To overcome the above delimit we came up with the idea, a real time virtual trialling mechanism, which allows the user to check and see the dress virtually before buying it.

1. Innovation in Online Retail Shopping – virtual trial rooms

2. Enriched Shopping Experience like never before!

3. High Customer engagement for best choices in less time.

4. High Sales turnover – enhanced profits.

5. Helps customers in making their decisions faster and better

To take care of this issue, we choose to construct an Online Trial Room Application titled as VIR-TRIAL. Our project depends on making an application which takes a video of the client utilizing the web camera and then after divide the video into separate frames from which it extracts the client's body. At long last utilizing capacities to separate data on the situation of joints in the body and to change, pivot, and scale the wearable picture onto the client continuously. In the writing audit, we experience different approaches to accomplish our objective with their favourable circumstances and hindrances.

Vir trial is an innovative virtual try-on platform that enables users to visualize how clothing, accessories, and jewellery will look on them in real-time using their device's camera. By leveraging augmented reality (AR) technology, Vir trial creates an interactive and immersive shopping experience. Users can select items from a diverse catalogue and see them superimposed on their live image, offering a personalized and accurate representation of fit and style without the need to visit a physical store. This platform enhances convenience, reduces return rates, and transforms the online shopping experience into an engaging, tailored journey.

## 2. INTRODUCTION

Shopping for wearables online can often feel risky since customers are unsure how the items will look on them. Traditional retail shopping also demands significant time and effort, as it involves visiting stores and physically trying on multiple items in fitting rooms. To address these challenges, we propose an innovative solution – **VIR-TRIAL**, a virtual trial room application that enhances the online shopping experience by digitizing the trial process.

Our system utilizes **OpenCV** and body-detection algorithms to extract and track body and facial landmarks in real-time. Users can simply activate their webcam, select a product, and see a superimposed, realistic view of the item on their body. Key features of this system include:

- **Real-Time Results**: The system processes video frames live, extracting body data and overlaying the selected wearable item.
- **Cost-Effective and Platform-Independent**: The application requires no additional hardware and works on any device with a camera and internet access.
- **Seamless User Experience**: The superimposed items adapt dynamically to the user's movements, providing a realistic and interactive trial experience.

The primary challenge of this project was achieving accurate and realistic superimposition of wearables onto users. However, our use of advanced computer vision techniques like **MediaPipe** and **OpenCV** ensured high precision in landmark detection and real-time adjustments. This approach enables users to make confident purchasing decisions while reducing product returns, ultimately revolutionizing the online shopping experience.

## 2.1 Problem statement

With the rapid growth of e-commerce, customers often face challenges in visualizing how clothes, accessories, or other wearable items will look and fit before making a purchase. Traditional static product images fail to provide an interactive or realistic representation, leading to dissatisfaction and increased product returns.

## 2.2 Objective

The goal is to develop an Online Virtual Trial Room that uses augmented reality (AR) technology to provide users with a realistic virtual try-on experience for clothing, accessories, and jewellery. This system will dynamically detect and size the user's body, overlay selected items accurately, and adapt to user movements in real time.

## 2.3 Existing system

Existing technique which is in a standard solicitation is using Microsoft's Kinect and Asus Xian contraptions. In this when the individual stands before the screen which can't avoid being which is with a Kinect scanner it distinguishes the human body according to its bearings and set up a human skeleton as indicated by that. As soon the structure is made a 3D model of the customer is prepared.

The Kinect helps in sifting the customer estimations. To change the 3D pieces of clothing to the model, 3D regions of the joints are used for arranging, scaling and turning. PC plans empower us to show and breathe life into virtual individuals. To reproduce individuals requires progressing insight and action, considering objectives on the data used for these virtual individuals addressing customers.

## 2.4 Proposed System

In the proposed framework, we will depict a straightforward and proficient Trial Room with virtual utilization. This application encourages the client to imagine his/her own clothing without really wearing it. At first, the client needs to confront the camera which centre the client's picture and fits different ensembles to it and presentations. This essentially causes the client to know his/her decision effectively and gives a more prominent degree of fulfilment.

## 2.5 System Architecture

### 1. Introduction to the Design Phase

The design phase is a crucial step in software development, where the focus shifts from identifying the problem to planning a structured solution. This phase ensures that all requirements are addressed and prepares the foundation for subsequent stages like implementation, testing, and maintenance. The design phase impacts the overall quality of the software and plays a vital role in ensuring that the system functions as expected.

The primary output of this phase is the **Design Document**, which acts as a blueprint for the solution and is referred to throughout implementation, testing, and maintenance.

### 2. Overview of the Design Process

The design process is typically divided into two stages:

- **System Design**: Focuses on high-level planning, identifying modules, and specifying their roles.
- **Detailed Design**: Defines the internal structure and logic of each module.

### 3. System Design

System design, also known as high-level design, identifies the system's major components, defines their purpose, and specifies their interactions to produce the desired results.

#### Outputs of System Design

1. **Modules**: Identification and description of the system's main components.
    - In the virtual trial room system, modules include:
        - User interface
        - Body detection module
        - AR fitting module
2. **File Formats**: Specify input, output, and intermediate file formats.

- Example: Using .png for clothing items and .jpg for accessory images.

3. **Interfaces**: Describe interactions between modules.
    - Example: How the user interface interacts with the body detection module.

**System Design in Context**

For the virtual trial room:

- The system captures a user's webcam feed.
- Detects body and facial features using computer vision.
- Overlays selected items in real time using augmented reality.

**4. Detailed Design**

Detailed design defines the internal logic and data flow for each module specified in the system design. It provides a low-level perspective, focusing on individual components' functionality and interactions.

**Outputs of Detailed Design**

1. **Internal Logic of Modules**:
    - Define the functionality and flow within each module. ○ Example: The **AR fitting module** dynamically scales clothing items to fit the user's body proportions.
2. **Algorithms**: Specify the algorithms used in processing.
    - Example:
        - **Face Detection**: Locating and cropping the user's face.
        - **Edge Detection**: Enhancing accuracy for clothing overlays.
        - **Scaling**: Adjusting items to the user's body dimensions.

3. **Data Flow**: Describe how data is transmitted between modules.
    - Example: The webcam feed passes through the body detection module to identify key points, which are then used by the AR module for overlaying items. **Detailed Design in Context**

For the virtual trial room:

- The user selects an item via the interface.
- The system processes the selection and uses body detection to identify points for overlaying the item.

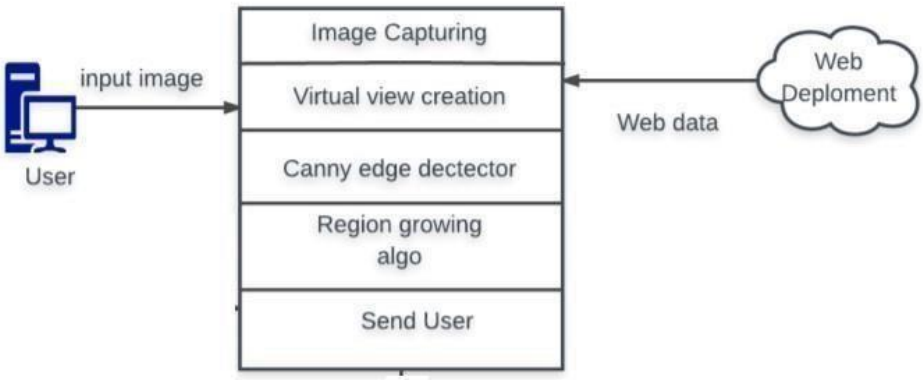


Figure 2.1: Architecture Diagram

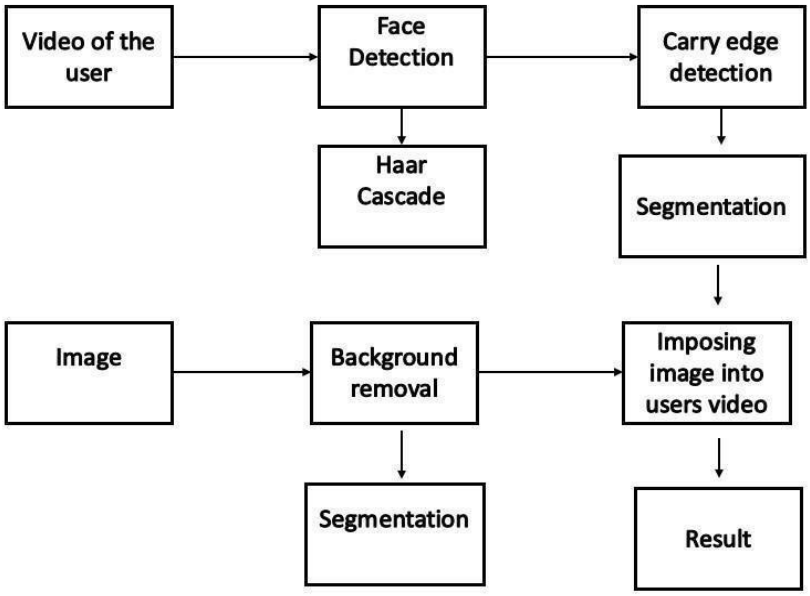


Figure 2.2: Block Diagram of Developer Processing.

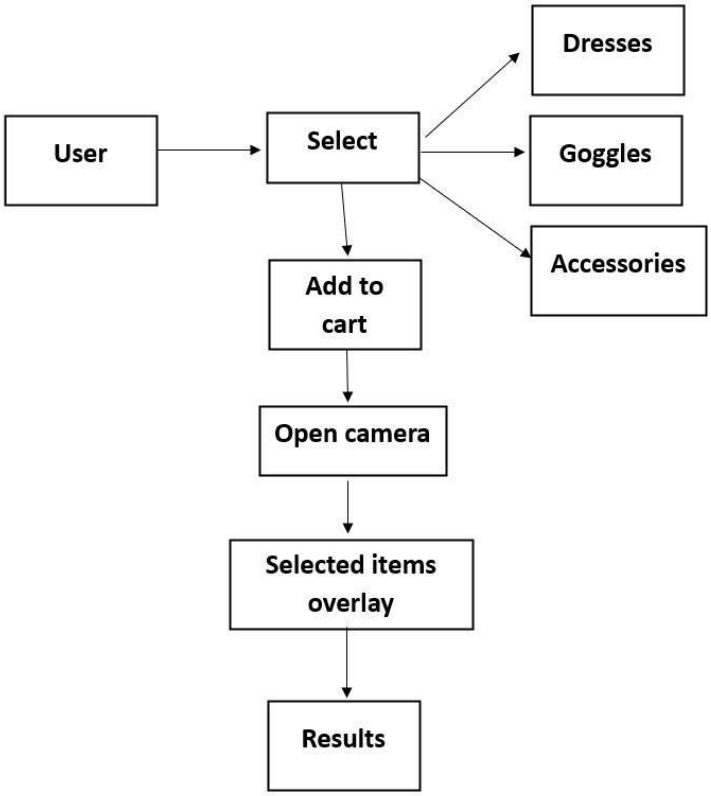


Figure 2.3: Block Diagram of User Flow

# 3.LITERATURE SURVEY

[1] The study "Applicability of a Single Depth Sensor in Real-Time 3D Clothes Simulation: Augmented Reality Virtual Dressing Room Using Kinect Sensor" (published in 2020) explores the use of a Kinect V2 sensor for capturing body measurements, combined with a Windows Presentation Foundation (WPF) application to process the data. This approach overlays 3D clothing models on users in real-time, achieving a realistic fitting with an error rate of less than 10%. While it improves the online shopping experience by enabling virtual try-ons, challenges arise with accurately measuring baggy clothing and shiny materials. Nonetheless, the method effectively simulates clothing with realistic physics, enhancing the fitting experience.

[2] Similarly, the "VICO-DR: A Collaborative Virtual Dressing Room for Image Consulting" (published in 2023) introduces a virtual dressing room that uses real-time cloth simulation to enhance the shopping experience. The system integrates a 3D avatar with a personalized consultant interface, providing an immersive experience. However, performance varies depending on hardware capabilities, and complex textures can cause delays in simulations. Despite these issues, the solution holds significant potential for effective garment selection and user satisfaction.

[3] On the other hand, "A Cost-Efficient Approach for Creating Virtual Fitting Room Using Generative Adversarial Networks (GANs)" (published in 2024) leverages machine learning algorithms and Convolutional Neural Networks (CNNs) to develop virtual trial rooms that enhance the online shopping experience. The use of smartphones makes it cost-effective and accessible, focusing on accurate fitting and convenience. However, challenges remain in the accuracy of measurements and user resistance to adopting new technology. Despite these challenges, the study concludes that virtual trial rooms can greatly improve online shopping by enabling users to assess garment fit effectively.

# 4. SOFTWARE REQUIRMENT SPECFICATION

## 4.1 Purpose

A software requirements specification (SRS) is a detailed description of a software system to be developed with its functional and non – functional requirements. The SRS is developed based on the agreement between customer and contractors. It may include the Use cases of how user is going to interact with software system. The SRS phase consists of two basic activities.

### 4.1.1 Problem/Requirement Analysis

Process is order and more nebulous of the two, deals with understand the problem, the goal and the constraints.

Problem Statement

It is always a risky process to purchase wearables online as there is always a question as to how the piece will look on its own. It also takes a lot of time to find products or necklaces offline through markets as we have to look for a store and then try each and almost every cloth by going inside the trial space.

### 4.1.2 Requirement Specification

Here, the focus is on specifying what has been found giving analysis such as representation, specification languages and tools, and checking the specifications are addressed during this activity. The Requirement phase terminates with the production of the validate SRS document. Producing the SRS document is the basic goal of this phase.

Role of SRS The purpose of the Software Requirement Specification is to reduce the communication gap between the clients and the developers. Software Requirement Specification is the medium though which the client and user needs are accurately specified. It forms the basis of software development. A good SRS should satisfy all the parties involved in the system.

## 4.2 Scope

SRS provides easy and seamless integration of business solutions with the Blockchain technology. We help simplify complex processes with innovative Blockchain and other technologies and it maintain the medical history of patient. The affordances of this new technology make it well suited to solving some of the most complex problems in health data, health financing, and health care. Consider specifically Protection of privacy, Protection against fraud, Interoperability across diverse systems and data formats.

### 4.3 Functional Requirements

Outputs from computer systems are required primarily to communicate the results of processing to users. They are also used to provide a permanent copy of the results for later consultation. The various types of outputs in general are:

External Outputs, whose destination is outside the organization,

Internal Outputs whose destination is within organization and they are the User's main interface with the computer.

Operational outputs whose use is purely within the computer department.

Interface outputs, which involve the user in communicating directly.

Understanding user's preferences, expertise level and his business requirements through a friendly questionnaire.

Input data can be in four different forms - Relational DB, text files, .xls and xml files. For testing and demo you can choose data from any domain. User-B can provide business data as input.

#### 4.3.1 Detecting and Sizing the Body

Beginning to advance of the proposed Online Virtual Trial Room procedure consists of 8acquiring the condition of the body, head or neck dependent upon the wearable to get reference centres. Reference centres are then used to sort out where to show the particular material or beautification. To procure the body shape, we applied a couple of procedures:

Filtering with thresholding, Canny edge revelation, K-means, and

Motion area or skeleton distinguishing proof wherein various edges were bankrupt down for any turn of events.

In any case, the results were dishonest and deficient to get reference centres for indicating the wearable. Subsequently, we introduced another acknowledgment reasoning reliant on finding the pith of the customer, changing a reference point at his/her neck and demonstrating the wearable subject to that point. Moreover, another viewpoint can be gotten by using an Augmented Reality (AR) marker. Notwithstanding the way that this was adequate for small apparel types like glasses or decorations yet it was satisfactorily not to design the articles of clothing onto the customer body. For getting the size of the customer, we follow a relative motorized body feature extraction procedure. After convolution, four channels are applied to recognize level, vertical and slanting edges in the readied picture. Morphological limits are similarly applied to get a closed blueprint. Finally, a 8-centers Freeman chain code is applied.

Figure:4.3.1 Detecting and Sizing the Body

### 4.3.2 Face Detection

As when the customer precedes the screen, to perceive the customer the discrete structure which is to be recognized is the face. Along these lines, to perceive the face, we use Haar incorporate based course classifiers. In haar classifier instead of using power assessments of the pixel, it uses the change then again values between adjoining social affairs of pixels. By then the change contrast between the pixel packs is used to choose the relative light and faint zones in the image. It is an AI approach. Subsequently, to work splendidly with the estimation the course work is set up from a lot of negative and positive pictures. A huge load of negative (pictures without faces) and positive (pictures with faces) are appeared to the classifier to get ready it so it can isolate features from it. The explanation behind using OpenCV makes it easier as it goes with pre-arranged classifiers for face, eyes, smile, etc It goes with a mentor and a pointer; we can set it up with our own classifier viably for anything acknowledgment. If it finds a match it returns Rect (x, y, w, h) proposing coordinates for left, top, base and right.

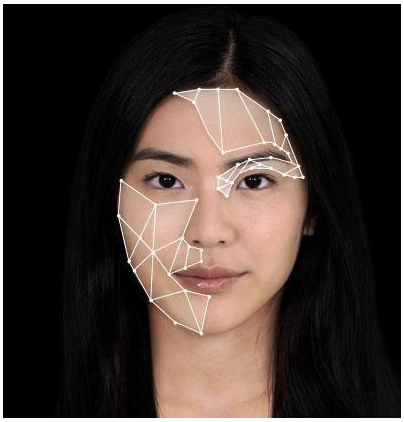

Figure: 4.3.2 Face Detection

### 4.3.3 Edge Detection

There are diverse edge revelation techniques. We have used Canny Edge disclosure methodology3 as discussed before for area of body. To play out this edge ID technique Gaussian channels are used. These channels cut out the disturbance in a high-level picture to prevent any false area by the processor. This achieves made by smoothening and diminishing the effect of uproar on the image for the real working of the processor. With this the power points of the image are not found. The edges in the image can point in various ways like level, vertical and in cockeyed edges, so this figuring uses four channels to recognize such an edge in darkened picture. After this cycle non-most extraordinary camouflage is applied to make the edge modest. This camouflage achieves exceptionally definite edge pixels with respect to introduce certified edges. In like manner, a couple of pixels may be achieved by the uproar, by then for such pixels we apply twofold edge on them.

Figure: 4.3.3 Edge Detection

## 4.4 Software Requirements

The product prerequisites determine the utilization of all necessary programming items like information the board framework. The necessary programming item determines the numbers and form. Every interface determines the reason for the interfacing programming as identified with this product item.

IDE: Anaconda-Spyder

Framework: FLASK

Computer Vision Concepts

Programming Languages: Python 3.7

## 4.5 Hardware Requirements

The equipment necessity determines every interface of the product components and the equipment components of the framework. These equipment necessities incorporate setup qualities... core i5 or above processor

4GB RAM or Above

Hard disk: 20GB or higher

### 4.6 Feasibility Study

In this economical study cost factor is considered as important point. Before project development is started, we need to check if this application is feasible in terms of cost benefits and within given cost is it possible to develop this application. This factor can be analysed by considering what are strengths, options, weaknesses and risk factors linked with this project and resources costs need to implement in given budget. In order to finalize economical factor analysis process is linked with other factors like economical phenomena and software procurement.

#### 4.6.1 Technical Feasibility:

In order to develop any software application software procurement is important factor for few projects there is need to analyse how much cost it required to purchase software's. There is need to list out total paid software's and free software. For this project most of the software are open-source software's which are freely available in market. For any future updating on software development there may be requirement of taking paid software services.

#### 4.6.2 Economical Feasibility

The piece of the audit is to check the level of affirmation of the system by the customer. This fuses the path toward setting up the customer to use the structure viably. The customer must not feel under mined by the system, rather, must recognize it as a need. The level of affirmation by the customers solely depends on upon the procedures that are used to teach the customer about the structure and to make him familiar with it. His level of sureness must be raised with the objective that he is more over prepared to make some gain full input, which is welcomed, as he is the last customer of the system. Evaluating the monetary practicality of an execution by playing out a cost/advantage examination, which as its name recommends analyses the full/genuine expenses of the application to its full/genuine monetary advantages. The options ought to be assessed based on their commitment to net income, the sum by which the advantages surpass the expenses, on the grounds that the essential goal of all ventures is to improve in general authoritative execution.

## 5.RESULT:

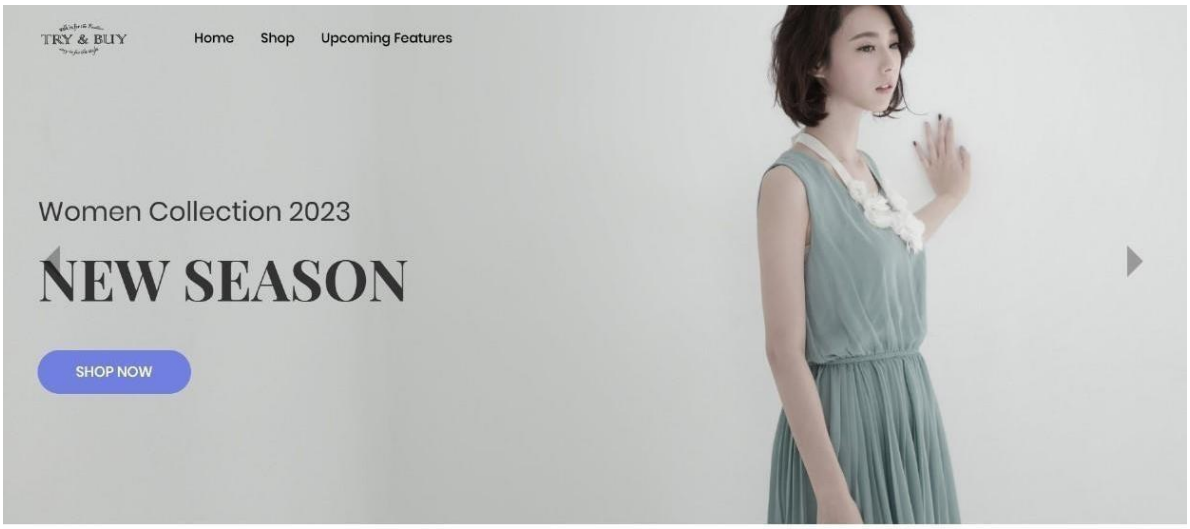


Figure 5.1: home page

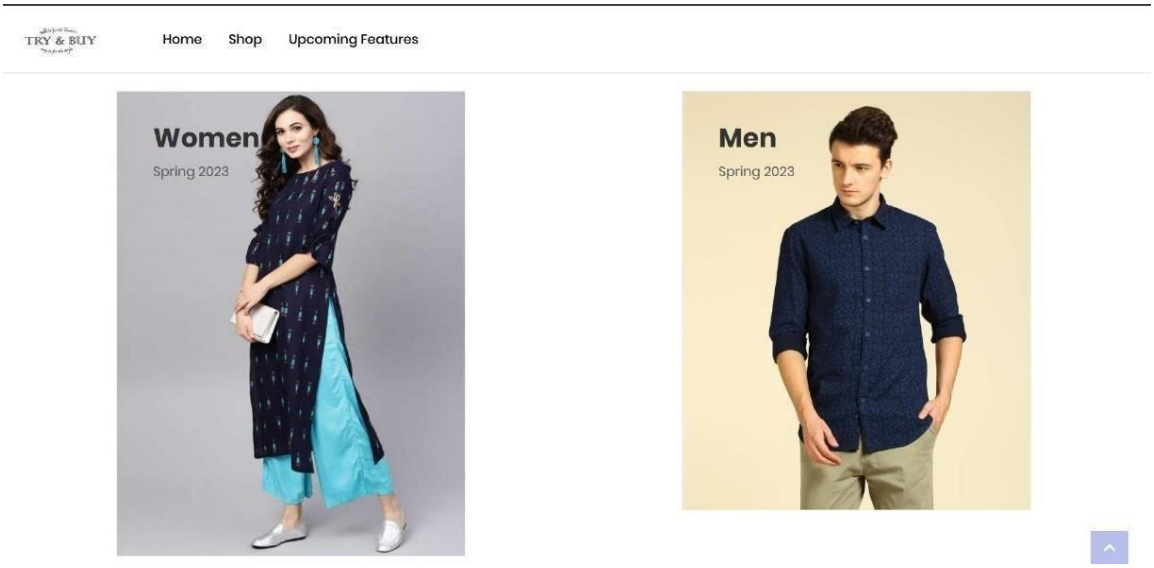


Figure 5.2. women and men page


Figure 5.3: mens page

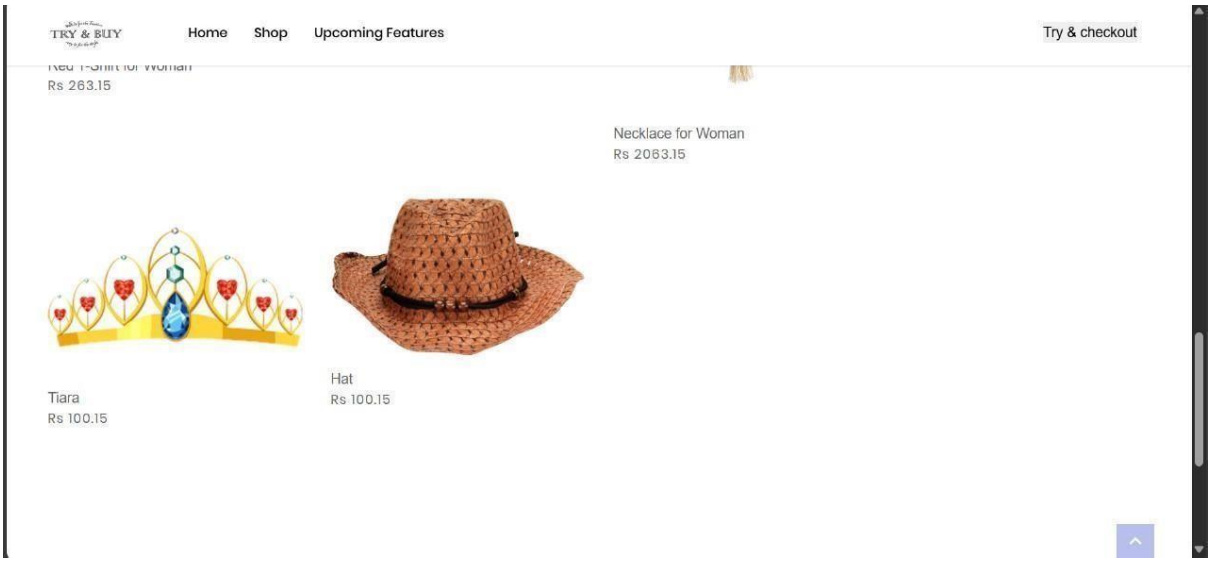


Figure 5.4: Accessories Page

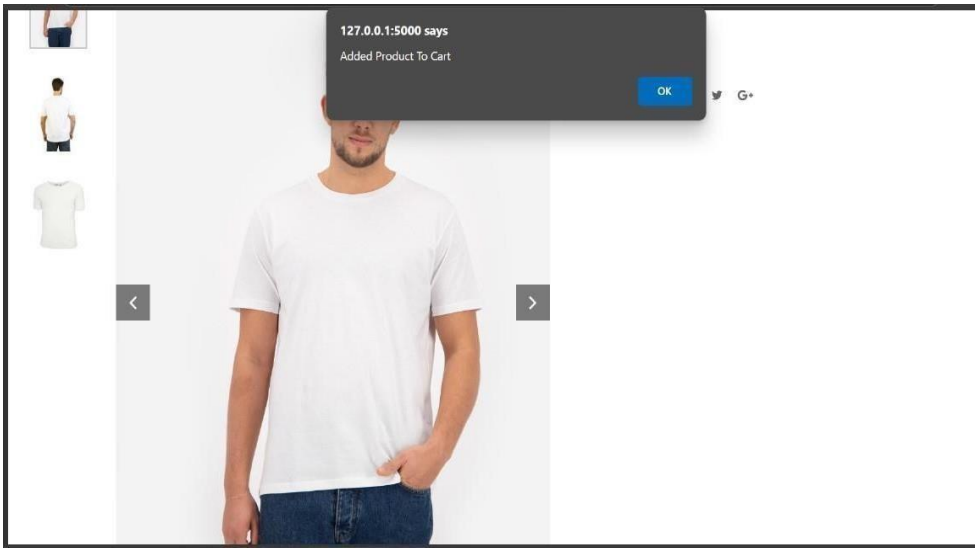


Figure 5.5: Add to cart

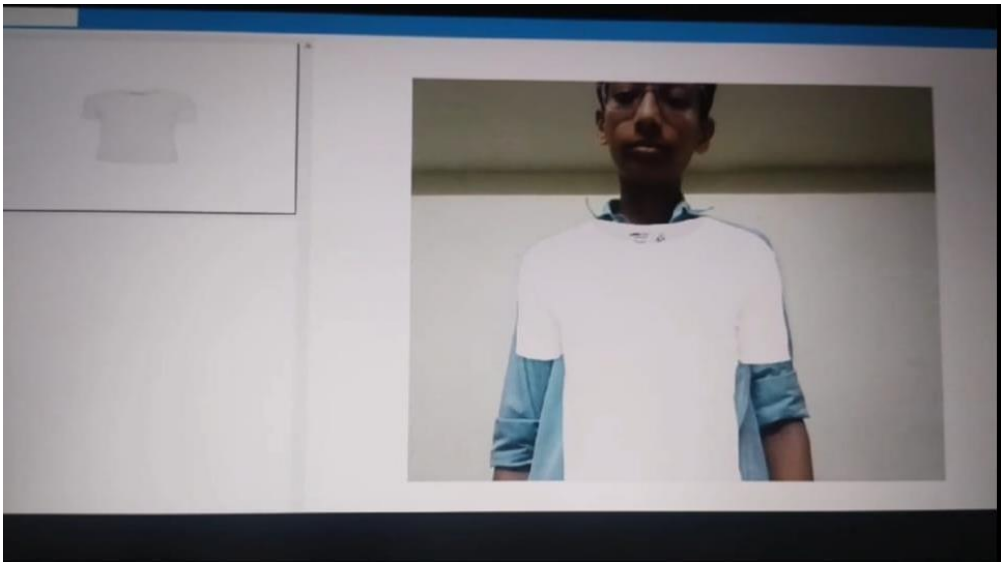

Figure 5.6: output frame of user trying different clothes

# CONCLUSION

The development of virtual trial room technologies, particularly through the integration of augmented reality (AR) and computer vision, has significantly enhanced the online shopping experience by enabling users to visualize clothing items in real time. Through methods like edge detection, body measurement, and real-time fitting, these systems ensure a more accurate representation of how clothes will fit users, making online shopping more interactive and reliable. However, challenges such as alignment issues, accuracy of measurements, and the need for better hardware and software integration still remain. Despite these hurdles, advancements in technologies such as Kinect sensors, machine learning algorithms, and webcam-based systems show promising potential in overcoming these obstacles, offering more accurate and user-friendly solutions in the future. In conclusion, the field of virtual fitting rooms and trial rooms is evolving rapidly, with the potential to revolutionize both online shopping and the fashion industry by improving customer satisfaction and reducing returns due to fitting issues. The ongoing improvements in image processing, edge detection, and AR integration are key drivers in making virtual trial rooms a vital part of the digital shopping experience.

## FUTURE SCOPE

The future scope for virtual trial rooms (VTRs) combining 2D and 3D technologies is highly promising, as advancements in AI, AR, and image processing enhance both personalization and realism. While 2D VTRs offer cost effectiveness and accessibility, integrating 3D capabilities can provide more immersive experiences, such as realistic fabric draping, movement, and lighting effects. This hybrid approach allows retailers to cater to diverse user needs, offering scalable solutions for emerging markets while transitioning to 3D for advanced applications. Social sharing, sustainability through reduced returns, and global accessibility further enhance their potential. By blending affordability with innovation, the future of VTRs lies in evolving from 2D simplicity to 3D sophistication, creating inclusive and engaging shopping experiences.

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