Indian Institute of Information and Technology Allahabad

SMART DRESSING ROOM

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INTRODUCTION & MOTIVATION

Problem Statement:

1. Traditional trial rooms are time-consuming and inconvenient.
2. Online shopping lacks an accurate way to visualize garment fitting before purchase.
3. High return rates in e-commerce due to improper fitting.

INTRODUCTION & MOTIVATION

Objective of Research:

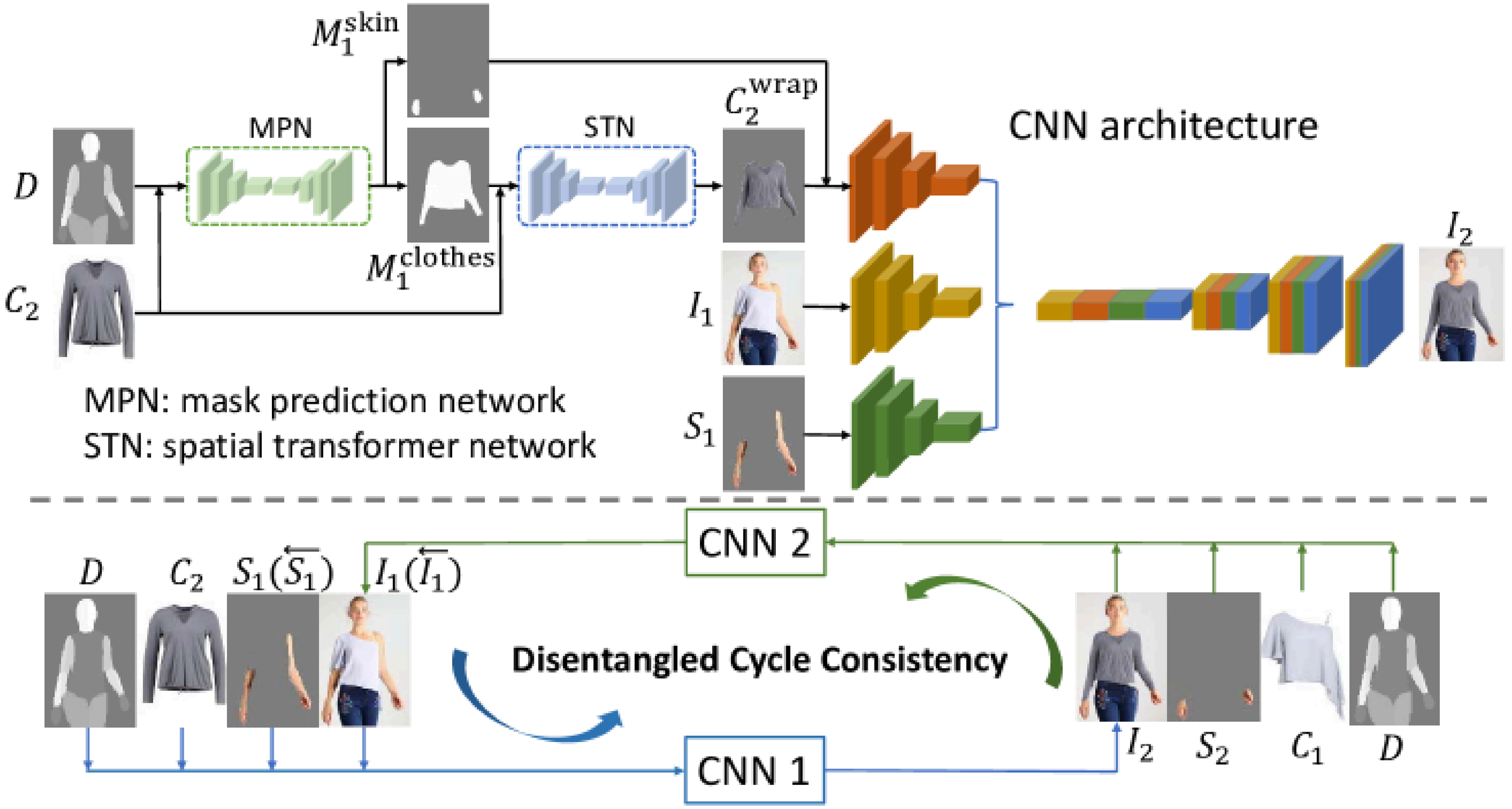
1. Develop a virtual trial room using computer vision and AR.
2. Implement real-time garment overlay based on body landmarks.
3. Improve user experience and reduce return rates.

OBJECTIVES

1. Detect human body and face landmarks accurately using computer vision techniques.
2. Overlay garments in real-time using augmented reality (AR).
3. Provide users with a seamless virtual fitting experience.
4. Reduce returns in e-commerce by offering a realistic preview of fit and style.
5. Optimize accuracy using machine learning and data augmentation techniques.

RELATED WORK

1. Model Used: Convolutional Neural Networks (CNNs)
2. Purpose: The CNNs are primarily used for detecting body and facial landmarks, allowing for accurate garment overlay in augmented reality (AR).
3. Limitations: While effective for 2D pose estimation, CNNs lack advanced 3D modeling capabilities and do not support high-fidelity texture mapping for realistic garment fitting.


M_1^{skin}
MPN
STN
C_2^{wrap}
CNN architecture
D
C_2
$M_1^{clothes}$
I_1
S_1
I_2
MPN: mask prediction network
STN: spatial transformer network
CNN 2
D
C_2
$S_1(\overleftarrow{S_1})$
$I_1(\overleftarrow{I_1})$
Disentangled Cycle Consistency
CNN 1
I_2
S_2
C_1
D

1. Inputs: Person's body shape (D) and clothing image (C_2).
2. Image Processing:
3. MPN: Creates skin (M_1^skin) and clothing masks (M_1^clothes).
4. STN: Warps clothing (C_2) to fit the person's shape, generating (C_2^wrap).
5. Intermediate outputs (I_1, S_1) are used for refining the try-on image.
6. CNN Architecture: Extracts features and generates the final output (I_2) showing the person wearing the clothing.
7. Disentangled Cycle Consistency: Uses two CNNs to ensure consistent and natural results through multiple try-on cycles, maintaining realistic body and clothing representations.

1. Model Used: Haar Cascade Classifier
2. Purpose: Haar Cascades are used for face detection and basic posture estimation through classical computer vision techniques like Canny edge detection.
3. Limitations: This approach is rule-based and does not involve machine learning. It struggles with real-time 3D visualization, as it focuses on 2D garment fitting without leveraging deep learning models for improved accuracy.

Address http://127.0.0.1:5000/ the website will be opened as shown above. As we move further the user gets to choose the clothing between the men and women and below products are displayed as showed in Figure 3.

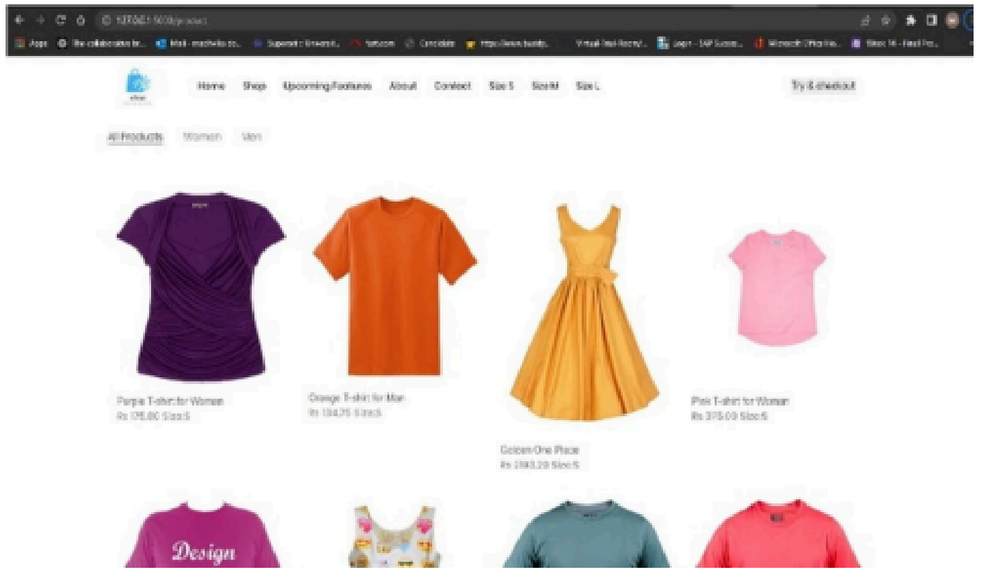


Figure 3: Different Types of Items Displayed to the User

The user can select the product and they can add to cart and they should click try and checkout then one GUI will be opened and then the cloth will be mapped to the body as showed in Figure 4.

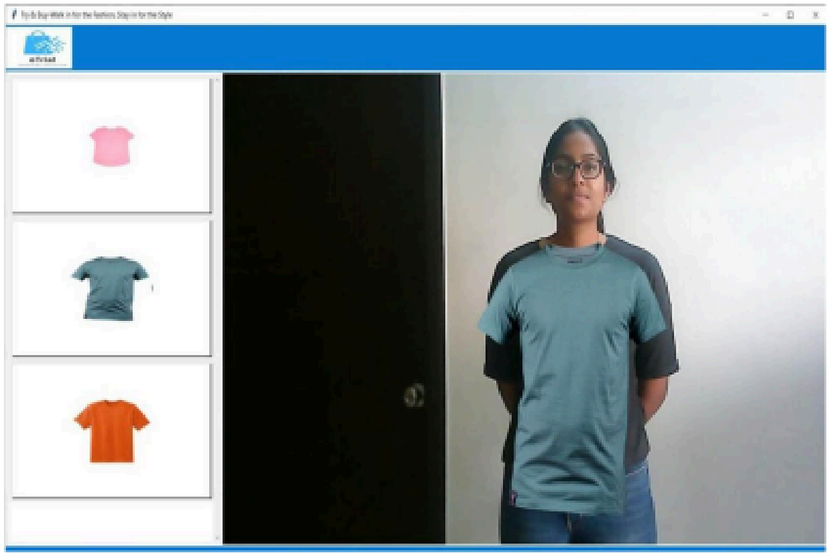


Figure 4: Mapping of selected T Shirt to user

1. Model Used: K-means Clustering
2. Purpose: K-means is used for segmenting the user's body shape in images, which helps in determining the area where virtual garments are to be superimposed.
3. Limitations: K-means is an unsupervised learning technique more suited for segmentation rather than pose estimation or 3D rendering. It does not support advanced features like dynamic fitting adjustments or AR integration.

RESEARCH GAPS IN EXSITING PAPERS

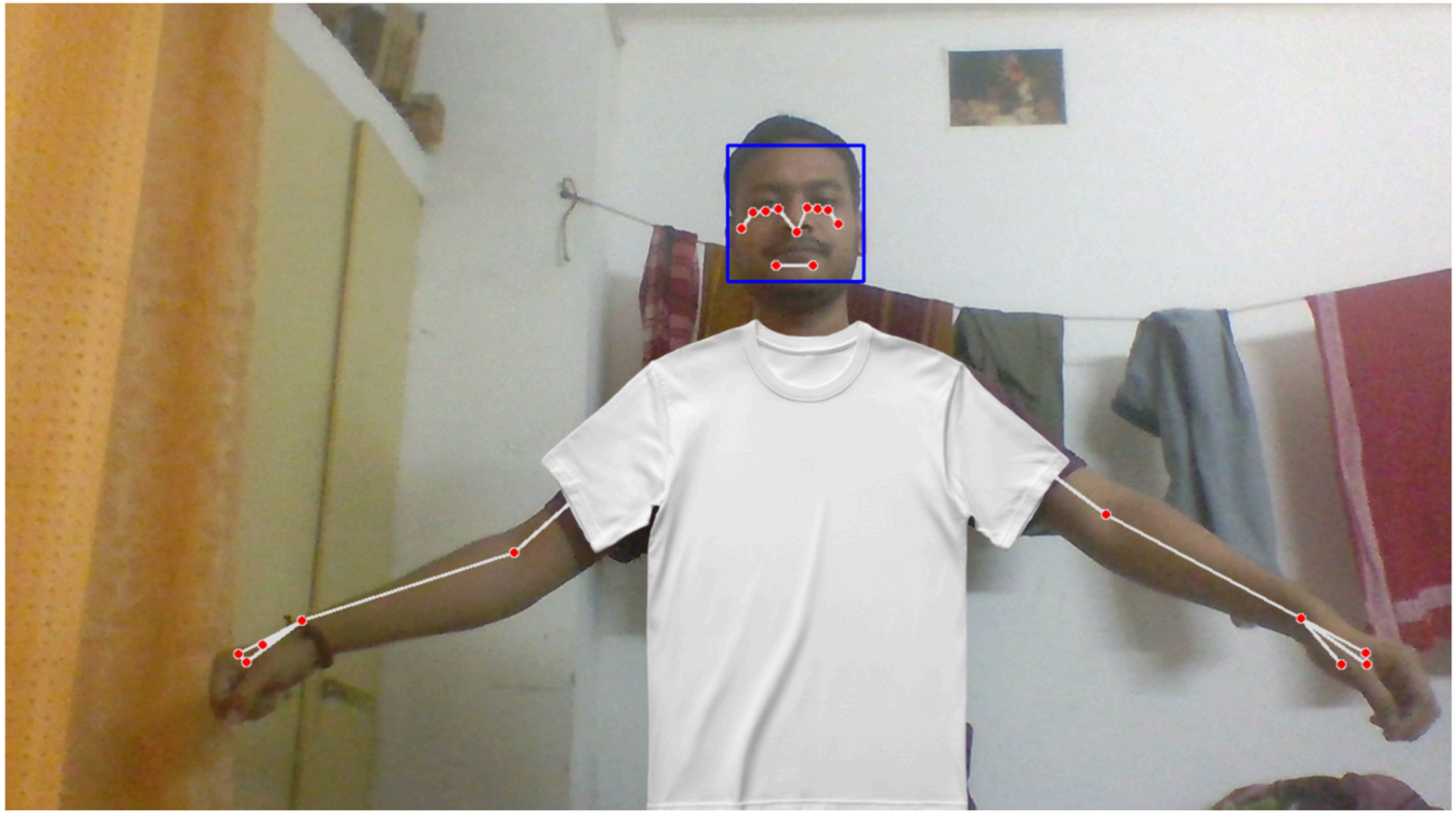
1. Lack of 3D Visualization:

- Previous models rely on 2D overlays, limiting the realism of virtual try-on experiences.
- Existing studies did not explore advanced generative models for 3D avatar creation.

2. Limited Augmented Reality Integration:

- Basic AR implementations lacked dynamic interaction with 3D models.
- No use of advanced frameworks like Three.js and WebXR for real-time rendering.

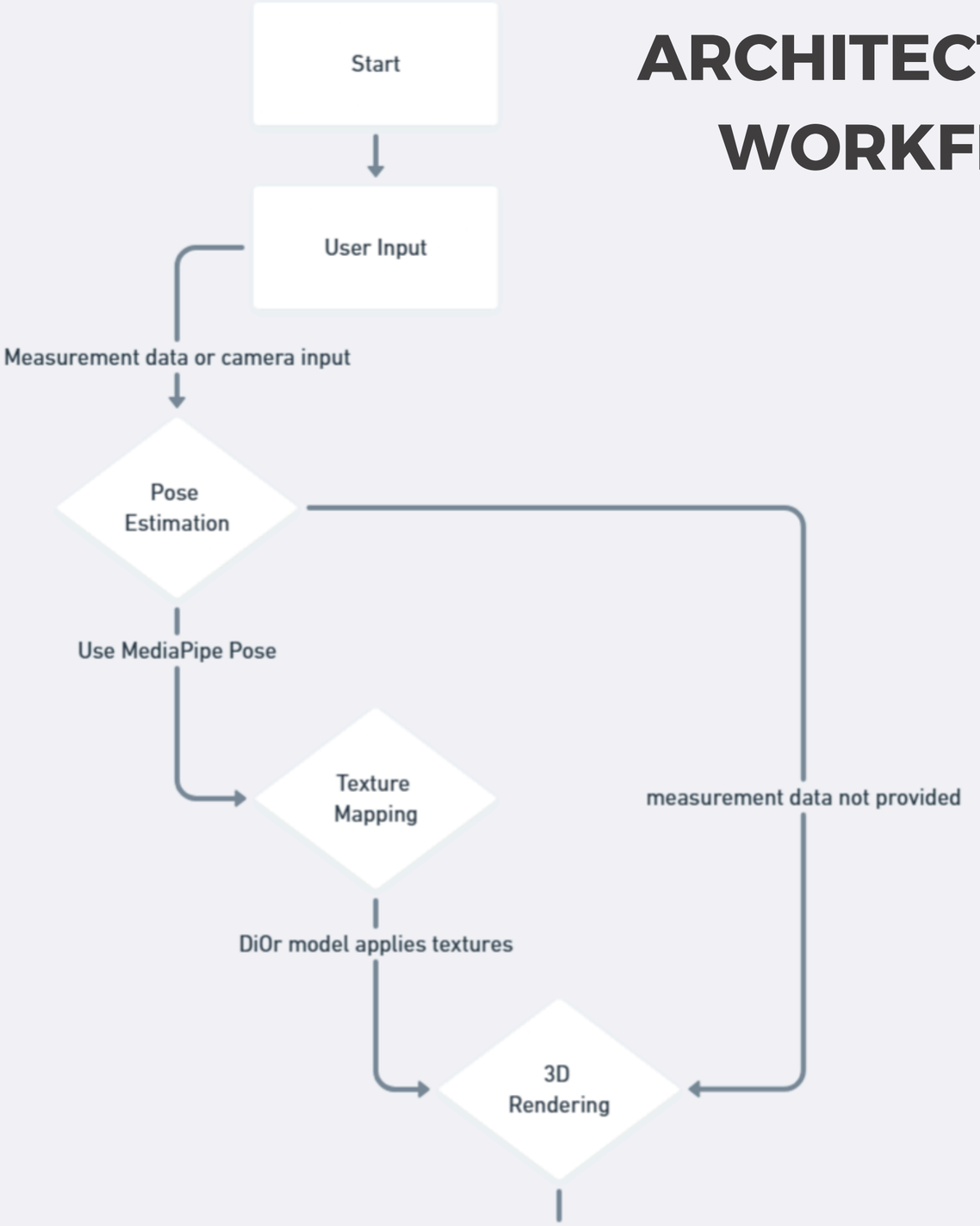
LIMITATIONS

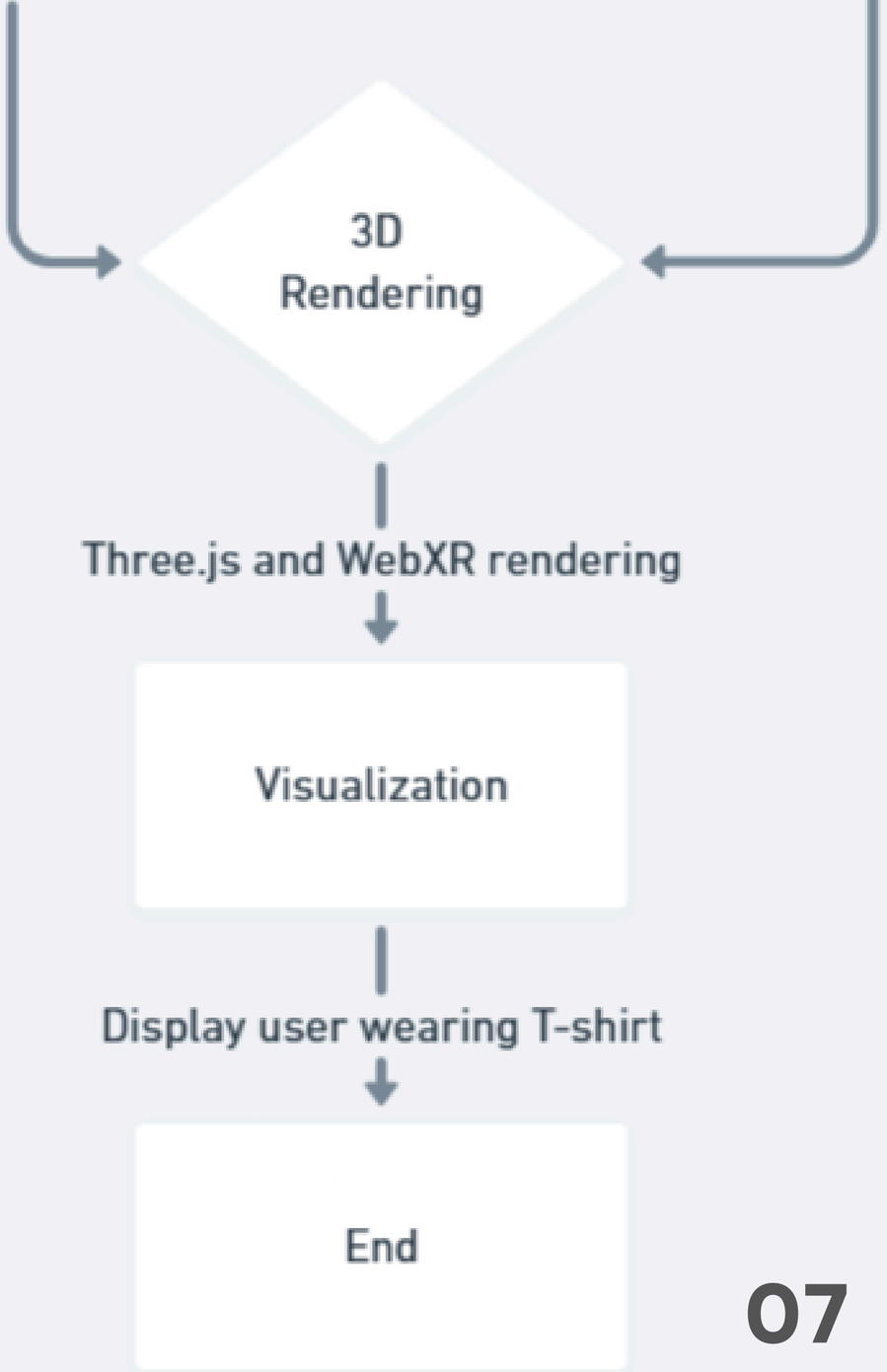


PROPOSED ENHANCEMENT: DIOR MODEL FOR VIRTUAL TRY-ON

1. **Model**: DiOr (Dense Image-Object Reconstruction)
2. **Purpose**: DiOr is a generative model that excels in high-quality texture mapping and creating 3D avatars from 2D inputs.
3. **Advantage**: Unlike previous methods, DiOr uses deep learning to reconstruct 3D geometry and apply textures dynamically. It supports:
4. **Pose Estimation**: Using MediaPipe Pose for accurate body tracking.
5. **Texture Mapping**: High-fidelity mapping to ensure garments fit naturally on the 3D avatar.
6. **Real-time Rendering**: Combines with Three.js and WebXR for immersive AR experiences.

ARCHITECTURE & WORKFLOW





REFERENCES

1. Harini M, Janalyn Maroula L, Dr. N. Mythili, "AI-Enhanced Virtual Trial Room Using Augmented Reality," Proceedings of the 6th International Conference on Mobile Computing and Sustainable Informatics (ICMCSI-2025), IEEE, 2025. DOI: 10.1109/ICMCSI64620.2025.10883600.
2. Finney Daniel Shadrach, Sneha S, Santhosh M, Sivakumar T, Sajja Vignesh, "Smart Virtual Trial Room For Apparel Industry," 2022 IEEE International Conference on Distributed Computing and Electrical Circuits and Electronics (ICDCECE), IEEE, 2022. DOI: 10.1109/ICDCECE53908.2022.9793030.
3. T.S. Arulananth, S.V.S. Prasad, Bittu Kumar, Chappidi Mahitha, Kiran Dasari, V Manohar, "Python Based Smart Trial Room," IEEE Conference on Interdisciplinary Approaches in Technology and Management for Social Innovation (IATMSI), 2022. DOI: 10.1109/IATMSI56455.2022.10119291.

THANK YOU