SMART AR WARDROBE

Project Reference No.: *49S_BE_5935*

College : Dayananda Sagar Academy of Technology and Management, Bengaluru
Branch : Department of Computer Science and Engineering
Guide(s) : Prof. Kavyashree L
Student(s) : Mr. Kartik Sharma
Mr. Mahaling C Sarapali
Mr. Rishav Raj
Ms. P Midhu Chandana

Keywords:
Augmented Reality, Virtual Try-On, MediaPipe Face Mesh, React.js, Three.js, Computer Vision, E-Commerce, Facial Landmark Detection

Introduction:

The rapid growth of online shopping has increased the demand for virtual try-on systems that help users visualize products before purchasing. Traditional e-commerce platforms rely on static images and textual descriptions, which are insufficient for products such as eyewear, jewellery, and accessories. This often leads to hesitation, low customer confidence, and high return rates. Existing virtual try-on systems depend either on costly hardware such as Kinect and LiDAR, or on cloud-based rendering systems that introduce latency and privacy concerns.

Objectives:

1. To develop a web-based virtual try-on platform for accessories such as glasses, earrings, and necklaces.
2. To implement real-time facial landmark detection using MediaPipe Face Mesh.
3. To provide accurate overlay, scaling, and alignment of 3D accessories on the user's face.
4. To reduce uncertainty in online shopping and improve user confidence.

Methodology:

1. The proposed system is implemented as a client-side single page web application using React.js and Three.js. The webcam feed is captured from the browser and passed to MediaPipe Face Mesh, which detects more than 468 facial landmarks in real time. These landmarks are used to calculate the position, orientation, and scale of virtual accessories.
2. The 3D accessory models are stored in GLTF/GLB format and rendered using Three.js. A dynamic occlusion mesh is created to ensure that virtual objects appear naturally behind facial features such as ears and cheeks. The system supports accessory selection, real-time rendering, and automatic scaling according to facial measurements. Since all processing occurs within the browser, the platform provides better privacy, lower latency, and no dependency on cloud servers.

Result and Conclusion:

1. The developed Smart AR Wardrobe system successfully performed real-time facial landmark detection and stable augmented reality rendering. The application maintained a stable frame rate with a low face detection latency. Functional testing confirmed correct camera access, stable landmark tracking, and proper overlay alignment.
2. The system performed effectively under different lighting conditions and user movements. Minor delays were observed only during low-light environments or rapid head movement. Overall, the project demonstrated that the proposed client-side architecture is reliable, accurate, and suitable for practical use in online fashion retail.

References:

1. [1] L. Ding, C. Zhang, and M. Tang, “Diffusion model based size-variable virtual try-on technology,” arXiv preprint arXiv:2504.00562, Apr. 2025.
2. [2] T. T. Ngo, J. B. Kim, and Y. H. Shin, “Virtual try-on system using 3D garment reconstruction and augmented reality,” IEEE Access, vol. 11, pp. 26358–26372, 2023.
3. [3] P. Xu, Y. Zhang, L. Wang, and X. Chen, “ARCloth: Real-time AR-based clothing try-on system using mobile edge computing,” in Proc. IEEE Int. Conf. on Multimedia and Expo (ICME), 2023.

Future Scope:

The future scope of this project includes:

1. Extend the system to support full-body virtual try-on using pose estimation and body tracking for clothes and footwear.
2. Implement AI-based size prediction to recommend the most suitable fit for each user.
3. Add personalized outfit and accessory recommendations using machine learning.
4. Integrate the system directly with e-commerce platforms so users can try products and purchase them instantly.