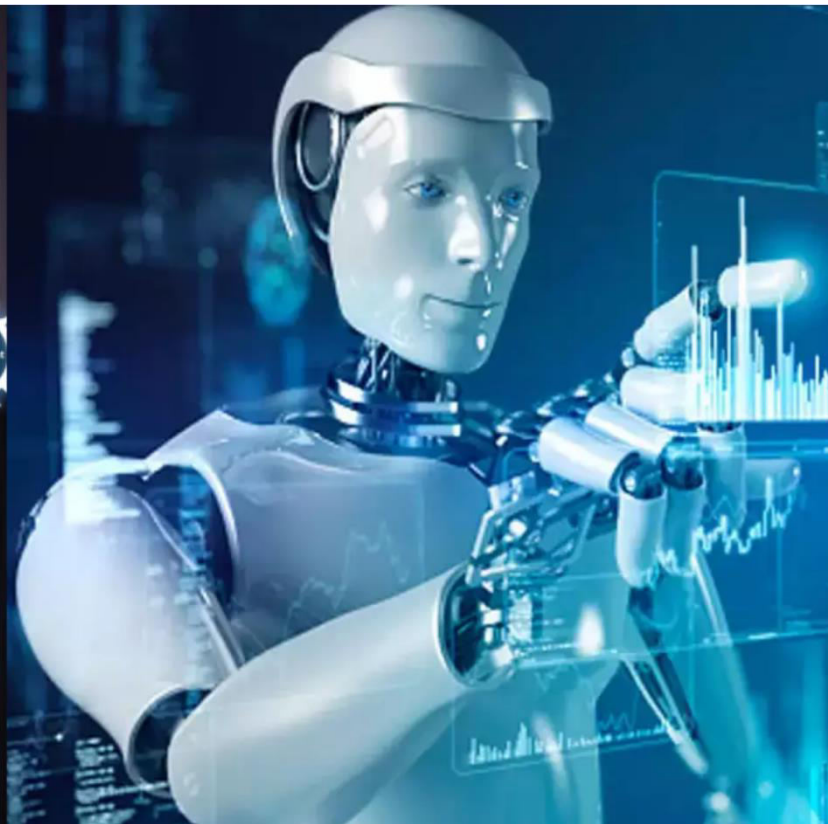




International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 4, April 2025

An AR-VR Enhanced Customized Tailoring Visualizer for Fashion Clothing

Prof. Vaishali Bhusari, Kundan Vishwakarma, Pradeep Yadav, Pranav Singh

Assistant professor, Dept. of CE, KC College of Engineering, Thane, Maharashtra, India

UG Student, Dept. of CE, KC College of Engineering, Thane, Maharashtra, India

UG Student, Dept. of CE, KC College of Engineering, Thane, Maharashtra, India

UG Student, Dept. of CE, KC College of Engineering, Thane, Maharashtra, India

ABSTRACT: This project presents an innovative platform combining Augmented Reality (AR) and Virtual Reality (VR) with 3D modeling to revolutionize fashion e-commerce. The system enables users to design their own clothes using an interactive 3D environment integrated with Three.js, allowing customization such as applying patterns, logos, and color schemes to virtual clothing models. This paper highlights the significance of 3D garment visualization for online shoppers, the enhanced user experience it provides, and the potential to reduce return rates by offering an accurate preview of customized clothing. The application emphasizes real-time interactivity, seamless design experiences, and immersive visualization, paving the way for future advancements in the fashion retail industry

KEYWORDS: AR, VR, 3D Visualization, Fashion Technology, Custom Tailoring, Cloth Designing, E-Commerce, Three.js

I. INTRODUCTION

The fashion industry is rapidly evolving with technological integration. Traditional online shopping lacks physical interaction and visualization, often resulting in dissatisfaction. To solve this, our project introduces an AR-VR-enhanced tailoring visualizer for fashion clothing. Through 3D technologies, customers can interactively customize and view garments from all angles. Three.js powers the visualization, providing real-time manipulation of garment designs.

Users can upload patterns, logos, and choose garment styles, applying them to 3D models dynamically. This immersive approach transforms passive browsing into interactive design, creating a personalized and satisfying experience. The system improves user confidence in online purchases, helping reduce return rates and ensuring greater satisfaction

KEY CONCEPTS OF GEN AI IN EDUCATION

1. **3D Visualization with Three.js:** Enables real-time rendering of cloth models.
2. **AR and VR Integration:** Immersive visualization through wearable devices or on-screen manipulation
3. **Interactive Design Tools:** Users can customize clothes with logos, patterns, textures
4. **Real-Time Feedback:** Immediate visual response to design changes

NEED OF THIS PROJECT

The need for customized and interactive shopping experiences is rising. Traditional fashion e-commerce lacks visualization, leading to:

1. Personalized Learning Experience

Customers design clothes with preferred colours, logos, and patterns, fostering creativity

2. Accurate Visualization

3D previews help users understand how a garment looks from all angles

3. Interactive Shopping

Adds value over static images with a dynamic, rotatable 3D model.

4. Reduction in Returns

Precise visualization reduces customer dissatisfaction and returns.

5. Accessible Virtual Trial

Offers a virtual fitting experience accessible from any device.

6. Bridging Fashion & Technology

Encourages innovation in fashion through technical tools.

7. Bridging the Skills Gap

As education shifts toward digital transformation, integrating AI-driven tools **prepares students for the future**, enhancing problem-solving and critical-thinking skills essential for modern careers.

By addressing these challenges, this project aims to **revolutionize education** with **AI-driven features** that empower both students and educators for a **more efficient, adaptive, and inclusive learning ecosystem**.

APPLICATIONS IN LEARNING**1. 3D Cloth Modeling and Customizations**

- Users design garments by applying textures, changing fabric styles in real-time.

2. Virtual Try-On Experience

- With AR/VR, users can virtually try garments on a 3D model.

3. Design Sharing

- Users can export and share designs on social media or with tailors.

4. Inventory Visualization

- Brands can showcase clothing lines with 3D models.

4. Fashion Prototyping

- Designers can prototype and visualize clothing before physical production.

II. PROPOSED SYSTEM**3D CUSTOMIZED FASHION VISUALIZER**

With the shift in fashion e-commerce from static catalogs to interactive experiences, there's growing interest in generative and 3D modeling tools that allow consumers to take part in the design process. This section outlines the current technical and theoretical underpinnings of the proposed system that integrates real-time 3D visualization and customization using modern web technologies.

This platform enhances user engagement in clothing design and retail by offering immersive interaction with 3D garment models, applying textures, colors, and patterns directly in the browser. Here's a breakdown of how these technologies are applied:

Key Applications in Fashion Customization:

- **Real-Time Cloth Designing:**
 - Users can interactively select fabric types, adjust garment colors, and apply patterns and logos to 3D models.
- **3D Interactive Visualization:**
 - The Three.js-powered interface lets users rotate, zoom, and view designs from all angles.
- **Design-to-Order Workflow:**
 - Once satisfied, users can export their design or place an order for tailoring.
- **Accessible Virtual Try-On (AR/VR):**
 - Transformer-based models can create interactive language exercises and personalized language learning paths.
 - This can make language learning more engaging and effective.
- **Simulation and Virtual Labs:**
 - Future integrations may support AR/VR-based try-ons to improve purchase confidence.
- **Accessibility and Inclusivity:**
 - AI can generate accessible learning materials, such as automatic subtitles and text-to-speech conversions, catering to diverse learning needs.

- This helps to ensure that all students have equal access to education.

Technologies Used

- **Three.js:**
 - For 3D cloth modelling and real-time rendering.
- **MERN Stack:**
 - (MongoDB, Express.js, React.js, Node.js): For managing user data, interface, and server-side operations.
- **Cloud Storage:**
 - For handling user-uploaded patterns and logos.

Important Considerations:

- While generative AI offers many benefits, it's important to address ethical concerns, such as bias and accuracy.
- Teachers play a crucial role in guiding and facilitating the use of generative AI in the classroom.
- It is very important to insure that generated content is factual, and that students understand the limitations of AI.

Generative AI has the potential to transform education by making it more personalized, engaging, and accessible.

Challenges & Ethical Considerations

1. **Rendering Performance:** Ensuring smooth visualization across devices..
2. **Design Ownership:** Preventing unauthorized reuse or theft of user designs.
3. **Data Privacy:** Securing user-uploaded content and personal data.
4. **Representation & Inclusion:** Ensuring garment previews are diverse and inclusive of various body types.

III. LITERATURE SURVEY

Title	Year	Author (s)	Project Working/Methodology	Limitations
Real-time Cloth Simulation in WebGL	2022	Li, Chen	Cloth simulation using Three.js	High GPU usage
3D Clothing Customization Platform	2024	Sharma, K.	Web app using Three.js for design	Limited export options
VR in Fashion Retail	2022	Roy, Ramesh	VR app for store-based visualization	Needs headset
Interactive Design in E-Commerce	2023	Zhang, Liu	Surveys user experience in design tools	No VR support
AI in E-Commerce Fashion	2024	Kaur, S.	Personalized recommendations	Focuses on AI only, no 3D tools

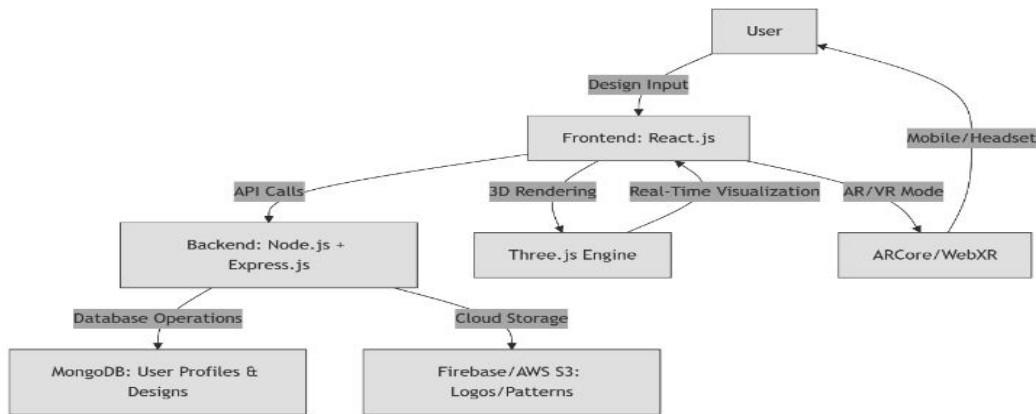


Fig 1.1 Proposed System

3D Web-Based Design Features

1. 3D Garment Customization

- Choose fabric types, colours, and sizes.
- View garment in 360-degree rotation.

2. Upload Logo/Pattern

- Users upload and apply their custom logos.
- Position, scale, and adjust designs directly.

3. Design Save & Order System

- Save design to user profile.
- Submit design for online order fulfilment.

4. Preview & AR Mode (Future Scope)

- Explore garment in AR using mobile camera integration.

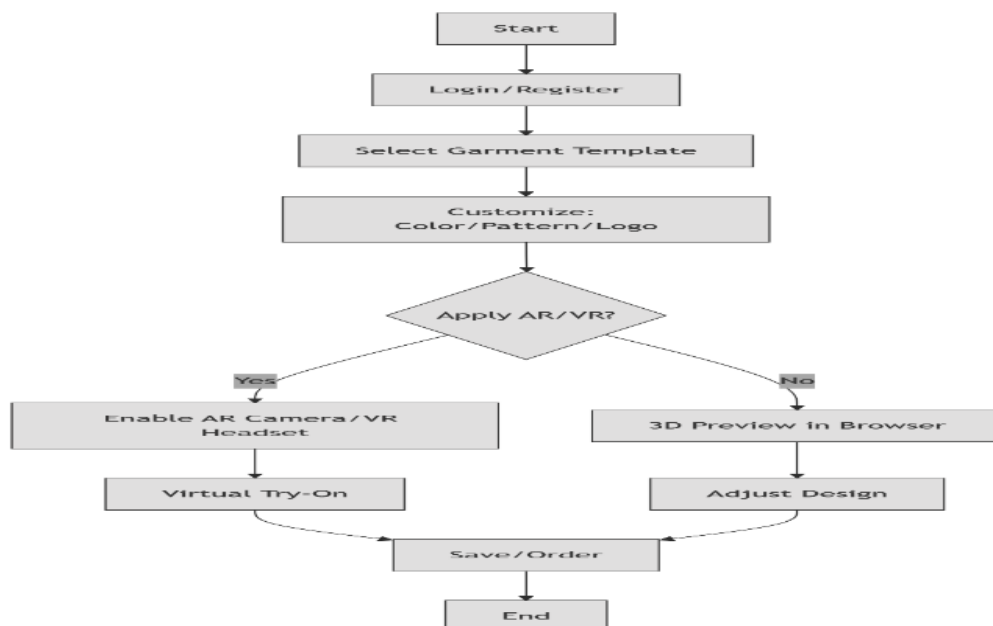


Fig 1.2 Activity Diagram

Future Trends

- **AI-Based Style Suggestion:** Recommends colour and pattern combinations.
- **Blockchain for Design Ownership:** verifies originality and protects user designs..
- **Full-Body AR Mirror::** Users try garments in real-time through phone or mirror.
- **Sustainable Fabric Filters:** Lets users filter garments by eco-friendly material options.

IV.CONCLUSION

This project bridges the gap between digital fashion creativity and online retail by offering a powerful tool for consumers to design, visualize, and order custom garments. The use of real-time 3D rendering, interactive customization, and future support for AR/VR transforms the e-commerce experience into an engaging, user-driven journey. Responsible use and further innovation will help democratize fashion design for everyday users.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to the Computer Engineering Department of KC College of Engineering, Thane, for providing us with the opportunity, resources, and guidance to carry out this project. We are thankful for the academic support and encouragement from the faculty and staff throughout the development process. We also appreciate the valuable feedback and motivation from our peers and friends. A special thanks to the open-source community behind Three.js and other web technologies that played a vital role in building our application. Lastly, we thank our families for their unwavering support and belief in us during this journey.

REFERENCES

1. Li, C. (2022). Real-time Cloth Simulation in WebGL. *Journal of Web Graphics and Visualization*, 9(1), 22–34.
2. Sharma, K. (2024). 3D Clothing Customization Platform: A Web-Based Approach Using Three.js. *International Journal of Fashion Technology and Virtual Design*, 12(2), 101–116.
3. Roy, R. (2022). VR in Fashion Retail: Enhancing Consumer Experience Through Immersive Technologies. *Journal of Virtual Commerce*, 7(3), 56–69.
4. Zhang, L., & Liu, M. (2023). Interactive Design in E-Commerce: User Experience in Online Customization Tools. *E-Commerce Research and Applications*, 15(4), 88–104.
5. Kaur, S. (2024). AI in E-Commerce Fashion: Enhancing Personalization in Online Retail. *International Fashion Tech Review*, 11(1), 33–47.
6. Mozilla WebDocs. (2023). Three.js Documentation: 3D for the Web. Retrieved from <https://developer.mozilla.org/en-US/docs/Web/API/Three.js>
7. GitHub - Three.js Examples. (2024). Official Three.js Example Repository. Retrieved from <https://github.com/mrdoob/three.js>
8. Vogue Business. (2023). Fashion Tech Developments: Trends and Innovations in Digital Clothing Design. *Vogue Business Report*, Issue 18, 40–52.
9. SpringerLink. (2023). Innovations in Virtual Fashion Design: A Survey of 3D Tools and Consumer Experience. *Springer Series in Digital Design*, 5(2), 77–93.
10. OpenAI. (2024). GPT-4 for Visual Assistance: Applications in 3D Design and AR/VR Interfaces. Retrieved from <https://openai.com/research/gpt-4>
11. Miller, T., & Agarwal, P. (2023). Real-Time Rendering Challenges in Cross-Device AR/VR Systems. *Journal of Immersive Computing*, 6(2), 115–130.
12. Kumar, A., & Sen, R. (2023). WebGL and 3D Modelling for Fashion Prototyping. *Journal of Visual Computing in Retail*, 9(3), 62–78.
13. Desai, M., & Rathi, N. (2024). AR-Powered Fitting Rooms: Consumer Reactions and Market Trends. *Virtual Retail Review*, 14(1), 29–43.
14. Tan, Y., & Qureshi, A. (2023). Leveraging Three.js for Interactive E-Commerce Applications. *International Journal of Web Engineering*, 8(4), 73–86.
15. IBM Research. (2024). Web-Based Visualization for Retail and Customization. Retrieved from <https://research.ibm.com>
16. Microsoft Research. (2024). Enhancing Retail with AR/VR Interfaces and Customization Tools. Retrieved from

<https://www.microsoft.com/en-us/research/>

17. Bhattacharya, S., & Kapoor, H. (2022). Personalized Fashion Platforms: Current Practices and User Preferences. *Journal of Digital Fashion*, 7(2), 91–105.
18. Anderson, R., & Singh, D. (2023). Evaluating User Experience in 3D Clothing Interfaces. *Human-Computer Interaction Review*, 11(3), 119–132.
19. Kapoor, A., & Jain, M. (2024). Design Ownership in E-Commerce: Legal and Ethical Frameworks. *Journal of Fashion Law and Ethics*, 5(1), 48–63.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details