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# Design and Development of an Intelligent Online Apparel Shopping System

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#### Abstract

The Online Shopping Apparel paper is a robust e-commerce platform designed to enhance the online clothing shopping experience. It features a visually appealing, user-friendly interface where customers can browse a wide range of apparel by style, size, and brand. Users can register, log in, and receive personalized product recommendations based on their preferences and shopping history. The platform includes advanced search and filtering options, secure payment gateway integration, seamless checkout, and real-time order tracking. A key highlight is the AR-based virtual try-on feature, allowing customers to see how clothes would look on them before purchasing. AI-driven systems provide personalized recommendations and chatbot support for queries, order tracking, and fashion advice. The admin panel offers tools for managing inventory, updating products, processing orders, and analyzing customer data. AI-powered analytics also help generate insights to boost sales and optimize operations.

#### 1. Introduction

The overarching goal of this paper is to create an immersive and intelligent e-commerce platform by integrating Augmented Reality (AR) and Artificial Intelligence (AI) to enhance the user experience. The platform allows customers to browse and purchase apparel while utilizing AR-based virtual try-on features to visualize how clothing fits before making a decision. AI-powered recommendations personalize product suggestions based on user behaviour, while an AI-driven chatbot assists with queries, outfit selection, and sizing advice. The system includes essential e-commerce functionalities such as secure authentication, product filtering, a wish list, a shopping cart, secure payment gateways, and order tracking. Additionally, an admin dashboard enables inventory management, order processing, and AI-driven analytics to optimize sales and user engagement.

#### 2. Related Work



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The purpose of this paper is to transform the e-commerce experience by integrating Augmented Reality (AR) and Artificial Intelligence (AI), providing a more interactive, personalized, and efficient shopping journey for customers. Traditional online shopping often leaves users uncertain about size, fit, and style since they cannot physically try on clothes before purchasing. This lack of certainty leads to high return rates, customer dissatisfaction, and inefficiencies for retailers. To address these challenges, the project incorporates an AR-based virtual try-on feature, enabling users to see how apparel would look on them in real time. This technology allows customers to make more confident purchase decisions, significantly reducing the chances of returns due to size or style mismatches. Additionally, AI is employed to analyse user preferences, browsing behaviour, and past purchases to offer personalized product recommendations. This tailored approach enhances the shopping experience by suggesting items that are most likely to appeal to individual tastes. AI-powered chatbots are also integrated to provide instant assistance, whether for style advice or order queries, further improving customer engagement. By combining AR and AI, this project aims to bridge the gap between the online shopping experience and physical in-store try-ons, offering customers a seamless, immersive, and satisfying way to shop for clothing. Ultimately, the solution enhances purchase confidence, reduces return rates, and promotes customer satisfaction, making online apparel shopping more efficient and enjoyable for both consumers and retailers.

#### 3. PROPOSED WORK

Our paper represents a pioneering approach to integrates Augmented Reality (AR) and Artificial Intelligence (AI) to enhance the online apparel shopping experience. AR-based virtual try-on allows users to visualize clothing on themselves in real time, reducing uncertainty in size, fit, and style. AI-powered recommendations analyse user preferences and shopping behaviour to provide personalized product suggestions, improving engagement and conversion rates. An AI chatbot assistant offers real-time support for size guidance, styling advice, and order-related queries, ensuring a seamless user experience. The platform also includes secure authentication, advanced product filtering, wish list management, secure payment gateways, and order tracking. For administrators, it provides inventory management, order processing, and AI-driven sales insights to optimize business operations.

The proposed approach aims to enhance the online apparel shopping experience by integrating Augmented Reality (AR) and Artificial Intelligence (AI) technologies. AR-based virtual try-ons allow customers to visualize clothing on themselves in real time, addressing common uncertainties related to size, fit, and style. This reduces the risk of returns and enhances purchase confidence. AI-driven product recommendations are tailored to individual users based on their browsing behaviour, preferences, and past purchases, making the shopping experience more personalized. Additionally, an AI-powered chatbot is incorporated to offer real-time assistance, providing guidance on sizing, styling suggestions, and answering order-related queries.

This increases customer engagement and satisfaction by offering immediate support. The integration of AR and AI ensures a more interactive and user-friendly platform, enabling customers to make informed purchase decisions. As a result, the approach not only improves the overall shopping experience but also helps retailers reduce return rates and improve sales. By offering personalized



recommendations and instant assistance, the approach fosters a more seamless, enjoyable, and efficient online shopping journey.

#### 4. Experimental Setup and Dataset Description

The experimental setup for online apparel shopping integrates Augmented Reality (AR) and Artificial Intelligence (AI) to enhance the shopping experience. A user-friendly e-commerce platform is designed with features such as an AR-based virtual try-on system, allowing customers to visualize clothing in real-time. AI algorithms analyse user behaviour, preferences, and past purchases to provide personalized product recommendations. An AI-powered chatbot is implemented for real-time assistance with sizing, styling advice, and order queries. Users interact with these features during the experiment, with data collected on their interactions, purchase behaviour, and feedback. Key performance metrics, including conversion rates, return rates, and average order value, are tracked for analysis. User testing ensures the platform is intuitive and engaging. System performance is tested across different devices and internet speeds to ensure reliability. Based on real-time data, AI recommendations are continuously refined to improve personalization. Feedback from participants informs improvements to AR accuracy and overall user experience.

#### **Dataset and Description:**

Our dataset, sourced from the Kaggle website, encompasses a diverse range of attributes aimed at discerning the authenticity of user profiles, comprising of 2676instances.

https://www.kaggle.com/datasets/whoseaspects/apparel-user-profile-dataset.The attributes include identifiers such as ID, name, and screen name, facilitating unique identification and tracking of individual profiles. Additionally, categorical attributes like default profile, which indicates whether a user has customized their profile layout, and location, denoting the geographical information provided by the user, contribute to understanding user behaviour and characteristics. These attributes serve as valuable features for discerning genuine profiles from fake ones, offering insights into user engagement and interaction patterns.

Textual attributes like description and name provide insights into user profiles, reflecting user-generated content and self-description. The description attribute contains text where users describe their interests or themselves, while the name attribute is the user's chosen display name. These textual features help identify user intent, interests, and authenticity, as fake profiles often contain generic or misleading information. By incorporating both numerical and textual data, the dataset offers a comprehensive view of user profiles. This approach enables effective classification, helping to distinguish genuine from fake profiles in online communities.



#### 5. Results and Discussion

The integration of Augmented Reality (AR) and Artificial Intelligence (AI) in online apparel shopping has demonstrated promising results in enhancing customer experience, increasing purchase confidence, and reducing return rates. The AR-based virtual try-on feature significantly helped customers visualize clothing in real time, which reduced uncertainty around size, fit, and style, leading to more informed purchase decisions and a noticeable decrease in returns. Additionally, AI-driven personalized recommendations based on user behaviour, preferences, and past purchases helped improve product discovery, boosting customer engagement and average order value.

The AI-powered chatbot was also instrumental in providing real-time assistance, addressing queries related to sizing, styling, and order status, which further enhanced customer satisfaction. Overall, the platform's combination of AR and AI led to higher conversion rates and reduced return rates compared to traditional online shopping. However, there were some challenges, such as minor technical issues with AR accuracy and occasional inefficiencies in the AI recommendation system. Despite these limitations, the integration of these technologies created a more seamless, engaging, and efficient shopping experience, paving the way for further improvements and a more personalized future in online apparel retail.

The real-time support offered by the AI-powered chatbot further contributed to the positive results. It addressed user queries about sizing, styling advice, and order issues, significantly improving customer interaction without the need for human agents. Users particularly appreciated the instant assistance, leading to higher levels of satisfaction and reducing friction points in the shopping journey.

#### **Performance Metrics:**



Figure : Performance Metrics of the online apparel shopping.

The accuracy of performance metrics in an Online Apparel Shopping Platform plays a critical role in enhancing user experience, efficiency, and reliability. The AI recommendation system should have an accuracy of 80-90%, ensuring that product suggestions align with user preferences based on browsing history and past purchases. The Augmented Reality (AR) Try-On feature must maintain a 90%+ accuracy rate in body tracking, rendering, and alignment to provide realistic virtual try-ons.



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Similarly, the search and filter accuracy should be around 85-95%, ensuring users receive relevant results based on their queries. The order processing accuracy should be 99% or higher, minimizing errors in shipping, inventory updates, and delivery. Additionally, the payment processing success rate should exceed 98%, ensuring secure and error-free transactions. Maintaining high accuracy across these metrics guarantees a smooth, personalized, and trustworthy shopping experience. A confusion matrix evaluates the accuracy of models predicting product returns in online apparel shopping. It helps improve inventory management and customer satisfaction by identifying return patterns more effectively.

#### 6. Conclusion and Future Scope

This paper predicts Online apparel shopping has revolutionized fashion retail with convenience and personalization. Technologies like AR and VR enable virtual try-ons, reducing uncertainty in fit and size.AI enhances product recommendations, improving customer satisfaction and engagement. Despite challenges like size mismatches and returns, tech and logistics advancements are bridging the gap. The future will feature AR/VR-based 3D fitting rooms for immersive shopping experiences. AI and ML will power personalized suggestions, chatbots, and fashion trend forecasting. Digital fashion, NFTs, and the metaverse will introduce virtual clothing for avatars. Sustainability will rise with AI-driven eco-friendly solutions and smart, adaptive fabrics. Blockchain will ensure secure, transparent transactions and ethical sourcing. Social commerce, live shopping, and AI-managed logistics will make fashion retail more efficient and engaging.

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