



FASHION TRY ON AND AR EXPERIENCE

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ABSTRACT —

Fashion try-on through images utilizes augmented reality (AR) and artificial intelligence (AI) to allow users to virtually try on clothing by overlaying digital garments onto static images of themselves. This technique is widely used in online shopping, social media filters, and fashion design applications. Key challenges include accurate body tracking, fabric simulation, and lighting adjustments to ensure a seamless and realistic appearance. With advancements in AR frameworks and AI-driven modeling, virtual try-ons are becoming more accessible and efficient, shaping the future of digital fashion retail.

Keywords — Augmented Reality, Virtual try-on, 3D Modeling, Retail Technology, Fabric Simulation, Fashion Technology, Virtual Dressing Room,.

Introduction :

The rise of immersive technologies has revolutionized how consumers interact with brands and products. Among these, Augmented Reality (AR) has emerged as a game-changing innovation in the fashion industry, offering a virtual try-on experience that transforms traditional shopping into an interactive and personalized journey. This technology enables users to visualize clothing, accessories, and other fashion items in real-time, blending digital overlays with the physical world.

The Fashion Try-on AR Experience addresses common challenges faced by online shoppers, such as uncertainty about the fit, size, and overall appearance of fashion items. By simulating a virtual dressing room, this application bridges the gap between in-store and online shopping, enhancing user confidence and reducing return rates. This also contributes to sustainability by lowering the environmental impact of excessive shipping and returns.

Leveraging advanced machine learning algorithms and 3D modeling, the system ensures high accuracy in garment rendering, textures, and motion tracking. The integration of AR into fashion retail not only elevates customer engagement but also empowers businesses with data-driven insights to refine their offerings. This paper explores the technical implementation, benefits, and future potential of AR-powered fashion experiences, highlighting their pivotal role in reshaping the industry.

LITERATURE REVIEW :

The integration of Augmented Reality (AR) into the fashion industry has been extensively explored in recent years, emphasizing its transformative impact on retail experiences and consumer behavior. AR technology allows users to virtually try on clothing and accessories, merging the physical and digital worlds to create a highly interactive shopping journey. Studies have shown that AR enhances customer engagement by providing real-time visualization of fashion items, significantly influencing purchase decisions. Research by Javornik (2016) highlights the role of AR in creating immersive experiences, enabling consumers to evaluate the fit and style of products before purchasing. This capability addresses common challenges in online shopping, such as uncertainty regarding product fit and quality.

Retailers have increasingly adopted AR-driven solutions to enhance the shopping experience, with major fashion brands incorporating virtual try-on features into their mobile applications and websites. For instance, companies like Gucci, Nike, and Zara have successfully implemented AR tools, allowing users to preview how shoes, apparel, or accessories would look on them before making a purchase. This innovation not only improves the shopping experience but also serves as an effective marketing strategy, strengthening brand engagement and loyalty.

Additionally, AR plays a crucial role in sustainable fashion by promoting mindful consumption. Virtual try-ons help consumers make more informed purchasing decisions, thereby reducing impulse buys and minimizing returns, which in turn lowers waste and carbon footprints associated with shipping

and logistics. As environmental concerns continue to grow, AR presents a viable solution for fashion retailers looking to align with sustainability goals while providing an advanced, tech-driven shopping experience.

From a technological standpoint, the continuous development of AR applications is pushing the boundaries of fashion retail. Advances in artificial intelligence (AI) and machine learning have further refined AR-based try-on experiences, improving body tracking, fabric simulation, and real-time rendering of textures and colors. Future advancements may incorporate haptic feedback and AI-driven personalized styling recommendations, creating an even more seamless and engaging interaction between consumers and fashion brands.

In conclusion, AR is revolutionizing the fashion industry by bridging the gap between digital convenience and the physical retail experience. As the technology evolves, it is expected to become an integral part of online and offline shopping, offering consumers an immersive, personalized, and sustainable approach to fashion retail. In the coming years, AR is expected to become even more sophisticated, further blurring the lines between virtual and physical shopping experiences, ultimately reshaping the future of fashion retail.

METHODOLOGY :

This research utilizes a qualitative research method to examine the developments in AR-based fashion try-on. The methodology is organized into three major elements: data collection, analytical framework, and assessment criteria.

A. Data Collection

Data for this research was gathered from peer-reviewed journal articles, conference proceedings, and industry reports released between 2018 and 2024.

The main sources are:

Scholarly databases like IEEE Xplore, Springer, and Google Scholar Market studies on fashion and technology companies Fashion brand case studies of AR try-on adoption A systematic literature review was also performed to obtain key themes, technological trends, and applications in the fashion industry of AR[8].

Additionally, data for this research was collected through expert interviews with industry professionals, including AR developers, fashion technologists, and retail executives, to gain insights into real-world implementation challenges and opportunities. Surveys and questionnaires were distributed to consumers to understand user perceptions, preferences, and adoption barriers related to AR try-on experiences.

Technical documentation and white papers from leading AR technology providers, such as Microsoft, Apple, and Google, were analyzed to examine advancements in AR frameworks and their applications in fashion retail. Furthermore, case studies from fashion retailers implementing AR solutions, including customer engagement metrics and sales impact reports, were reviewed to assess the effectiveness of virtual try-on technology. Finally, social media sentiment analysis was conducted to evaluate consumer discussions, trends, and feedback on AR-based fashion experiences.

B. Analytical Framework

The research adheres to thematic

analysis methodology with findings classified under the following principal areas:

Technology Stack: Study of AR ecosystems like ARKit, ARCore, and body tracking based on AI[10]. Consumer Interaction: Measurement of user interaction and purchasing behavior driven by AR try-on[5].

Business Impact: Examination of the impact of AR try-on on sales, return rates, and customer satisfaction[9]. Technical Limitations: Determination of existing limitations and areas for improvement in AR try-on technology[6].

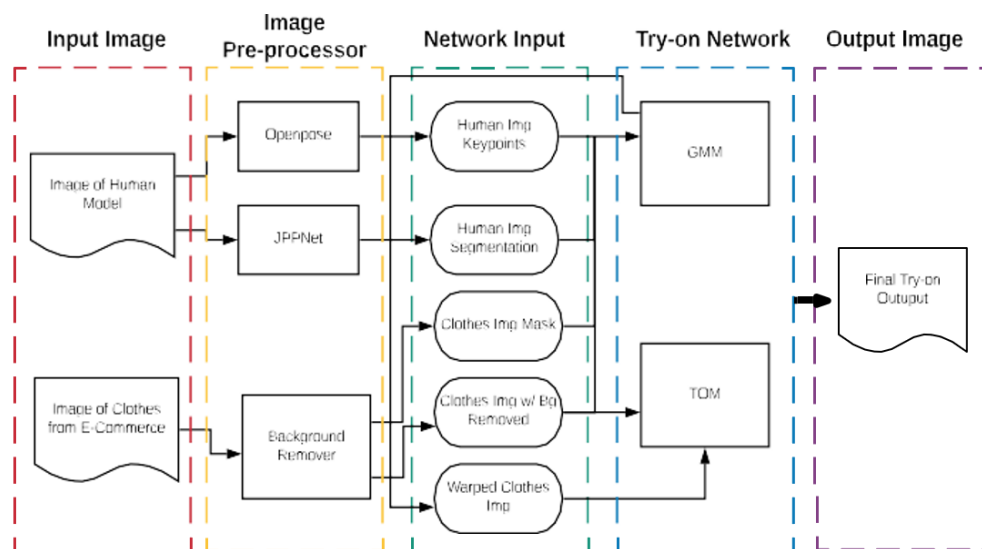


Fig 1. Architecture in Fashion Try-On AR

C. Evaluation Criteria

The performance of AR-based fashion try-on systems was measured on three major criteria:

Virtual Try-On Accuracy: Quantified by the fit and motion of the virtual garment in real-time[2].

User Experience & Engagement: Assessed through usability testing and customer feedback[4].

Commercial Viability: Examined through case studies of brands that have implemented AR try-on and its effect on sales and customer retention[7].

Through the application of this approach, the work presents an in-depth review of the state of AR try-on in the fashion industry, revealing the advantages and constraints of the technology.

III. Charts and Graphs

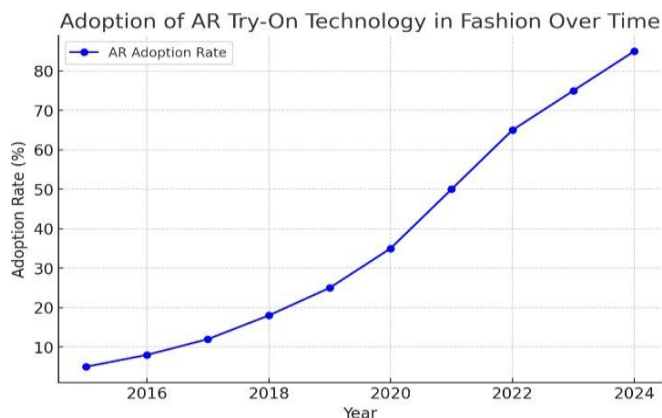


Fig 2. AR Adoption in Fashion Over Time

ADVANTAGES :

The Fashion Try-on AR Experience offers numerous advantages that revolutionize the way consumers interact with fashion and retailers deliver their products. These benefits include:

AR enables users to visualize how garments and accessories will look on them in real time, creating an immersive and interactive shopping experience. This reduces the uncertainty associated with online shopping and increases customer confidence. Users can try on clothing virtually from the comfort of their homes, eliminating the need to visit physical stores. This is particularly beneficial for individuals with limited mobility or those residing in remote areas. By allowing users to accurately assess fit, style, and appearance before purchase, AR minimizes the likelihood of returns due to dissatisfaction, saving costs for retailers and enhancing customer satisfaction.

The reduction in returns and overproduction due to AR try-on technology contributes to more sustainable practices in the fashion industry. It decreases waste and lowers the environmental impact associated with shipping and manufacturing. AR try-on solutions can be tailored to individual users by leveraging body measurements, preferences, and style history. Virtual try-ons reduce the need for physical prototypes and in-store fitting facilities.

Moreover, AR fosters greater brand engagement by offering a unique and entertaining shopping experience, encouraging customers to spend more time exploring products. Retailers can integrate AR features with social media platforms, allowing users to share their virtual try-ons with friends, which enhances brand visibility and word-of-mouth marketing. Additionally, AR try-on technology supports diverse body types by offering more inclusive sizing recommendations, helping brands cater to a wider audience.

The integration of AI with AR further enhances personalization, suggesting outfits based on user preferences, past purchases, and trending fashion styles. Retailers can also use AR data analytics to gain insights into consumer behavior, optimizing inventory management and marketing strategies. As technology advances, the adoption of AR in fashion is expected to evolve, making shopping more efficient, engaging, and accessible for consumers worldwide.

DISADVANTAGES :

While the Fashion Try-on AR Experience offers numerous benefits, it is not without its drawbacks. Some of the key disadvantages include:

High Development Costs Developing and implementing AR systems requires significant investment in technology, software, hardware, and content creation. Smaller retailers or startups may find it challenging to afford these costs. Not all devices support advanced AR features. Older smartphones and low-end devices may lack the necessary hardware or software capabilities, limiting the accessibility of the technology.

Collecting and storing user data, such as body measurements and images, raises privacy and security issues. Any breaches or misuse of this sensitive information can erode consumer trust and lead to legal complications.

Accuracy

Ensuring that virtual garments fit accurately on users with diverse body types and proportions is a complex task. Minor inaccuracies in garment visualization can lead to dissatisfaction and reduced trust in the technology.

Real-time rendering and processing of AR experiences depend on stable and fast internet connections. Users with slower connections may experience delays, poor performance, or degraded visual quality.

CHALLENGES :

The development and implementation of a Fashion Try-on AR Experience come with several challenges that need to be addressed to ensure a seamless and effective solution. These challenges include:

1. **Accuracy of Fit and Visualization :-** One of the primary challenges is ensuring the accurate fit of virtual garments on users with diverse body shapes, sizes, and postures. Variations in body proportions and movement can make it difficult to achieve a realistic and precise overlay of clothing.
2. **Realistic Garment Rendering :-** Simulating the texture, fabric properties, and natural draping of garments in real-time requires advanced rendering techniques. Ensuring that garments respond realistically to body movements and environmental lighting adds complexity to the development process.
3. **Hardware and Device Limitations :-** Not all devices have the computational power or AR capabilities required for seamless performance. Ensuring compatibility across a wide range of devices, including low-end smartphones, without compromising quality is a significant challenge.
4. **User Data Privacy:-** The collection and storage of user data, such as body measurements and images, raise privacy concerns. Ensuring data security and compliance with regulations like GDPR is critical to gaining user trust and protecting sensitive information.
5. **Scalability :-** As the user base grows, the system must handle increased traffic and data processing demands. Ensuring that the platform remains responsive and performs efficiently at scale requires robust cloud infrastructure and optimized algorithms.

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CONCLUSION :

Fashion try-on through images is transforming the online shopping experience by enabling users to visualize clothing digitally before making a purchase. By leveraging AI and AR technologies, this approach enhances convenience, reduces return rates, and offers a personalized shopping experience. Despite challenges such as accuracy in garment fitting and lighting inconsistencies, ongoing advancements in machine learning and image processing are improving realism and usability. As fashion technology continues to evolve, image-based virtual try-ons will play a crucial role in shaping the future of e-commerce, digital styling, and sustainable fashion practices. Fashion try-on through images is a revolutionary technology that allows users to visualize how different clothing items would look on them without physically trying them on. By integrating augmented reality (AR), artificial intelligence (AI), and computer vision, this technology enhances the online shopping experience, digital styling, and fashion design. It is widely used in e-commerce, mobile applications, and social media platforms, offering a more interactive and engaging way for consumers to explore fashion.

LIMITATIONS :

Despite the numerous benefits offered by the Fashion Try-on AR Experience, there are certain limitations that need to be considered:

Data Size and Accuracy Constraints AR technology relies heavily on accurate 3D models and precise user body measurements. Any inaccuracies in the data can lead to poor garment fitting and dissatisfaction among users. Furthermore, creating high-quality 3D models for all products can be time-consuming and resource-intensive.

The effectiveness of AR experiences depends on the capabilities of the user's device. Older smartphones or low-end devices may not support advanced AR features, leading to inconsistent experiences across different users.

Additionally, lighting conditions and environmental factors can impact the accuracy of AR try-on experiences, potentially affecting the realism of virtual garments. Internet connectivity and processing power also play a crucial role, as lag or delays in rendering can diminish user engagement. Privacy concerns arise due to the need for personal data, such as body measurements and facial scans, raising questions about data security and user consent. Moreover, while AR enhances online shopping, it cannot fully replicate the tactile experience of physically trying on clothing, which remains a key factor in fashion retail.

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