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Try On Tech: The implementation of the augmented reality in the retail sector

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Abstract. Our project explores the transformative potential of augmented reality (AR) technology in the fashion industry, focusing on virtual clothing and footwear try-on experiences. With the growing prominence of e-commerce, the ability to virtually try on items has become a pivotal innovation. The project investigates the development and implementation of AR-based solutions that enable users to try on clothes and shoes from their homes using smartphones or other compatible devices. Key technologies such as computer vision, 3D modeling, rendering techniques, and machine learning are examined for their roles in enhancing the accuracy of virtual fitting by accommodating individual body shapes and sizes. AR-based virtual try-on offers not only convenience and accessibility but also economic benefits for fashion retailers. Reduced return rates, due to customers making more informed choices, are explored, along with the environmental implications of a more sustainable shopping experience. Furthermore, user acceptance and satisfaction levels are investigated, revealing the increasing demand for this technology. In summary, this project highlights how AR is reshaping the retail landscape, offering a dynamic, interactive, and personalized approach to clothing and footwear try-on. By improving the online shopping process, reducing returns, and contributing to a more sustainable fashion industry, AR-based virtual fitting rooms are poised to redefine how we shop for apparel and shoes, opening new horizons for consumer engagement and retail success.

Keywords: Augmented Reality, 3D Modeling, Computer Vision, Rendering

Introduction

In the dynamic realm of fashion, technological advancements play a pivotal role in reshaping the industry. Augmented Reality (AR), at the forefront of this transformation, offers an innovative solution to the age-old challenge of virtual apparel and footwear try-ons. Titled “Try On Tech,” this project explores AR-based virtual fitting rooms, providing immersive shopping experiences from home. In response to the growing ecommerce momentum, the project investigates AR solutions enabling users to try on clothing and footwear virtually using smartphones. Core technologies, including computer vision, 3D modeling, and machine learning, enhance precision by accommodating individual body shapes and sizes.

Amidst these advancements, the COVID-19 pandemic has accelerated online shopping preferences, with 62% of customers favoring it [1]. This research aligns with findings that weekly online shopping has increased by 16%, indicating a significant shift in consumer behavior [1]. Recognizing the surging demand for AR and online shopping, the "Try On Tech" project not only addresses convenience but also explores the economic benefits for retailers. The integration of AR reduces return rates, revolutionizing retail industry efficiency and sustainability.

Moreover, the study considers user acceptance and satisfaction levels, affirming the increasing demand for AR-based virtual fitting rooms. Grounded in technological innovation, the project aims to redefine the fashion retail landscape. The cited literature highlights AR’s capacity to broaden human perception, facilitate content delivery platforms, and enhance immersive experiences, emphasizing the project’s contextual relevance [4]. Additionally, AR’s impact on online shopping preferences and virtual try-ons aligns with recent research [1, 5, 10].

In summary, “Try On Tech” signifies a paradigm shift in fashion retail, utilizing AR to provide personalized and immersive virtual try-on experiences, addressing consumer demands and industry trends.

Literature Review

"Designing Augmented Reality Services for E-Business: A Project Management Perspective" by T. Tahirović et al [1] explores integrating AR into e-commerce, focusing on the furniture industry. It discusses advantages like enhanced user experience and increased sales, alongside challenges such as technical complexity and accessibility limitations. Overall, it highlights AR's potential to transform online shopping and provides insights for successful implementation. "Augmented Reality and Virtual Reality Enabled Precious Jewelry Selling" by N. Hada et al [2] reviews the integration of AR and VR in online jewelry shopping, providing convenience and safety amidst the COVID-19 pandemic. These technologies offer enhanced shopping experiences, increased sales, and personalized interactions for users. However, they also present technical limitations, costs, and user experience challenges that need addressing for widespread adoption.

N. Patil et al [3] discusses "E-commerce Store with Augmented Reality Features," exploring personalized shopping experiences through virtual product interaction. AR integration into web applications enhances user engagement and satisfaction by enabling real-time product visualization. Challenges such as scalability and data optimization require attention for widespread adoption, despite advantages like increased conversion rates and improved user engagement. M.T. Roxo et al [4] delve into the "Evolution and Impact of Augmented Reality in Business and Economics (B&E) Domains," offering insights into technical aspects, user interactions, and development motivations. The research provides a structured framework for understanding AR trends and applications, though it has limitations, including a temporal focus and bias towards technical aspects.

"Application and Prospect of AR Technology in E-commerce" by S. Cao et al [5] explores integrating AR into mobile e-commerce to enhance consumer engagement and purchasing behavior. It discusses AR's basic principles, advantages such as immersive shopping experiences, and challenges like high development costs. Despite these challenges, AR holds promise for revolutionizing online shopping. Navneet et al [9] explore "Evolution in E-Commerce with Augmented Reality," highlighting how AR technology enhances online shopping experiences through immersive product visualization. While AR offers benefits such as reduced return costs, its widespread adoption in e-commerce remains limited, necessitating further development. "An Augmented Reality Application for Personalized Diamond Shopping" by O. A. Egaji et al [6] discusses an AR jewelry app that enables customers to design and visualize bespoke pieces remotely, enhancing engagement and reducing return rates. Despite its advantages, challenges such as high development costs persist, requiring further development and user education.

Jayanand P.K.V et al [7] present "Augmented Reality Based Smart Supermarket System with Indoor Navigation using Beacon Technology," offering improved navigation and remote shopping convenience. Challenges include accurate indoor localization and complex navigation interfaces, but solutions like the Easy Shopping app show promise in enhancing customer satisfaction. N. Wadhawan et al. [8] examine "Understanding E-commerce within a Competitive Economy," meticulously exploring the pros and cons of e-commerce in India. The study emphasizes aspects such as market expansion and cost-effectiveness while addressing challenges like trust issues and logistical complexities. Xinyu Li et al. [10] explore the "Integration of Augmented Reality into E-commerce through Markerless Tracking," focusing on enhancing the ecommerce experience by superimposing virtual product information onto the real world. The authors propose a markerless visual tracking method to enhance accuracy, showcasing its efficiency and effectiveness in AR-based e-commerce applications.

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Methodology

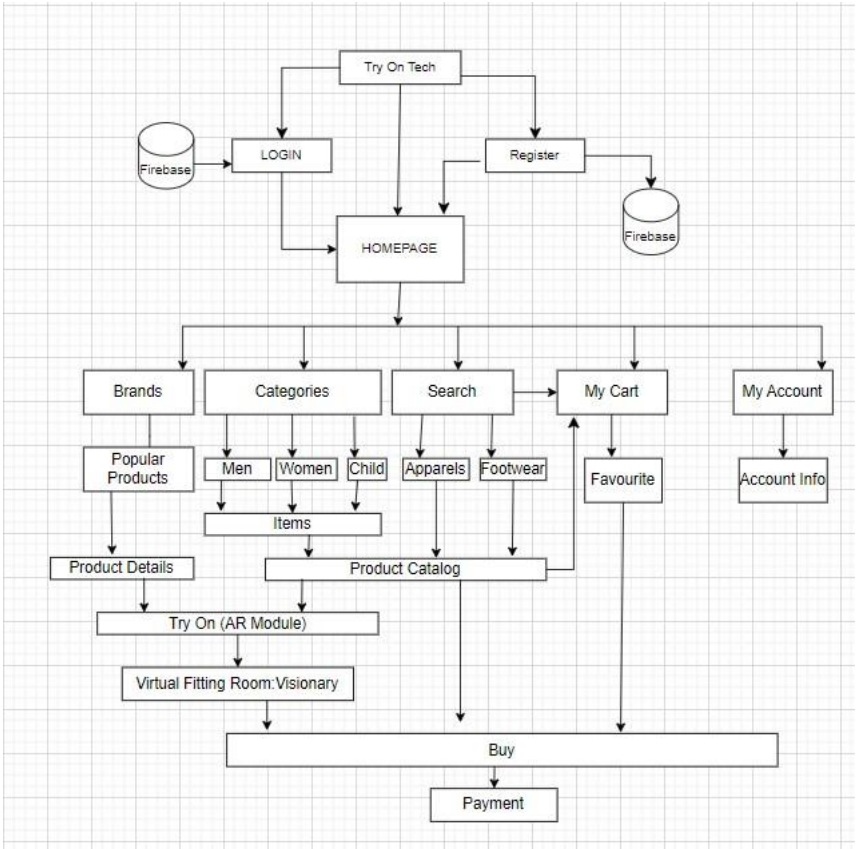

Figure 1 : Architecture diagram for detailed overview of the Try On Tech methodology

The architecture diagram intricately outlines the systematic flow of data and user interaction within our app. Initially, users engage with the login/register page, which seamlessly integrates with Firebase authentication, ensuring secure user verification. Upon authentication, users are directed to the homepage, serving as a centralized platform for navigation. Here, users encounter various options, including brands, categories, search, my cart, and my account. The brands section offers a curated selection of popular brands, with detailed product information provided for user reference. Additionally, users have the opportunity to virtually try on products before proceeding to purchase, enhancing their shopping experience. Similarly, the categories section categorizes products into distinct sections such as men, women, and child, streamlining the browsing process. Through the search category wear functionality, users can efficiently search for specific items like apparels and footwear, with search results dynamically generated from the database. The My Cart section serves as a centralized repository for selected items, allowing users to manage their purchases and proceed with transactions seamlessly. Moreover, users can add items to their
"Favorites" list for future reference and easy access. Finally, the My Account section provides users with access to their account information, empowering them to manage their profiles and preferences efficiently. Overall, the architecture diagram illustrates a cohesive and user-centric approach, ensuring a seamless flow of data and interaction throughout the app, thereby enhancing the overall shopping experience for users.

The development process of the application is divided into four modules namely creation of the e-commerce application, creation of AR content using Lens Studio, interacting with the user interface and integration of e-commerce app and Lens Sudio.

3.1 Creation of E-commerce Application

The project began with the utilization of Android Studio and Java to develop a custom e-commerce platform tailored for clothing items, resulting in the creation of the Try On Tech app. By leveraging Android Studio, a cost-effective development environment, our team effectively managed development expenses. The process entailed the initial design of an intuitive user interface through wireframes and mockups, streamlining the browsing and selection of products. Core functionalities, such as product categorization and search capabilities, were meticulously implemented. Backend systems for product management and inventory control were also established to ensure efficient data management. Frontend development focused on translating interface designs into functional components, with particular emphasis on adaptability to screen sizes and touch interactions. Comprehensive quality assurance measures were integrated to guarantee reliability and performance. These measures facilitated iterative improvements, ensuring that the app met the desired standards while remaining costeffective in its implementation.

3.2 Creation of AR Content Using Lens Studio

3.2.1 The Initial Approach:

The exploration into AR content creation began with the utilization Of Unity and other software tools. However, as the team immersed Themselves further, it became apparent that a more specialized Solution was necessary. Faced with technical complexity in Unity, Such as its challenge for beginners requiring time and effort to learn Effectively, as the creation of the models where time consuming and The need for a more accessible platform became evident. After Thorough experimentation, the strategic choice to transition to Lens Studio was made. This decision was propelled by Lens Studio's Advanced features and user-friendly interface, promising to Streamline the workflow and enhance the quality of AR content Significantly. This transition aligns with the research findings and Underscores the importance of selecting the most suitable tools for Efficient and effective content creation

3.2.2 Transition to Lens Studio:

The transition to Lens Studio represented a critical juncture in their AR content development trajectory. Lens Studio provided a Comprehensive suite of tools tailored specifically for AR lenses and 3D models. Its intuitive interface and extensive feature set made it The ideal platform for their project. Additionally, Lens Studio is Easily accessible, and intuitive interface was comfortable to use, further Enhancing its appeal. Leveraging Lens Studio, this study aims to harness Its capabilities to enrich the virtual try-on experience within the Try On Tech app, delivering a more immersive and engaging user Experience.

3.2.3 Advantages of Lens Studio:

Lens Studio offered numerous advantages that propelled our AR content creation efforts forward. Notably, it simplified the intricate process of creating AR lenses and 3D models. The software provided specialized features for classification and categorization, facilitating efficient organization of our work. Additionally, Lens Studio's user-friendly interface enhanced productivity, allowing us to focus more on the creative aspects of AR content development.

3.2.4 Collaboration and Iterative Improvement:

Collaboration played a pivotal role in ensuring the success of our AR content development endeavors. Developers and designers collaborated closely to align the AR content with the visual style and branding of the Try On Tech app. Furthermore, we adopted an iterative approach to improvement, actively seeking feedback from users and stakeholders. This feedback loop enabled us to identify areas for enhancement and refine the AR content iteratively, resulting in a more polished and user-centric end product.

3.2.5 Objective:

Throughout this module, the primary objective was to Create a captivating and immersive virtual try-on experience for users Of the Try On Tech app. They aimed to achieve this by leveraging the Advanced capabilities of Lens Studio to develop high-quality AR Content that resonated with their target audience. Focusing on user Engagement and satisfaction, they sought to deliver a virtual try-on Experience that surpassed expectations, driving the success of the Try On Tech app in the competitive e-commerce landscape. Additionally, We found that creating 3D models was made significantly easier Through Lens Studio, reducing the difficulty level of the Task

3.3 Interacting with the User Interface

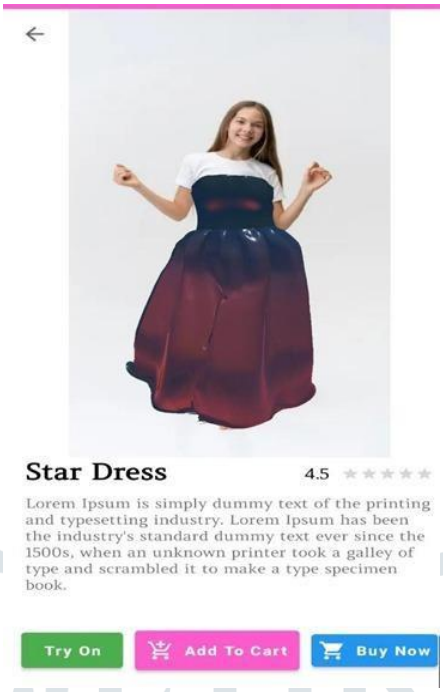

Figure 2: Product Page - Enhancing Accessibility with Intuitive Icons

In response to the challenges faced by users with the virtual try-on feature, the project Has implemented a user-friendly interface that simplifies interaction. By integrating Clear icons and strategic visual cues, users can easily navigate the try-on process Without confusion or frustration. This improved interface design prioritizes user Experience, optimizing for mobile devices and considering factors like screen size and Touch interactions. Through iterative testing and refinement, the project ensures that Interacting with the virtual try-on feature is intuitive, straightforward, and enjoyable for Users. Additionally, by addressing issues of complex navigation and unclear cues, the project significantly reduces user challenges associated with the try-on process

3.4 Integration of E-commerce App and Lens Studio

The final module focuses on integrating the e-commerce application with Lens Studio to seamlessly incorporate AR functionality into the Try On Tech app. This involves developing a dedicated AR module within the app architecture, enabling users to transition between traditional browsing and virtual try-on modes effortlessly. Integration points are identified and implemented to ensure compatibility and interoperability between the e-commerce platform and Lens Studio. Key features include triggering AR try-on experiences from within the app, real-time rendering of AR content, and seamless interaction between the two systems. Compatibility testing verifies that the integrated system functions as intended across different devices and operating systems, with performance optimization measures ensuring a smooth and immersive virtual try-on experience.

This condensed methodology outlines the step-by-step process involved in integrating AR try-on technology into the Try On Tech app. Each module addresses specific aspects of the development process, from creating the e-commerce platform and AR content to designing user interface elements and integrating e-commerce app and Lens Studio. Through a structured and systematic approach, the Try On Tech app aims to deliver a compelling and immersive virtual try-on experience for users.

Results And Discussion

Figure 3: Try-On Shoes - Revolutionizing the Online Footwear Shopping Experience

Try-On Shoes introduces a groundbreaking feature that transforms the way you shop for footwear online. With this innovative tool, customers can simply select a pair of shoes they love and leverage their phone's camera to visualize how the shoes will look on their feet in real-time. This eliminates the uncertainty of guessing sizes and provides shoppers with a more accurate representation of their potential purchase. By seamlessly integrating augmented reality technology into the online shopping experience, Try-On Shoes offers convenience, confidence, and precision, making it easier than ever to find the perfect pair of shoes from the comfort of your own home.

Figure 4: Try On Apparel - Effortlessly Discover Ideal Hoodie Fit

Try On Apparel presents a cutting-edge feature that streamlines the process of trying on Clothing and accessories online. Specifically tailored for hoodies and side bags, this tool Allows users to virtually try on the latest collections with just a few taps. By leveraging Advanced visualization technology, customers can explore various styles, colors, and Sizes without the need to physically try them on.

Figure 5: Try On Gowns: Discover Your Ideal Women's Dress Fit

Introducing Try On for women's gowns, a revolutionary tool for online Shopping. Tailored specifically for formal wear, effortlessly browse and virtually try on The latest gown collection. With advanced visualization technology, explore various Styles, colors, and sizes from the comfort of your home. Say goodbye to the hassle of Multiple store visits and uncertainty in online purchases. Experience the future of gown Shopping today, hassle-free and with newfound convenience.

Conclusion

This works dive into the promising applications of augmented reality (AR) technology within the fashion industry, particularly focusing on its potential to revolutionize the virtual try-on experience. By integrating AR features into the Try On Tech app, our aim was to create an immersive and interactive shopping platform that simulates the in-store clothing try-on experience. This involved utilizing AR technology to visualize clothes on individuals and enhancing the app's online shopping infrastructure and ensuring intuitive user interface design.

The integration of AR technology brought several benefits, both for users and retailers. The potential benefits of AR technology for both consumers and retailers remain significant. For consumers, it promises a more convenient and enjoyable shopping Experience, allowing them to visualize clothing items and make more informed Purchase decisions. For retailers, AR technology has the potential to reduce return rates By empowering customers to accurately assess the fit and style of garments before Purchasing. Additionally, AR-based try-on experiences have the potential to contribute To sustainability efforts by reducing the need for physical garment transportation.

Our project underscores the transformative potential of AR technology in reshaping Consumer engagement and industry practices within the fashion retail sector. By Providing a dynamic and personalized shopping experience, AR has the power to Redefine how individuals interact with fashion products and brands. Looking forward, AR is poised to play a significant role in the future of fashion retail, offering endless Opportunities for innovation and creativity in the way we shop for clothing.

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