



## 4. Augmented Reality (AR) Applications in Online Shopping

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### **ABSTRACT:**

*Augmented Reality (AR) technology are increasingly being integrated into online shopping platforms to enhance the consumer experience and decision-making process. In order to explore the importance, benefits, challenges, and possible uses of augmented reality and virtual reality in online retail environments, this study looks at the corpus of research from journals that are scopeps-indexed. In recent years, augmented reality (AR) technology has become more popular and mature, which has encouraged its use and given rise to a number of applications.*

*By boosting popularity and brand appeal, augmented reality (AR) integration into commerce can improve marketing campaigns and influence consumer brand engagement behavior. As a result, merchants and brand owners are making more investments in the AR commercial services industry.*

*A new kind of information technology that has attracted a lot of attention recently is mobile augmented reality technology. One of the important technologies that could change future purchasing trends is augmented reality technology. This article presents the fundamental ideas and concepts of augmented reality technology, as well as the feasibility analysis and advancement of its application in Indian mobile e-commerce. Traditional online shopping applications are very different from augmented reality online shopping. We will talk about it in this paper. Applications of Augmented Reality (AR) in Online Shopping.*

### **KEYWORDS:**

*Augmented Reality, Applications, Online Shopping, Customer Experience, Decision-Making, Brand Appeal, Retailers, Information Technology, Shopping Trends, Mobile E-Commerce.*

## **Introduction:**

### **Augmented Reality Shopping:**

Using an electronic device, such as a smartphone or virtual reality headset, augmented reality shopping enables shoppers to digitally try on and test things. Customers can use AR to see how things would seem in their homes or, in the case of fashion, on their bodies, or it can help them experience what it would be like to engage with products in a physical store.

Numerous prospects for AR are seen in retail, especially in e-commerce. Even if e-commerce has become more commonly accepted, some purchases still require a little more background information. That might make it more difficult to sell some product categories online. Therefore, AR is a good tool for marketers since it lets customers do pre-purchase activities like virtually trying on clothes or makeup or superimposing furniture into a room to see how big it is and how well it matches the rest of their furniture. [1]

By giving clinicians comprehensive information on a patient's medical history, including previous treatments, prescriptions, and test results, augmented reality (AR) has been employed in the healthcare industry to aid enhance patient care. By offering real-time direction and feedback, augmented reality (AR) can also be utilized to direct medical procedures like surgery. By showing virtual pictures of internal organs and offering instructional materials, augmented reality (AR) can also be utilized to help patients better understand their medical issues.

Creating interesting and educational learning experiences has been made possible by AR in the sphere of education. Students can get a deeper knowledge of difficult ideas by interacting with 3D models and simulations of real-world things, such as the human body's anatomy or the traits of various animals, through the use of augmented reality technology. Additionally, AR can give kids access to virtual field trips that allow them to explore and learn about other places in a realistic and engaging way. This improves their educational experience by making it more engaging and memorable. All things considered, augmented reality has the power to revolutionize how we engage with the actual world. It can be used to provide more immersive and detailed experiences in a variety of disciplines, including healthcare and education. There will probably be more uses of AR in our daily lives as technology advances. [2]

### **Types of AR Applications**

Since AR technologies offer slightly different kinds of capabilities, there are a few different kinds of AR technology.

- 1. Marker-based AR.** Marker-based AR, sometimes referred to as Image Recognition or Recognition-based AR, uses a camera to identify an object (the "marker") and displays details about it on the screen.

2. **Marker less AR.** An object in the actual world doesn't have to activate marker-less AR. Rather, a virtual object can be placed anywhere the user wants. The object can then be moved and rotated.
3. **Location-based AR.** A subset of marker-less AR known as location-based AR makes advantage of geographic location to show digital material at specific points in time. One instance of location-based augmented reality is Pokémon Go.
4. **Projection-based AR.** Projecting artificial light onto real-world surfaces and, in some situations, enabling user interaction are the components of projection-based augmented reality. We've all seen holograms in science fiction films like Star Wars, so these are common instances. [3]

### **Augmented Reality in Online Shopping:**

By removing the gap between online and offline buying, augmented reality technology creates a more fascinating and engaging shopping experience. Unlike traditional web-based buying, which relies on static images, AR allows consumers to see products in their natural contexts, which improves decision-making. Customers may now visually test items before making a purchase thanks to the adoption of this technology by major companies like ASOS and IKEA. Studies have shown that AR can increase customer satisfaction, engagement, and purchase intention. Studies that examine the use of augmented reality in online shopping are reviewed in this area. It demonstrates how AR enhances customer engagement, influences purchasing decisions, and expands the visualization of products. A summary of the main conclusions about user perceptions and behavioral outcomes is provided.

### **Augmented Reality:**

- **Positive Effects:** Augmented Reality (AR) enhances user experiences by providing realistic product renderings. It also positively affects brands, user satisfaction, purchase intention, and overall user experience.
- **Personalization and Engagement:** By allowing consumers to customize their shopping experiences and engage with products in meaningful ways, augmented reality (AR) promotes self-expression and experimentation.
- **Social Interaction:** By facilitating both synchronous and asynchronous user interactions, AR apps can influence purchasing decisions and promote the sharing of social knowledge.
- **Investment and Adoption:** Despite the high initial expenditures, augmented reality offers significant benefits by boosting consumer interest and improving the shopping experience. [4]

### **Review of Literature:**

The earliest ideas and prototypes for AR/VR technologies appeared in the middle of the 20th century, and their history spans several decades. While VR creates completely immersive surreal worlds, AR favors digital data over real-world data. By providing customers with a more realistic and captivating method to view the products, both technologies can enhance the buying experience in a number of businesses, including online retailing.

The COVID-19 epidemic has had a significant negative impact on seasoned retailers who rely on rich sensory experiences to attract customers, such as restaurants, fashion boutiques, and specialty shops. As these retailers shifted their operations online, technologies like virtual reality (VR) and augmented reality (AR) became apparent as potential means of replicating comparable experiences. Despite its potential, comprehensive guidance on integrating AR and VR in online business is currently lacking. Ebrahimabad, Fatemeh Zare, et al. (2024) [5]

Users may benefit from an even better experience and value when augmented reality is used in e-commerce (Nikhashemi et al., Citation2021). A number of AR features impact the experience and perceived value, which in turn affects user behavior when using e-commerce, particularly with regard to the intention to keep using e-commerce. This is highlighted once more when virtual product trials use AI context-specific factors and augmented reality elements to create captivating experiences. [6]

Expanding shopping alternatives by combining emerging technology benefits businesses and improves the shopping experience for customers. As AR grows more popular, there will probably be a greater demand for AR-related apps, which will lead to competition among industry participants. According to numerous studies, augmented reality (AR) technologies are commercial marketing tools that increase brand appeal and recognition while increasing sales, all of which support overall marketing objectives (Arghashi & Yuksel, 2022). Thus, increasing customers' AR-enabled brand engagement is a top priority for companies. Research on brand engagement habits in relation to AR technologies is scarce. Users must also be open to interacting with brands' augmented reality platforms in order to make more purchases. In order to encourage brands to employ AR-enabled services, the current study investigates the elements that affect users' engagement with AR. [7]

By utilizing technology, offering competitive prices, and expanding consumer segmentation through online interactions and transactions, e-commerce has revolutionized the way manufacturers market their goods. These benefits have allowed e-commerce to grow significantly and create new e-commerce websites that sell a variety of goods. On-site purchasing experiences, however, have not been fully compensated for by these advancements (Lu & Smith, 2008). Shopping on-site offers customers the advantage of being able to handle the product in person.

They have direct access to the product to see, touch, and test. If customers have any questions concerning the product, they can also speak with the seller or the store employee. When customers purchase online, they do not completely experience these things. As a result, when customers hold the goods in their hands, they frequently express disappointment. [8]

### **Objectives:**

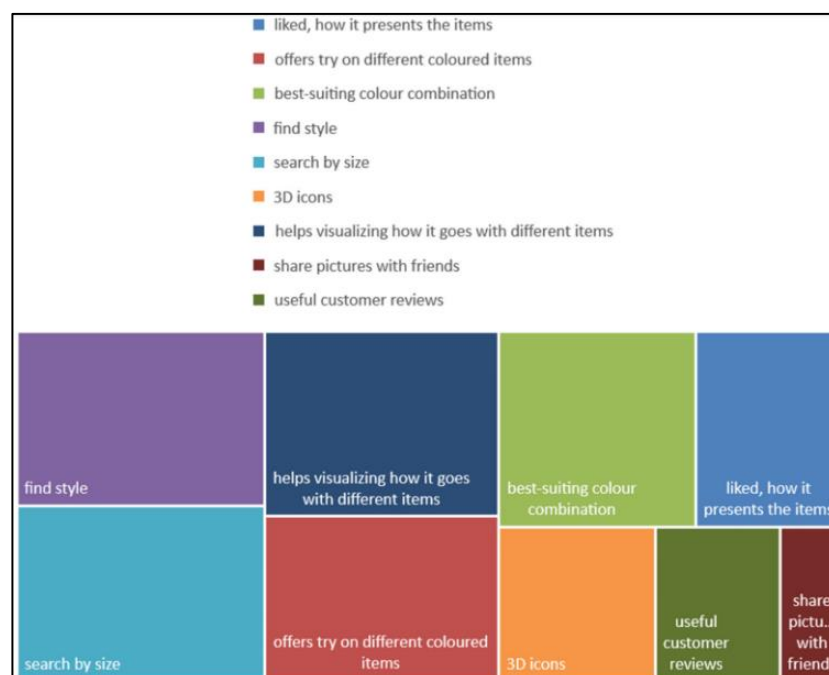
- Examination of the impact of AR technology attributes, flow experience, and user satisfaction on AR service engagement.
- To Study the Augmented Reality (AR) Applications in Online Shopping
- To Analyses advantages of using AR applications in the fashion purchasing process

### **Research Methodology:**

The secondary research methodology employed in this work includes a survey of the literature from several reputable journals. To learn more about the purchasing of products through different online platforms, a number of holes in the previously completed research were found and filled.

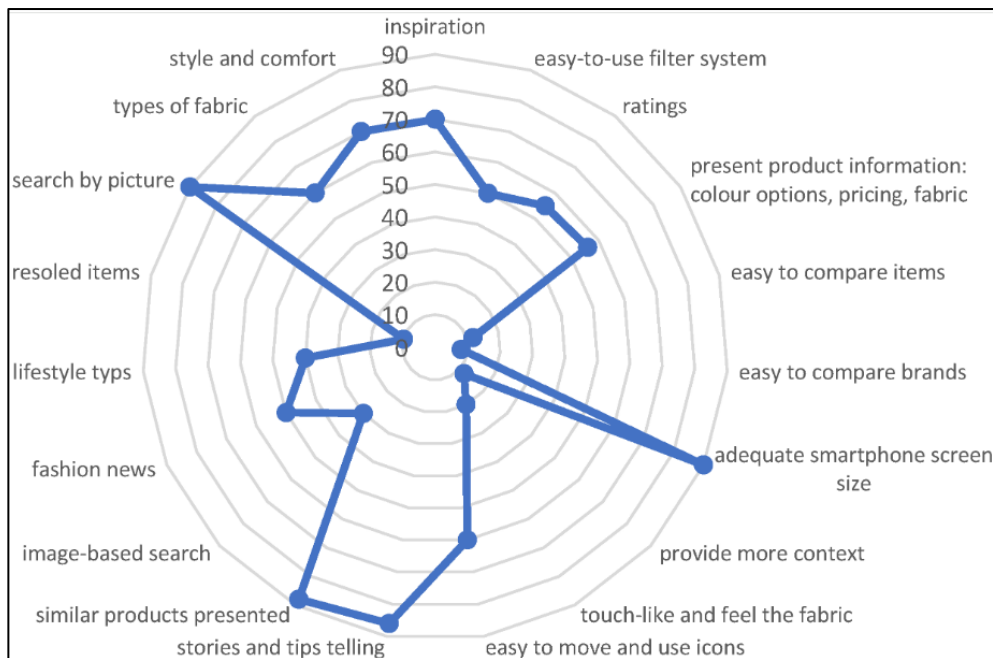
### **Result and Discussion:**

The benefits of augmented reality (AR) applications in the fashion buying process, as reported by research participants, are depicted in Figure 1. The ability to find style accounts for the greatest portion and is the main advantage, suggesting that users place a high value on AR's ability to help them identify appropriate fashion styles. After that, a lot of focus is put on the feature that makes it easier to see how different pieces match different ensembles, emphasizing how crucial augmented reality is to helping consumers successfully mix and match clothing items. The second notable benefit is the ability to determine the most appropriate color combinations, demonstrating the usefulness of AR in color coordination. Additional noteworthy advantages include the opportunity to try on various colored things, search by size functionality, and an understanding of how items are presented, all of which improve the overall shopping experience. The ability to share images with friends, 3D iconography, and helpful user evaluations are some extra elements that enhance the allure and efficacy of augmented reality applications in the fashion retail industry. This thorough analysis highlights the various benefits that augmented reality offers, making the shopping experience for consumers more convenient, enjoyable, and informative. [9–10]



**Figure 1. The advantages of using AR applications in the fashion purchasing process mentioned by the interviewees (Source: www.mdpi.com).**

According to the mentions, the following were the most commonly mentioned top-of-mind responses regarding the visuality and content criteria on AR applications: inspiration, an easy-to-use filter system, ratings, product information (color options, pricing, and fabric), the ease of comparing items and brands, a smartphone screen size that is appropriate, creating context for tasks that mimic natural interactions, the feel and touch of the fabric, easily navigable icons, experiences, stories, and tips, the presentation of similar products, image-based fashion search, fashion news, lifestyle websites, resold items, search by picture, the types of fabric, style, and comfort. Figure 2 shows how frequently these responses occur. Strong brand recognition and recall are indicated by top-of-mind awareness, which is the brand or product that first springs to mind when a consumer thinks about a particular category. [11]



**Figure 2. The key criteria for using AR applications as mentioned by the respondents**

Figure 2 illustrates the most crucial requirements for young users to use AR applications. These include a sufficiently large smartphone screen, the capability of finding comparable items from other brands, the capacity to search by image, and the incorporation of fashion advice and anecdotes. According to the interviews, imagination, displaying comfort and style, and providing thorough product information are other crucial traits. [12]

### Interactive Shopping Using Augmented Reality:

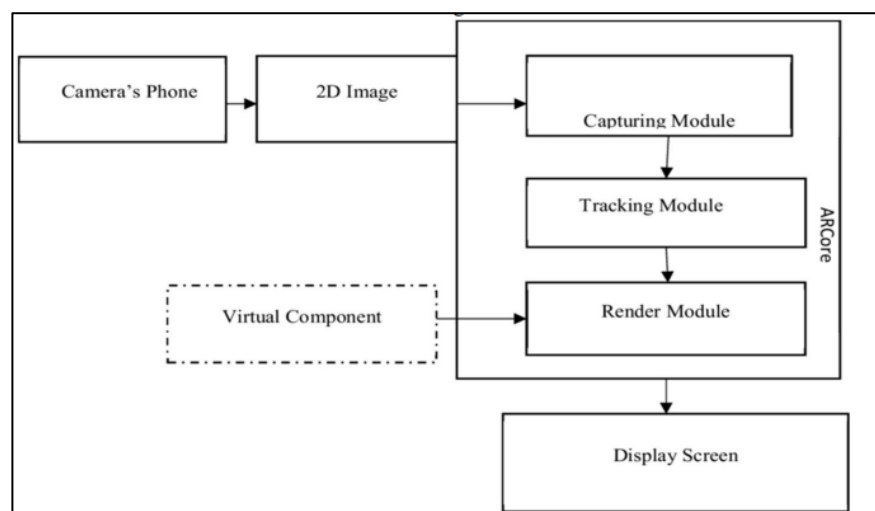
An innovative new method of purchasing that combines virtual and real-world encounters is interactive shopping with augmented reality (AR). By superimposing computer-generated content on the actual environment, augmented reality technology gives users an immersive and participatory experience.

**A. Existing System:**

Online or physical businesses have historically been the only options for the current shopping system. Customers can view and touch the things in physical stores before making a purchase, which is an advantage. Physical storefronts, however, can be problematic and time-consuming, especially if the consumer has mobility issues or the business is far away. On the other side, although online shopping allows customers to shop whenever and from anywhere, they are unable to physically view or handle the things before making a purchase. When the products are eventually delivered, this may cause apprehension and discontent. Some stores have used virtual reality (VR) technology and 3D modeling to close this gap and give customers a more engaging shopping experience. However, these technologies are costly and not readily available to consumers because to their specific hardware and software requirements.

**B. Proposed System:**

The goal of the suggested augmented reality (AR) interactive shopping model is to give customers a more engaging and immersive buying experience while addressing the shortcomings of the current system. The suggested strategy would let shoppers see products in their actual settings by superimposing computer-generated content onto the real world using augmented reality technology. Consumers would be able to access an AR application offered by retailers using their smartphones or other AR-capable devices. After that, users might choose a product that caught their attention, and the AR app would create a 3D model of it to overlay on the actual surroundings. Customers were then able to view the goods from many perspectives in their surroundings, which helped them better comprehend its dimensions, form, and characteristics. Because it would only require an AR-enabled smartphone, which is becoming more and more prevalent, the suggested model would be available to a larger audience. Additionally, the approach would improve the shopping experience for customers by enabling them to make better informed decisions and lowering the possibility of returns or unhappiness. [13]



**Figure 3: Block Diagram [14]**

### **AR Applications Are Relevant for Online Apparel Retailers:**

Due to a number of limitations and risks involved, buying clothing online has traditionally lagged behind buying it in a real store. Numerous augmented and virtual reality technologies have been integrated into the business platforms of online shops, particularly those in the fashion, accessory, and clothing industries. The most cutting-edge technology in online clothing retailing are the extensively used virtual try-on systems and 3D virtual models.

- **Virtual try-on technology:**

Through improved device cameras, the Virtual Try-on technology allows users to experience reality in virtual environments. The VTO technology was proven to have a significant impact on consumers' perceptions of the advantages and risks of online buying. It was discovered that there was no difference in the customers' age or gender when it came to using VTO when completing online purchases.

Because it offers a more realistic experience, the VTO systems are regarded as one of the most dependable technologies and are therefore the most widely used technology among online businesses. The most significant predictors of customers' intentions to embrace and use VTO were thought to be elements like "innovativeness" and "optimism." The main element influencing a customer's intention to use and embrace VTO during exploratory shopping was thought to be consumer inspiration. Stereoscopic virtual reality is thought to improve consumers' hedonic purchasing experiences by offering a three-dimensional view of the virtual world's products.

- **3D VIRTUAL MODELS:**

Through the exhibition of a graphical and interactive depiction of the goods, augmented and virtual reality provide buyers a sense of reality. Customers' decisions to use 3D image view for purchasing were found to be more influenced by hedonic motivations since they were thought to offer more entertainment value (Nakayama, 2019). Regarding perceived ease of use, the 3D rotation view was deemed to have the greatest score among the different sensory enabling technologies, including virtual try-on, 2D bigger view, and 3D rotation view.

Online purchasing would not be enjoyable or entertaining if buyers were only given product information. As a result, 3D virtual models—the most engaging technology—were created, giving consumers a realistic look at the goods they want to purchase.

It is anticipated that the 3D environment would give customers access to three-dimensional virtual systems that offer an in-depth view and interactive experience with high-quality, visually rich product photos, hence increasing their satisfaction and fun when they purchase online. The store layouts of the 3D embedded online stores have an impact on the attitude of the customers and their enjoyment of online shopping. When the virtual model bodies accurately reflect the customer's actual body size, the 3D virtual models will significantly lower the risk related to clothing fit. The primary factor influencing customers' decision to use virtual 3D models for online purchases was their entertainment value. [15]



**Table 1: A comparative review of the virtual apps that businesses and online platforms provide**

Type of Application	Brand	Short description
Virtual Try –on	○ Myntra	● Try me
	○ Flipkart	● Shopping virtual
	○ Amazon	● Virtual dressing room
	○ Ajio	● Virtual fitting rooms
3D View modeling	○ Sketchfab	● TriMirror
	○ ZARA	● Zara Interior 3D Model
	○ OptiTex	● Real-to-Life 3D simulation
	○ Levis	● Levi’s Tailor shop
	○ Nike	● Nike By You

*Source: The data elaboration as per industry reports, newspaper articles and company website.*

**Conclusion:**

E-commerce is one of the sectors growing the quickest in the world. To improve the user experience on their website and mobile applications, these e-commerce firms employ machine learning and artificial intelligence technologies. The current hiring procedure will be improved and made more effective by our technology. This will provide the organization with a candidate who is fully experienced in that field and who possesses the necessary skills. Provide the organization with possible applicants, and the candidate will be put in a company that values his or her abilities and skill set. Our system's main goal is to improve the present resume ranking method and give it greater flexibility for both parties.

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