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TECHNOLOGY INNOVATION HOLDS THE KEY TO VICTORY FOR THE FASHION INDUSTRY'S BRIGHT FUTURE

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ABSTRACT

The fashion sector has been in the forefront of implementing cutting-edge technologies for the last ten years. From the first sewing machine uses for fabric creation to cutting-edge developments like biodegradable fabrics, fashion rental applications, and even needle-free stitching processes, this evolution covers it all. As technology is advancing rapidly in today's world, the arrival of artificial intelligence represents a major turning point in the industry. Notably, artificial intelligence (AI) is increasing production efficiency in the fashion industry, augmented reality is improving the customer shopping experience, and virtual platforms are boosting the industry's economy. Among the most recent technological developments, artificial intelligence is noteworthy when considering evolution. AI is revolutionizing the fashion business by driving efficiency out of large-scale production processes. The current state of technology in the sector is unparalleled [1,2].

The fashion industry has been at the forefront of using cutting-edge technology during the past ten years. The fashion business has undergone many advances in the previous few years, including the introduction of needleless sewing, biodegradable materials, sewing machines for fashion products, and fashion rental apps. Artificial intelligence marks the beginning of fashion evolution. The usage of technology in fashion is at its peak right now. Technology includes artificial intelligence, which is increasing the fashion manufacturing industry's production capacity; augmented reality, which improves the shopping experience for customers; and virtual outlooks, which raise the fashion industry's remunerative economy [1].

Artificial intelligence is the newest technological advancement when it comes to evolution. There has never been more technology in fashion as there is right now. Large production lines are being optimized by artificial intelligence, consumer experiences are being improved by augmented reality, and profitable new revenue streams are being created by the virtual world.

One of the most obvious changes in the fashion sector is attributed to e-commerce. Online shoppers are becoming more and more accustomed to its convenience. Innovative digital strategies have been adopted by fashion firms to establish a connection with their target audience. Among this cutting-edge technology are virtual fitting rooms, which let buyers make more rash selections by showing them how a product would seem on their particular body type

To improve efficiency, artificial intelligence is also being used in the design process. For instance, designers can use it to digitally resize clothes without having to make them, change colors, and even create visual backdrops that give buyers a clear idea of how a garment will look in general. This method conserves materials and time.

E-commerce has caused one of the most noticeable shifts in the fashion business. Online purchasing is getting increasingly popular due to its convenience. Fashion brands are starting to use cutting-edge digital strategies to connect with their target market. Virtual fitting rooms, one of the more sophisticated technologies, allow buyers to try on clothing and see how it fits their body type, which encourages more impulsive decision-making.

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Artificial intelligence (AI) is used in the fashion design process to make the process much simpler. For example, AI can be used to digitally resize a garment without actually making it, change its color digitally, and create a visual backdrop that will allow the buyer to make an accurate judgment about the garment's overall appearance. This conserves resources and time, which the introduction of 3D printing is a huge technological advancement that enables firms to reach a wider customer base. Furthermore, automation is essential for increasing output rates. Innovative production processes, like digital pattern-making procedures, computerized laser cutting equipment, and design software, are also revolutionizing the fashion business [3].

Keywords: Virtual Reality, Augmented Reality, Evolution, Technology, Customer Satisfaction, Sustainability

1. INTRODUCTION

1.1. OVERVIEW

The use of cutting-edge technology in the fashion industry is revolutionary and essential to success. The failure of many businesses to accept cutting-edge technology has resulted in their demise. In order to survive in the fashion sector, one must prioritize consumer pleasure, sustainability, and cutting-edge digital approaches. Fashion firms use artificial intelligence (AI) and intelligent data analysis to create sustainable and eco-friendly designs by making the most use of available resources. AI data analysis also aids in trend predicting, which boosts purchasing power and results in customer happiness. Every step of the fashion industry uses advanced technology, from design to manufacture to packing to quality control to shipping to marketing to sales. The fashion business uses artificial intelligence in many different ways. For example, the textile manufacturing sector uses it for color matching, quality control, supply chain management, and production enhancement. Artificial Intelligence streamlines online buying and other related processes. Virtual fitting is a basic need for all consumers [1.6.7].

The user values the fit and appearance of the garment. If the fit is off, all of the garment's great features—including the pricey fabric and design—are useless. An item of clothing that fits poorly will not be worn and may not even be sold; on the other hand, a well-fitting item looks better and is more comfortable. According to Brown and Rice (2014), the comfort of wearing is determined by the combination of fabric characteristics, pattern structure, ease allowed, and body dimensions, as noted by Geršak (2014). The ease allowance, defined as the difference between the body dimensions and the garment (Wang, Newton, Ng & Zhang 2006), serves two purposes: it facilitates the body's movements functionally or fits well, and it adds style or flair to the garment's design (Ashdown & DeLong 1995; Beazley 1999).

Fashion companies are prioritizing virtual try-on technology these days in order to address this issue by improving product visibility and providing haptic feedback for online shoppers. Using photographs on a computer or smartphone screen, consumers may virtually try on sizes, styles, and colors thanks to this technology. Customers are able to assess products more thoroughly based on their needs.

Try-on technology has the power to completely transform the fashion business if it is applied sensibly and responsibly. Fashion brands must, first and foremost, consider how try-on technology may improve the experiences of consumers both online and offline while also taking into account its adoption challenges [1,2].

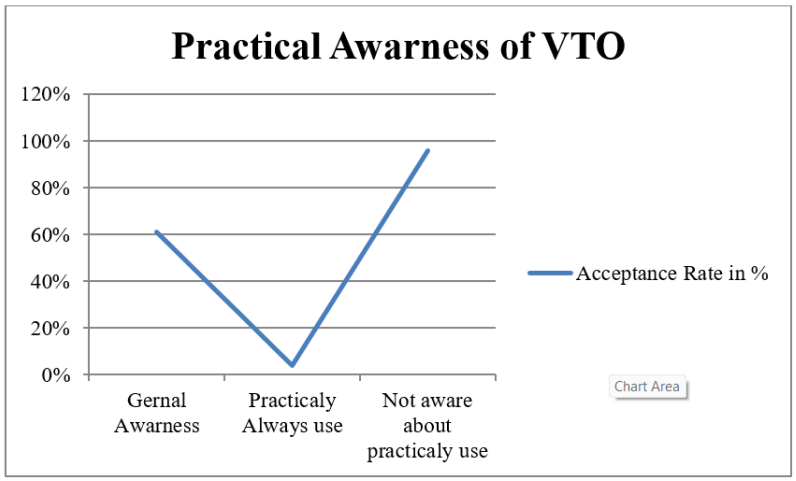
Types of VTO Classification of Virtual Fitting Rooms: Considering the consumer experience, we may divide virtual fitting rooms into seven groups based on the

precision, allure, and involvement that these VTO technologies exhibit. According to Lee and Xu (2020), these groups offer a variety of VTO capabilities and provide a unique approach to enhance the fitting experience for clients. The accuracy with which VTOs record and display the user's body proportions is a crucial factor to take into account. Certain virtual try-ons (VTOs) can be incredibly realistic, ensuring that the virtual version of the garment closely mimics its appearance and fit in real life.

2. OUTCOME AND DISCUSSION

Giving consumers a positive and satisfying fitting experience is one of the various approaches for VTO solutions that are now accessible and have been investigated. Just 61% of consumers are aware that virtual try-on tools exist. Researchers used a random selection process to choose 25 respondents out of a total of 25 only 4% of consumers are aware of augmented reality technology and always use it, whilst the remaining 96% have never used it or are unaware of it.

The following is a description of the virtual Try-On method and a customer acceptance analysis using data from a broad survey shown in graph no 1:



Virtual Try-On instruments and methods are mostly advantageous to Production Houses, Industries, and Clients

Researchers study 45 different companies for various products, but 78% are currently in the luxury retail space. Luxury shops are consistently at the forefront of technological breakthroughs, and virtual try-on technology is no exception. They strive to analyze which type of industries provides most tools on top in the market. Online purchasing is growing thanks to virtual try-on technology, but the physical market economy is also struggling.

For VTO, a variety of tools are available; some of them are listed below:

3. MEDIA SYNTHETIC

Artificial Intelligence-generated images, movies, audio, and text are known as synthetic media. Thanks to modern, advanced technology, these images appear remarkably lifelike. Artificial Intelligence-generated photos or movies are produced digitally, which significantly reduces production costs and time. For example, it is possible to make a digital photograph of a garment on a model against the backdrop of an outdoor shot without using a real garment or traveling to an outdoor location. Deep fakes are one specific instance that requires careful consideration in the context of synthetic worlds. "Deep learning" and "fake" refer to advanced

applications of artificial intelligence methods, specifically computer-generated deep learning neural networks, to create realistic-looking synthetic media images. Through careful examination and integration of existing data, digital content is produced that is incredibly lifelike. Artificial Intelligence (AI) technology can be used to create expressions on faces, voices, actions, and gestures that seem very natural. The face expression and features of one person can be easily combined with those of another using the deep fake techniques, producing identical outcomes.

4. ONLINE INFLUNCER

People with a large following on social media platforms are considered influencers [3]. The newest technological innovation is a character that has been digitally produced. Digital 3D modeling and animation were used to create this. Thanks to recently developed technology, content writers can now engage with clients on social media without the need for human intervention through the creation of virtual influencers. Naina, Kyra, and Sravya are a few of the well-known virtual influencers from India who are designed to facilitate consumer interactions and offer a range of services. Virtual characters have existed since the early 1990s, when cartoon characters were the first digitally produced personas. Because animation has a high viewer acceptance and engagement rate, it has been employed as an advertising strategy since the 1940s. On the other hand, virtual idols—media performances that take place without reference to any live performer—and virtual celebrities were introduced in Japan by the same firm, Botany Lamb.

Technology and Consumer Involvement in Fashion Design: Examine the study about the impact of VTO technology and the researcher's usage. Try to provide an explanation of the review data in tabular form, as indicated below Table no 1:

Technology VTO	Utilization	Effective
E-Commerce Platforms	Retail Increases	More than 89 % growth on selling items on virtual platform
Social Media	Influence Brand	70% consumer’s influenced for shopping by social media brand or new products.

This table clearly illustrates the several cutting-edge technologies used in the fashion industry to engage consumers and the ways in which they affect consumer behavior and brand contact.

5. VIRTUAL TRY-ON'S ADVANTAGES IN TERMS OF FASHION

Apparel stores stand to benefit greatly from virtual try-ons. Virtual try-ons have a lot of advantages that can increase traffic and revenue for merchants [1]. virtual try-on enables consumers to view their appearance in the clothing they are thinking about purchasing without physically visiting the store. Customers who reside distant from the retailer's physical location or who lack the time to visit a store may particularly benefit from this; The ability to assist clients in making better purchasing judgments is another benefit of virtual try-ons. They can obtain an idea of what looks good and what doesn't on themselves by using virtual try-ons to see how various colors and styles look on them. This may result in fewer returns and better-informed purchasing decisions;

For fashion retailers, virtual try-on is another excellent strategy to boost traffic and revenue. Customers are more likely to purchase products they otherwise

wouldn't have when they can digitally try on clothing. Virtual try-ons can also help merchants attract new clients who might not have otherwise visited their business;

Another important ally in lowering returns, which is one of the biggest problems facing e-commerce today, is virtual try-on. It enables clients to make better-informed choices, which results in more precise expectations for the goods they will receive; Furthermore, virtual try-on can prevent unsold goods and drastically cut down on the requirement for real samples3]. Businesses can reduce expenses related to creating real samples and prevent overproduction by enabling clients to virtually try on clothing and shoes using 3D twins.

6. THE FASHION INDUSTRY IS CHANGING BECAUSE TO VIRTUAL TRY-ON.

Virtual try-ons are transforming the fashion industry by providing consumers with a more accurate representation of how clothing will appear on them. Customers can try on virtual replicas of clothing before making a purchase in order to achieve this. Because buyers are more inclined to make a purchase if they can see how the garments will appear on them, virtual try-ons for retail also contribute to higher sales[3]. Virtual try-on technology is also constantly evolving, with new capabilities being added on a regular basis. Consider the well-known virtual fitting rooms as an example of how consumers may now utilize virtual reality for fashion to try on clothing in a virtual environment. The fashion business will undoubtedly undergo a change thanks to this technology, and it will be interesting to watch what further advancements are made in the virtual try-on space in the future.

Technology	Application	Impact
E-commerce Platforms	Online Retail.	150% increase in sales over the last 5 years
	Personalized Shopping	60% of consumers prefer personalized recommendations.
Social Media	Influencer Marketing	80% of consumers influenced by social media trends
	Brand Engagement	70% increase in brand engagement through social platforms.
Personalization	Customization	45% rise in customer loyalty due to personalized experiences.
	Tailored Marketing	55% increase in conversion rates with targeted marketing

The new technologies used in the fashion industry to engage consumers are displayed in this table along with their effects on brand interaction and customer behavior. The table's crucial statistics and research findings are highlighted, demonstrating the important influence of technology on consumer interaction methods in fashion design [4,].

Modern technologies like augmented reality (AR) and virtual reality (VR) have greatly improved the fashion design brainstorming stage. Fashion design is about to undergo a revolution thanks to 3D printing, which makes it possible to explore sustainable materials and produce customized items as needed. The emergence of wearable technology and smart textiles has blurred the boundaries between fashion and utility, resulting in clothing that is both responsive and interactive. Manufacturing has been streamlined by automation, robotics, and artificial intelligence, which has reduced costs, shortened production schedules, and optimized efficiency all while upholding quality standards. Because they provide

accuracy and customization on a large scale, these technologies have revolutionized the way that traditional garments are made. The retail industry has undergone a transformation thanks to e-commerce platforms, which provide customers unmatched accessibility and ease. Influencer marketing and social media have grown to be crucial in determining customer trends, tastes, and brand involvement [4,5].

7. STYLE AND TECHNOLOGY

Businesses in the fashion industry are seen to be surviving the shift in market trends thanks to the advent of advanced applied science. To a great extent, businesses may prepare for sustainability through the early application of AI. AI-assisted data analysis is yet another example of progress. This aids in providing real-time data and aids in spotting trends, both of which support customer interaction and ultimately increase income. AI has a huge impact on the fashion industry at every level, including design, production, packaging, product transportation, retail, marketing, and ultimately product sales. Artificial intelligence (AI) technology is useful in many areas, including supply chain management, demand forecasting, creative designing, product recommendation, product search, and virtual support in the form of digital product visualization on body types[7,8].

Virtual fashion is the use of technology to allow customers to see fashion items digitally on their body types, giving them a 3D appearance that helps them picture the item on them. Because fewer things need to be manufactured physically, virtual fashion also promotes sustainability by reducing material prices and waste. People are embracing virtual fashion because it allows them to use products digitally, for as by uploading images of them to social media, without having to pay for them. Three-dimensional human modeling technology holds significant research value in the fields of digital fashion design, virtual fitting, virtual clothing display, and personalized apparel. In terms of realization, 3D human modeling is mainly divided into four types: human feature modeling, human parametric modeling, human polyhedral modeling, and human surface modeling. Existing three-dimensional clothing body modeling technology can be divided into three main types of methods based on three-dimensional body scanning technology, modeling software, flat body images, and body measurement information[5,6].

8. FABRICS 3D PRINTED

These items are created by applying layers of material directly onto fabrics using digitally designed images. This procedure offers a sustainable substitute for conventional techniques by precisely controlling the usage of materials and minimizing waste. In contrast to conventional clothing manufacturing, 3D printing produces less waste because there are no cutoffs or extra fabric . With the help of this cutting-edge technology, only the required amount of material is used. Because 3D printed clothing uses less material and requires less labor during manufacture, it's also a more affordable choice[4,7]. Recyclable and biodegradable materials can be used to create 3D-printed clothing, providing a sustainable option. Textiles created with 3D technology have endless creative possibilities. Designers may now produce elaborate and avant-garde items that were previously thought to be impossible because to new technologies. Bespoke apparel that is made to a person's exact size and style is another benefit of 3D printing.

The integration of a digitally generated image of a product into the user's environment is known as augmented reality. For instance, a person can set a digital

representation of a piece of furniture in a room of their house to see how it would look. When purchasing online, AR applications can be utilized to see the product. By allowing customers to view products digitally before making a purchase, augmented reality (AR) technology boosts consumer confidence and lowers the likelihood of returns. Customers' confidence in that specific brand is further bolstered by this.

The met averse creates a three-dimensional image that seems to be all around the user. Users can hang out, shop, and play games in this virtual world. Computer-generated environments are included in the met averse. The Met averse is a digital twin of the internet that facilitates continuous online 3D virtual worlds where the public's virtual experiences, real-time 3D content, and related media are linked and available via VR/AR, as well as traditional devices like PCs and mobile phones.

9. BLOCK CHAIN

With the help of block chain technology, luxury brands may now easily hold, buy, swap, and trade non-fungible assets by assigning them unique identifying numbers made from encrypted functions known as tokens. Consumers can create and verify ownership of a luxury item that can be subsequently transferred to another party by logging on to a brand's website [6,7].

10. CREATIVE ECO-MATERIALS

In the current fashion industry, reusing old materials to create new fabrics is an environmentally responsible substitute. The manufacturing method of these cutting-edge textiles is also typically more environmentally friendly [7]. The abandoned items are reprocessed to create new products for continued usage and to reduce waste. It might require a lot less water and chemicals, for example, than the majority of conventional fabrics. It might contribute to a decrease in atmospheric CO2 emissions. Among the Eco materials accessible is potato waste, which is used to make the breakthrough bio plastic perplex. The effective fusion of fashion with technology frequently results in advanced technology-made materials, new processes, and procedures that help steer the fashion industry towards a more sustainable future. These natural products include hemp, bananas, coffee, pineapple, water lilies, nettles, and hemp. Although these products appear to be ingredients or consumables, they are actually natural resources that may be used to create sustainable textiles.

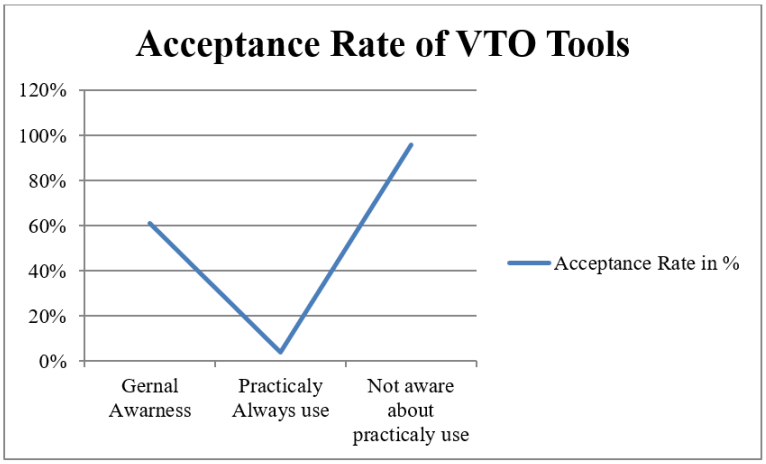
11. CONCLUSION

Virtual try-on technology, which offers customers a virtual try-on experience, has the potential to completely transform the luxury market. Luxury businesses may enhance customer satisfaction and eventually increase sales by enabling customers to view how a product appears on them before making a purchase. Virtual try-on technology does, however, come with certain drawbacks, including implementation costs and an inability to duplicate the in-person experience. Virtual try-on technology is an exciting breakthrough for the luxury market and is expected to play a bigger role in e-commerce in the future, despite these obstacles [8].

All things considered, virtual try-ons are an excellent method for fashion stores to enhance client satisfaction and boost traffic and sales. Virtual try-on technology enables customers to select the perfect clothing without leaving their homes, while businesses may expand their customer base and boost revenue. Everyone who is involved benefits from it.

Importance of VTO Tools for the Fashion Industry: Virtual Reality (VR), Augmented Reality (AR), and 3D Modeling Software are the three main tool types utilized in the fashion industry in mentioned table no 3Graph no 2.

VTO Tools	Acceptance Rate in %	Experience
Virtual Reality (VR)	82%	Upgrade Visualization
Augmented Reality (AR)	68%	Upgrade Creativity
3DModelling Software	86%	Upgrade Price and Profit



AI has the power to completely transform the fashion business by enhancing client experiences, fostering sustainability, and strengthening functional regulation. AI can open up new possibilities and provide cutting-edge goods and services, as demonstrated by its applications in supply chain management, fashion design, virtual try-ons, stock management, and predictive analytics. Retailers of clothing will get a competitive advantage, remain on top of trends, and boost sales if they employ AI and make investments in its advancement. Future trends in the fashion sector will be shaped by AI technology, which will become a vital tool for retailers as it develops and matures. As a result, fashion retailers need to embrace AI and take advantage of its potential to transform their business strategies, gain market share, and provide outstanding value to customers. The fashion business has benefited greatly from the use of technology. It has revolutionized the way we purchase, display, and market clothes. It has also democratized style, spurred sustainability and innovation, and ushered in a new era of data-driven fashion. Without a doubt, technology will continue to advance and positively influence fashion in the future.

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CONFLICT OF INTERESTS

None.

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