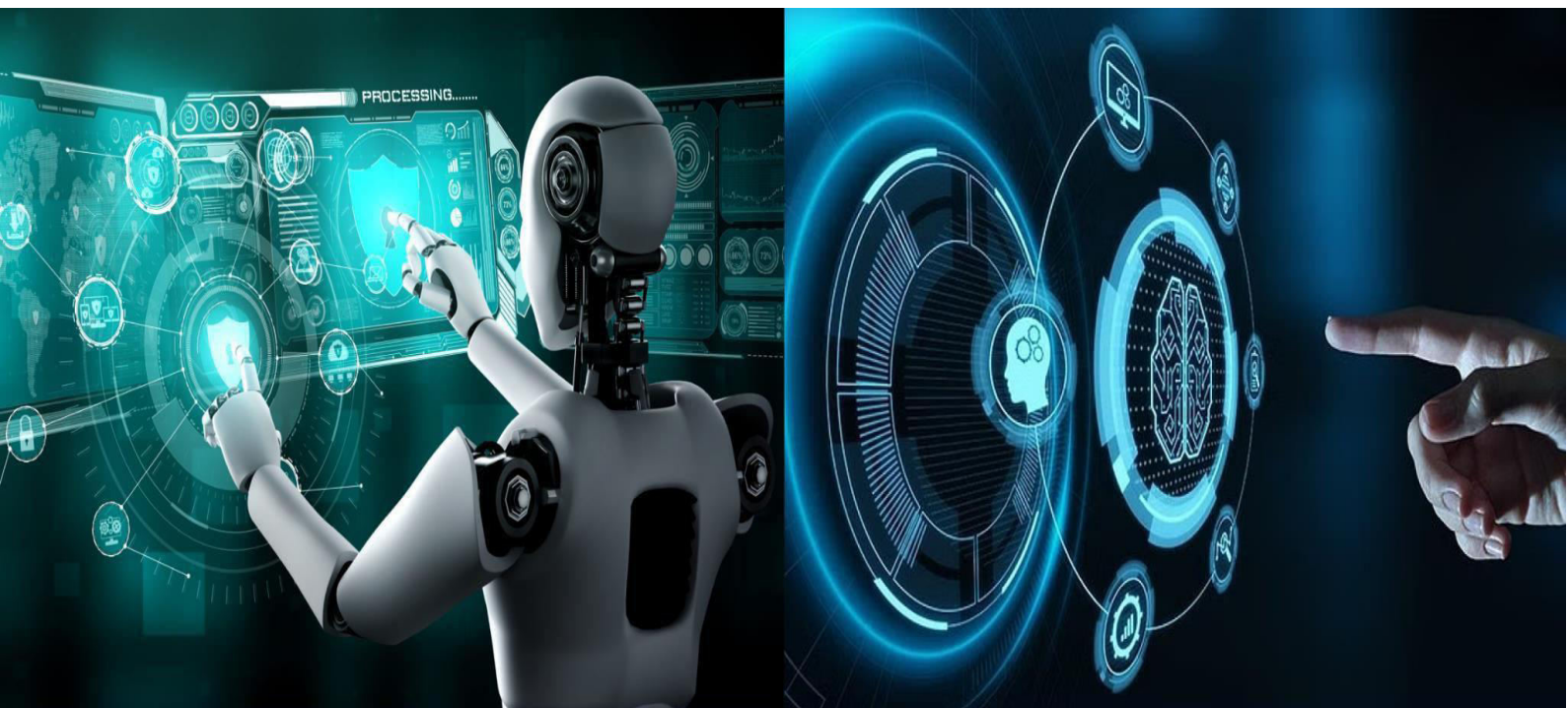




# International Journal of Innovative Research in Computer and Communication Engineering

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# Implementing Personalised Fashion Recommendations for Enhanced Shopping Experiences using AI

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**ABSTRACT:** The fashion industry has changed a lot because of the growth of shopping. There is still a problem with online shopping. People cannot try clothes on before they buy them. This means a lot of people send the clothes back. They are not happy with their purchases of clothes. The Virtual Try-On technology is a solution to the problem of shopping. It lets people see what the clothes will look like on them by using computer models of the clothes. Virtual Try-On technology is really helpful because it shows people what the clothes will look like on them before they actually buy the clothes. This is a deal. People have learned a lot lately. They have gotten really good at using things like Generative Adversarial Networks and diffusion models. Virtual Try-On technology has improved a lot because of these things. Now, Virtual Try-On systems. Feel more real when people use them to see how the clothes will look on them. This research paper is about try-on technology. It is really about how deep learning can be used for try-on technology. The paper examines what others have said about try-on technology and deep learning.

## I. INTRODUCTION

People really like to go shopping because it's easy and they can find lots of things they want. When people buy things on the internet, clothes are the things that people send back to the store the most. People send back clothes because they do not know if the clothes will fit them or if they will look good on them before they buy them. This is a problem for people who buy clothes online and for the stores that sell clothes.

The clothing stores are trying to solve this issue with something called Virtual Try-On technology. Virtual Try-On technology is a way for people to try on clothes using pictures or characters that look like them. People can use Virtual Try-On technology to see what the clothes will look like on them before they actually buy the clothes. This is really helpful because people can get an idea of what the Virtual Try-On technology clothes will look like on them. Virtual Try-On technology is a way for people to try on Virtual Try-On technology clothes without actually having to put them on. [1][2][3]

Virtual try-on systems use computers to show what clothes look like on a person.

They use computer programs and some smart techniques to do this.

Now virtual try-on systems can make pictures that look really real and show how the clothes fit and look on the person.

This is because virtual try, on systems use something called learning to make these pictures.

Virtual try-on systems are getting better at making these pictures because of this learning.

This research is about try-on systems that use learning in the fashion world. The main goal of this research is to figure out how these try-on systems work and what makes them so useful. Try-on systems are really popular in the fashion industry. The reason for this is that they help people see what clothes look like on them without having to wear them. Virtual try-on systems are a deal because they make shopping easier and more fun for people who love fashion. Try on systems that use learning are especially useful because they can show people what they would look like in different clothes. [2][3]



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### II. BACKGROUND AND LITERATURE SURVEY

People who study this kind of thing have looked into try-on technologies. These people tried two ways to do this. They used 3D. They used 2D. The try-on technologies are really interesting, and people are still learning about them.

People used to do research on fitting rooms that used 3D a long time ago. They would scan people's bodies. Use computer programs to see how clothes would look on them. Virtual fitting rooms that used 3D were really interesting because they could show people how clothes would fit without having to try them on. People were very curious about fitting rooms that used 3D and how they could make shopping easier. These methods were pretty good. They gave good results. The thing is, they were also very slow and really hard to use when you are actually doing things in the world. Virtual try-on technologies are still something that people are working on.

People are using pictures to see how clothes look on them. This is happening because of something called learning. Some studies have found that we can use computer programs like VITON, CP-VTON, VITON-HD and Style VTON to make pictures of people trying on clothes look real. [5][6][7]

These computer programs are really good at keeping the details of the clothes and dealing with how the body is positioned. They also make sure the person in the picture still looks like themselves.

Virtual try-on systems are getting better. They are using pictures. Learning to create new pictures. Virtual try-on systems and VITON CP-VTON VITON-HD and Style VTON are making it possible for people to try on clothes using pictures. [5][6][7]

People who do surveys say that systems that let you try on clothes virtually, which are called VTO systems, make customers really happy with the things they buy. VTO systems help customers feel more sure about what they're buying, and they send back fewer things they do not like.

There are still some issues with these VTO systems. For example, the information used to create VTO systems is not always fair to everyone. VTO systems do not show people in poses, which is a problem. VTO systems also have trouble making the clothes look real with the texture and everything, just like they do in life.

### III. THEORY / EXPLANATION OF LITERATURE REVIEW TABLE

With the rapid growth of online shopping, especially in the fashion industry, customers now expect recommendations that match their personal style, preferences, and needs. Traditional recommendation systems often suggest products based only on past purchases or basic filtering methods. However, such systems are not always accurate because fashion choices depend on many factors, like colour combinations, trends, body type, and personal taste. To solve these issues, researchers have started using Artificial Intelligence (AI) to build smarter and more personalised fashion recommendation systems. [1][2]

The research papers listed in the table show how fashion recommendation systems have evolved between 2024 and 2026. Earlier studies mainly focused on using machine learning and deep learning models to analyse customer behaviour and product data. Techniques like collaborative filtering and neural networks helped in understanding user interests, but they required large amounts of data and struggled when new users or products were introduced. [1][4][5]

As research progressed, more advanced approaches began to appear. Many studies started using image-based deep learning models to analyse fashion items. These models can understand clothing features such as colour, pattern, texture, and design by processing product images. This improved the accuracy of recommendations compared to text-based methods alone. Recent research has gone a step further by combining visual and textual information. Multimodal systems use both images and user inputs (such as descriptions or preferences) to generate better suggestions. The use of large language models and vision-language models allows systems to understand fashion context, recommend complete outfits, and respond more naturally to users. [1][4][5]

Some papers also introduced graph-based models, which study the relationships between users, products, and styles. These models help in understanding how different fashion items can be paired together. Although these methods offer better personalisation, they require high processing power and complex data structures. [2][3]



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Another important development discussed in the table is the use of virtual try-on and augmented reality technologies. These systems allow users to visualise how clothes might look on them before purchasing. While this improves customer confidence and shopping experience, such systems still face challenges related to accuracy, scalability, and real-time performance. Despite these advancements, the literature highlights several limitations. Many systems depend heavily on large datasets, are computationally expensive, and lack testing in real-world environments. Privacy concerns and system explainability are also major challenges that need further attention. Overall, the reviewed studies show that AI-based personalised fashion recommendation systems are becoming more intelligent and user-focused. However, there is still room for improvement in terms of efficiency, scalability, and real-time usability. These research gaps provide motivation for developing more practical and reliable fashion recommendation systems in future work. [1][2]

### Literature Review Table

Sr.No	Title	Authors	Journal / Conference	Methodology	Technology	Limitations
1	Decoding Style: Efficient LLM Fine-Tuning for Outfit Recommendation	N. Forouzandehmehr et al.	arXiv Preprint (2024)	Fine-tuning LLMs using multimodal data	Large Language Models (LLMs), image captioning	Not peer-reviewed; high computation & data requirements
2	Fashion Recommendation System (ML + DL)	M. Vinitha et al.	IRJAEH (2024)	Collaborative filtering with neural networks	Machine learning, deep learning (RNNs)	Requires large datasets; computationally intensive
3	AI-Driven Precision Clothing Classification	W. Abbas et al.	Information (MDPI) (2024)	Two-objective hybrid learning	Hybrid learning techniques	Focuses on classification, not full recommendation
4	CHROMAWEAR : AI Personalized Fashion for Skin Tones	H. Naaz et al.	Journal of AI Research & Advances (2024)	Skin-tone-based recommendation modeling	Machine learning, augmented reality (AR)	Limited feature scope beyond skin tone
5	StyleAI: A Comprehensive Framework for AI-Driven Personalized Fashion Recommendations in SaaS Retail Applications	S. Kompella	Int. Journal of Scientific Research in CS & IT (2024)	AI-based image recognition & recommendation	Deep learning, image processing, microservices	Limited real user behavior evaluation
6	Personalized Recommendation System and Virtual Try-On	D. N., C. M. et al.	Samvakti Journals Conference(2025)	Deep learning-based recommendation	Computer vision, virtual trial room	Limited scalability testing
7	FashionM3: Multimodal, Multitask Fashion Assistant	K. Pang et al.	arXiv Preprint (2025)	Multimodal multitask learning	Vision-Language Models (VLMs)	High latency, domain-specific
8	StePO-Rec:	Y. Bi et al.	arXiv Preprint	Knowledge-	Knowledge	Complex



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	Knowledge-Guided Multi-Step Outfit Styling Assistant		(2025)	based multi-step reasoning	graphs, re-ranking algorithms	knowledge graph construction
9	Trend-Aware Fashion Recommendation with Visual Segmentation	M. Djilani et al.	arXiv Preprint (2025)	Semantic segmentation & weighted scoring	CNNs, image segmentation	Lacks real-world dataset validation
10	Agentic Personalized Fashion Recommendation in the Age of Generative AI	Y. Deldjoo et al.	arXiv Preprint (2025)	Mixed-modality refinement	Generative AI, LLMs	Theoretical; real-time adaptation challenges
11	Fashion.AI – Personalized Outfit Recommendation	K. Roy et al.	IJRASET (2025)	Image categorization-based recommendation	Faster R-CNN, color clustering, ChatGPT	Limited modeling of complex fashion preferences
12	Personalized Fashion Recommender with Multimodal GNNs	X. Lu	ResearchGate Preprint (2025)	Graph-based multimodal learning	GNNs, CNNs	Preprint; limited peer validation
13	Leveraging Deep Learning for Personalized Fashion	Navya Vattikonda	IJETCSIT (2025)	Deep learning using benchmark datasets	Deep learning	Simplified dataset; lacks real-world testing
14	Hybrid-Hierarchical Fashion Graph Attention Network	S. Saed & B. Teimourpour	ML & AI Journal (Elsevier) (2025)	Hierarchical graph attention modeling	Graph Attention Networks, multimodal learning	High computational cost

#### IV. TRADITIONAL METHODS

Traditional virtual try, on methods mostly used to rely on:

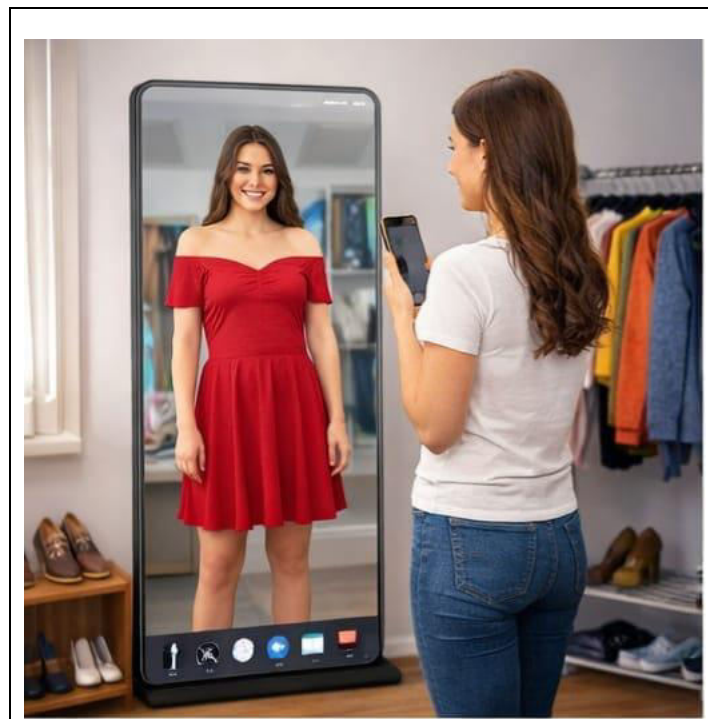
##### 3.1 Physical Try-On

When you are at a store, you usually try on clothes to see how they fit. This is a way to shop for clothes because you can really see how the clothes look on you. You can see how the clothes look on you. It helps you decide if you want to buy the clothes. Trying on clothes takes a lot of time. It is not a way to shop when you are buying clothes on the internet. You are shopping for clothes on the internet. You cannot try on the clothes. You cannot try on garments when you are shopping online for garments.



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### 3.2 Size Charts and Manual Measurements

When you buy things on websites, they have size charts that are supposed to help you figure out what size you need.. The thing is, every person's body is really different. This means that using these size charts is not a good way to determine your size. Online stores have these size charts. People come in all shapes and sizes, so these charts are not very good at helping you find the right size. Size charts, on platforms, are not very reliable because people's body shapes vary so much.

### 3.3 3D Virtual Fitting Rooms

These systems use 3D body scanning and physics-based cloth simulation. They look really real. They need machines and a lot of power to run. They also need a setup. This means we cannot use these systems everywhere. The 3D body scanning and physics-based cloth simulation in these systems are very detailed. We need all these things for these systems to work properly. The 3D body scanning and physics-based cloth simulation are what make these systems so



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good. The old ways of doing things are not good enough when it comes to finding the size in online fashion retail. These old methods have limitations. They just do not work well. That is why they cannot fully solve the problem of finding the size in online fashion retail. The problem of finding the size in online fashion retail is a big issue. Finding the size in online fashion retail is something that is very hard to do. [2][3]



### V. PROBLEM STATEMENT

With the rapid growth of online fashion shopping, customers face major difficulties in selecting suitable clothing without physically trying it on. Unlike in-store shopping, online platforms do not allow users to check fit, appearance, comfort, or style compatibility before purchase. As a result, customers often experience dissatisfaction, leading to frequent product returns, increased costs for retailers, and a poor shopping experience. Traditional solutions such as size charts, manual measurements, and basic recommendation systems are often inaccurate because they fail to consider individual body shapes, poses, fabric behavior, and personal fashion preferences. Existing virtual try-on and recommendation systems also struggle with realism, pose variation, scalability, and personalization. Therefore, there is a need for an intelligent, AI-based personalized fashion recommendation and virtual try-on system that can accurately visualize clothing on users, enhance decision-making confidence, reduce return rates, and improve the overall online shopping experience

### VI. PROPOSED METHODOLOGY

We want to do this by using a system that lets you try on clothes virtually. This system uses computer programs that look at pictures of the clothes. The virtual clothes system works in a simple way. Here is how the virtual clothes system works:

#### 4.1 Input Data

Image of the person (candidate) Image of the clothing item. You can also include some details about the pose if you want. The pose information is not required; it is completely optional. You have the choice to add the pose details or not it is totally up to you to decide what is best for the pose. What you think is best for the pose is what matters.

#### 4.2 Segmentation Module

The deep learning segmentation model is very good at finding the parts of the body. It can find the torso and the arms, and even the background. This is really helpful because it lets the model put the garment in the right place on the body. The deep learning segmentation model knows where the torso is and where the arms are. The deep learning segmentation model uses this information to put the garment on the body. The deep learning segmentation model is good at this because it can find the parts of the body, like the torso and the arms. [1][4][5]



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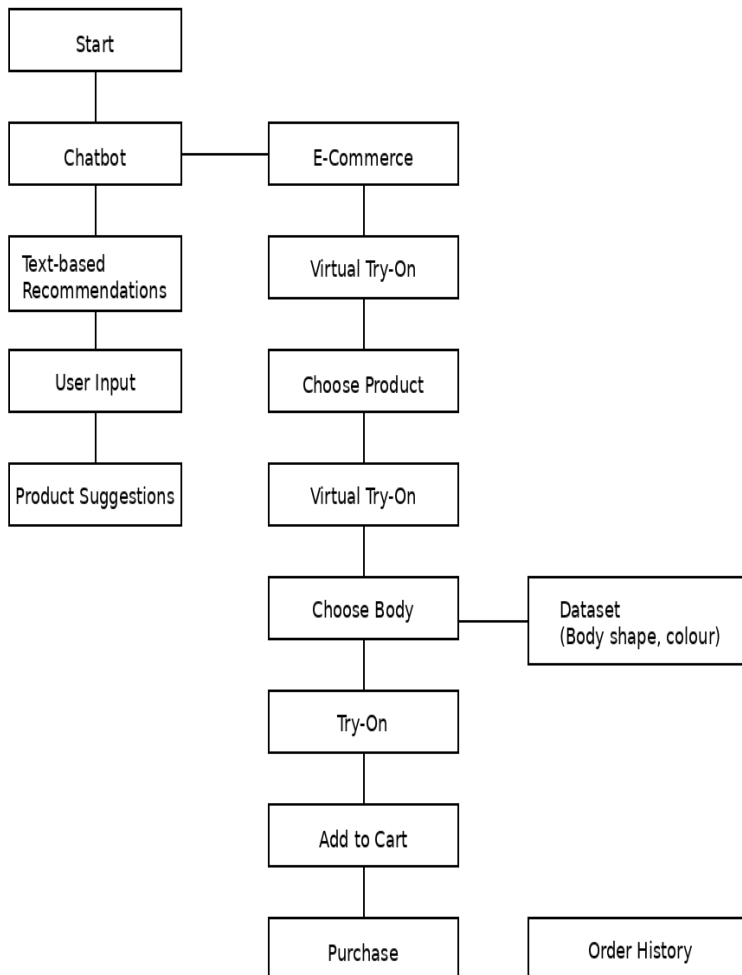
### 4.3 Garment Warping Module

The clothing image is changed to fit the person. This is done by using computer programs. These computer programs are called networks. They help the clothing image match the shape of the person's body and the way the person is standing or sitting. The clothing image is adjusted to look like it is really on the person. This is, about making the clothing image look natural on the person. The clothing image is changed to match the body shape and pose of the person. The clothing image is made to look like it belongs on the person. The person and the clothing image should look like they go together naturally. The clothing image is changed to fit the person and the person's pose.

### 4.4 Image Synthesis Module

This thing uses GAN or diffusion to make a picture of you wearing some clothes. It takes the clothes. Changes them so they fit you. Then it puts the changed clothes on a picture of you. The picture still looks like you. It also keeps the details of the clothes, and you like the texture of the fabric and your face. The model makes sure the picture of you, in the clothes, looks real, like it is really you wearing them. This method makes things look more real. It is also good at pose variation. This means people like using it. The main thing this method is trying to do is make the user experience better. The user experience is what it is really trying to improve, so people have a good time using this method. This method is good because it improves the user experience of the thing, and that is important. [10][13]

### Architecture





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### AI-Based Fabric and Clothing Personalization in Fashion Recommendation Systems

Clothing Type	Common Fabrics Used	Fabric Characteristics	AI-Analysed User Factors	Recommendation Outcome
<b>Hoodies</b>	Cotton, Fleece, Polyester	Warm, soft, durable, comfortable	Geographic location, season, browsing history, past purchases, comfort preference	Recommends suitable hoodies for cold weather, college fashion, and daily casual wear
<b>T-Shirts</b>	Cotton, Cotton-Polyester, Rayon	Lightweight, breathable, flexible	Fit preference, color choice, wearing frequency, lifestyle	Suggests comfortable daily-wear T-shirts matching personal style
<b>Shirts (Formal / Casual)</b>	Cotton, Linen, Poplin	Crisp appearance, breathable, wrinkle-resistant	Occasion type, professional needs, body fit, style preference	Provides appropriate shirt recommendations for office and social events
<b>Jeans</b>	Denim (Cotton + Elastane)	Durable, stretchable, long-lasting	Body measurements, preferred fit (slim/regular), lifestyle habits	Personalized fit and size recommendations, reducing product returns

### VII. RESULT ANALYSIS

People have tried out some try-on models that use deep learning, and the results are really good. The pictures that these deep learning-based virtual try-on models create show us that virtual try-on models are better than the ways of doing things we used to do. The generated images, from these learning-based virtual try-on models, demonstrate: High visual realism, accurate garment alignment Preservation of facial identity, and better handling of multiple poses. We look at how something works by checking the details and using numbers like how similar things look and how good the pictures. The results show that virtual try-on systems that use learning to try on clothes virtually are really good and work well in the world for deep learning-based virtual try-on systems. Virtual try-on systems that use learning are very good at what they do. [1][4][5]

### VIII. CONCLUSION

This study is about try-on technology and how it uses learning. The old ways of doing things are just not good enough for fashion stores anymore. Try-on technology is really good at helping people see how clothes will look on them. It uses things like GANs and diffusion models to make the clothes look really real and personalised for the person trying them on. Try-on technology is great because it helps people feel sure about what they're buying. People can use try-on systems to try on clothes without actually putting them on. This means that people will send back things they do not like. Try-on technology is very useful for fashion stores and the people who shop at them. [10][13]

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