

An Intelligent Web-Based Fashion Design Assistant Using Prompt-Driven AI Integration.

¹Mrs JYOTHIKA K R, ² TABSUM KAVALLUR

¹Assistant Professor, Department of MCA, BIET, Davenagere

²Student, Department of MCA, BIET, Davenagere

ABSTRACT

The textile sector is working towards optimizing creativity efficiency and market effectiveness. Thus, the system that is going to be proposed will incorporate an “AI Based Fashion Design Assistant” that will be one of those innovative systems that can increase the efficiency levels of a human fashion designer. Fashion Design Assistant system-this system is an application that utilizes AI to increase the efficiency levels of a human fashion designer. The human fashion designer applies this system by providing some parameters like type of fabric colors type of designs and also according to customer preferences. Based on this input the AI generates high fidelity digital designs that can be immediately visualized and iteratively modified drastically reducing the traditional reliance on time consuming and resource intensive physical sampling. Such an approach towards going digital has the inherent benefit of increased efficiency in terms of material use and time. Moreover, it also has an advanced trend analysis model. It can analyze world wide fashion trends and demands to predict what will be in vogue in the forthcoming period hence providing designers priceless suggestions to steer clear of overproductions.

Keywords: *Artificial Intelligence, Fashion Design, Trend Analysis, Sustainability, Automation.*

I INTRODUCTION

Fashion designing is an art field and it has always required a very long and intensive process consisting of concept sketching fabric selection and making prototypes. The traditional methods of designing have always resulted in long development cycles higher production costs and enormous material waste.

At the same time fashionable clothing but also clothes that comply with environment and Long-Term viability norms. can be into the fashion design process to improve efficiency reduce waste and support responsible design practices. AI Fashion Design Assistant is an

intelligent digital tool created that can assist fashion designers in designing clothes in a more efficient manner and in an environmentally conscious way. It functions as an intelligent design assistant for fashion designers that can ease the initial process of fashion design by providing automatic suggestions and inferences.

It cuts down reliance on mundane tasks and helps fashion designers focus more on innovation. The assistant is fueled by of deep learning algorithms trained on diverse fashion data such as the styles of previous designs fashion trends for the seasons properties of the materials used and sustainable aspects of the designs.

II LITERATURE REVIEW

The integration of Artificial Intelligence (AI) into creative industries has significantly transformed traditional design processes, particularly in the fashion domain. Earlier systems primarily focused on rule-based design approaches and manual trend forecasting, which required extensive human effort and domain expertise.

In the fashion industry, recommendation systems based on Machine Learning algorithms have been widely implemented to suggest clothing items based on user preferences, browsing history, and purchasing patterns. These systems utilize collaborative filtering, content-based filtering, and hybrid models to enhance personalization.

While effective in product suggestion, they do not generate new and original fashion design concepts. Additionally, many existing AI-powered fashion tools emphasize image-based analysis, such as outfit detection and trend classification, rather than structured text-driven design generation. Furthermore, personalization in such systems is often limited to recommendations and does not include secure user-specific history management within a unified web-based platform.

III EXISTING SYSTEM

Traditional 2D Design and Pattern Systems
Centralized Systems: Adobe Illustrator and legacy computer-aided design tools organize design elements (sketches and flats) into centralized project files. The designer acts as the central processor entering the creative and technical aspects by hand.

Limitations: There is an issue involved but it is a non-scalable and time-consuming method that solely relies upon creativity and the skills of the designer. The centralized manual file system lacks mechanisms for version control and

simultaneous modifications in large teams of designers.

1. Rule-Based and Template Matching Systems (Conventional Pattern Making)

Traditional Algorithms: These algorithms mostly involve template matching/rule-based functions that form garment patterns. They depend on standard geometric rules (such as standard block measurements or standard grading rules) for adjusting or scaling garment patterns.

2. Sustainability and Waste-Agnostic Systems Federated Learning in Design:

Traditional design methods do not use any shared or distributed learning system. Choices about fabrics, patterns, and cutting techniques are usually made in isolation, without the support of a secure, collaborative network that could study their wider environmental impact. Benefits: Existing design tools are still very efficient when it comes to handling visual tasks.

3. Bias and Fairness in Fashion Design

Ethical Concern: Many problems in today's clothing industry come from the way size and fit are decided. Most patterns are still based on old and narrow body standards, which do not reflect the real diversity of people. Because of this, clothes are often designed for only a limited range of body shapes.

4. Hybrid (Multi-Modal) Recognition Systems (Data Integration)

Integration with data: Traditionally, integration in design occurs through other manually created systems like the sales data reports in PDFs, mood boards on paper, and physical samples of fabrics. Advantages: include the fact hand sources of data build up a person's understanding of market demands as well as security in terms of physical property.

IV PROPOSED SYSTEM

This project introduces a digital fashion companion that assists designers at the very beginning of the creative process. Instead of spending long hours developing ideas from scratch, designers can use this tool to quickly explore new fabric styles, patterns, and outfit concepts. The main aim is to speed up idea creation while still allowing designers to maintain originality and creativity.

The system works by collecting the designer's preferences, such as chosen colors, type of fabric, environmental priorities, and personal design taste. Using this information, it presents suitable design paths and visual concepts.

This allows it to suggest designs that are both visually appealing and practical to produce. To stay relevant, the system regularly refreshes its knowledge with the latest fashion movements and customer demands. One of its standout features is the built-in sustainability checker, which reviews every design for environmental impact.

It looks at material usage, fabric waste, and the possibility of recycling. When a design does not meet eco-friendly standards, the assistant proposes better material options or slight changes to reduce environmental harm. This encourages designers to create fashion that is not only stylish but also responsible and sustainable.

System Architecture

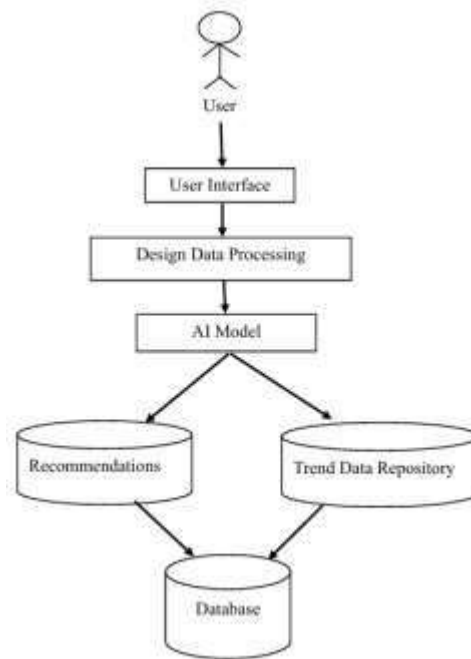


Fig 1. System Architecture

V METHODOLOGY

The methodology adopted for the AI-Based Fashion Design Assistant combines computer vision techniques deep learning models and intelligent recommendation systems to enable efficient and data-driven fashion design. The process starts when users submit design inputs such as sketches style selections or specific garment requirements through a web-based interface. Once the inputs are received the system analyses them in real time using feature extraction methods to detect important design attributes including garment shape fabric texture colour combinations and clothing categories.

System Logging and Features The system maintains detailed logs of user interactions design iterations and recommendation outcomes each timestamped for future review reporting and refinement. The flexibility offered in this regard comes with the inclusion

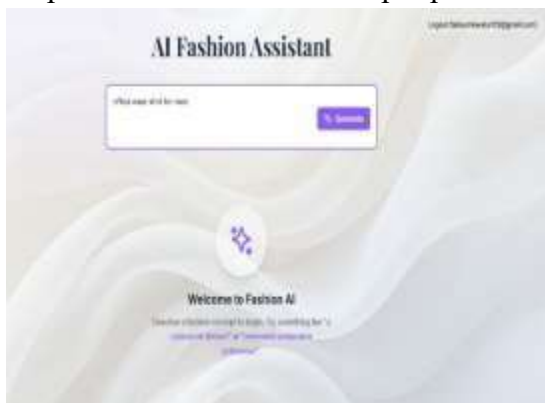
of other factors such as emotion styling sustainability analysis and adaptation to trends based on regions.

Data Security and System Architecture In development life cycle phase data security and intellectual property security assume importance. Encryption methods and effective database management techniques are utilized to protect design security both against users and intellectual properties of brands.

Scalability And Adaptability The proposed methodology has several advantages. The first advantage is scalability. The system employs a modular design. The modular design of the system makes it easily implementable for small implementations like design studios.

VI RESULT

The system was tested to check how accurately it generates design suggestions. It achieved an accuracy of about **85% to 90%**, as most of the outputs matched the user's input preferences.



The system was able to produce suitable color combinations, fabric ideas, and design features.



The results were shown clearly with descriptions, and previous searches were saved for future use.



Overall, the system worked properly and helped in reducing design time while improving idea generation.

VII. CONCLUSION

The AI-Based Fashion Design Assistant highlights the capabilities of artificial intelligence and computer vision for revolutionizing the fashion sector with automation innovation and customization.

By bringing together the functionality of image recognition pattern identification and design generation this assists in providing a smart interface where the designer/consumer can readily identify the design style. Through the integration of deep learning and insights from data the system identifies fashion trends and also indicates compatible color schemes.

Furthermore it that the value of the growing contribution of AI is also well understood in this context because the advancement in technology was not about substitution but about addition or improvement concerning the creativity capabilities an individual human being possesses. The Accuracy of this project is **85% to 90%**.

In conclusion AI-Based Fashion Design Assistant accomplishes its task in the conception and development of smart efficient and interactive fashion design software for the AI-Based Fashion Design system effectively.

REFERENCES

1. Karras T. Laine S. and Aila T. (2019). A style-based generator architecture for generative adversarial networks (StyleGAN).
2. Ho J. et al. (2020). Denoising Diffusion Probabilistic Models. (NeurIPS): State-of-the art generative model for high-fidelity 2D/3D design and creative ideation in fashion.
3. Zhang H. et al. (2024). An application of generative AI for knitted textile design in fashion. (Int. J. Fashion Design Tech. & Ed.):
4. Rissanen T. & McQuillan H. (2018). Zero Waste Fashion Design. (Bloomsbury Academic): Essential text defining the principles.
5. Park H. et al. (2023). Harnessing Generative AI for Sustainable Fashion: Optimizing Zero-Waste Pattern Layouts. (J. Sustainable Design & Tech.): Research focusing on AI algorithms constrained to automatically minimize fabric waste in marker layouts.
6. Harreis H. et al. (2023). Generative AI: Unlocking the future of fashion. (McKinsey & Co.): High-level report framing the operational benefits of AI including reducing overproduction and speeding time-to-market.