# Title of the Invention

System for Intelligent Virtual Fitting, Emotion‑Driven Design, Dual‑Biometric Payment and On‑Demand Textile Production

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# Field of the Invention

The invention relates to the field of fashion e‑commerce and computational garment customization, particularly systems that enable intelligent virtual try‑on, automated garment generation, emotional preference inference, and just‑in‑time (JIT) textile production with dual‑biometric transaction confirmation.

# Background

Existing e‑commerce platforms in the fashion industry suffer from high return rates due to sizing mismatches and lack of personalization. Current virtual try‑on tools are limited to catalog-based items, with no integration to create or manufacture new garments dynamically. Single-factor biometric authentication offers weak protection against fraudulent activity. A complete system is needed that can visualize and fit garments realistically on a digital body, capture user preferences implicitly, generate new garment models if no match is found, authorize payment securely, and orchestrate production without human intervention.

# Summary of the Invention

The present invention provides a unified system that combines: (i) an AI-based virtual fitting interface with real-body parametric avatar; (ii) a textile comparator that scores catalog or generated garments based on pattern, tolerance, elasticity, and emotional preference; (iii) a Creative Auto‑Production module (CAP) capable of emitting production-ready files when no suitable catalog garment exists; (iv) an intelligent recommender (PAU) that integrates emotional signals with trend data from sources such as Google or TikTok; (v) a dual‑biometric payment module (AVBET) that uses both iris and voice with liveness verification; and (vi) a just‑in‑time (JIT) factory orchestration engine that handles production via secure digital transfer.

# Problem–Solution (EPO)

Closest prior art: (A) try‑on systems bound to fixed product catalogs, (B) isolated on‑demand print services, and (C) single-biometric authentication. Objective technical problem: design a system that can generate and validate a new garment design when none is available, ensure secure transaction, and launch production in real-time with delivery tracking. Proposed solution: using 3D anthropometric scanning combined with an emotion-driven selector and auto‑generation engine, linked to a secure dual‑biometric module and factory orchestration layer.

# Brief Description of the Drawings

• FIG. 1 — System overview: user input, avatar generation, emotional ranking, biometric payment, print decision, factory hand‑off.  
• FIG. 2 — AI Layered Logic Flow: recommendation engine (PAU), design creation engine (CAP), mockup rendering.  
• FIG. 3 — Secure JIT production and logistics with traceability.  
• FIG. 4 — Dual biometric authentication process (iris + voice).  
• FIG. 5 — Style and trend matching using external platforms and search engines.

# Claims

1. A computer‑implemented system for real‑time personalization, production and sale of garments, comprising: a three‑dimensional virtual fitting module configured to generate a parametric avatar from body measurements; a textile comparator configured to rank catalog garments by a fit score computed from silhouette deviation, strain estimation and contact penalties; an emotional recommender configured to adjust the ranking according to a user state; a creative auto‑production module configured to generate, upon no garment meeting a threshold, a new design and production‑ready files; a dual‑biometric payment module configured to authenticate using iris and voice with liveness detection; and a just‑in‑time orchestrator configured to transmit the production‑ready files to a factory via a secure interface and to receive status updates through delivery.

2. The system of claim 1, wherein the virtual fitting module includes real‑time cloth‑physics simulation for drape visualization.

3. The system of claim 1 or 2, wherein the avatar is generated from a single image using anthropometric priors or from multi‑image calibration including depth sensors.

4. The system of any of claims 1–3, wherein the fit score combines normalized silhouette distance, predicted strain maps based on fabric elasticity, and contact/penetration metrics.

5. The system of any of claims 1–4, wherein the catalog is indexed by pattern, tolerance and elasticity, and ranking is performed per garment class.

6. The system of any of claims 1–5, wherein the creative auto‑production module outputs pattern files with seam allowances and a color‑managed print file including production metadata.

7. The system of any of claims 1–6, wherein the just‑in‑time orchestrator enforces latency thresholds and supports status callbacks including queued, cutting, sewing, quality and shipped.

8. The system of any of claims 1–7, wherein the dual‑biometric payment fuses iris and voice scores sequentially or simultaneously and stores encrypted templates only.

9. The system of any of claims 1–8, wherein liveness detection comprises blink dynamics for iris and randomized phrase prompts for voice.

10. The system of any of claims 1–9, wherein transport security uses TLS 1.3 and tokens are revocable.

11. The system of any of claims 1–10, wherein the re‑offer module schedules personalized incentives based on historical behavior with opt‑out controls.

12. The system of any preceding claim, wherein nesting optimization reduces fabric waste during cutting.

13. The system of any preceding claim, wherein production files include vector cutting contours and calibrated color profiles compatible with factory equipment.

14. The system of any preceding claim, wherein quality gates validate pattern compatibility with machine constraints before dispatch.

15. A computer‑implemented method comprising: generating a parametric avatar from body measurements; computing a composite fit score and ranking garments; adjusting the ranking using an emotional recommender; when no garment meets a threshold, generating a design and production‑ready files; authenticating payment by dual‑biometric verification with liveness; and transmitting the production files to a factory via a secure interface with status callbacks.

16. The method of claim 15, wherein the composite fit score is computed from silhouette distance, strain estimation and contact metrics.

17. The method of any of claims 15–16, further comprising enforcing latency budgets for the time between checkout and factory acknowledgment.

18. A non‑transitory computer‑readable medium storing instructions that, when executed, perform the method of claim 15.

19. The system of any preceding claim, wherein avatar landmarks are used to compute local strain and contact constraints per garment region.

20. The system of any preceding claim, wherein user privacy is preserved by storing only transformed biometric templates with retention policies compliant with data‑protection regulations.

21. The system of any of the preceding claims, wherein garments or patterns are selected based on user's real-time preferences, previously collected behavioral data and inferred style choices.

22. The system of any of the preceding claims, wherein matching garments or patterns are also selected based on best results retrieved from external search engines, combined with the user's precise measurements and stylistic preferences, to automatically propose a white base garment optimized for production and user satisfaction.