

Digital Fashion Development

Ruobing Zhao

Fashion Department, Fashion Institute of Technology, 227 West 27th Street, New York, NY10001, U.S.A

*Presenter's email: ruobing_zhao@fitnyc.edu

ABSTRACT

Digital technologies are fundamentally reshaping fashion development processes, influencing how products are designed, produced, marketed, and consumed. Innovations such as artificial intelligence (AI), augmented reality (AR), virtual reality (VR), and digital product creation tools are enabling fashion brands to improve efficiency, reduce material waste, and create more engaging consumer experiences. This research examines recent transformations driven by emerging digital technologies within the fashion industry, with a particular focus on AI applications across key stages of fashion development.

Based on the fashion development lifecycle, this study investigates three primary areas: design, commerce, and production. In the design stage, AI-driven 2D and 3D digital design tools and virtual prototyping technologies are increasingly replacing physical sampling. These tools allow designers to simulate garment fit, drape, texture, and color variations digitally, significantly reducing development time, costs, and material waste. AI programs also support the creation of digital fashion images, virtual garments, and avatars, enabling rapid experimentation and enhanced creative flexibility. In the commerce stage, digital technologies address one of the main challenges of online fashion retail—the inability to physically try on garments. AI-powered virtual try-on systems using AR and VR technologies allow consumers to visualize garments on digital avatars, improving confidence in sizing and fit. Additionally, virtual fashion shows, digital garments, and immersive virtual stores are gaining popularity, particularly among younger consumers, opening new opportunities for brand engagement and digital marketplaces. In production, AI is transforming traditional technical documentation processes. Static technical packages are evolving into dynamic, AI-assisted systems that better connect design and manufacturing. AI-based tech-pack tools can automate repetitive tasks such as material specifications, size grading, and construction details. Furthermore, sketch-to-tech technologies enable designers to upload hand-drawn or generative designs, which AI converts into detailed technical flats with accurate measurements, streamlining communication and reducing errors in production.

Overall, digital product creation and AI integration are driving greater efficiency, sustainability, and innovation in the fashion industry. While AI tools currently have limitations, they offer significant potential when applied strategically. AI serves as a powerful support tool that enhances creativity, improves workflows, and contributes to the ongoing digital evolution of fashion.