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To cite this version:

HAL Id: hal-04358171
https://hal.science/hal-04358171
Submitted on 21 Dec 2023

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PerfectFit: Custom-Fit Garment Design in Augmented Reality

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Figure 1: PerfectFit is an interactive AR garment design system for fitting garments based on individual body shape. Two examples of custom-fit garment design using PerfectFit: the designer views the virtual garment on the clients in different poses from various viewpoints (a, d) to identify fitting issues. The designer extends the front panel for full coverage of the belly (b). The designer views the accommodation of the new design (c, e).

1 INTRODUCTION

The mass production of garments under a standard size in the garment industry does not consider individual body shape differences, resulting in poorly-fitted garments and severe overproduction. Unfortunately, the traditional tailor-fitting process is time-consuming, labour-intensive and expensive. We present PerfectFit, an interactive Augmented Reality (AR) garment design system for fitting garments based on individual body shapes. Our system simulates the virtual garment reacting realistically to the client’s body shape and motion, and displays stereoscopic images to the designer via the AR headset. This enables the designer to identify the garment fitting via the client’s real-time motion from any viewpoint. Additionally, our system provides an editing interface to the designer which allows him/her to interactively explore the design space of the garment and adjust the fitting. Our system then reflects the changes on the client’s body.

Though existing computer-aided garment design methods [Brouet et al. 2012; Montes et al. 2020; Wang et al. 2005; Wolff et al. 2023] and professional software [Fashion 2022] can support the designer to adjust the garment fits on a virtual predefined avatar via their PCs, this neglects the fact that estimating the garment fits or looks requires a situated experience on the real human body. Instead, leveraging the design in situ advantage of AR, our system allows the designer to interactively customize the fit garment on the client’s real body and view the fitting of the new design immediately. Compared with existing projection [Saakes et al. 2016] or screen-based [Chong et al. 2021] mirror try-on systems, our system provides the designer stereoscopy scene stimulating the way humans perceive depth in the real world, which is essential for garment fitting evaluation. Additionally, our system uniquely enables the designer to change the shape of the virtual garment by simple interaction technique and we will bring a demonstration for visitors to Siggraph Asia 2023.

Visitor Experience For the exhibit, visitors will play the role of the Designer and interact with a person who plays the role of the Client. The visitor (Designer role) wears the AR headset and...
The garment editing, as the key function of our system, is designed as follows (see Figure 1 (b)): the designer brings the design pen into the field of view to initiate the editing mode. Our system then shows a blue sphere around each garment semantic part (e.g., front panel, sleeve). The designer selects the desired sphere with the design pen to activate the editing functions. We use a one-dimension range slider for each editing parameter (e.g., length, width), which users can freely adjust to explore the design space in 3D and customize the design. Our editing interaction design mimics directly manipulating the virtual garment by hand akin to the traditional tailor-fitting process, but can reduce the body contact with the client. Technically, we utilize the blendshape method [Lewis et al. 2014] to parametrize the 3D garment shape with the range slider. We developed our system on the Unity platform.

3 DISCUSSION AND FUTURE WORK

This work presents an AR garment design system that supports the designer to realistically view the fitting of the garment for the client from any viewpoint by stereoscopic images, and the designer can interactively customize the fitting garment and view the changes. Our system showcases the advantages of AR in the fashion towards smart manufacturing.

In our current design, we focused on augmenting the designer and the client with visual effects. In the future, we plan to also augment them with haptic feedback via pressure sensing and interactive textiles technique. It will allow them to feel the fabric texture and the tightness of the garment. Additionally, we will investigate more system design considerations together with professional fashion designers to support the creative garment design process for designers and the co-design process for both the designer and the client in the AR environment.

4 ACKNOWLEDGEMENTS

This work is partially supported by JST AdCOPF and JPMJKB2302.

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