Out of the Archive: A Pilot Study on Using Virtual Simulation Technology to Render Historic Garments and Textiles for Accessibility and Preservation

Savannah Schemenauer, Paulina Hernandez, Ling Zhang
Iowa State University
Keywords: Virtual simulation, historic garment, virtual exhibition display

Introduction. Natural fabrics made of cotton, silk, or linen are subject to degradation over time. Thus, the process of preserving textiles and garments is extensive to ensure the longevity of the object. Preservation includes both the environment in which the garment is stored and how the garment must be handled when examined or displayed (Geiger, 1961). There are specific rules an archive must follow to be in accordance with preservation standards, including types of light near the objects, the temperature of the room in which the textiles are stored, the humidity levels within the room, the method of storing, and the method of handling (Geiger, 1961). Light is the most important factor to consider, as it can fade colors on fabrics, potentially destroying the integrity of the fiber and irreparably damaging the garment (Geiger, 1961). Displaying historical garments at universities is essential and unavoidable as it provides students with tangible connections to the past, fostering deeper understanding and critical discourse about fashion, culture, and society.

Research Purpose. Marcketti et al. (2011) dived into the benefits of having a campus museum archive, which includes reaching university students "in nearly every discipline by engaging in collaborative projects with faculty and students" (Blanco, 2010, Marcketti et al., 2011, p. 248). Digital archives also allow remote or hybrid students to utilize campus resources they don't otherwise have access to, typically through photos and written descriptions, but many lack sufficient detail of garments and textiles. Because the technology is relatively new, there is a lack of research to support the use of virtual simulation technology, such as Vstitcher and other related software, as a viable preservation method for historic garments. This pilot study seeks to address this gap by proposing a method for integrating virtual simulation technology into museum exhibitions at the university level. The aim is to not only enhance the preservation of garments but also to broaden accessibility to the exhibition. The study examines the breadth of possibilities that this technology can offer. Thus, two major research objectives are identified: 1) a means of preserving garments for digital museum repositories, and 2) a need for more thorough visuals on digital repositories to increase accessibility to remote and hybrid students and the broader fashion community.

Methods and Procedures. *Back patterning and digitizing.* The selected garment, a size 6 kimono sleeve, fit-and-flare dress c.1960 by Lanz Originals was back-patterned using a cloning method to copy and transfer each piece of the dress onto pattern paper without taking the dress apart or pinning into it. This method allowed the seam lines of each piece to be traced with a pencil without harming the integrity of the garment. Detailed measurements of the garment pieces/seams were taken using a soft measuring tape, both while the garment was on the dress form and when it was

Figure 1. Measuring the garment

laid flat on the table (see Figure 1). The finished patterns were then digitized and uploaded to Lectra Modaris for refining.

3D Modeling. The patterns were loaded into Vstitcher and virtually fitted. It was discovered that the garment, though a size 6 stated on the garment label, fit into two different sizes at the bust and waist, at 32.5" (size 4 in the 1960 standard,) and 25.25" (size 8 in the 1960 standard), respectively, which required a specialized avatar to be developed. The hip measurement was calculated between the two sizes, at roughly 35.5", since the skirt of the dress was gathered, and exact measurements could not be taken. In order to determine a reasonable hip measurement, the WolfForm Co. and Alvanon sizing charts were consulted. Once the avatar was created, all measurements were cross-referenced with the garment measurements for accuracy.

Digital Assembly. The procedure by Zhu, C. et al. (2022) was referenced for digitization. The pieces were arranged on the form and digitally stitched in layers in accordance with the order of the dress's layers; facings were placed closest to the body, and the front right bodice was placed farthest, since it overlaps all other pieces. The embedded digital libraries were utilized for selecting trims and a fabric swatch was imported to closely resemble the original fabric, and the physics were customized to match that of the cotton twill of the original. Figure 2 demonstrates the comparison of the original garment (left) and the virtual simulated garment (right).

Figure 2. Original garment (left) and 3D garment (right)

Conclusion and Implementation. This study highlights the utilization of virtual simulation technology in representing historical garments within university museum settings. Following careful adjustments to both the avatar and 2D patterns to ensure accurate fitting and alignment with the physical garment, several considerations emerged for future implementation. While the software proves user-friendly, initial time investment is necessary to acquaint oneself with its features, potentially prolonging the rendering process. However, the establishment of a library of avatars enables their interchangeable use with minimal modification for future garments, ultimately saving time. Moreover, there is a need for further development in the software's library to enhance the availability of trims and embellishments for historical garment representation. The avatar's minimum size range may require modifications to accurately represent historical body measurements and ensure proper garment fit. Overall, this research underscores the potential of virtual simulation in educational contexts, suggesting that instructors of digital patternmaking and virtual fitting classes could integrate such projects to empower students to critically analyze historical garments and explore various functionalities of virtual simulation software. This study also serves as an example for implementing virtual simulation into virtual exhibitions or online garment displays, providing a more visual representation of garments to engage audience interaction, rather than relying solely on flat garment photos.

References:

Blanco F., J. (2010). Fashion at the museum: successful experiences with student curators. *Museum Management and Curatorship, 25*(2), 199-217. https://doi.org/10.1080/09647771003737323

Geijer, A. (1961). PRESERVATION OF TEXTILE OBJECTS. *Studies in Conservation, 6*(sup1), 185-189. https://doi.org/10.1179/sic.1961.s042

Marcketti, S. B., Fitzpatrick, J. E., Keist, C. N., & Kadolph, S. J. (2011). University Historic Clothing Museums and Collections: Practices and Strategies. *Clothing and Textiles Research Journal*, *29*(3), 248-262. https://doi.org/10.1177/0887302X11419361

Zhu, C., Liu, K., Li, X., Zeng, Q., Wang, R., Zhang, B., Lü, Z., Chen, C., Xin, X., Wu, Y., Zhang, J., & Zeng, X. (2022). Research on archaeology and digital restoration of costumes in Daolian Painting. *Sustainability*, *14*(21), 14054. https://doi.org/10.3390/su142114054