Jan 1st, 12:00 AM

Categorization of Existing 3D Apparel Modeling Approaches from a Development Pathway Perspective

Liwen Gu  
North Carolina State University, lgu2@ncsu.edu

Cynthia Istook  
North Carolina State University, cistook@ncsu.edu

Yanwen Ruan  
Donghua University, ruanyanwen.elsa@hotmail.com

Xiaogang Liu  
Donghua University, liuxg@dhu.edu.cn

Follow this and additional works at: https://lib.dr.iastate.edu/itaa_proceedings

Part of the Fashion Business Commons, Fashion Design Commons, and the Fiber, Textile, and Weaving Arts Commons

Gu, Liwen; Istook, Cynthia; Ruan, Yanwen; and Liu, Xiaogang, "Categorization of Existing 3D Apparel Modeling Approaches from a Development Pathway Perspective" (2017). International Textile and Apparel Association (ITAA) Annual Conference Proceedings. 4. https://lib.dr.iastate.edu/itaa_proceedings/2017/posters/4

This Event is brought to you for free and open access by the Conferences and Symposia at Iowa State University Digital Repository. It has been accepted for inclusion in International Textile and Apparel Association (ITAA) Annual Conference Proceedings by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
Introduction

As additive manufacturing (AM) or 3D Printing (3DP) technology develops, more and more attempts have been made to introduce it into the apparel industry. In the process, 3D apparel modeling technology will play an essential role. Three D apparel modeling refers to the technology which is used to build a 3D digital model and to drive the product manufacturing process. So far, there have been a few kinds of 3D apparel modeling approaches. Some of them have matured as a part of commercial software, while others are still developing as academic concepts. According to the literature review, most researchers have classified the 3D apparel modeling approaches from the perspectives of operating features, such as input forms like 2D pattern input, sketching input, etc. (Liu, Zhang, & Yuen, 2010). This kind of classification which focuses on particular technical problems could usually be done quite professionally and comprehensively, but lacks a global view of the development pathway (DP). The DP of a technology not only shows the relationship between its present and past status, but also the relationship between itself and technologies in other fields. Users can choose the approaches more appropriately based on their own knowledge background and R & D personnel can choose their research direction more accurately by clearly understanding the resources they can utilize.

Methodology

For this study, 3D apparel modeling approaches were classified into three groups of DP. The category defined as DP1 utilized existing non-apparel 3D modeling approaches that are mature. The DP2 category was based on real garment making technologies. The DP3 category included brand-new 3D modeling technologies or methods.

Results

The 3D apparel modeling approaches were classified from the perspective of development pathways. DP1 was identified as virtual sewing, which is a 2D-based to 3D apparel modelling approach. It works for sewing digital 2D patterns into garments in the virtual environment. It is the most widely accepted 3D apparel modeling approach and has reached the level of commercial utilization. The representative software includes CLO 3D, GERBER 3D, V-
Stitcher and Optitex, etc. Its greatest advantage is that the operating process is almost the same as 
the real garment sewing process, which makes it easy to understand for users in apparel industry 
and able to realize almost all kinds of apparel product. The drawback is that it requires 
professional pattern making and sewing knowledge.

DP2, independent direct modeling, refers to building the apparel model without 
considering the relationship to the human body by using the 3D modeling approaches which 
have been widely used in other industries. These approaches have been used in the mechanical 
engineering and graphic design industries, such as mesh-based modeling and curve-based 
modeling. Its greatest advantage is that the technologies on which it relies started much earlier 
than any 3D apparel modeling approach. It has matured so well that it can meet almost any needs 
in 3D apparel modeling. In addition, the 2D pattern making step is unnecessary with this method. The disadvantage is that the modeling workflow is quite unfamiliar to the user in the apparel 
industry. Additionally, neglect of the interaction with the human body increases the difficulty to 
achieve excellent fit of garment model.

DP3, virtual human body-based direct modeling, is based on the ease value which reflects 
the relationship between the human body and the garment model. Usually, the surface of the 3D 
garment model is generated automatically by connecting the key contours of the garment which 
are obtained according to the equivalents of human body taking the ease model into account 
(Zhang, Innami, Kim, & Takatera, 2015). The advantages are obvious. First, the 2D pattern 
making step is not required before 3D modeling. Second, it solves the problem of fit from the 
source. The negative is that it is hard to do detail editing, such as in collars or pleats. This 
approach is still in the academic experimental level.

Conclusion

Every DP mentioned above has its own advantage and disadvantages. Generally, for the 
three DPs, the more existing sources can be utilized, the more difficult for user to use. On the 
other hand, the more convenient it is, the more effort R & D personnel need to take for further 
development. Which DP most appropriate for a given situation depends on the particular needs 
and research and development investment that is allowed.

References
