Designing Special Occasion Dresses with Virtual Background Using 3D CLO

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Concept Statement

3D CLO is currently making a significant contribution to the production efficiency of fashion brands and companies. With advancements in technology, virtual garment simulations have become an integral part of the fashion industry, enabling designers to visualize their creations before actual production. Especially, the usage of 3D CLO for virtual fitting of special occasion dresses, such as wedding dresses or evening gowns, is becoming a trend nowadays (Smith, 2023; PR Newswire, 2023). Studies on the designing of special occasion dresses using 3D CLO have mainly focused on silhouette and pattern development. However, to achieve a high level of realism and fidelity in the design of special occasion dresses in a 3D virtual environment, various attempts are needed to express delicate materials commonly used in dresses, such as tulle, lace, and beading.

This study aims to explore the use of 3D CLO designing special occasion dresses and propose a method for implementing virtual backgrounds. In this research, designs are primarily focusing on the realistic representation of materials like tulle, lace, and beading. It is expected to serve as fundamental research material for the realistic implementation of various material expressions required for special occasion dresses in 3D CLO. Additionally, this study aims to propose a method to enhance the virtual garment presentation by incorporating virtual backgrounds using 3D CLO that complement the overall aesthetic and ambiance of the design. This combined approach provides designers with a comprehensive toolset for creating and showcasing special occasion dress designs in a virtual environment.

Design Developing Process

The design development was carried out using 3D CLO, a tool for creating 3D digital garments. A total of three looks were completed in this study, and the following 9 steps were followed to produce the looks:

1. Create the 2D patterns of the designed garments.

2. Place the 2D patterns on a 3D avatar and virtually sewn the patterns.

3. Check the fit of the garments on the avatar and modify the patterns as per the designer's intention.

4. Implement the properties and material representation of each pattern, such as fabric by adjusting various settings.

5. Set a suitable pose for the dress.

6. To achieve a rendering result that closely resembles the physical garment, the particle spacing of the designed garments must be reduced to 5.

7. Create a background, and bring the avatar wearing a completed dress onto the background.

8. Adjust the lighting according to the fabric's material representation, design, and the atmosphere of the background.

9. Find the optimal angles to effectively showcase the design for the final rendering.

In terms of material representation in the 3D virtual environment, 3D CLO provides settings to adjust, such as 'texture', 'normal map', and 'displacement map'. 'Texture' represents the surface texture or pattern of the material in 2D. 'Normal map' represents the shaded appearance of the material's uneven texture. 'Displacement map' expresses the bumpiness and thickness of materials or fabrics. Adjusting these three values appropriately based on materials or fabrics allows for realistic and delicate material representation.

This study created the background as well in 3D CLO to present the final designs. The aim is to create the entire outcome within a single program without using other software such as Photoshop. In 3D CLO, the patterns, which serve as fabrics, can be utilized as walls and floors. When the pattern is set as a wall and the material is set to 'Metal', it can create a mirror-like effect in the final rendering. Flower images were inserted into the floor utilizing graphic features, providing a background to showcase the designs.

Techniques and Execution

In order to pursue the efficiency of pattern utilization and reduce design developing time, Look2 and Look3 were designed based on the patterns developed in Look1 through pattern transformation and modification.

Look1 was designed as a baby-doll dress in an A-line skirt starting below the chest. A yoke was created on the top and embellished with tulle fabric. Lace was added on top of the tulle fabric to represent beading details. The sleeves were designed with volume to match the silhouette of the baby doll dress, with lace overlay on the tulle fabric, and the cuffs were designed with lace scallops. For the skirt, a tiered skirt design was developed, and tulle was added to the bottom tier, with lace embellishments on top.

Look2 separated the pattern of the baby-doll dress from Look1 and transformed it into a separate top and high-waisted skirt while maintaining the silhouette of the baby-doll dress. The tiered skirt was retained, but the width of each tier was adjusted on the pattern to achieve the intended skirt silhouette, with immediate design feedback observed in the 3D garment simulation window. The cropped top, similar to Look1, maintained the sheer detail of the yoke on the top, and the sleeves were modified to create puffed sleeves. Additionally, a large floral motif chemical lace was added to the body panel of the top to add some details. In order to represent the thickness of the chemical lace, the settings of the displacement map were adjusted, and a normal map was also applied for shading.

Look3 utilized the pattern from Look2 to create a sleeveless top dress and a cropped top made of tulle fabric. The sleeves of the cropped top were modified by transforming the sleeve pattern from Look1 and adding volume. Chemical lace from Look2 was added to the front and back panels of the cropped top, and beading from Look1 was added to the sleeves for additional delicate details.

Design Contribution and Innovation

The design production using 3D CLO demonstrated its potential as a design tool, as it allows for unlimited color and material selection, easy pattern transformation, and immediate reflection of modifications. This study has

academic significance as it focused on expressing beading and lace texture in the 3D CLO environment, which has not been extensively explored before. The study also stands out by completing the overall look and implementing a background that complements the design within 3D CLO. The integration of 3D CLO for special occasion dresses design with virtual background offers a powerful solution for designers to create and showcase their designs in a virtual environment. This approach facilitates efficient design iterations, customization, and realistic visualization, leading to improved design outcomes. From a practical standpoint, this research indicates the potential for expanding the application of 3D CLO as a design tool and provides foundational material for the development of efficient virtual lookbook production methods. Future research can focus on further advancements in virtual garment simulation technologies and the development of other intricate materials for special occasion dresses.
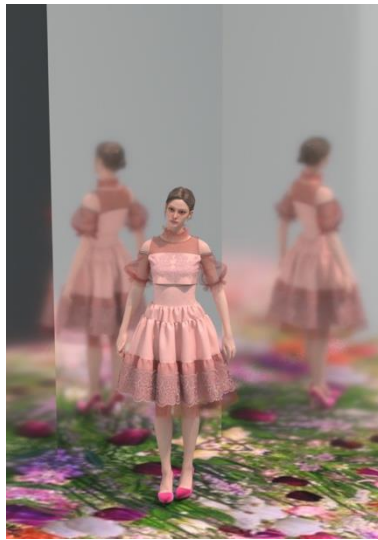

Image A. Look1   Image B. Look2   Image C. Look3

References

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3D CLO, Virtual Fashion, Fashion Design, Special Occasion Dress