

A Webbed Affair

Angela Lan, Cornell University, USA

Design Mentor: Fatma Baytar, Cornell University, USA

Keywords: 3D printing, textile design, new technologies

Contextual Review and Concept Statement: This ensemble was an exploration of how new technologies can be integrated with traditional design techniques to create unique, intricate fashion pieces. A given theme of “60’s Fashion” served as the basis for the overall silhouette, while a secondary theme of “Fungi and Mushrooms” was self-chosen as the inspiration for the textile design. Designers such as Iris Van Herpen and Noa Raviv have utilized 3D printing technology to create futuristic garments with geometric shapes, although their designs primarily are worn on their own as avant-garde clothing pieces (Logan, 2015). Meanwhile, 3D printing has been commonly used to create accessories such as jewelry and shoes, due to the inflexible materials available for extrusion (Flynt, 2019). Drawing from these two ideas, the goal was to design an outfit with the soft material and hard material garments complementing each other and being equally important in the overall look and style.

Aesthetic Properties and Visual Impact: This design captures the essence of nature being free-flowing and unpredictable, yet also self-regulating. Inspiration was taken from the geometric structures and shapes produced by naturally biological organisms. The cage-like corset, stiffness of the jumpsuit’s sleeves, and high-neck collar impart a restrictive feel, yet the irregular web pattern has an organic quality that loosens any rigidity. Simultaneously, the combination of green and gold, as well as the elaborate bodice, contribute a fantasy element to the garments, similar to medieval styles seen in modern film interpretations such as Game of Thrones or The Lord of the Rings. The style lines of the jumpsuit allow the textile design to shine while still having interesting elements, and a mix of laser-cut and engraving was used to create depth and to prevent overwhelming the eye. The shorts balance out the top-heavy sleeves and collar, while the tailored torso gives the wearer’s body shape in comparison to the puffiness around the arms, retaining a sleek and elegant look. The result is a visually pleasing yet intriguing ensemble.

Process, Technique, and Execution: After studying inspiration images of fungi, a rough motif was hand-drawn on the iPad using Procreate and a stylus pen. The illustration was imported into Adobe Illustrator to turn into a repeatable pattern and create the laser-cutting and engraving files shown in Figure 1. For the sleeves and collar, a fusible web was applied to the back of a gold lame fabric. Then it was laser-cut with the web pattern and fused on top of the green satin to form a two-layer textile. For the body fabric, the green satin was engraved with the same web pattern. Flat patterning techniques were used to draft the pieces for the jumpsuit on paper, which were then scanned using Optitex PDS to create digital patterns to virtually simulate the garment in Browzwear VStitcher. The measurements of the avatar in the simulation were adjusted to

match the real-life dress form shown in the photos, which allowed the fit of the patterns to be tested virtually prior to the construction of the final garment. YouTube video of virtual garment simulation: <https://youtu.be/pOsugDIUmHA>

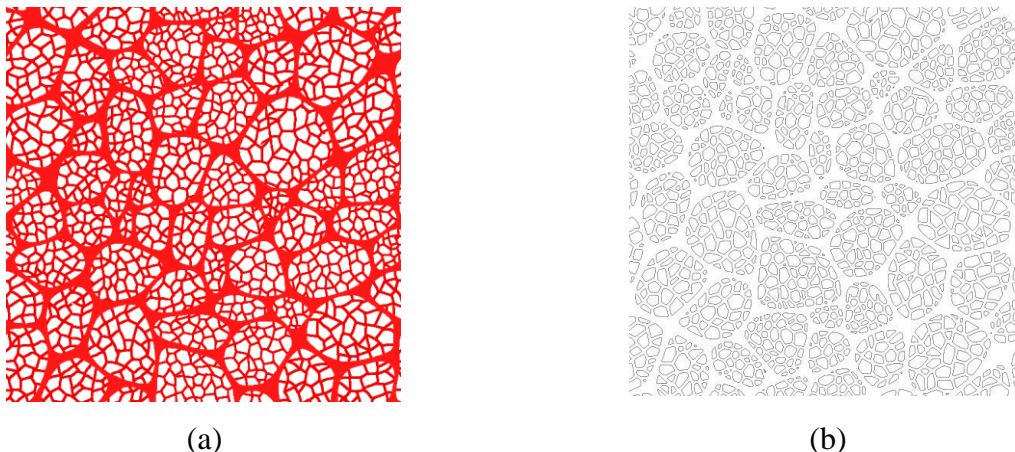


Figure 1. (a) Engraving, and (b) Laser cut details

The dress form was scanned using a 3D body scanner to serve as the base model for the 3D-printed corset. The resulting stereolithography file of a solid object was offset to create a shell and cut according to style lines in Rhino, before it was hollowed out and the Voronoi cell pattern was applied in Autodesk Meshmixer. Finally, the design was printed by a Stratasys Fortus mc400 3D printer using ABS m30 over 154 hours as three separate sections: front, leg, and back bodice. The pieces were spray-painted gold afterward and laced together using the cording that also served as a closure.

Cohesion: The web pattern is the main motif that ties the entire look together. It appears in multiple materials, colors, and scales, which creates variety throughout the form while still being visually united. The work showcases how fashion is interdisciplinary and the particular combination of design elements draws on different aspects of viewers' knowledge as they evaluate what they are visually seeing. The garment shapes and colors might remind viewers of cultural fantasy media, while the sleek satin fabrics are associated with formal wear, and the textile patterns resemble cell walls seen in nature. Thus, the final impression is that the clothes are both historical yet futuristic, refined yet organic, and experimental yet polished. This parallels how digital and hand techniques complemented each other in a multi-step design process that drew inspiration from a variety of sources and utilized mixed methods, creating an outfit that has layers of interpretation.

Originality and Innovation: The work exemplifies how a range of virtual programs can be used seamlessly with each other throughout different parts of the design process, in combination with physical construction techniques, to bridge the gap between wearable soft goods and futuristic fashion. Future works can consider how 3D technologies might aid in the development of

existing apparel to produce innovative materials and conceptualize complex designs, as well as be a mechanism for creating clothing that can primarily be made by a machine.

References

- Flynt, J. (2019, September 23). *3D printing fashion: Advantages, disadvantages, and future*. 3D Insider. Retrieved May 30, 2022, from <https://3dinsider.com/3d-printing-fashion/>
- Logan, L. (2015, November 6). *The Dutch designer who is pioneering the use of 3D printing in Fashion*. Smithsonian.com. Retrieved May 30, 2022, from <https://www.smithsonianmag.com/innovation/dutch-designer-who-pioneering-use-3d-printing-fashion-180957184/>

