The Sun Shines Through

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As one type of transformable garment, modular designs feature small components that can be worn independently or replaced with other components, thus creating an endless number of combinations for different looks (Koo, Dunne, & Bye, 2013). With the concept of modularity, it is possible to change pieces of a design without redoing the whole therefore increasing efficiency and extending the garment's life span (Fletcher & Grose, 2012). As a concept, modular design has been explored by textile and apparel designers. For example, the Fragment Textiles designed by Soepboer and Van Balgooi developed two small wool forms, squares and stars, which were assembled to create a textile (Stam & Eggink, 2014). Additionally, fashion Designer Kosuke Tsumura created cocoon shape garments using individual sonic-cut units with materials that he invented called Felibendy (Mini, 2009). However, most designers who explored modular textile and apparel designs, such as those of Soepboer, Van Balgooi, and Kosuke Tsumura, focused on two-dimensional products or more boxy silhouettes that did not contour closely to the body since most of their works were made from modular shapes of one size. There was also little information about the methods of developing more fitted garments with the modular concept. Previous studies from the researcher have explored the use of modular pieces to create wearable art pieces. This research exploration was continued with specific focus on creating modules that can be used to create fitted garments combined with digitally printed fabric for dramatic and changeable surface design.

To investigate the concept of modularity in apparel design and explore the possibilities of creating fitted garments allowing more modular design options, the researchers focused on creating one modular garment based on a polygon shape to test out the effectiveness of the design research. The polygon shape was inspired by one of the classifications of modular designs, known as geometric modules, that use shapes such as a triangle, quadrangle, or polygon to form the textiles and garments (Li, Chen, & Wang, 2018). By combining the basic polygon shape with inspiration from elements found in nature, the purpose of this design research was to develop methods for apparel design allowing for the creation of fitted garment constructions, as

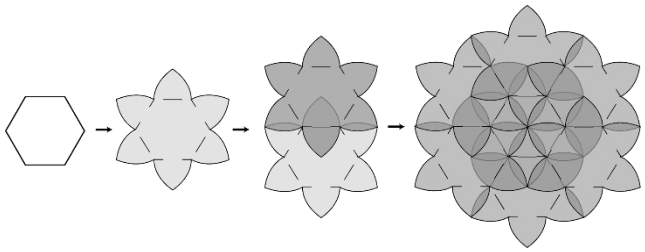

Figure 1. Module Design I developed from a polygon and its interlocking method.

well as explore the use of modules on digital printed fabric to elevate the design potential and create stimulating surface design. The silhouette for this design was set to be a fitted torso dress for women since the goal was to create garments that were fitted and shaping is more pronounced on a woman's body.

The process started by developing the module based on a polygon shape. Using inspiration from a picture of sunrays shining through flower petals and leaves, a flower outline was created on the polygon shape in Adobe Illustrator and functional cutouts were added on each of the six petals for interlocking. Figure 1 represents the flower module, Module Design I. The modular shapes could be interlocked together by hand through the slots on the petals to create a textile without the use a sewing machine (Figure 1). After the Module Design I was developed, methods of creating fitted garments were explored. For fitted garments, the shape of the body at the front, as well as the sides, needed to be addressed in the pattern including chest, waist, and hip measurements (Anand, 2011). Therefore, the first method was to gradually increase the size of the modular shapes to fit the three measurements of a dress-form at the same time making sure the slots were still functional. The second method was inspired by the use of darts on traditional pattern pieces especially around the bust. Since darts are used on flat fabric to take in ease and provide shape to a garment, Module Design II, a pentagon module, was engineered on Adobe Illustrator to take the corresponding eases out while keeping similar outer designs (Figure 2).

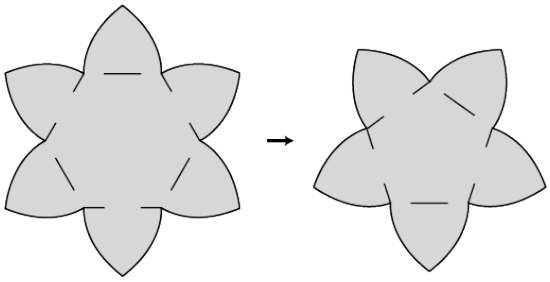

Figure 2. Module Design II (right) developed from Module Design I (left).

Next, to complete the design and achieve the second goal of this design research, the researcher applied the modules with digital printed fabric for dynamic and changeable surface design. First, an image of sunrays shining through flowers and leaves was used in Adobe Photoshop to add filters and change colors. The processed image was then digitally printed on silk charmeuse fabric. After the fabric was printed, a laser cutter was used to cut the fabric into the Module Design I created previously (Figure 3). A total of five different sizes of Module Design I was used, based on the method one discussed above, which provided the ability to create a fitted torso. The placement of the digital printed modules was also considered during this process to create a gradually changing color effect. Therefore, when cutting the modules on the digitally printed fabric, all smaller modular shapes were placed on the darker side of the print while all bigger modular shapes were

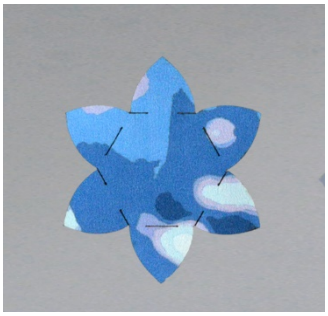

Figure 3. Module Design I on digitally printed fabric.

placed on the lighter side of the print. The final outcome of this design achieved the goals of creating a fitted garment design with interlocked modules while forming a dynamic and changeable surface. The design focused on fitting the torso of the body with smaller sizes on the neckline and waist and gradually changing to bigger sizes on the hem. The modified modular shape, Module Design II, developed from method two was used at the bust area to take in ease. Additionally, polyester organza cut into the same flower modular shapes was added to the back of the final design to create a transparent look representing the sun light on the image.

The modular concept allows the researcher and wearers to create endless variations on a single garment. Since all the modular pieces were slotted together without sewing, either the whole garments can be taken apart and reformed a new shape or some parts of the garments, such as the length of the dress, can be changed by adding more modular pieces. In addition, when multiple modules interlocked, the overlapping petals from each piece generated a three-dimensional effect. By combining with digitally printed fabric, it increased the versatility of the surface design. Furthermore, two methods were developed for the use of modules on fitted garment construction which could contribute to the use of modular systems on apparel design. By providing wearers more options with one single garment, this module design has the potential to be sustainable by extending the garment's life span and therefore minimizing waste.

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