



## **Making Space at the Intersection of Fashion Design & Architecture Using Digital Knitting**

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The purpose of this project is to use digital knitting technology to explore human interactions with space through interdisciplinary collaboration between architecture and apparel design. Functionally, both architecture, as a spatial enclosure, and garments, as body covering, provide important environmental support by protecting from the elements while also providing psychological support as shells that are used to hide, protect, define, communicate, and take comfort within (Albers, 1953). Clothing embodies a space around a body and can direct how this body moves within a space (Entwistle, 2001), while architecture and interior design create spaces through forms of enclosure that further define the body and its experience. This applied research at the intersection of architecture and apparel design resulted in digitally knitted items that span scale and application to define space in personal and engaging ways that support and connect the user/wearer to their environment. This sense of space involves existing within a structure as well as wearing an item of clothing, and highlights how architecture and clothing can support each other as spaces people inhabit and can create both healthy or unhealthy human environments.

This health is related to the impact the production of these products has on the environment. Both the fashion and architecture design industries face sustainability challenges, as virgin resources are increasingly depleted. A majority of clothing is still produced through the cut and sew process in a complex supply chain, a system in need of transformation. (Gwilt and Rissanen, 2012) Further, the trend of retail spaces is one of rapid turnover, with an average lifespan of five years, (Douglas cited in Plevoets and Van Cleempoel, 2012), which means that retail interior design elements and materials are more frequently disposed of than in similarly-sized office environments (Plevoets and Van Cleempoel, 2012). While retail is shifting towards e-commerce over brick and mortar stores, spaces where customers interact with products are still important to drive sales. One solution is using existing “dead” retail space for pop-up shops to present an extension of the brand and its values by creating an exciting retail experience. However, the cost of the temporary physical interior structure is both economic and environmental, as it is temporary and will be discarded once the season is over. (Rosenbaum et al, 2020).

In this project, the application of digital knitting technology to the development of interior spatial elements in retail design incorporates a system of temporary enclosure and furniture produced from recycled materials coordinated with the use of the same knitted systems in apparel design. At the scale of the body and interior, retail and apparel design through the application of digitally knitted elements has an immediate impact on the reduction of materials and waste, as the components are reusable and adaptable. Digital knitting is an emerging technology capable of producing innovative products for apparel, architecture, and interiors, automotive, safety, and even medical applications. This process allows textiles to be designed and created with 3d form, unlike woven goods that must be cut and sewn. By knitting

exact shapes, waste is minimized or eliminated. Combined with specialized yarns, a wide variety of products can be developed.

Following a research through practice framework from clothing and textiles (Bye, 2010) and the creative practice method from interior design (Vaux and Wang, 2020), initial inquiry into the capabilities of digital knitting to address functional, aesthetic, and sustainable needs of apparel and architecture was conducted separately, but the connections became apparent while the researchers worked alongside each other developing prototypes. (figure 1) The common needs were primarily sustainable processes, functional products, and aesthetic appeal. The visual appearance of the knitted goods needed to make the user feel supported yet comfortable. After many prototypes, a form of knitted structure with the appearance of a quilted panel or puffer jacket was chosen. This structure was stuffed after knitting, providing a stiff yet soft textile product that could be used in a variety of applications, such as the wall panels, chair cover, and jacket. (figure 2) Additionally, Repreve™ (Unifi) yarn, recycled from plastic bottles, was chosen to knit the goods. By responding to the materials and processes throughout the design research, both sustainability and aesthetic appeal were achieved in developing products. Furthermore, the products can be repurposed, moved, transformed, or recycled again to extend their use or become part of a circular design process.

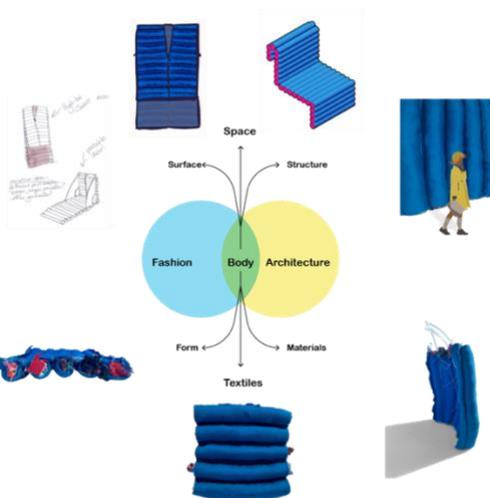


Figure 1 – Process



Figure 2 – Results

Reflection on this research suggests that digital knitting and further interdisciplinary collaborations with the process can be used to introduce more sustainable and even circular manufacturing methods to clothing and space design, as well as any industries requiring textile goods. By working through process, values, and purpose within the design process a shift in approach to the use of materials and the relationship between the spaces we live within and the clothes we inhabit daily is formed; as Kate Fletcher states, we struggle to think beyond “our current experiences and imagine fabrics and garments in

other configurations, with other agendas and possibilities.” (p.240, 2014) Digital knitting introduces a combined process of textile and product production with multifunctional purposes in a near zero-waste manner. The “act of making textiles is more than a series of steps on the road to new product development and innovation,” (Valentine et al, p. 973, 2017) and the use of digital knitting offers the potential to develop significant sustainable transformation to industries that use textile goods by allowing the designer to imbed values of function and aesthetics into the product throughout the process.

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