# Knitgeist

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**Contextual Review and Concept.** While sustainability is a growing area of focus in textile and fashion design, most researchers highlight either slow fashion practices or traditional reuse strategies (cut-and-sew), and very few are investigating if the waste resulted from the use of computerized knitting technologies can be incorporated back into innovative knitwear design process (Periyasamy & Periyasami, 2023; Aus et al., 2021). Knitting is the most flexible textile technology for zero-waste mass production, but minimizing waste throughout the design and production phases is of outmost importance (Maiti et al., 2022). There's a lack of investigation into how industrial *misknits* or design fallout can be creatively reincorporated into high-concept design (Motta, 2019). Moreover, contemporary knitwear often focuses on surface design (e.g., jacquards, textures, or colorwork), which involves numerous trials and errors, but there is limited exploration of silhouette innovation using traditional modular draping techniques that are known to often lead to minimal or zero waste design (Landahl, 2015; Rana &Swale, 2014).

Wilgren (2023) explored modular designs where knitted shapes had features like holes and tubes, enabling assembly and disassembly through drawstrings. However, the study highlighted that the broader application of modular principles in knitwear—especially concerning disassembly, interchangeability, and repair—is still limited and warrants further exploration. Most modular knitwear designs are functional (for temperature regulation, convertibility) or stylistic (removable elements for wearability), but few integrate speculative narrative or personal identity encoding. In the opening scenes of *Guardians of the Galaxy*, where characters walk on a planet overwhelmed by human debris while wearing layered, modular costumes, we are reminded of a future shaped by excess and survival—paralleling the urgent need for knitwear design that transcends mere functionality to become a medium of self-expression and resistance within an increasingly digitized, plagued by hackers and ethically fragmented world.

Therefore, the purpose of this project was to explore the intersection of cyber-organic aesthetics, knitwear silhouette innovation, and modular functionality using design fallout from computerized seamless knitwear. Drawing from the speculative narrative of a hyper-connected future in which privacy and personal boundaries are digitally eroded, this study aimed to envision fashion as a protective human interface—part soft armor, part stitch-by-stitch encoded self-expression.

**Process, Technique and Execution.** *Knitgeist* is constructed primarily from four seamless knitted tubes produced on a Santoni TOP2 26gg circular knitting machine. These tubes were trial-and-error experimentations with the plating technique, made with post-consumer recycled polyester yarn blended with a metallic yarn for the ground and nylon covered spandex yarn for plating. The textural design, featuring bows, mesh structures, and ladder holes, was conceived to evoke a feminine corset/camisole aesthetic (Fig. 1a). However, each knit trial exhibited minor misalignments and

asymmetries, highlighting a common challenge in digital knitwear design: the disconnect between on-screen design and the output produced by the knitting machines (Gorea et al., 2021). The tubes also had inconsistent dye uptake since they were dyed in separate batches. The designers brainstormed how to repurpose these digital "errors" as aesthetic language.

Threading knitted strips (made on a Shima Seiki WHOLEGARMENT®15gg machine) through the ladder holes of the tubes led to various modular configurations. Gathering the center of the torso tube and the sides of the leg tubes was found to give versatility to the silhouette, allowing the wearer to cinch the form, distort the stitch patterns, and mimic signal disruption or digital glitching—an embodiment of the concept at the silhouette-level. Two 3D-knit pouches were engineered as seamless pieces on Shima Seiki machine, using the same yarn plating technique carried through the entire ensemble. One pouch features an oversized plastic zipper, and multiple black plastic buckles connect the ties to various pieces. The look is completed with a detachable hood made of one of the shorter seamless tubes. A knitted tie was added to hold the hood up on the head and support a set of vintage-looking wearable over-ear headphones that function as both sensory shield and customizable accessories. This modular headpiece suggests autonomy and sensory agency, hinting that in a world saturated with noise, the ability to control one's exposure is a form of empowerment. A glove and two sleeves were added to the modular system, each being a design fallout for various reasons: the orange glove had machine needle breakage (Fig. 1b), an intended cover for the headphones was repurposed into the tight sleeve, and the large sleeve represents a miscommunication between the designers, as it was supposed to have a glove integrated. Each of these errors is common in the industry and results in waste. Knitted tube ties connect all the pieces through small plastic buckles, their crossings relaying the idea of interference through form distortion, detachable audio components, and surface glitches.

**Aesthetic Properties and Visual Impact.** The visual and structural language of this ensemble is informed by cyberpunk references, tactical apparel and speculative futures. The material choices and textural interplay present knitwear not just as form fitting clothing, but as digital interface: responsive, encrypted, and expressive. The multiple ties guide the eye of the viewer around the body, and the subtle blue tones are balanced by the orange pops of color. Feminine corsetry details are combined with masculine hard industrial elements into an androgynous look with interchangeable front to back. The sleeves contrast in volume and balance the silhouette, creating different side views.

**Cohesion.** The uneven dyeing of the seamless tubes communicates the concept of industrial misfit that flows through the various design details, from the slightly off-centered plating patterns to the running line of missed stitches on the glove, but all unified by the metallic yarn that sparks through all the pieces. The metallic yarn is conductive, a sensor-like element in the cyber-organic context. The bow embellishments of the tubes contrast with their otherwise coded feel, referencing a push-pull between nature and machinery, softness and resistance. The threading pattern of the ties evokes signal transmission that creates connections, introducing an interactive element, one that can be modulated

physically without relying on digital actuation. The integration of multiple technologies demonstrates a cohesive collaboration between design intent and technical capability.

**Design Contribution and Innovation.** This creative research not only contributes to innovation in knitwear and textile development but also proposes a conceptual framework where design failure, modular construction, and engineered aesthetics coalesce into a sustainable and adaptive fashion artifact. The innovation of this work consists in the variety of knitting technologies used, contrasting to most existing creative scholarship using machine knitting. The look repositions knitwear design within a forward-thinking, technology-integrated framework, advancing the dialogue on how garments can serve both utilitarian and narrative functions.
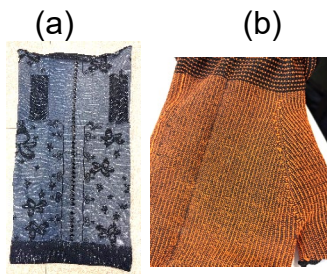
(a)              (b)



**Figure 1.** (a) Seamless knitted design fallout tube, and (b) 3D knit glove with error in stitch design.

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