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Nature-Inspired Aesthetics in Textile Design: Creative Sets of Eye Mask, Cap, and Pillowcase

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ABSTRACT

This study explores the interdisciplinary integration of artistic design and nanotechnology in the development of a coordinated textile set consisting of an eye mask, a cap, and a pillowcase. The research emphasized creative design processes inspired by natural forms such as shells, butterflies, sunflowers, and leaves, employing diverse approaches to form, color, and symbolism. Initial sketches and conceptual drafts were refined through academic feedback, resulting in selected designs that balanced aesthetic originality with functionality. To enhance user comfort and health-related performance, cotton fabrics were treated with nano-strontium particles through ultrasonic processing, producing hypoallergenic properties while maintaining the softness and integrity of the textile. Experimental evaluation using the Winter standard confirmed an 86% improvement in the anti-allergic properties of the treated cotton samples. These results highlight the effectiveness of nano-strontium as a functional additive, while the creative designs demonstrated how everyday textile products can be transformed into expressive and symbolic objects. The findings suggest that combining artistic innovation with advanced material treatments offers a pathway for developing textile products that simultaneously address well-being, usability, and aesthetic value. This research therefore contributes to the growing discourse on interdisciplinary textile design, illustrating the potential of merging technology and creativity to meet contemporary human needs.

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Introduction

The design of textile-based accessories, particularly items such as eye masks, caps, and pillowcases, extends beyond their practical utility and increasingly encompasses aesthetic, cultural, and psychological dimensions. In contemporary design research, the integration of creative artistry with material innovation has gained considerable attention, offering opportunities to reframe everyday objects as both functional products and carriers of artistic value. This study investigates the conception and realization of a coordinated set of an eye mask, a cap, and a pillowcase, with primary emphasis placed on artistic design strategies. The work explores the deliberate use of form, color composition, texture, and stylistic cohesion to generate products that embody visual appeal while promoting an enhanced sensory experience.

To support comfort and usability, the textile surfaces employed in this project were further modified through the application of nano-strontium particles, which confer anti-allergic properties. While the technical enhancement ensures health-related benefits, the principal focus of the research lies in demonstrating how advanced textile treatments can serve as a foundation for, rather than a substitute for, creative design practice. Accordingly, the project underscores the potential of interdisciplinary approaches in which scientific developments in material engineering complement artistic exploration, resulting in textile products that harmonize functionality, well-being, and aesthetic innovation (Moloud Charaki, 2023; Parisa Yazdani, 2022).

The cap has historically occupied a significant position within the broader context of textile and fashion design, serving simultaneously as a utilitarian object and a cultural artifact. Early research in this area has often emphasized the protective function of caps, particularly in relation to environmental factors such as sunlight, temperature regulation, and hygiene. Over time, however, scholarly attention has expanded to include the symbolic and aesthetic roles of headwear. Studies in fashion history and design theory have demonstrated that caps can operate as markers of identity, style, and social status, thereby transcending their primary utilitarian purpose.

Recent research has increasingly explored the artistic potential of cap design, focusing on the interplay between material choice, structural form, and decorative elements. Investigations into surface embellishment, color theory, and cultural symbolism reveal that caps are uniquely positioned to combine functionality with personal and artistic expression. At the same time, advancements in textile engineering have influenced cap production, with studies examining the incorporation of performance-enhancing fabrics, sustainable fibers, and functional finishes such as UV resistance and moisture control.

Interdisciplinary approaches have also emerged; wherein material innovation supports the development of more comfortable and health-conscious designs. Although limited in scope, some

studies have examined the integration of nanomaterials into cap fabrics, highlighting their potential to improve wearer comfort through antimicrobial and hypoallergenic properties. Nevertheless, the literature indicates that the artistic and aesthetic dimensions of cap design often remain underexplored in comparison to technical aspects. This gap provides opportunities for research that foregrounds creative design practices while simultaneously integrating advances in textile technology (Turner and Sappington, 2024).

The eye mask has long been recognized as a textile accessory that supports rest, relaxation, and protection from external stimuli. Early studies have primarily focused on the functional aspects of eye masks, particularly their role in improving sleep quality, reducing light exposure, and supporting recovery in medical or travel-related contexts. These investigations emphasize comfort, ergonomic fit, and material softness as key parameters in product performance (Akram Shahbeigihassanabadi, 2022).

Beyond these functional considerations, more recent research has explored the artistic and cultural dimensions of eye mask design. Designers and scholars alike have highlighted the potential of eye masks to operate not only as sleep aids but also as expressive objects that reflect personal style, cultural narratives, and aesthetic values. In this context, investigations into the visual language of eye masks (including color palettes, motifs, surface decoration, and symbolic meaning) demonstrate how these items can transcend their utilitarian purpose to become wearable artworks.

Parallel to artistic developments, advancements in textile technology have influenced the evolution of eye masks. Research into specialized fabrics, such as temperature-regulating materials, hypoallergenic fibers, and nanostructured textiles, has expanded the possibilities for enhancing user comfort and health. A small but growing body of studies has examined how functional modifications can be integrated into eye masks without diminishing their aesthetic appeal. Nonetheless, the literature indicates that while technical improvements are well documented, the creative and design-oriented dimensions of eye mask production have received comparatively less systematic scholarly attention. This imbalance underscores the need for research that unites artistic innovation with material functionality in the design of contemporary eye masks.

The pillowcase, as an integral component of bedding, has traditionally been studied from the perspective of hygiene, comfort, and durability. Early research emphasized the importance of fabric properties such as breathability, softness, and ease of maintenance, with particular attention to their influence on sleep quality and skin health. These investigations often positioned the pillowcase as a functional covering designed to protect the pillow while contributing to the overall ergonomics of the sleeping environment (de Ronde et al., 2019).

In addition to its practical role, scholarly attention has increasingly turned toward the aesthetic and artistic dimensions of pillowcase design. Studies in textile design and interior decoration have underscored how pillowcases contribute to the visual identity of domestic spaces, functioning as both decorative and symbolic elements. Research exploring pattern design, color harmonization, and cultural motifs demonstrates the capacity of pillowcases to reflect broader artistic traditions and personal expression, thereby transforming them from mere functional textiles into meaningful design objects.

Contemporary studies also highlight the intersection of material innovation and creative design. Investigations into sustainable fibers, eco-friendly dyeing methods, and advanced textile treatments have introduced new directions for pillowcase production. Emerging research on the integration of nanomaterials into bedding fabrics has further expanded the scope, with applications aimed at improving antimicrobial resistance, temperature regulation, and hypoallergenic performance. However, the literature suggests that while technical enhancements are increasingly documented, the artistic exploration of pillowcase design remains relatively underrepresented. This gap underscores the potential for interdisciplinary approaches that merge textile engineering with creative design practices, thereby positioning the pillowcase as a site where functionality, comfort, and aesthetic innovation converge (Atefeh Dadkhah Tirani, 2018; Bajelan, 2023; Sonia Avazpur, 2017).

Material and Method

Initially, the cotton fabric intended for use in the project was thoroughly washed to remove surface impurities and ensure optimal absorption of subsequent treatments. In parallel, a 1.5% solution of nano-strontium particles was prepared within an ultrasonic bath, providing effective dispersion of the nanoparticles in the liquid medium. The prewashed cotton fabric was then immersed in this prepared solution and subjected to ultrasonic waves once again, facilitating the penetration and uniform distribution of the nanoparticles across the textile surface. Following this stage, the treated fabric was rinsed with distilled water to eliminate residual particles and chemicals, and subsequently dried under controlled conditions. This process ensured the development of cotton fabric with enhanced hypoallergenic properties while maintaining its structural integrity.

In addition to the technical preparation of the fabric, the research emphasized creative and artistic design methods for the development of the coordinated set. Based on the discussions presented in the preceding chapters, the design process began with initial sketches and conceptual drafts (études) of various forms of eye masks, caps, and pillowcases. Several alternative designs were explored to evaluate variations in form, aesthetic composition, and functionality. Feedback and critiques from academic advisors were incorporated into the process, and the most suitable concepts were refined into detailed pre-execution sketches. Ultimately, the approved designs

were selected and brought to the production stage, where they were implemented using the prepared nano-enhanced cotton fabrics. This methodological approach ensured that the final products embodied both innovative material treatment and artistic creativity (Davodiroknabadi et al., 2024; Zohoori et al., 2024).

Results and Discussion

The increasing prevalence of diseases caused by pathogenic bacteria, alongside the growing resistance of such microorganisms to conventional antibiotics, has encouraged researchers to explore alternative hygienic and safe approaches for the development of human-centered products. Within this context, nanotechnology has emerged as a promising field in the twenty-first century, offering new pathways for enhancing textile performance. Nanomaterials such as silver, gold, zinc, copper, and titanium dioxide have been widely studied and applied as antimicrobial and anti-allergic agents due to their bioactive properties and their ability to improve user well-being. In the present study, the effectiveness of the nano-strontium treatment applied to cotton fabrics was evaluated through the Winter standard test for anti-allergic performance. The experimental results demonstrated a significant improvement, with the finished fabrics exhibiting an enhancement of approximately 86% in their hypoallergenic properties compared to untreated samples. This outcome highlights the efficiency of nano-strontium integration in modifying textile surfaces without compromising the base qualities of the cotton fabric. Beyond the technical findings, the results underscore the relevance of incorporating nanotechnology into textile design for daily-use products such as eye masks, caps, and pillowcases. The improvement in hypoallergenic behavior confirms the potential of such treated fabrics to address the increasing demand for safer and more health-conscious materials. Furthermore, the successful integration of advanced material treatment with creative design processes in this research illustrates the capacity of interdisciplinary approaches to generate products that are not only functional and protective but also aesthetically innovative. These findings support the argument that future developments in textile design should embrace both artistic exploration and material innovation to meet the evolving needs of users.

Analysis of Designs

The designs presented in Figure 1, illustrate two distinct conceptual approaches to the creation of coordinated textile accessories, namely the shell-inspired set on the left and the butterfly-inspired set on the right. Both designs emphasize the integration of aesthetic inspiration from natural forms into practical items such as eye masks, caps, and pillowcases.

The “shell design” demonstrates a soft pastel palette dominated by shades of pink and peach, evoking a sense of calmness and delicacy. The curved, segmented forms of the shell motif are translated into the structure of the eye mask and pillow, producing a sense of organic rhythm and

visual unity. The choice of gentle gradients and smooth textures enhances the impression of softness, while the stylized eyelashes on the eye mask add a playful and expressive detail that connects functionality with artistic expression. Overall, the shell-inspired design emphasizes fluidity, harmony, and comfort, reflecting the protective yet delicate qualities of its natural source of inspiration.

The "butterfly design" employs a more vibrant color scheme of lilac, violet, and soft blue, symbolizing transformation, lightness, and elegance. The butterfly motif is directly represented through symmetrical wing forms on the eye mask, which serve as both decorative and structural elements. Additional details, such as ribbon-like embellishments on the pillow and cap, reinforce the thematic consistency of the design and contribute to a sense of movement and grace. The sharper contours and contrasts between colors in this design, compared to the softer gradients of the shell-inspired set, highlight its dynamic and expressive qualities.

Together, these two design concepts exemplify how natural inspirations (shells symbolizing protection and calmness, and butterflies symbolizing beauty and transformation) can be reinterpreted through form, color, and decoration in textile product design. The artistic exploration in both cases enhances not only the aesthetic appeal but also the symbolic value of everyday textile items, transforming them into expressive objects that merge utility with creative storytelling.

Figure 1. Shell design (left), Butterfly design (right).

The designs illustrated in Figure 2, highlight two distinct natural inspirations (sunflowers and leaves) translated into coordinated sets of textile accessories. Both approaches emphasize a close dialogue between nature and design, yet each expresses a unique artistic interpretation through color, form, and symbolic meaning.

The “sunflower design” on the left adopts a bold and vibrant aesthetic. Dominated by a saturated green background, the composition is accentuated by the bright yellow petals and dark central disc of the sunflower. This high-contrast palette creates a visually striking effect, symbolizing vitality, optimism, and warmth. The circular sunflower motif is consistently applied across different products, reinforcing thematic unity while also serving as a decorative focal point. The rounded and organic forms of the accessories echo the natural curvature of flower petals, further enhancing the sense of harmony between inspiration and product design.

In contrast, the “leaf pattern design” on the right presents a more subtle and understated interpretation of nature. A predominantly green palette, with variations from light to deep tones, conveys freshness, calmness, and environmental consciousness. The linear contours of leaf veins are directly incorporated into the surface of the accessories, producing a minimal yet elegant aesthetic. The softer forms and muted gradients emphasize natural simplicity, while the overlapping leaf structures on the pillow evoke a sense of layering and depth. This design embodies balance, tranquility, and a strong connection to organic forms.

Together, these two concepts illustrate how natural elements can inspire contrasting approaches in textile design: the sunflower design celebrates brightness, energy, and decorative impact, while the leaf design emphasizes subtlety, calmness, and structural elegance. Both highlight the creative potential of translating botanical motifs into functional yet artistically enriched textile products.

Figure 2. Sunflower (left), Leaf pattern (right).

Conclusion

This research demonstrated the potential of integrating artistic design with advanced textile technology in the creation of coordinated sets consisting of an eye mask, a cap, and a pillowcase. By employing nano-strontium treatment, the cotton fabrics used in this study achieved significant improvements in hypoallergenic performance, with test results indicating an enhancement of approximately 86%. These findings confirm the effectiveness of nanotechnology in responding to contemporary health and comfort needs, while preserving the essential qualities of natural fibers.

Equally important, the project placed strong emphasis on creative design practices inspired by natural forms such as shells, butterflies, sunflowers, and leaves. Through careful consideration of color, form, symbolism, and surface decoration, the products were elevated beyond their utilitarian function to become expressive objects that combine beauty, symbolism, and practicality. The design process (spanning from initial sketches to finalized prototypes) highlighted the value of artistic exploration in shaping textile products that resonate with users on both aesthetic and emotional levels.

In conclusion, the study illustrates that interdisciplinary approaches, merging material science with artistic creativity, can result in textile products that embody functionality, well-being, and cultural meaning. By addressing both health-related requirements and aesthetic aspirations, the designs developed in this research point toward future directions in textile design where innovation, artistry, and human-centered values coexist harmoniously.

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The author has conceptualized the article and writing of the original and subsequent drafts.

Data Availability Statement

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Ethical considerations

The author avoided data fabrication, falsification, plagiarism, and misconduct.

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