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An Integrated concept to 3D Innovations in Garment Manufacture

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Abstract

The concept of 3D styles and printing has remained a unique practice in the fashion industry to produce interesting garments. With the influential contribution of 3D printing to the fashion industry, an alternative technique like origami is commonly employed by fashion designers in producing 3D forms and shapes in garments. To further contribute to the creative scope, this project combined the folding technique (origami) and newsprint concept to produce contemporary garments for everyday use. The focus of the project was achieved through an art studio-based practice guided by a conceptual framework. This studio-based research employed observation as the sourcing of information. Final garments were exhibited on the runway at the 2018 Fashion Show at Kumasi Technical University with a considerable expression of acceptance by the attendants. The choice of cotton fabric and a blend of polyester and nylon was deemed appropriate due to their crease or foldability. The paper uncovered that *origami techniques could be creatively employed in 3D garment production. 3D concepts in garments are gaining global recognition, a technique that is recommended for other fashion designers to incorporate cultural elements with alternative techniques for garments to promote cultural heritage.* It is therefore recommended that the training of fashion designers should include 3D computer graphics in the designing stage of garment production and techniques in origami.

Keywords: 3D effects; 3D garments; Origami; Newsprint concept; Functional garment.

Introduction

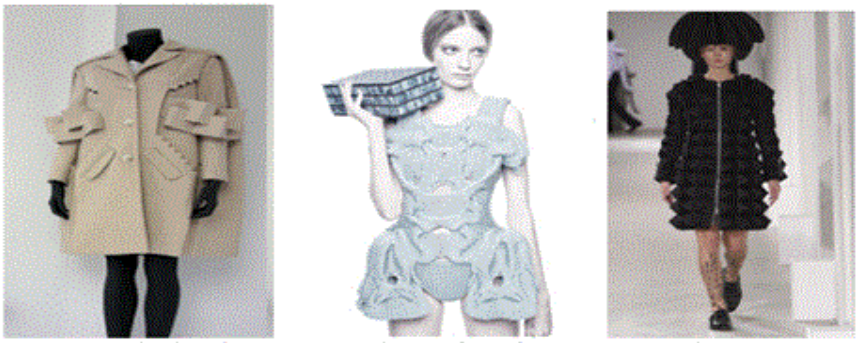
The dynamism of the fashion industry continues to grow in the ever-changing taste and preferences of consumers. This has influenced manufacturers and designers to employ different creative techniques to produce interesting effects on garments. Aside from the commonly practiced 2D effects which utilises surface designs on fabrics before being applied in garment production, more current 3D effects are explored to create textured surfaces. This design approach utilises current technology that is 3D printing machines and manual creative processes to produce possible effects aimed at meeting the client's choices. Modern printers provide the opportunity to create 3D patterns by building levels of materials onto each other. Rheeston [7] clearly outlines three core reasons for the application of 3D printers in the fashion industry; reduce waste, produce garments that fit on the individual with the right measurements, and lastly to minimize the amounts of harmful emissions generated by synthetic fabrics when disposed into the environment. With such positives, the materials however needed for the printing process are largely limited in supply unlike that of cotton. This situation encourages the creation of garments with 3D effects that are showcased on fashion runways to expose the possibilities available (Figure 1a&b).

Designers, however, have explored different techniques and approaches to produce 3D effects on garments. Notable amongst these techniques is the origami technique that is historically applied on paper. As an essential source of inspiration, the designer has adopted such a folding technique on garments to create the appropriate effects. In a practice-led design approach, Choi [5], experimented with materials (wool, polyester, taffeta, and rayon) and folds from origami paper planes for fashion garments. This practice revealed the possibility of drawing inspiration from paper plane folds for fashion design aims at producing new outfits unto the markets. Magablog [6] cites a number of fashion designers that have employed the origami technique in producing interesting folds on the garments. Key amongst are Alexandra Verschueren (Figure 2a) and Sandra Backlund (Figure 2b) who have used woven and knitted fabrics in creating folds on the garments.

Other fashion designer, Junya Watanabe cited by Howarth [3], produced huge garments with mathematical patterns for the Paris Fashion Week inspired from origami technique (Figure 2C). This traditional method of folding papers has largely influenced the art of making pleats and interesting folds in dresses. The choice of an appropriate material Hinders [2] should exhibit relevant properties similar to that of a paper to ensure the folding effects are created. A synthetic paper (Tyvek) was experimented by Julie Waibel, a designer in her 2013 dress collection. This material type

1a 1b

Figure 1a & b: 3D effects on garments created for runway fashion show
(Source: https://garmentprintingblog.com/2016/11/30/could-3d-printing-be-the-future-of-printed-clothing/)



a- Design by Alexandra V. b- Design by Sandra B. c- Design by Junya W.

Figure 2 a-c: 3D Effects created by designers using manual processes
A & B– Source: ajurettemagablog.blogspot.com/2010/11/origami-inspired-fashion-designs.html
C– Source: (https://www.dezeen.com/2015/03/10/junya-watanabe-aw15-paris-fashion-week-pleats-folds-mathematical-patterns/)

a- Design by Finell. b- Design by Lucia B. c- Design by Jule W.

Figure 3 a-c: 3D Effects created by designers using manual processes
Source: (https://www.contemporist.com/10-fashion-designs-inspired-by-origami/)

was chosen as stated by Hinders [2] due to its tear and water-proof properties coupled with its lightweight structures.

Additionally, in a practice approach by Wu [9], fabric types such as dupioni silk and organza silk was experimented to produce three dimensional sculptural forms into garments that are wearable and comfortable. The choice of the fabrics was due to their lightweight properties and the ability to retain crease very well. Contemporist [1] cited a number of works produced by designers inspired from origami technique; Finell produced handbags (Figure 3a) that creates room for expansion and contraction based on the quantity of items put in it, Lucia Benitez produced origami-inspired folded skirt and neckline (Figure 3B), and Jule Waibel who produced unfolded fabric dresses from chiffon (Figure 3C) steamed in reusable paper mould.

It was evident from the practice approach by designers the possibilities of adapting a traditional folding (origami) technique in garment production.

The purpose of this study was to investigate how folding techniques referred to as origami and newsprint concept could be combined to produce creative garments designs for contemporary use.

Methodology

The study employed qualitative research method in studio-based approach. The qualitative study adopted a process called conceptual model which aided the creation of the garments. Studio-based practice coupled with a prepared conceptual model (Image 3) aided in the creation of the garments. The following key fabrics were used; cotton, blend of polyester and nylon due to their crease ability. The qualitative study adopted a process called conceptual model which aided the creation of the garments. The conceptual model was outlined in four (4) stages; design concept, sketches, fabric sourcing and printing, and production and exhibition. The suitable fabric used for the project was cotton fabric and polyester blends due to their crease ability. Observation was the data collection instruments. Prior to data collection, observational check list was prepared and pretested based on the following research questions:

1. How successful can folding techniques and newsprint concept could be combined to produce creative garments?

2. How would consumers value 3D garment as convenient for contemporary world?

3. How successful can cotton fabric be combined with polyester and nylon in the manufacture of 3D garments?

The conceptual model for the design is outlined in flowchart in figure 4.

Design Concept

The design concept encompassed the combination of sculptural design features and columns of newsprint to design fashionable garments for young adult celebrities in the music and movie industry in Ghana. The garments were carefully tailored to required specification. The design focussed on the details that draw client closer to appreciate the design. The design targeted for young celebrities who were fashion conscious, believe in individualism of the ages of adventurous and were eager to try new look. Being a studio-based practice also known as practice-led research [8]. A mood board (Figure 5) was prepared based on inspiration drawn from the origami techniques. Additionally, the color choices for the garments were black and white.

Garment Sketches

A fashion sketch is used to concretely express designers' ideas and garment details to related departments. Fashion designers therefore sketch to express their design concepts. Sketch is also known, among others, as a production drawing, technical drawing, or production sketch [9]. There are two methods of fashion sketches. These are by hand, which leads to what is called ``manually drafted'' fashion sketches and the other method is the use of special design software, such as Adobe Photoshop or Illustrator and CorelDraw, which is called ``computer aided drafting''.

In view this, appropriate sketches were made showing pleats and folds at certain portion, hence given a clear guide to the final look of the garments in both and finalised with computer (Adobe Photoshop). These gave a clear guide to the final look of the garments. Supporting this, after acquiring the needed understanding of the problem, the final sketches were made to help explore and explain the design concepts. Additionally, the sketches aided in brainstorming ideas and save the time spent on the creative process. After going through many sketches, three garments were produced as shown in Figure 5 a-c.

Fabric Sourcing and Printing

Selection of fabrics was based on their fold and crease ability. Ding et al [10] orates origami art is the compound of experience and techniques in paper folding therefore, different choices of materials and fabrics for origami art have now become possible, however the variety situates origami designers in an issue of materials selection.

Fabric such as cotton, and a blend of polyester and nylon were used as the crease base fabric. The ability for the fabric to retain crease would aid in creating the 3D effects on the garment. Subsequently, news print from the stands was gathered hence the shell fabric was printed using a developed screen of newspapers column before using it for the production of the garment (Figure 6). Water-base printing paste was used for the printing.

Pattern Drafting and Cutting

Pattern making is the art of designing patterns by making

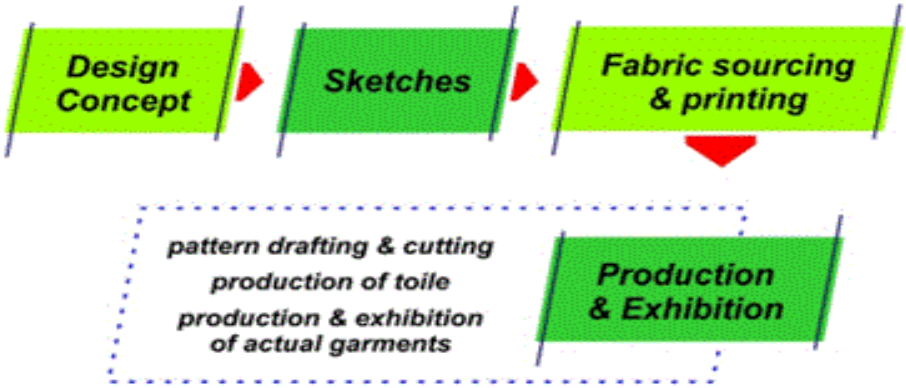


Figure 4: Conceptual Model for the design process
(Source: Studio Practice, 2018)

Figure 5: Mood board
(Source: Studio Practice, 2018)

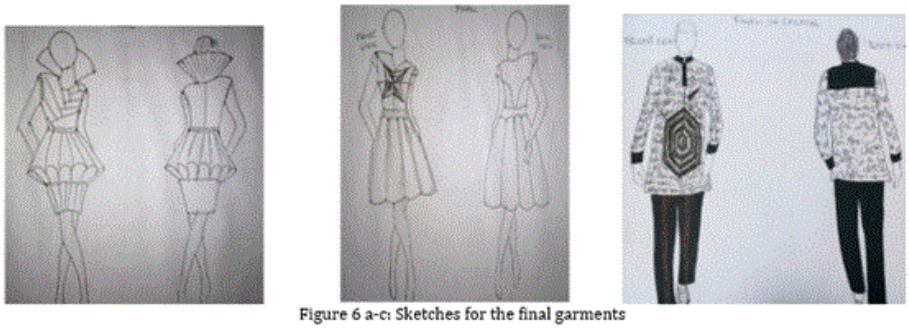


Figure 6 a-c: Sketches for the final garments
(Source: Studio Practice, 2018)

Image 7 a-c: Screen printing processes of the newsprint
(Source: Studio Practice, 2018)

Figure 8 a-d: Pattern Drafting and Cutting processes
(Source: Studio Practice, 2018)

Figure 9: Toile
(Source: Studio Practice, 2018)

templates from which clothing and craft items can be sewn. The pattern making process actually help to come out with the imagination of designer from the sketching till real product [11]. The patterns (Figure 7) for the project were made using the measurements of the models that were to fit the garments during the fashion show. The patterns were transferred onto the shell fabric and cut out with the aid of a tailored chalk, tracing wheel and shears. These patterns guided the cutting of the fabric which were sewn together with the folded portions to form the garment. Afterwards, the patterns were removed and kept for reuse in the future.

Figure 10: Final Garments exhibited at 2018 GFS at KTU
(Source: Studio Practice, 2018)

Production of Toile

In the creative process, prototyping is essential to translate two dimensional drawings or sketches to three dimensional products (garments). To achieve this, toile (sample garment) was produced to get a fair idea of the final look of the garment. Khar and Ghosh [4] states that, the making of a toile essentially seeks to evaluate the appearance, fit and functionality of a sample garment before the final production. Premise on this, a toile (Figure 8) was produced to correct the final patterns and get clearer idea of how the effects on the actual garments would look. All kinds of technical and aesthetic problems were rectified at this stage and approved before proceeding with production of the actual styles.

Production and Exhibition of 3D Garments

Interfacings were fused at the appropriate parts of the fabric pieces in order to enhance the firmness of the garments produced. The researchers employed round technique in the assembling of the garments which were all lined. The garments (Figure 10) were finally showcased on the runway of the 2018 Fashion Show at Kumasi Technical University's Great Hall.

Discussion of the Results

The outcome of the origami technique employed in the garments production for the study was unique and intriguing. As a result, the finished garments portray a high sense of creativity in terms of designing and decoration. This affirms Kyung-Hee [2] assertion that, origami has long served as an inspiring medium for designers interested in developing architectural and innovative fashion designs. Ding et al [10] opines that, origami technology incorporated in garment design does not only maintain functionality of the original design but also highlights the sense of design. Evidently, the outcome of the finished garments fits the intended functionality and aesthetic requirements of a young celebrity's dress. The designs are versatile and adaptable for dual usage as church, festive occasions, work, formal and casual wear.

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