

INVESTIGATION OF LOCAL HAND KNITTING CRAFT PRACTICES FOR BUILD A RESPONSIVE TEXTILE ENVIRONMENT ON THE ACTIVE HUMAN BODY

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Abstract

Literature of the knitwear says, it originated to satisfy the functional aspects of human, at present it has gone beyond a mere functional aspect and has assumed a fashionable value in the clothing industry and keeps spreading rapidly. The main objective and the intention of this research is to experimenting innovative textile developments to the active wear fashion with a novel conception. Main hypothesis is to be 'By using an inherent quality of local hand knitting craft practice, molding different three dimensional(3D) voluminous spaces and handle the voluminous space in between the human body and the fabric is a most important thing to build a responsive textile environment on the active human body. Initially the research would be paying more attention to the inner side of the textile material and innovative textile fabric material is designed and practice here by making use of 3D structural, architectural and sculptural hand knitting potentials. The knitted layer here is interpreted as a second skin on the biological skin of man. That is by making use of the idea related to this research. This is namely, "Responsive Knitted Skin with Voluminous inside Spaces". The research would be paying more attention to the inside knitted spaces in between biological skin and knitted skin and there are three types of sub inside knitted spaces introduced through this research.

Keywords: *3D Hand knitting, local hand knitting craft practice, responsive second skin, functional to fashionable*

1. Introduction

Hand knitting technology is a very valuable hand craft technology with several features inherent in it. The special features in it can be ability to create 3D forms and textures on one production process, structural and Architectural forms, stretchable fabrics by using non stretchable yarns and moulds of sculptural forms. Out of these qualities, some of them are used in the fashion industry presently and are being debated. As at present there is a good demand and inclination towards the use of 3D techniques even in hand knitting techniques. But still, although there are good skilful hand knitters with techniques within Sri Lanka, there is no adequate attention interest shown about this aspect. In this research it is expected to divert the attention more towards inner side of the fabric than the outer surface of the knitted fabric. In other words, concentrate more on the in-between spaces of the human body and the fabric. The innovation part of this research is to create 3D textures and 3D forms with different voluminous spaces on the inner side of the knitted fabric by making use of the potentials of 3D structural, architectural and sculptural hand knitting. If it is necessary to create 3D textures and forms as mentioned above by making use of any other technology, it would be necessary firstly to create a 2D textile fabric and secondly 3D textures and forms have to be created by using different fabric manipulating systems. But the unique ability and the feature of hand knitting technology is that, in the process of developing the fabric itself it can create different voluminous spaces with 3D textures and 3D forms to the inner side of the fabric.

2. Aim and Objective

The main objective of this research is to experimenting innovative and responsive textile developments for active human body with a novel conception.

3. Methodology

The research would be a practice led approach with engaging local hand knitting craft communities. Initially, identify the local hand knitting craft communities with unique potentials and start relevant experiments through their existing practices. Subsequently continue the appropriate experiments with design intervention. Finally In keeping with the concept an innovative hand knitted textile materials were designed through experiments. When the designed materials are used as a functional to fashionable' Environment/skin on the human body, all features such as silhouettes, forms and patterns were also experimented to check the suitability of the responsive textile environment, if not responsive knitted skin on a human body.

4. Fashion and Textiles for Human Body

“...Are you happy with your body? Some people are not – if not yours somebody’s and have tried to disguise it, hide, reshape it, transform it, and remake it in to a cultural object” (Koda, 2010)

As at present, man has become much more conscious about his body both internally and externally than in the distant past. By now fashion has become a very significant external medium of responding to the human body. Fashion has also achieved a unique status as a medium of transforming the human body and also as a medium of de contextualizing and restructuring when creating a design considering the human body, one cannot do it solely on the material alone, but in this regards the presence of a strong structure also plays a vital role. In order to get various complex human needs such as protection, adornment, identification, modesty, status, value, attitudes and conformity versus individuality fulfilled garments are used. At the same time, a rapid progress in technologies, techniques and materials etc... could be seen in fashion industry today.

5. Knitting Industry, Hand Knitting and 3d Knitting

Knitting industry has made its control and importance felt in the fashion world all over. Knitting fabrics made by employing advanced technological techniques have a big demand in the fashion market currently. As at today, machine knitting technology too has reached its peak while knitting technology as well as knitting techniques appears in different forms in the fashion world. 3D structural knitting garments which are of wearable quality and condition appear to be in high demand in the modern fashion world. 3D knitting is utilized not only for the manufacture of wearable garments, but also in various other areas of disciplines 3D knitting is applied. The designers seem to make use of 3D techniques mainly to display their creativity skills, for communication purposes and for the socialization of message etc.

Irrespective of the high degree of progress the machine knitting techniques have reached, the popularity and the demand for hand knitting industry has not in any way got reduced. The reason for this is that many knitting designs and creations could be created by using the hand knitting technology which the machine knitting cannot create. For example, the 3D knitting techniques mentioned above could be created very well by making use of the hand knitting technology. In addition, by making use of the hand knitting industry which makes use of the craft skill of men is accepted as a more valuable industry.

6. Fashionable Knitting and Fashionable Wearable Concept

“Fashionable knitting” when considered in general, people tend to think of it as knitting carried out according to the latest trends or prevailing styles.

However, when the history of knitting is examined, it reveals very clearly that, “functional knitting” is a strong medium of knitting responding to the human body and the functionality of the human body. With the passage of time along with the development of functional knitting to fashionable knitting within the fashion world, “fashionable knitting” has received a deeper meaning to it is not just knitting designs or techniques carried out only with the objective of an aesthetic value, but done giving the “fashionable wearable” concept prominence. In the text “Fashionable Technology” by S. Seymour, he points out the fact that “Fashionable wearable” concept is a result of blending aesthetic and styles with that of functional technology. “Fashionable wearable are designed garments, accessories, or jewelry that combines aesthetics and style with functional technology.

“...as designers of fashionable wearable, we view end user as fashionable beings who are attentive to style and the powerful potential of wearable technologies. Our design philosophy is based on the notion that garments are the immediate interface to the environment and thus are a constant transmitter and receiver of emotions, experiences, and meaning.” (Seymour, 2008)

When the market development in the knitting industry from the functional to fashionable knitting techniques which occurred towards the end of the 19th century and at the beginning of the 20th century is reviewed, it is very clearly evident that “fashionable knitting” is not a knitting technique based primarily on aesthetics, but a more advanced state of a blend of both functionality and fashion ability than ever before. In fashionable knitting although fashionable wearable concept received a prominent status with the tag of “fashionable” conspicuously emerging, the “functional” aspect also got a prominent place during that time.

“Fashionable wearable can enhance the cognitive characteristics of our epidermis. Our clothing is often referred to as our second skin. Today this is more than just a metaphor as advances in technology produce fabrics that mimic many of the skin’s properties.” (Seymour, 2008)

S. Seymour in his text on “Fashionable Technology” has pointed out clearly that several factors are inter linked in the making of fashionable wearable.

“The many considerations for the construction of fashionable wearable are based on body ergonomics, perception, functionality, technology, materials, energy and environmental impact. The table below can be used as a guideline for the construction of fashionable wearable.” (Seymour, 2008)

LOCAL HAND KNITTING CRAFT PRACTICES..

Factor	Considerations
Body Ergonomics/ Wearability	Placement, form language, human movement, proximity, sizing, attachments, weight, accessibility, heat, body shape, comfort, cut of the garment, compartments.
perception	Aesthetics, look and feel, design, culture and psychological functions
Functionality	Usable interaction with the system (input & outputs), wearer's control, modular construction for multi- purpose
Technology	Ubiquitous computing, sensor technology, embedded systems design, physical computing
Materials	Interactive or reactive materials/textile, electronic textile, washing/ cleaning, shielding, durability
Energy	Batteries, solar, kinetic, fuel cells
Recycles	Ecological, biodegradable, modular construction for dissemble

7. Local Hand Knitting Craft Practices

For the sake of trade purposes in 1980 “Scandinavian method of circular knitting” was introduced for the first time to Sri Lanka. Knitting canters were established in Sri Lanka by Scandinavian countries like Norway for this purpose most of the women labor in Sri Lanka was obtained. Small knitting canters were opened in cities in the costal belt like *Balapitiya, Munnakkara, Negambo, Galle, Matara, Kalutara, Wadduwa, Wattala* etc... The main livelihood of those people was the fishing industry, but as they led very tough and poor lives, the hand knitting industry became an additional method of income to their families.

Hand knitting companies such as Dale Craft, Octa, CHF, KALARO started in Sri Lanka by now have provided training in knitting for about 4000 women. The knitters so trained have now been able to produce very high quality hand knitting finished products. The main Business concept of these companies was “The industry to Village”.



Figure 117: Local Hand Knitters at Balapitiya

There is a special community engaged in this knitting handicraft along the coastal areas in 30 years with a very too rough knowledge, experience and with very high skills in this trade.

8. Inspiring Active Wear Trends

MAS active Linea Intimo (Pvt) Ltd, Biyagama, innovation team was awarded to development the most suitable knitwear fabric for the sportswear collection for the year 2012 expected to be produced by NIKE brand. The project was 'Experimentation of Contemporary Three Dimensional knitting techniques for Nike Sport wears using machine knitting. Ms Sashi Hewakapuge, Senior Designer, Linea Intimo (Pvt) Ltd, Biyagama said that, their sportswear collection is meant for a men's collection, while the material qualities that they expect also have been specified. MAS' active has taken in to consideration few qualities for their special consideration, namely Breathability/ Ventilation (the ability to absorb and wick sweat away from the body fast), Compression (a firm fabric that is stretchy to get strong and high in modulus: able to firmly hold muscle during high impact strenuous workout and sport), Insulation (a 3D sort of fabric able to keep the warmth in harsh cold weather and protect muscles from cooling down too fast after workout and games) .According to the NIKE stipulations the quality requirements of the material expected to be developed must have all the above qualities or properties in that single material.

Unlike developing normal knitwear, in developing a sports wear a good knowledge of the human body structure is very essential. Here, in developing body related 3D knitting structures as stated before they have once again focused attention on the '**Breathability/Ventilation**', '**Compression**' and '**Insulation**'

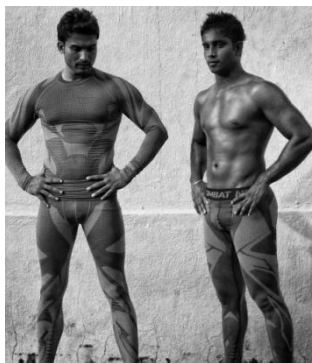


Figure 218:3D structural active wear

The above photographs show how, the 3D knitting structure is developed by the MAS active innovation team to achieve the above qualities when the

knitted structure is worn. When the body parts get stretched, the narrow drains like grooves get opened due to the stretching, and provide good ventilation to the body due to the enhanced entry of air through the stretched spaces or openings from the outer environment. At the same time, however much the fabric is stretched, the muscles are kept in position preventing any damage and keeping them in correct position when engaged in sport activities.

The 3D knitting structure is developed to achieve all these properties or functions successfully. At the same time the body is kept warm and it is retained, so all these functions are fulfilled satisfactory by this 3D knitting structure developed. The 3D knitting structure is developed to achieve all these properties or functions successfully. At the same time the body is kept warm and it is retained, so all these functions are fulfilled satisfactory by this 3D knitting structure developed. The novel fabric structure with the 3D knitting techniques developed for NIKE brand by MAS active, a final garment was designed by placing these fabric structures in different places of the body so that the functional aspects of the fabric suits those different places. This process is called 'body mapping'. Finally to show to what extent this sportswear with the 3D knitting techniques match for a masculine body functionally and aesthetically it is put on to an actual masculine body with the final design. According to the case study, the three types of requirements (Breathability, Compression and Insulation) for sport wear, are the main reference to develop the unique inside hand knitted spaces in this research.

9. Raising a Research Question

Initially the research would concentrate on local hand knitting craft practices and their potentials. There are special communities and groups who possess about 30 years' experience in Hand knitting technology engaged in this hand knitting craft along the coastal areas. As stated above, the existing local hand knitting craft practices has many issues like they are concentrate only on export production, new experiments are not carried out with hand knitting techniques, not attempting to vary and modify knitting technology to produce new patterns and designs, attach more emphasis only to flat knitting, not making use of different kind of yarns for hand knitting practices, there is hardly any use of 3D structural, sculptural and architectural forms of hand knitting techniques. So main research question is to be how to build a responsive textile environment on the active human body through local hand knitting craft practices

10. Hypotheses

Main hypothesis is to be ‘By using an inherent quality of local hand knitting craft practice, molding different three dimensional(3D) voluminous spaces and handle the voluminous space in between the human body and the fabric is a most important thing to build a responsive textile environment on the active human body.

11. Building a Responsive Knitted Skin on the Human Body

Further, experiments are being carried out presently to find out how a knitted layer acts as an additional 2nd skin to the biological skin. Alana Clifton describes through her research, ‘*SECOND SKIN: EXPLORING PERCEPTIONS OF CONTEMPORARY KNITTING*’ how knitted skin act as a second skin. She said that,

Second Skin explores contemporary knitwear design functioning within the ‘high-fashion’ area of design. It challenges traditionally established rules and perceptions, and potentially blurs the boundaries of what is considered fashion design, into art. While conceptual fashion design has always been a debateable issue among fashion scholars as to whether it can be viewed as fashion, anti-fashion or possibly art, this work observes the influences of modernity and deconstruction in relation to knitting. Knitting has the ability to be manipulated and molded into two and three-dimensional forms through the knitting/making process. It is highly versatile can be highly patterned and textured, making it a unique medium. Through hand and machine knitting methods of making, the work interrogates the notion of ‘deconstruction’ by looking past the traditional knitted coverings for the body. Knitting here functions as a vehicle for ‘deconstruction’, with familiar garment structures transformed into disarticulated ‘body pieces’” (Clifton, 2007)

During this research, by using Hand Knitting techniques an innovative knitted textile will be experimented, as a trial and that is the most important and main part of this research. Here the 3D structural, architectural and sculptural hand knitting potentials are used; two methods are adopted to develop a textile with inside knitted spaces. They are namely, through knitted textures and knitted forms. The research would concentrate on various types of knitted textures and knitted forms with using different moods and inspirations. Using various kind of yarns like cotton, silk, metallic yarns, wool ect.. And yarns of different gages for those experiments. Subsequently, develop the inside knitted spaces by using the potentials of 3D structural, architectural & sculptural hand knitting technology. By the above two methods, mainly one type of inside knitted space can be designed

namely, Inside knitted spaces in between biological skin and the knitted skin. The fabric development in this manner with different voluminous inside spaces can be categorised in to three types of inside spaces based on the purpose for which it can be used as a 2nd skin on a biological skin. They are; **Breathable inside spaces, Compressible and moveable inside spaces and Insulating inside spaces**

11.1 BREATHABLE INSIDE SPACES

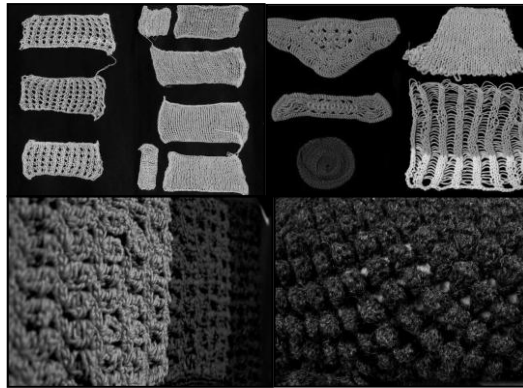


Figure 3: experiments of breathable knitted spaces with and without 3D quality

Here, the inside spaces are designed in such a manner to create a very efficient ventilation system between the body and the knitted skin. Here the important feature is that 3D textures and the 3D forms of quality of the knitted structure is retained as it is, with holes facilitating the exchange of gases very smoothly. Firstly I experiment Breathable knitted fabric without 3D quality. After that I tried to create the breathable knitted spacer fabric with 3D quality.

11.2 COMPRESSIBLE AND MOVEABLE INSIDE SPACES

The inside spaces designed here between the body and the fabric varies from zero to different volumes in keeping with the corresponding body movement showing its ability for moving freely. By using a non-stretchable yarn and applying knitting technology a stretchable textile was designed and then using this stretchable quality an inside spaces was designed and it was developed so that it would be changed from zero up to different volumes. The special feature here is within the frame of the 3D textures and the 3d forms all the above mentioned material developments are will be carried out. If attention is focused to examine how this 3D knitted fabric with compressible and moveable inside spaces act, it can be seen that this is able

to hold the body muscles very strongly and it capable of functioning as a firm fabric varying the volume of the inside spaces in keeping with the corresponding movements of the biological skin.

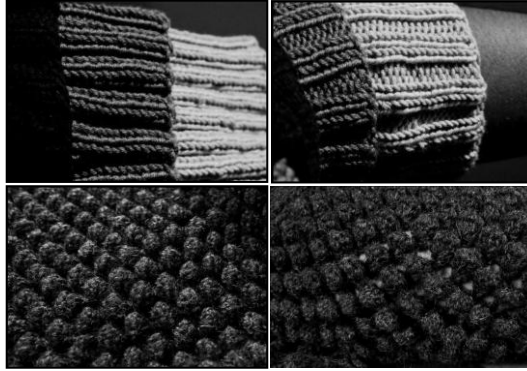


Figure 4: experiments of compressible and moveable knitted spaces

11.3 INSULATING INSIDE SPACES

Designed here a 3D fabric with different textures and forms. These types of inside spaces create 3D textures and forms to outside. This knitted material therefore can provide protection; retain the warmth, protect the muscles and acts as a 2nd skin.

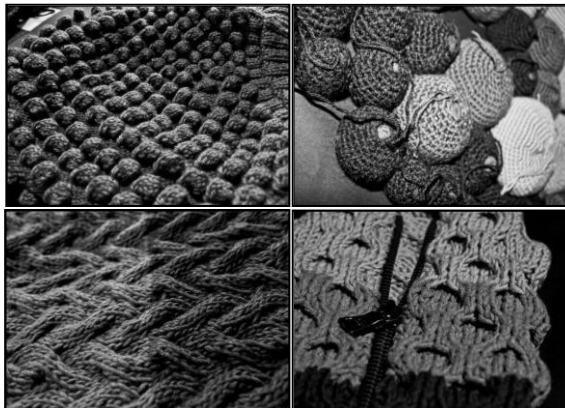


Figure 519: experiments of insulating knitted spaces

11.4. TEXTILE APPLICATION AND DESIGN PROTOTYPES

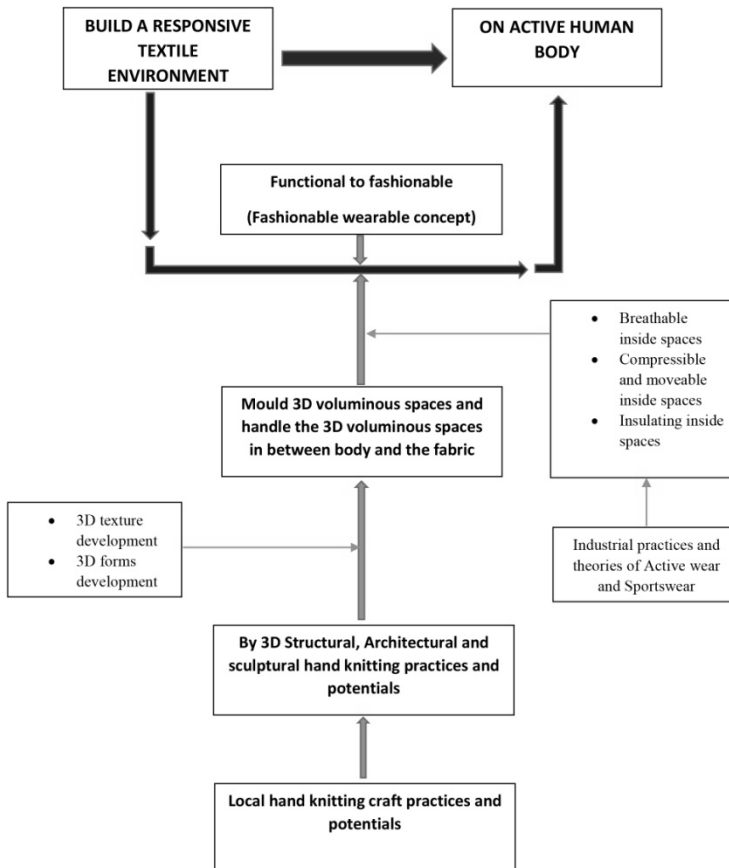


Figure 620: design prototypes

CONCLUSION, FINDINGS AND FURTHER STUDIES

Especially, this research is not carried out according to a brief or to fulfil the requirements of a client at all. It was based on the main concept of “Space in between”, and this basic concept was further developed supported by experimental studies to introduce the novel concept of the “Responsive textile environment (Knitted Skin) with Voluminous inside Spaces”. So it can be described as purely an academic research backed with practice led experimental studies. As an experimental research, studies were carried out mainly on three key topics, namely; **responsive knitted Skin, inside knitted spaces** and **functional to fashionable knitwear**. According to the ‘responsive knitted skin’ the knitted layer here is interpreted as a **2nd skin** on the biological skin of man. Through this research, hope to introduce **“Inside knitted spaces** in between biological skin and knitted skin”. By developing the above mentioned method, there are three types of sub inside knitted spaces introduced through this research. They are namely.

- Breathable inside knitted spaces.
- Compressible and moveable inside knitted spaces.
- Insulating inside knitted spaces.



Finally all those experiments have been demonstrated how to build a responsive textile environment on the active human body through local hand knitting craft practices and unique potentials.

By the way as the pointed out previously the modern man in using garments goes a step beyond covering the naked parts of the body. It shows very convincingly as at today that garments act as highly advanced and active second skin with **functional aspects as well as fashionable aspects**, very close to the biological skin of man, because of this very reason, several important facts for launching this research have been identified. They are summarized below,

- As an important research study to explore the **potentials that the hand knitting technology** possesses as a knitting industry and especially as a **craft technique**.

LOCAL HAND KNITTING CRAFT PRACTICES..

- As a collection of study with various capabilities of knitting by making use of hand knitting techniques which cannot be done by other methods of using machines or any other machinery.
- To carry out trial experiments with the potentials of hand knitting technology to explore the **possibilities of developing 3D structural, Architectural and sculptural forms** further.
- To carry out trial experiments to see the possibility of using hand knitting and 3D structural and sculptural quality to **mould spaces** of different sizes **in-between the biological skin and the knitted skin**.
- To **introduce three new inside knitted spaces** by developing 3D structural and sculptural hand knitting techniques.
- It was possible successfully to develop inside spaces using 3D structural and sculptural hand knitting techniques during the production process itself.

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