Re-Visualizing Modest Fashion: Use of LED in Changing Fashion Trends

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***Abstract*: The fashion industry is one of the biggest industries in the world and we are living in the" Insta- age" where new technological innovations have emerged into the fashion industry and affected the lifestyles of people today. New technology also termed an emerging technology is defined as innovation in any beneficial methods that offer critical improvement based on established machinery. Technologies like Artificial Intelligence, Magic mirrors, 3-D printing, and Virtual Reality, etc. have played major roles in reshaping the fashion market. Consumers are intertwined in the digital world, and designers embrace the latest innovations in their designs, manufacturing, and marketing. This paper explores the blend of traditional designs from the Gulf region, with inbuilt hi-tech and digital inclusions using LED (Light Emitting Diode). The objective of the paper is to retain the value of heritage and yet align with existing and future trends.**

Keywords: Futuristic, New technology, Modest, LED, Fashion, Nano- Technology, Tradition, Culture.

I. INTRODUCTION

New technology has great potential to transform our lives with many new experiences which have been

witnessed among human and wearable devices. The new technology which is used in this study is lightweight, easy portable, flexible and can also be termed as wearable technology. The "Wearable" word gains new meaning with technological advancements.[1] It changes the way of human-computer interaction radically. The widespread and early-adopted wearables are smartwatches, fitness bands, head mounted displays, wristbands and ear buds. On the other hand, many wearables such as skin sensors, smart lenses and smart textiles are recently

about to go mainstream. Combining fashion with technology opens new doors to enhance clothing. Modifications like Light Emitting Diode is now applied for fashionable clothing for its feature of flexibility in shape, color, dimming control. It can be easy to control the output using switched mode power converter. The power levels of LED are now available in 1W to 5W with reasonable price. This is for high brightness illumination. For decoration, the low power with less than 50mW is available. They are placed in various points to provide the required needs for clothing design. An LED embedded clothing provides stronger light and different colors. It can also be supplied by low voltage battery such as Li-ion rechargeable one. Therefore this paper has explored the use of LED embedded clothes.

TABLE I. ADVANTAGES & DISADVANTAGES OF LED EMBEDDED CLOTHING

LED advantages	LED disadvantages
Less energy consumption than other bulbs types so they can be battery powered and used in clothes.	Relatively high prices more expensive than other types of bulbs however, the total ownership costs of LED is less than incandescent, halogen and fluorescent regarding energy consumption and lifetime.
They are tiny, shock resistant, and hard to be damaged.	LEDs will only light with the right electrical polarity not as incandescent light bulb that gives light regardless the electric polarity, if the voltage is of the wrong polarity, the device will be reverse biased, very small current flows, and no light is emitted.
Emits cool non thermal light which emits a small heat amount and gets rid of it by mounting phenomena in a direction opposite to light emission direction.	Requires certain electric current; the higher current applied the brighter is the light emission, but GaN based LED is an exception as above a certain current the light begins to degrade and produces inner heat which is harmful to LEDs causing device failure.
Produces brighter light comparing them to other types of bulbs so they save energy.	LED efficiency largely relies on the temperature of the environment, operating the LED can completely fail in high ambient temperatures as a result in overheating.
Has quick on and off cycling so they are perfect if the wearer want to switch off and on light frequently on his illuminated garment.	(white and blue) may exceed safe limits causing blue hazard which affects eyes safety.
LEDs are from the fastest devices to get full brightness when lighted.	LEDs efficiency decreases when electric current increases.
Also it has a characterized long lifetime between 35,000 to 50,000 hours of life so time required for complete failure will be longer.	
Can emit light of any desired color without using color filters depending on the semiconductor type.	
Are perfect for devices that need dimming as they don't change their color tint when the current passing through them is lowered.	

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Modest Fashion does not have a single definition to it because everyone has their own varying explanations of what modest fashion means to them, so it's a broad idea that gets very narrow inside those two words. Shortly, modest fashion is the act of covering up on purpose. The decision to do so can be religious/ethnic fulfilment or to attain a certain aesthetic and level of ease. .[2]The modest fashion from the Islamic point of view is an emerging phenomenon that offers non- adherent and non-transparent clothes that cover a large part of the body respecting the religious dictates. It is seen as a growing industry in the fashion sector and has spread throughout the world bringing the attention of global fashion houses and famous designers.[3]

This paper introduces the use of nanotechnology fabrics in modest fashion with LED as surface ornamentation. Non-textiles are manufactured to have special qualities like hydrophobicity and high durability. These characteristics are created by weaving nanofibers that have certain properties and by adding nanoparticles that can provide traits such as bacteria resistance and the "lotus plant" effect, which creates dirt and water resistance. Nanotechnology fabrics are a relatively new and expanding field. They have applications in bioengineering, electrical engineering and computer science. They also have the possibility to completely transform the textile industry. Some important and useful applications for nanotechnology fabrics include wrinkle and stain resistant clothing and antimicrobial clothing. These effects can be produced on fabrics using Thierry plasma systems with a fast and effective microwave plasma process. Other desirable clothing characteristics that could be achieved with nanotechnology include self-cleaning fabrics, water- repelling textiles, and clothing that can reduce odours by chemically changing the compounds that cause bad odour. These innovations would take advantage of Nano- specific properties, particularly the high surface area per volume ratio of Nano-sized materials that increase the exposure of active surfaces to the surrounding environment.

II. REVIEW OF LITERATURE

Will Nano-fabrics be the future of clothing, enabling us to all have self-cleaning, water-resistant clothes that we only have to wash a few times a year? Only time will tell. The field of Nano-fabrics is still very much in its infancy and it still faces some challenges. For example, washing clothes that contain antimicrobial silver releases nanoparticles into the waste water, giving them a limited effective lifetime as the nanomaterial washes out. Perhaps more important is the potential environmental risk of this nanoparticle release into the environment, which has incited continued debate and controversy, as metal nanoparticles can dissolve into toxic ions when exposed to environmental conditions.

Newer Nano fabric technologies may carry their own concerns, which have not yet been thoroughly studied. However, the potential benefits of Nano- enhanced fabrics makes their use worth exploration. And with continued scientific advancement that will allow us to address environmental concerns, this sector of nanotechnology can only continue to grow.[14]

There is at all times some confusion when it comes to customary clothing in the UAE. Apart from the admirers of Islam, not many are familiar with the Arab clothing style. With the exemption of Dubai, the rest of the Emirates in the United Arab Emirates are traditional in their style of dress, prefer "modesty" and, to a certain extent, adhere strictly to the provisions of Islamic manuscripts. Dubai fascinates a lot of outsiders, includes expatriates and tourists, so the dress code is softer here. Traditional clothing is based with and designed keeping in mind the local hot weather and religious beliefs.

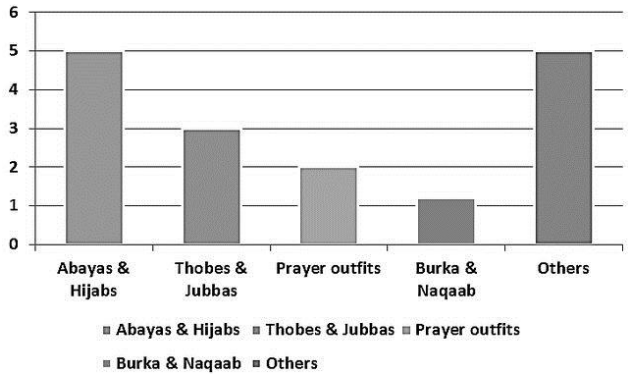

Fig. 1. Global Modest Clothing (Sales %) Market Share

According to the State of the Global Islamic Economy Report 2017, the modest fashion market is one of the biggest markets in the global fashion sector and has a large proportion of consumers(Fig:1). Muslims have spent about 11 per cent of the world's total fashion spending, which is indicative of its importance (State of the Global Islamic Economy, 2017), and its emergence in the world markets is due to the growing number of Muslims in the world (Hanzaee & Chitsaz, 2011). Further, the Pew Research Center (2017), on the distribution of religions in the world, the number of Muslims in the world in 2015 was 1.8 billion people around the world. Muslims constitute about 24% of the total population density, and therefore the Islamic religion is in second place after the Christian religion, by the end of the century, Islam is expected to surpass Christianity, because the rate of births among Muslims is 2.9 versus 2.2 for other religions, including Christianity. Thus, Islam is currently the fastest-growing religion in the world (Lipka, 2017), and therefore this growth is a significant chance for many companies around the world, including the fashion sector, many fashion companies seek access to modest fashion markets and increase their association with them, but this is often difficult because of the lack of understanding and knowledge.

Integrating LEDs into garments: Wired light LED strand with battery holder and switch can be fixed through snaps into the garment so that it would be at the surface of it. When diffused with semi-transparent fabrics like sheer fabrics, the inkling stars take on a subtle glow for a variety of soft lighting effects. Added to indoor and outdoor textiles, combined with digital prints and painted backdrops, or integrated into set design pieces, these LEDs offer truly limitless design options. Light up outdoor fabrics, nettings or prints with water proof LED components.

Two pin LEDS: LEDs are perfect for wearables, since they're small, inexpensive, and easy to work with once you know the basics. The simplest LEDs, and the best place for beginners to start, are two pin LEDs. These LEDs have two pins, or wires. The longer wire is the positive side, known as the anode, and the other is the negative, or the cathode. Currents in LEDs only go one direction, from the positive to the negative. This is important to remember when working with LEDs, since LEDs with wires in the wrong direction won't work.

Addressable LEDS Some LEDs have more than two pins. These are multicolour RGB LEDs, or addressable LEDs. These LEDs can be controlled for a variety of functions, including lighting up and changing colours in a pattern or sequence written in code, or responding to sensors. RGB (red green blue) LEDs have three pins powering the red, green, and blue elements the fourth pin is a return pin. Addressable LEDs have a "data in" pin, a "data out" pin, a ground pin, and a power pin. Both of these LEDs gather data from a signal that determines the brightness and colour of the LED.

Strip LEDS: lights on a roll LED strips can also be used in wearables. (Fig 2)These are convenient to work with since they are already wired together and can be cut into the length you need for your project. The lights on analogue LED strips all act as one, and digital strips allow each LED to be addressed individually.

Fig. 2. LED strips in Rolls

Flex led strands, designed with wearables in mind. This strip has LED spaced out perfectly for fashion tech projects, and is flexible and durable. This has recently taken the top spot as our go-to for wearable tech, since it offers the convenience of strip LEDs without the tedium of sewing LEDs individually one at a time. Sew able LEDS, wearable technology has gained popularity, there are a number of LEDs and microcontrollers designed specifically for sewing. The Adafruit Sequin and LilyPad LEDs are both designed to be small, lightweight, and with small holes for thread. While these can be slightly more expensive than standard LEDs, they can be a great starting point for beginners and projects where you intend to have the LEDs visible on the surface.

III. METHODOLOGY

In current times, digital innovations are a vital tool in design and fashion industry. The use of new technology in the design industry is growing every day. There are many various digital technologies explored and implemented to give newness and comfort in the clothing line. One such tool is LED lights which can be used in many variations in the clothes. These lights can serve as surface ornamentation, use d as functional component, display mood swings and many more. A survey was conducted to understand the modest fashion consumers preference towards technology embedded in their clothing. 50 such consumers participated in the survey. As a part of the survey 5 major questions were asked, the results have been described in the form of table and graph.(Table:2) It has been noticed that modest consumers are looking for variation in their clothing and are open to try out new design options related to fabrics and technology.(Fig 3)

TABLE II. SURVEY CONDUCTED ON MODEST CLOTHING PREFERENCES.

Survey on Modest Clothing		
Questions	YES	NO
1) Are there enough variations of designs available in modest fashion at the moment?	20%	80%
2) How open are you to have technology in built in the modest Fashion designs?	72%	28%
3) Are you aware of the fabrics used in modest clothing?	32%	68%
4) Are you aware of use of Nano- Textiles?	5%	95%
5) Do you think new technology and textiles can bring change in modest clothing?	64%	36%

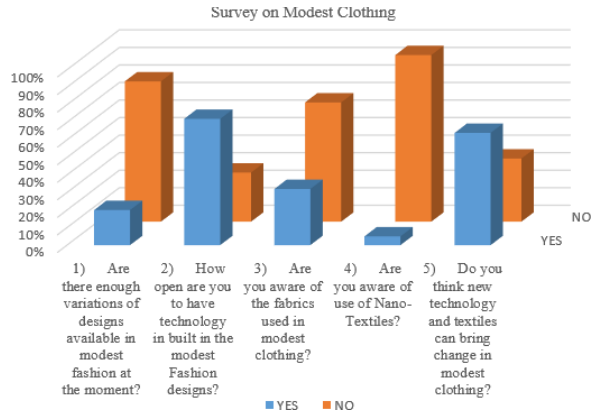

Fig. 3. Results of the survey conducted.

Based on the above findings, designs were created and tested on the modest fashion clothing.

IV. WORKING MODEL OF LED INBUILT CLOTHING:

There are 5 major parts is used for the working of LED lights. (fig 4)

Fig. 4. Technology behind the LED design

- LEDs allows the flow of currents only in one track, from the (positive to the negative). (Image:3) If in incorrect direction the LED wires will not work.
- Requires Power adapter.
- Safe to use, with very little or no heat emission.
- It is touchable and safe on body, the lights are sandwiched between the two layers of heat and light resistant Nano treated fabrics.

Easy stitching, safe application and Installation. Easy to cut in several shapes; decent suppleness, it can fold and bend.[15]

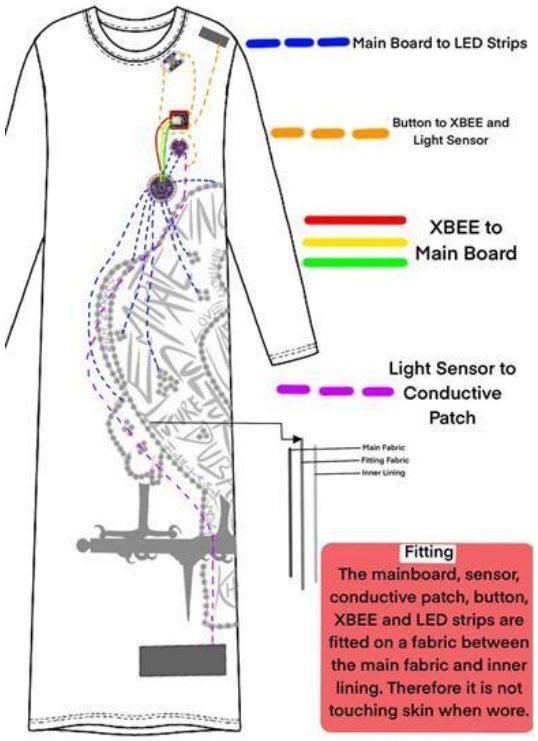

Fig. 5. the application of motif and installation of LED lights.

The motifs are derived from the local inspirations and the light are placed and stitched accordingly. All sockets are placed hidden in between the layers of fabrics and invisible buttons are operated from the outer layer of the garment. (Fig 5). The Lilypad Arduino main board is microcontroller board designed for wearables and e-textiles. It can be sewn to fabric.it consists of ATmega328 with bootloader and minimum number of external components to keep it as small as possible. This board will run from 2V to 5V and offers large pin-out holes that make it easy to sew and connect. Each of these pins, with the exception of (+) and (-), can control an attached input or output device (like a light, motor, or switch).[16]

The LilyPad Light Sensor is a sewable breakout board with an ALS-PT19 light sensor built in and ready to use right away. Each sensor outputs voltage between 0V and 3.3V depending on the level of ambient light shining on it. As more light is applied on the sensor, more current will flow from the board through the signal tab to the microcontroller you connect the sensor to. If the sensor receives no light, no current will flow through it. The LilyPad Button Is designed to give the user a low profile button without any sharp edges. Button closes when you push it and opens when you release. XBee is a module produced by Digi International mainly used as a radio communication transceiver and receiver. XBee supports peer-to-peer as well as point to multi-point network communications wirelessly with the speed of 250 kbits/s. Overall the working of the model is that the Main board has battery which supplies current to the wires which are connected to one end of all the LEDs and XBEE module which can be programmed by connecting it to a computer. The battery has positive and negative wiring attachment from the LEDs and also power XBEE for time span of 6-12 months depending upon the use. LEDs strips are notched on outer side to form a curve suitable for the design. A light sensor is above the main board which is also connected to our main board of which helps decide how much Light is emitted.[17]

V. CONCLUSION

With the fast trade and industry along with high-tech development, consumption patterns of individual are now replaced with the consumption of product attributes. Individuals pay more consideration to personal contentment, comfort and luxury.[18] The modest fashion clothing is an emerging line of clothing range, now becoming a part of global fashion with inclusion of technology, trends and fabric variations. It has been noticed well known designers and fashion houses are now creating special collections for modest consumers. The result above clearly states the objective of this paper is achieved to introduce new skill and fabric for creating an innovative line of modest fashion which will define new economic opportunity for the fashion sector represented by modest consumers. The findings stress on the importance of the change or variation to be brought in modest clothing due to its global acceptance and demand in the international market.[19] Findings also highlight that despite new technology and concepts applied, the ethical and moral values of the clothing for specific segment of people will remain the same. The newness in designs do not compromise of the conventional aspects and value of clothing. The untapped design aspects are very well captured and explained in the paper. The anti-bacterial properties of the Nano fabrics at altered temperatures establish the preparation new functional fabrics. Therefor this line of collection can also be called as Smart Garment. [20]

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