Fashion Design in light of Interaction Design applications (Analytical research)

Prof. Amr Gamal El Din Hassouna

Professor of Apparel Design, Apparel Design department, Faculty of Applied Arts-Helwan University

Hassouna_amr@yahoo.com

Prof. Shereen Sayed Mohamed Hassan

Professor of Apparel Design, Apparel Design department, Faculty of Applied Arts-Helwan University

Shereen.elsobkey@gmail.com

Researcher. Nahla Maamoun Ahmed Mohamed Salem

Teaching Assistant, Fashion Design department, Faculty of Arts and Design- M.S.A University

Nahla_maamoun@hotmail.com

Abstract:

Today, there is a new design space in which the fields of Fashion Design and Interaction Design are integrated. Therefore, new expressive and interactive technologies are becoming relevant for the field of Fashion Design. Fashion, technology and interaction design are contrasting notions that will be analysed in this research. Since "Interactivity", as the origin of this research, has a strong inter-relationship with electronic design. Electronic design technology is the based technology for setting up interaction processes and operating the whole system of Interactive Fashion Design. Based on the electronics applied into clothing, there has been the term named wearable electronics. Interaction designs today adopt electronic technology terms and user interface designs. While modern living has been increasingly interactive, equal attention has been drawn upon emotion psychology in the course of interactions. It is timely indeed for the aspiration for creation of Interactive Fashion and a deeper understanding of its interactions among wearers and between wearer and clothing. This research highlighted the concept of fashion that is interactive between the garment and the wearer and the context in which it is worn.

Keywords:

Wearable Technology, Intelligent Clothing, Functional Fashion, Interaction Design, Interactive Fashion.

Introduction:

Our life is growingly interactive. 'Interactivity', as the origin of this research, was first expressed in art as early as the 60s and it started to develop into different design disciplines such as installation, architecture, product, as well as fashion and textiles since 1980s. The term 'Interaction Design' was first proposed by Bill Moggridge and Bill Verplank in the late 1980s (Saffer 2006). A piece of clothing item is 'active' only when it is activated by the movement of the wearer while it is being worn. However, this kind of actions and changes is one sided, initiated by the wearer. Interaction is broadly defined as presence of interdependent actions at the mutual initiation between two or among more subjects. Since electronic products and user

experience needs were becoming complicated, Interactivity has become a design form to create dialogues between human and artifact. This paper highlighted the concept of fashion that is interactive between the clothing and the wearer and the context in which it is worn. Since the research is an interdisciplinary integration which involved art, design, fashion, electronic technology, physiology, psychology and humanity, a study of substantial amount of prior applications of interactivity that include areas other than fashion was conducted by which an original theoretical framework of interactivity which is standardized, systematic, and multifarious was established. This theoretical framework of interactivity provided theoretical reference for decoding and analysing interaction design applications whereby various interaction processes, interactive relations and levels were summarized towards a better understanding of the essence and law of the happening of interactivity as well as their varied courses. (Preece, Rogers and Sharp 2015)

Research goal:
The aim of this research is to create a theoretical framework that combines functional fashion design values with interaction design values in a model that could theoretically be used interdisciplinary for the future development of wearable technology products.

Research Problem:
We can conclude the research problem in the following questions:
1. What is Interaction Design?
2. What is Interactive Fashion?
3. How Interactivity is useful in Arts and Design in general and in Fashion Design specifically?

The importance of the research:
This research provided theoretical reference for decoding and analysing interaction design applications in the field of fashion whereby various interaction processes.

Research hypothesis:
Blending interaction design and fashion design in order to create new Interactive Fashion designs.

Methodology:
This research is interdisciplinary. It involves art, design, fashion, electronic technology, psychology, humanity, etc. Therefore, inclusive literature reviews, systematic theoretical research, analysis research as well as a series of integrated applications are provided.
The research follows the descriptive analytical approach to study the affection of interaction design applications on fashion. In order to achieve the goal of the research, the following points should be covered:
1. Fashion Design.
2. Fashion vs. Clothing.
3. Functional Fashion.
4. Wearable technology "Wearables".

5. Fashion meets technology "Techno-Fashion".
6. Intelligent clothing and smart fashion.
7. What is Interaction Design?
8. The Components of Interaction Design.
9. Interactivity in Art and Design.
10. Review of Interaction Design applications in Art and Design.
11. Interaction Design applications in Fashion.

Fashion Design:

Broadly defined, "fashion" refers to the symbolic, aesthetic, and cultural meanings that objects carry, especially the ways in which people use objects to express their taste, lifestyle, social status and belonging to a community (Pan, et al. 2015). One imagines that fashion drives consumption and premature obsolescence at the expense of efficient use of resources. At the same time, fashion exists in various aspects of our lives and plays an essential role in shaping consumption practices. Also, fashion-oriented design encourages ingenuity, imagination and innovation, which are crucial elements in pushing forward technological and social progress.

Defining Fashion:

Fashion eludes easy definition. Broadly, Fashion can be understood as shifting the styles of dress-that is, specific combinations of silhouettes, textiles, colours, details and fabrications-embraced by groups of people at a particular time and place. Such styles may be projected by a designer or emerge from the street. Fashion can also be viewed as the entire system of innovation, production, marketing, dissemination, and adoption. Fashion is both a creative endeavour and a product; or, to put it in another way; it is an aesthetic practice that produces useful, and sometimes lucrative, objects. On the one hand, a craft or an art form; on the other, a multibillion-dollar worldwide business. Fashion's reach, of course, goes far beyond the chain of activities that result in objects de la mode. Dated back to at least to the late Middle Ages with the rise of the city and early capitalism, fashion was redefined in the second half of the nineteenth century with the spread of industrialization and the birth of the modern couturier, and again in the late twentieth century with increasing levels of democratization and globalization. Along the trajectory, fashion has operated as cultural construction, social performance, spectacle, class identification, self-expression, and life style articulation. A consumer of history enmeshed in its own time, fashion, like all design, can also be read as an attempt, however fleeting, to predict and shape the future. (Kennedy, Stoeher and Callderin 2013)

Functional Clothing:

Assigning value to something that stems from individual creativity is a very subjective thing when the only criteria are the standards of the day. In addition to being judged for its aesthetic value, fashion is also charged with being functional. Successful functional clothing design is the result of designers becoming thoroughly conversant with the culture, history and tradition associated with the particular end-use or range of activities. The subtleties of identified particular life-style trends will affect the style and mood of the clothing. Certain cultures and

their traditions may specify codes of dress. A design that is considered attractive for a wearer from one community or age group may be totally unacceptable for another. What is perceived to be a 'cool' design for the youth market will not be appropriate and attractive to an elderly user in a wheel chair? Concerns such as social and cultural issues, historic context and tradition, corporate and work culture, participation patterns and levels, status, demographics, and the general health and fitness of the wearer will impinge on the design of smart clothes and wearable technology. An investigation of the lifestyle demands of the wearer, in terms of behaviour, environment and peer group pressure, is needed to provide an awareness of both clothing requirements and the application of emerging wearable technologies that have appropriate functionality and true usability for the identified user. (Calderin 2011)

Wearable Technology "Wearables":

The term wearable technology is a broad and all-encompassing label that does not express the social, cultural and aesthetic dimensions of a specific, more fashion-oriented subgroup of wearables. It includes examples varying from haute couture outfits, outdoor apparel, and functional work wear to wearable accessories and gadgets such as jewellery, wearable cameras, smart watches, medical devices, and an abundance of health and activity trackers. To be able to refer to a particular subcategory of wearable technology that is more explicitly connected to the realms of fashion, dress, and clothing. I will adopt Bradley Quinn's notion of 'techno-fashion'. (Toussaint 2016)

Wearables: What's in a Name?

The term "Wearables" as the primary way of referring to the field of applied electronics and technology situated on the body via garments or other body-specific adornments. However, many competing names exist describing the field of wearables from unique angles, including: e-textiles, intelligent textiles, smart fabrics, techno-textiles, future textiles, material futures, fashion-tech, computational couture, and coded couture. Nowadays, wearable electronics can be applied to smart fabrics, wearable e-textiles, intelligent clothing and smart fashion. Over the past few years, many textile scientists and electronic engineers have been conducting research on various technologies of textiles and clothing related to interactivity. Besides research on functionality, a few fashion designers also started to design interactive intelligent clothing and smart fashion. Wearables or wearable technologies are on body products such as clothing, footwear, accessories and jewellery designed to create a communication/interaction enabled by technologies such as digital and virtual to amplify and extend natural ability and performance of the human body or add new functions to the user connecting him with his body, with other persons or objects and with the environment. (Larsson, Teunissen and Colombi 2018)

Fashion meets Technology "Techno Fashion":

From design to retail, from product to communication, fashion and technology are interconnected and the shift from craft to industrial production, from analogue to digital involves all stages of the production process, improving them and making them quicker and more efficient. Over the years, fashion and innovation have often come to meet, growing closer and affecting one another in attempts at testing each other's limits, guaranteeing better

performing products or systems, essentially to improve one another. In history, technological innovation reached peaks of progress identified as industrial revolutions and, interestingly always presented some connection with the fashion world. Fashion Tech is technology that enables a fashion experience when the user wears it or interacts with it. (Larsson, Teunissen and Colombi 2018). Fashion and Technology Entwine focuses on the emerging phenomenon of techno-fashion. The entwinement of fashion and technology is no longer exclusively belongs to a fantasy world rather it has become the focus of a new wave of innovators eager to change the course of fashion. Flexible solar cells that turn a coat into a sustainable battery charger, a jacket that is worn against air pollution, a shirt that sends hugs over distance, or trousers that help to correct your posture: they now all exist in real life (Toussaint 2016) .What distinguishes techno-fashion from the broader field of wearable technology is that it specifically concerns garments and accessories (as distinct from tools, instruments, or devices) that combine the functionalities of technology with the aesthetic, expressive, critical and/or communicative role of fashion. Depending on "various discourses of technology, fashion, and dress on the one hand and historical narratives in science fiction, media, and culture on the other," techno-fashion notably merges the functional with the fashionable.

Intelligent clothing and smart fashion:

Intelligent clothing and smart fashion are part of this exciting technology that involves building computing, connectivity and sensing abilities into materials people are comfortable to wear. In general, smart fabrics and wearable e-textiles technologies will be taken as the basis for further research and development of intelligent clothing and smart fashion, which are essentially two sides of the same coin. Based on the needs of intelligent clothing and smart fashion, smart fabrics and e-textiles of different functions can be individually or comprehensively designed. There are various types of intelligent clothing and smart fashion to meet the varying needs in terms of sensory resources and reaction intensity or forms. In respect of sensory resources, some intelligent clothing and smart fashion are designed to sense the surrounding environment only. Some are designed to sense the bodily activities or physical changes, while some possess both. Reaction intensity and forms can be defined according to the intelligence level and specific functions of intelligent clothing and smart fashion, while division of intelligence level can refer to the classification of the extent of intelligence used in smart fabrics, which can be roughly divided into passive smart, active smart and very smart. The reaction forms include changes in visual sensing, auditory sensing, and form as well as information input and processing. In the next few years, intelligent clothing and smart fashion are likely to incorporate even smarter features. These could include certain intermediates, transporters and interfaces for an enormously broad range of micro-systems. The latest innovations would create significant demand for creative capabilities in the clothing industry. (Seymour 2008)

Interaction Design:

Interaction is a kind of action which occurs when two or more objects have an effect upon one another. The idea of a two-way effect is essential in the concept of interaction, in contrast with a one-way causal effect. A central concern of interaction design is to develop interactive

products that are usable. By this is generally meant easy to learn, effective to use, and providing an enjoyable user experience. (Larsson, Teunissen and Colombi 2018)

Defining Interaction Design:

By interaction design, we mean designing interactive products to support the way people communicate and interact in their everyday and working lives. Put another way, it is about creating user experiences that enhance and augment the way people work, communicate, and interact. More generally, Winograd describes it as "designing spaces for human communication and interaction". Thackara views it as "the why as well as the how of our daily interactions using computers" while Saffer emphasizes its artistic aspects: "the art of facilitating interactions between humans through products and services". A number of terms have been used to emphasize different aspects of what is being designed, including user interface design, software design, user-centred design, product design, web design, experience design, and interactive system design. (Preece, Rogers and Sharp 2015)

The Components of Interaction Design:

In the following figure interaction design is viewed as fundamental to all disciplines, fields, and approaches that are concerned with researching and designing computer based systems for people. Why are there so many and what do they all do? Furthermore, how do the various disciplines, fields, and design approaches differ from one another?
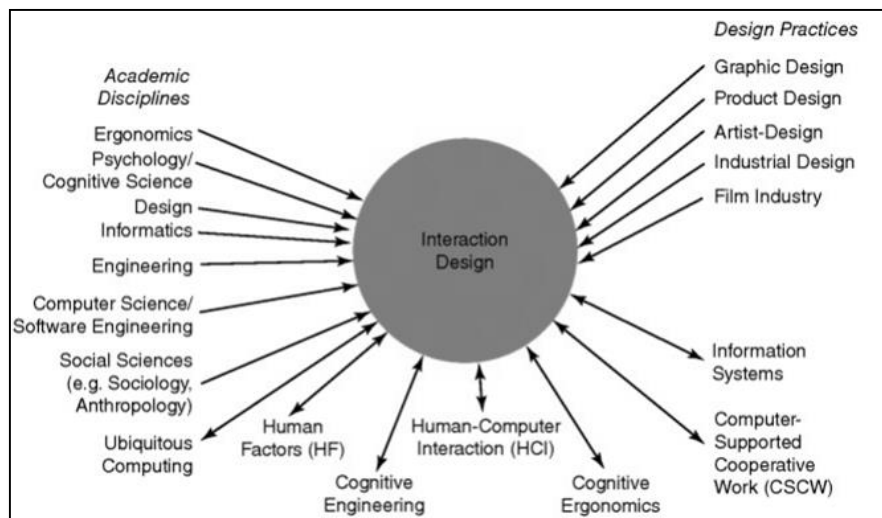

FIGURE 1:INTERDISCIPLINARY FIELDS CONCERNED WITH INTERACTION DESIGN

We have already described the distinction between interaction design and software engineering. The differences between interaction design and the other approaches referred to in the figure are largely down to which methods, philosophies, and lenses they use to study, analyse, and design computers. Another way they vary is in terms of the scope and problems they address. For example, Information Systems is concerned with the application of computing technology in domains like business, health, and education, whereas Computer-Supported Cooperative Work (CSCW) is concerned with the need also to support multiple people working together using computer systems. (Preece, Rogers and Sharp 2015)

Interactivity in Art and Design:

Before reviewing and analysing applications of interactivity in Fashion, Review of the development and applications of interactivity in various disciplines of Art and Design is essential. Extant literature has reported that interactivity was first expressed in art as early as the 1960s, and it started to develop into various design disciplines such as installation, architecture, product, as well as fashion and textiles since the 1980s.

Definition of interactivity:

Interactivity is similar to the degree of responsiveness, and is examined as a communication process in which each message is related to previously exchanged messages, and to the relationship of those messages to messages preceding them. In the 'contingency view' of interactivity, it is divided into three levels: non-interactive, when a message is not related to previous messages; reactive, when a message is related only to the last message; and interactive, when a message is related to a number of previous messages and to the relationships between them. Interactivity generally takes effect in human to human, and human to artifact communication. Human to human interactivity is the communication between people and people whereas human to artifact interactivity is the way people communicate through new media. Here, interactivity refers to the artifact's interactive behaviour as experienced by the human user. (Preece, Rogers and Sharp 2015)

Interactivity in Art - Interactive Art:

With the development of computer science and digital technology, multimedia technologies have been incorporated into artworks which gave rise to new art forms, i.e. new media art. Being the main characteristic of new media art, interactivity was detached and developed into a medium of new art form - interactive art. It is a form of installation-based art that involves spectators in some ways. Artworks frequently feature computers and sensors to respond to motion, heat, meteorological changes or other types of inputs to which their makers program them to respond. The use of interactivity as a communicative tool between artist and spectator as well as an art form originated in the late 1960s. In 1968, Jasia Reichardt arranged The Landmark Computer Art Exhibition Cybernetic Serendipity at the Institute of Contemporary Art (ICA) in London, which was the first exhibition ever to attempt to demonstrate all aspects of computer aided creative activity: art, music, poetry, dance, sculpture, and animation. Since then, interactive art has gradually become an important expressive and communicative means of new art.

Interactivity in Design - Interaction Design:

Since electronic products and user experience needs were becoming complicated, requirements of interactivity were felt increasingly in the 1980s. It is a discipline which defines the behaviour of products and systems with which a user interacts. The practice typically centres on complex technological systems such as software, mobile devices, and other electronic devices. Interactivity has become a design form to create dialogues between humans and artifacts. The term interaction design was first proposed by Bill Moggridge and Bill Verplank in the late 1980s. To Verplank, interaction design is an adaptation of what the computer science term "user

interface design" is to the industrial design profession. To Moggridge, it was an improvement over soft-face, which he had coined in 1984 to refer to application of industrial design to products containing software.

Review of Applications of Interaction Design in Art and Design:

1. Wall Showroom:

In Wall Showroom, a mobile projection surface formed the central element of the installation. As it moved about, the layout of the room was continuously altered, creating new spaces in which information could be disseminated. Viewers followed this projection surface, accompanied by a guide. The idea of the showroom was to demonstrate unification of space, media and movement. Wherever films and information were projected onto the dynamic surface, they directly reflected the content and style of the exhibition. Sound and lighting effects added to the experience.
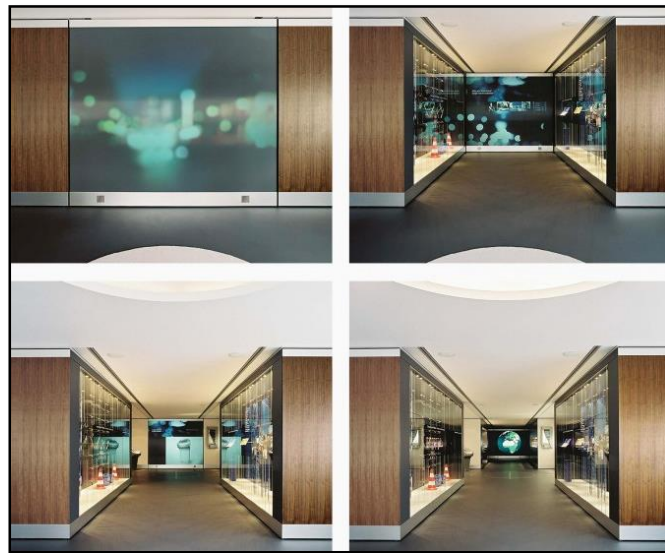

FIGURE 2: WALL SHOWROOM, ART+COM, 2002.

2. The Famous Grouse Experience:

In this "interactive environment" - a room with floor and wall projection - visitors were able to interact with film images in real time. By jumping or stomping they could break the ice projected onto the floor. They could also run across the surface of the water, making waves as they moved (without getting wet). Up to 20 people could enjoy this experience simultaneously.

FIGURE 3: THE FAMOUS GROUSE EXPERIENCE (ART+COM FOR HIGHLAND DISTILLERS LTD., 2002)

3. Liquid Space:

 Liquid Space was a space which physically reacted to the behaviour of the visitor. Through the use of sensors, software and mechanisms, the space changed in form and sound. If visitors sat silently, Liquid Space would fall asleep, and if there were a lot of activities, the space would become larger and more dynamic. This way, an adaptive situation was created in which visitors and space became one.

FIGURE 4: LIQUID SPACE, ROOSEGAARDE, 2003.

4. 4D-Pixel:

 4D-Pixel was a smart surface which physically reacted to voice of visitors and music and showed relievo (sculpted) letters. This interactive sculpture was a merging of electromagnetics, software and electronics. The dynamics of the wall was made of hundreds of pixels which dynamically reacted to sound frequencies. This way a direct relation between human activity and the appearance of the surface was established; it was a kind of fusion between body and machine.

FIGURE 5: 4D-PIXEL (ROOSEGAARDE, 2005)

5. Sunshine:

Sunshine was a large, wall-mounted disk whose changing light qualities helped prevent Seasonal Affective Disorder by positively affecting the 'bio-clocks' of people in its vicinity. Sunshine compensated for the lack of light from outside and simultaneously let people make use of its energizing blue light mode when they felt especially tired. Sunshine 'sensed' the level of light outside - as well as the colour 'temperature' - and compensated for indoors light when needed. Its outer 'ambilight' ring projected onto the wall a constantly changing glow that imitated natural light rhythms and engendered a pleasant 'outside-in' feeling for people close by. Its overall surface also emitted a bright, yellowish light when it was dark outside to ensure that one had the right amount of light inside during the day. At any time of the day, if one felt tired, one only had to turn the active blue light of Sunshine on. To do this, one stood before it and moved one's arms as if one was opening or closing a set of curtains. The more one 'opened' them, the lighter one received; the more one 'closed' them, the less light one received.

Figure 6: Sunshine, PHILIPS Research, 2006.

6. Versa Tiles:

Versa Tiles was a system of interactive, modular tiles that enabled children and teenagers - even adults - to play a variety of physically demanding games on the floor of any room. The system consisted of a set of identical, pressure-sensitive Play Tiles that acted as a gigantic interactive floor display, a Master Tile that brought power and intelligence to other tiles, and a couple of smart 'pucks' for specific games.

FIGURE 7: VERSA TILES (PHILIPS RESEARCH, 2006)

7. Smoking Lamp:

Smoking Lamp was an object that amplified the personal choice of smoking or not smoking in a public environment. It was designed as a funnel that terminated with a ring of light, the lamp changed from a bright white to a warm pink if it detected nicotine smoke beneath it. The light emitted corresponded with the new situation, illuminating the particles being exhaled by the smoker, and placing the smoker inside a theatrical scene.

FIGURE 8: SMOKING LAMP, HeHe, 2005-2007.

8. Target Interactive Breezeway:

The Target Interactive Breezeway offered a unique target branded interactive experience adjacent to the newly reopened Rockefeller Centre top floor observation deck. The Interactive Breezeway engaged pedestrians in an ephemeral interactive encounter where their positions and paths were traced by colourful avatars and effects.

Figure 9: Target Interactive Breezeway, ELECTROLAND, 2006.

9. City National Plaza Towers:

 An interactive ring sat in the plaza, between the twin towers. At night it rises slowly and takes its place 150 meters up in the sky. It changes colour and intensity in response to activity along a circular paving in the plaza below. The Sky Mesh was suspended between the tops of the twin towers. It featured a grid of LED lights spaced 1.5 meters apart on a steel cable grid.

Figure 10: City National Plaza Towers, ELECTROLAND, 2005.

Interaction Design applications in Fashion:

1. Climate Dress - C02 sensing fashion:

The Climate Dress is made of conductive embroidery and contains over a hundred LEDs inserted into the embroidery. The twist on this dress: it includes a C02 sensor which monitors the surrounding air for C02 level, sends the data to a LilyPad Arduino, which then visually indicates the pollution level by LED light patterns on the dress.

Figure 11: Climate Dress - C02 sensing fashion -Danish cooperation, 2009.

2. Kukkia and Vilkas (2005):

Kukkia is an expressive and behavioural kinetic sculpture that develops a visceral relationship with the wearer. The Kukkia flowers frame the face and slowly open and close over time, like a caress. The felt and silk petals provide relative rigidity and integrate stitched Nitinol (a shape memory alloy) wire, which enables the slow, organic movement. Vilkas is a dress with a kinetic hemline on the right side that rises over a 30 second interval. It is constructed of heavy handmade felt and uses a very light yellow cotton element that contracts using hand-stitched Nitinol wires. When heated, the Nitinol easily pulls the cloth together and creates a wrinkled effect. The hemline is programmed to rise autonomously and not in response to any external or internal input. Materials: electronic fabrics, soft electronic circuits, specially designed circuit boards, Nitinol, mechanical actuators such as magnets.

Figure 12 :Kukkia and Vilkas (2005): Montreal, Canada by Joanna Berzowska, Marcelo Coelho, Hanna Soder

3. Electric Dreams (2007 – 2008):

To illuminate can mean to make something brighter and lighter, or it can mean to make something clearer or more understandable. Electric Dreams explores both of these meanings of illumination and makes the relationship between light and thought tangible and visible. The private and fleeting daydreams of the dreamer are transformed into a shifting and ephemeral

display of light and colour. EEG electrodes monitor the dreamer's brainwaves. This signal is read by a custom microcontroller circuit, which amplifies and interprets the electrical signals of the brain to control shifts of colour via red, green, and blue light emitting diodes embedded in a hand-moulded felt headdress. End-lit fibre optic cables transport the LED light through the headdress. This light and colour become a visible extension of fleeting thought processes. Side-lit fibre optics carrie these light impulses into the body of the garment to emphasize the distribution of the nervous system throughout the skin of the body. The design of the garment and headdress is based on the universal archetype of the tree of life.

Figure 13: Electric Dreams (2007 – 2008): London, UK & Vancouver, Canada with Jordan Benwick

4. Barking Mad (2005 – 2006):

Barking Mad was designed to help shy, stressed people deal with situations of urban overcrowding. Proximity sensors respond to infringements on personal space by emitting the sound of a barking dog through flat panel micro speakers in this ultimate urban survival coat. The sounds range in strength from a poodle's yap to the bark of a rott-weiler, depending on the level of infringement.
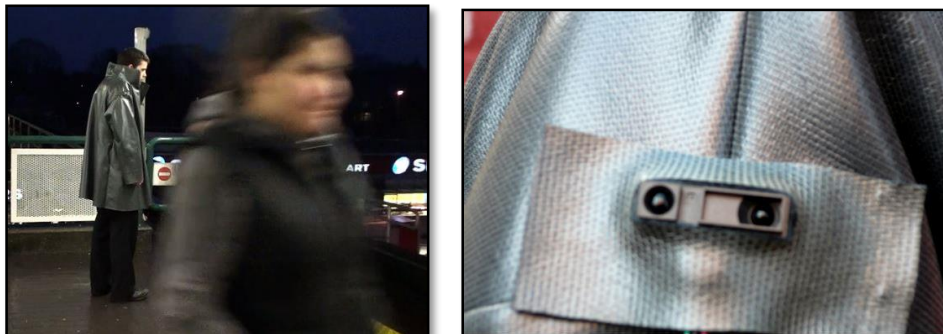

Figure 14: Barking Mad (2005 – 2006): London, UK with Jordan Benwick

5. Tornado Dress (2007):

The fabric of the Tornado Dress features a Mimaki print of a tornado and is embroidered with conductive threads and electronic components on the lining. Three small sensors are stitched to the outside of the dress and detect ambient light. Depending on the quantity of light that is detected, different flashing patterns are triggered in the dress.

Figure 15: Tornado Dress (2007) Montreal, Canada with Hesam Khoshneviss, Diane Morin, Meghan Price

6. Smoke Jacket:

 The jacket has a built-in pair of lungs on the front. As the wearer smokes, the lungs are filled up with exhaled cigarette smoke and begin to gradually darken over time. This project was a result of exploring reflective design as it is related to the body, behavioural choices, and information displays.

Figure 16: Smoking Jacket (Carswell, 2007)

7. SKIN: Dresses

PHILIPS has formulated two conceptual models to detach emotional changes of the wearer through the sensors in the cloth and to project them in visual forms on the cloth. The LEDs developed by Frisson light up and dim according to the degree of excitement of the wearer. This technology is more of an 'analogue' phenomenon; like emotion sensing and exploring technologies that are 'sensitive' rather than 'intelligent'.

Figure 17:SKIN: Dresses (PHILIPS Design Probe program, 2006)

8. Leeches (2004):

The Leech dress explores a different kind of parasitic metaphor. Instead of individual bodies acting as parasites by sucking the energy from other nearby bodies, the parasites become the very devices that we want to power. The dress itself provides power at several different points of contact. The Leeches dress, constructed with stitched conductive organza stripes, functions

as a soft, wearable, and reconfigurable power-distribution substrate for attaching individual silicone-coated electronic modules (the 'Leeches') that illuminate the dress. The Leeches can be attached in a variety of positions and configurations. They are held in place by magnetic snaps, which act both as mechanical and electrical connections. A single power module can be attached at the shoulder and can power up to ten Leeches. The red LEDs inside the Leeches suggest power-hungry creatures that, once attached, they suck or draw power (the metaphoric 'blood') from your body. The Leeches dress provides comment on the potential dangers of electromagnetic fields emanating from electronic garments.
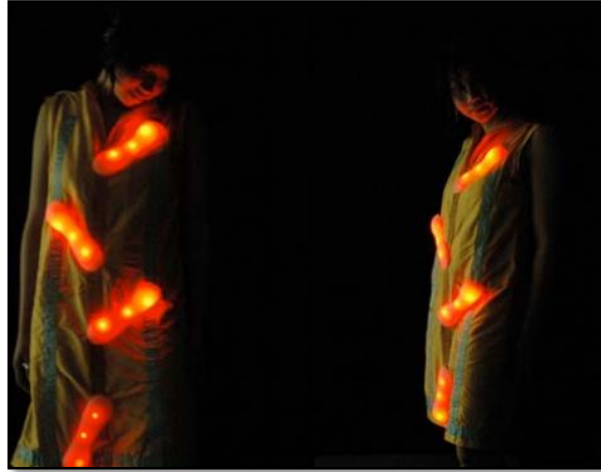

Figure 18: Leeches (2004): Montreal, Canada by Joanna Berzowska

9. Walking City (2007)

Walking City stands at the crossroads between fashion design and media arts. It focuses on the creation of three dresses, which react to their immediate environment. Ying inserted a pressure detector in the back of the dress, which retracts when it's touched. In the second dress, a sound detector senses the wearer's breath and activates the dress, which gracefully unfurls. The third dress is animated when approached. Each garment is connected to a pneumatic system that allows air to enter and exit; this system paces the garment's 'breathing' and analyses the wearer's movements and sounds the wearer produce. The garment's physical changes are achieved through fluctuations in the volume of air. Influenced by origami this project is also a tribute to Archigram, a group of British architects whose projects involved designing temporary, inflatable structures as modular residences. Materials: organdie, and various electronic components.

Figure 19: Walking City (2007) Montreal, Canada with Simon Laroche, Anne-Marie Durand La flamme, Isabelle Giroux, Annie Hébert

10. Living Pod (2007 – ongoing):

This project consists of two pneumatic and interactive coats that represent a pair of fraternal twins. While at first glance they appear identical, Garment B actually mimics the transformations of Garment A in sequential and fixed intervals. When an individual, dressed in Garment A, engages in a conversation with a third party, the frontal area of the garment is subjected to structural modifications generated by inconspicuous bursts of air within its numerous folds. Although there is no apparent reason for its sudden transformation, Garment B mimics these bursts a few moments later, tripling in size and becoming odiously flashy. Materials: nylon, non-woven interfacing

Figure 20: Living Pod (2007 – ongoing) Montreal, Canada with Simon Laroche, Anne-Marie Durand La flamme, Isabelle Giroux

Conclusion:

This research reviewed the integration between Fashion and Interaction Design through an analytical approach; it has involved art, design, fashion, electronic technology, psychology, humanity, etc. Therefore, inclusive literature reviews, systematic theoretical research, analysis research as well as a series of integrated applications are provided, the research clarified the relation between fashion design and interaction design starting from defining fashion and

highlighting the difference between fashion and clothing, representing the functional fashion and clothing, focusing on how could it be functional using technology, passing by wearable technology, electronic technology, techno fashion, intelligent clothing and smart fashion; down to applications of interactivity which are applied in different fields other than fashion and specifically the applications of interactivity in fashion. So this research could be a theoretical reference for researchers in the field of interactive fashion.

Recommendations:

1. Further investigation of electronic components, materials to be applied, and electronic components for Interactive Fashion applications.

2. To develop more sophisticated electronic components specifically for Interactive Fashion by cooperating with some technology companies.

3. Future research should focus on development of interactive models and systems.

4. Future Interactive Fashion should allow people to wear it in daily life, by facilitating daily activities and providing appealing appearance with intelligent interactive features.

References:

1.   Breward, Christopher. *Fashion:Oxford History ofArt.* Oxford New York: Oxford University Press, 2003.

2. Calderin, Jay. *Fashion Design Essentials* . The United States of America : Rockport Publishers, 2011.

3. Jefferson, Sheila. *Know All about Clothing Teohnology.* Delhi : Abhishek Publications , 2009 .

4. Kennedy, Alicia, Emily Banis Stoeher, and Jay Callderin. *Fashion Design, Referenced"A Visual Guide to the History, Language, & Practice of Fashion.* United Stated of America: Rockport Publishers, a member of Quayside Publishing Group, 2013.

5. Larsson, Jonas, Jose Teunissen, and Chiara Colombi. *Fashion-Tech, Education and Research Benchmarching Report.* Creative Commons - attribution - noDerivs CC BY-ND, 2018.

6. McCann, Jane, and David Bryson. *Smart Clothes and Wearable Technology.* Woodhead Publishing series in Textiles, 2009.

7. Moggridge, Bill. *Designing Interactions.* MIT Press, 2007.

8. Pan, Yue, David Roedl, Eli Blevis, and John C. Thomas. "Fashion Thinking:Fashion Practices and Sustainable Interaction Design." *International Journal of Design*, 2015: 53-66.

9. Preece, Jenny, Yvonne Rogers, and Helen Sharp. *INTERACTION DESIGN:beyond human–computer interaction.* Chichester, West Sussex, United Kingdom: John Wiley & Sons Ltd, 2015.

10. Saffer, Dan. *Designing for Interaction: Creating Innovative Application and Devices.* New Riders, 2006.

11. Seymour, Sabine. *Fashionable Technology:The Intersection of Design, Fashion, Science, and Technology.* Austria: SpringerWienNewYork, 2008.

12. Toussaint, Lianne. *Wearing Technology: When Fashion and technology entwine.* Canada, 2016.

13. Xia, Crease, Li Zuwang, and Frankie Ng. "Design of Interactive Fashion (IF) related to emotionrecognition based on detection of physiological signal data." *Journal of Textile Engineering & Fashion Technology*, 2017: 297–306.