

A Study on the Characteristics of Interactive Fashion Through User Participation

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Abstract

The purpose of this study is to examine a user-centered and interactivity-based user-participatory design that could be completed by users by helping them to better understand a diverse experience and be involved in a design process. The aspects of expression that were marked by direct user participation and subsequent interactivity in the areas of design, the arts and fashion were investigated to determine their characteristics. The kind of fashion that is characterized by interactivity is of significance in that it is variable according to the purpose of the users, it's possible to have sustained communication with them through their direct participation, and that the designer is consequently able to build a new, communicative relationship with the users as co-creators. This study found that the characteristics of interactivity through direct user participation are classified into four characteristics; One is playfulness, which offers a new experience and way to create fun and value. Another is variability, which is changeability of form; the third is the convergence of technology and function. Lastly, the fourth is virtuality. This is to embody images in virtual space.

Keywords : user participation, user experience, interactivity, variability, virtuality, changeability

1. Introduction

As consumers' various needs and satisfaction with products are demanding, the contemporary fashion is attracting users' with diverse experiences to participate. Even in the spheres

of art and design, there is a concept called 'user interface' design. This is being emphasized in which a producer and a user exchange mutual opinions and in which a user is directly participating.

In contemporary design, a new concept has

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emerged, where a user is being utilized beyond the concept called consumer. This is because considering user, usage environment, and relationship with user came to be gradually important according to being emphasized a concept such as person-centered, user interfaces, user experience, and interactivity unlike before when a designer had been subjective. A user is being slowly accepted as a subject of communication and participation called a customer and a joint creator beyond the recognition called a purchaser and a consumer.

Amidst this flow, the participatory design is being much attempted through a user's creation by inducing diverse experiences and participations of a wearer. There was significance of research in that the interactivity-based design in the user interfaces is available for a frequent change depending on a user's desired aim, is being continuously made an exchange with a user by leading to direct participation, and can be a part of the creative process through new relationship caused by it.

This study examined the aspects that are expressed design, which has interactivity through the experience-centered design caused by user participation, and researched into characteristics of fashion based on interactivity and aims to inquire into characteristics of interactivity fashion that makes an exchange with a user by which this allows a user to join and satisfy inner desire.

Furthermore, the aim of this study is to allow the user to continuously participate in the development stage, which then enhances the satisfaction within the users. This allows us to observe whether the user-participatory design has the potential to enhance the creativity within

the fashion design industry.

Research method used was analysing previous studies, researches and documentary data which were related to the study of user interactivity. These documents and informations were taken from the internet and the content was condensed down to clothes and shoe designs after the year 2000.

II. Theoretical consideration

1. A consideration of user participation

Victor Papanek, who researched into design for a human being, emphasized the importance of design participation in order to satisfy both the designer and a user, with saying that 'one method, which makes design and a person closer is by designing a product that certainly requires an end user's participation, and thus expressing it as 'end user' rather than 'consumer' will be better.'(Victor, 1983) As the user participatory design is the one that draws a direct exchange, it can be said to be a method that makes a designer and a person close.

Finn Kensing and Jeanette Blomberg explained that a reason of a user's participation in design process is because of a user's interest in a design outcome, too, as well as what a user's skill and experience have value, thereby being regarded a user's positive participation as a core element in value and success of a project(J. PARK, 2012). Goh Hyeon-jin(2008)'s research is being described the user interface design, which satisfies a user's demand, as 'fashion(H. Ko, 2008) that has socio-cultural significance, which points to a user-centered idea by which a consumer gives a special significance to the identity of a consumer

oneself, pursues scarcity value in identity of being differentiated from other person, and tries to experience the analogue-like sensitivity and fun by directly participating in the design process.

As for a meaning of user participatory design, first, it implies that a designer offers a situation to which a user can respond, and helps the expression in order to be completed visually. Second, it implies the design that is manifested individuality through action that a designer proceeds with making by modularizing so that a user can directly join. There is significance of being reborn as sole design, which is different, respectively, depending on a user.

2. A consideration of interactive design

As mutual action, namely, interactivity is a compound word of Inter, which has a meaning of 'mutual, two-way,' and Activity, which has a meaning of 'activity, action,' it is a noun that has a meaning dubbed 'two-way participation, conversational use.' As 'interaction' implies 'action of affecting and influencing each other,' it means that a change and a movement in each function mutually without being independent. Interaction can be said to be all

the actions that a human being does with a person or a thing in the given environment. A medium of providing such possibility can be said to be interactivity (M. Lombard, 2001)

Accordingly, interactivity can be known to pursue a communication method in the form of two-way, not one-way method, in the human-to-human interaction and the human-to-media relationship.

Lev Manovich, who is a media theorist, is asserting in his book titled (Language of New Media) that interactivity is not a characteristic peculiar to new media. According to him, all the arts have interactivity regardless of being classic or modern (H. Sim, 2006). It can be said that interaction in a different type from before came to be possibly created owing to a help of high technology and digital media.

A characteristic of interactivity these days has more important significance in allowing the existence of a viewer to positively participate in the process of creating a work, not to be fixed in the dimension of a passive work appreciator (H. Kim, 2005). Interaction between a designer and a user, which was shown in horizontal structure, is attracting viewer's participation through media escaping from the past method, and is inducing a change and an outcome of

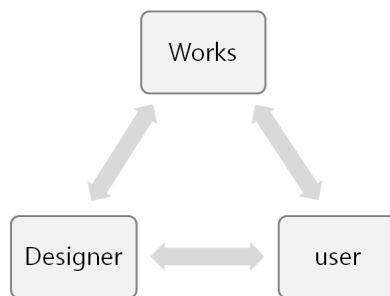


Figure 1. Interaction among Designer, Works and User

the process through action caused by it (Figure 1). For interaction, communication with a user needs to be first made. Communication is based on a viewer's participation (H. Kang, 2011). The interactive design is important to attract a viewer's direct experience.

Accordingly, this study aims to carry out a research with defining the design of having interactivity as the one based on all experiences such as a human being's action, thought, and emotion, and the design as the one of causing new experience between individuals.

III. Expression aspects of interactive design

1. Interactive design of art field

A viewer, who shows visual response in art, got higher in its weight as a part of a work, participates as a direct medium in a work of requiring various interactions, and was expanded a role as a correlational participant who proceeds with completing the work.. A work in Figure 1 was designed and produced with a digital method, but is a work that expressed the analogue-like sensitivity called the human action. As a method that a viewer oneself directly becomes an element of a work, the work is completed by depicting a user's movement and image through the movement of a mirror ball by using the mirror reflection effect.



Figure 2. Daniel Rozin's 'shiny Balls Mirror'. 2000

-www.smoothware.com/danny



Figure 3. The Hello Cube. 2012

-www.tate.org.uk

The Hello Cube is installed at the British Tate Modern Gallery, a work of art that was made in order to be possibly communicated through a viewer and a twitter (Figure 3). It is a work that a viewer of seeing this work can leave and share a record of the experience with interacting by diversely indicating an individual's participation through social media.

As the interactivity in art is what has difference from traditional art in which the relationship between a viewer and a work relies upon empathy, it is, so to speak, established by the positive participatory action regardless of being physical or psychological in the relationship between a work and a viewer. It is art that was expressed with a method that a work and a viewer coexist while a viewer's becoming a participant in the position of an appreciator leads to being collapsed a wall, which had existed between a work and a viewer (K. Lee, 2004). This can be said that a characteristic of interaction shown by art is what a work appreciator changes into a method of experiencing and completing in the position of seeing a work as a participant by employing technology.

Even in industrial product field, the importance of design based on a user can be known to get higher owing to the development in scientific technology. Robot can be said to be what is most typical among products (Y. Bae, 2006). that have Activity themselves with responding positively to a user's action, namely, that are available for communication between a user and a product. Paro was developed by AIST(National Institute of Advanced Industrial Science and Technology), a doll robot with psychotherapy for the first time in the world. It is a special-education robot that encourages a patient's energy and stabilizes blood pressure and pulse (Figure 4). As this robot in a shape of sea cat is a doll that helps interaction between a person and a product, it can be said to be innovative design available for mutual connection with a person. It is a product that plays a role of a friend requiring warm sympathy owing to having the function of remembering behavior that a user likes and of repeating this, and that gives a psychological treatment effect on improvement in dementia, single elderly, and a patient with aphasia. This can be mentioned to be available even for emotional interaction between a user and a product.

2. Interactive design in product field



Figure 4. Doll Paro. 2003
-<http://www.parorobots.com>



Figure 5. Stina Wine Package. 2012

–<http://www.bruketa-zinic.com>

Stina Wine Label is the wine label design that was produced by OM(Bruleta & Zinic OM), which is a representative studio in Croatia, it is wine that has just text of having been intagliated on the pure-white paper (Figure 5). As a method of completing design by which a user displays creativity with the wine of having flowed down to label attached to a bottle, it offers the experience of allowing a person of drinking wine to complete the product design by directly drawing a picture.

Product based on interactivity is emphasized the planning-based aspect like idea, information or resource. That is because a work came to be stressed the process-based aspect that grows with continuously responding to a reader or a viewer in terms of the interactive intervention of readers or viewers, not what is completed at the moment of leaving an artist's hands (J. Park, 2004). The product design, which applies this interactivity, has great significance available for feeling a pleasure of medium based on experience through direct participation.

3. Interactive design in space field

The contemporary architectural space is now

changing into the interactive space of moving and changing according to the surrounding environment and a user's need beyond a structure (Y. Bae, 2006).. Interaction between space and a human being is being made while image is produced through a change or movement of sound or light within space and while space is changing depending on a person's movement and direction.

In addition, a work that is functioned by light responding according to a visitor's route and position, by using object that is adjusted by the brightness in light (Figure 6). A video camera changes space depending on a user's movement while being followed the color pattern according to a user's movement by combining a visitor's route and position (Figure 7). On the other hand, a work with interaction that allows a user to change the surrounding environment due to being shown on the outer layer of a building according to a shape that a curtain wall of having been made with stainless goes by (Figure 8). A role to decorate an outer wall of a building while being shown with light, owing to users' action with responding given stepping on the area designated by a user on the floor surface with the screen pattern (Figure 9).

The elements, which are certainly necessary for the interactive space, are those of having been added a temporal element for the action that a viewer joins with becoming a participant, the space necessary for the action, and additionally a playing element that a viewer can join with feeling fun (H. Kang, 2011).

IV. A consideration of interactive design shown in fashion

1. Morphometric expression aspects of interactive design in fashion

1) Customize design

'Participatory marketing,' which draws a

customer's participation, is being vitalized as a strategy for coping with consumers' quickly changing trend. As the Customize Design is a system close to DIY that makes a product according to a customer's demand, beyond a meaning as saying of 'designing after receiving an order,' it is a method in which a user directly takes part. This is being applied to diverse fields due to a change in consumers' purchasing form that own individuality gets clearer recently, and has a merit as saying of being able to express individuality and feel satisfaction as just own thing in the world because of making a product in line with customer's demand from the stage of beginning production. Adidas, which is sports brand, is available for selecting depending on each preference by choosing colors in the uppers, lining, and string of a product thanks to the customize service available for directly



Figure 6. Dune 4.0. 2007
-www.studioroosegaarde.net



Figure 7. Target interactive breezeway. 2005
- www.electroland.net



Figure 8. Podium Light Wall. 2006
-www.kinecity.com

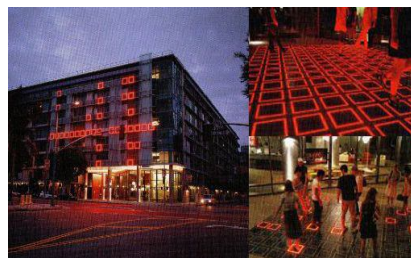


Figure 9. Enter Active. 2005
-www.enteractive.se



Figure 10. Miadidas. 2015
- <http://shop.adidas.co.kr>



Figure 11. Mongolian shoe BBQ. 2009
- <http://www.freshnessmag.com>



Figure 12. Renewable Clothing. 2010
- <http://fernandobrizio.com>



Figure 13. Berber Soepboer One piece. 2010
- www.berbersoepboer.nl

designing shoes and clothes only for me that are just single in the world (Figure 10).

It can be utilized as a good strategy available for having the experience, which directly produces the design of being desired to be worn in a consumer's position, and for publicizing young and free image of brand in a corporate position, and for grasping a consumer's tendency of preferring design.

Moreover, even consumers, who are not professional in many casual brands, are promoting differentiation of brand by applying items available for designing easily and for giving a change to mass-production system. 'Mongolian Shoe BBQ' that a consumer can directly select color and material and express own identity is also introducing a system

available for making own product (Figure 11). A dress of making a new pattern by which the ink in a pen is literally absorbed in a cloth due to being put a pen, it is perfectly disappeared color given washing anytime when a user wants and is available for dyeing again with a desired method (Figure 12). Hence, design in a new pattern according to a user's participation is interesting. Berber Soepboer designed a clothing where a user can directly put a desired color in clothes and can directly put color in a desired position (Figure 13). This is a work of completing with a different image according to a wearer's liking. Also, it is design that gives a user a pleasure and a fun of proceeding with completing because of being available for newly assembling by mutually disassembling each

dress through using buttons in more than about 100 pieces.

The customize design allows a consumer to experience a fun coming from creating own product and the handcraft-based sensitivity through creatively designing or directly making a product, thereby approaching young consumers with strong individuality more attractively.

2) Multi-functional design

Multi-functional clothing has rationally changed with satisfying a consumer's demand according to a change in the times. Consumers are requiring a clothing in complex function that performs specific function even with being decorative and able to well express an individual's

taste rather than a primary clothing. Fashion in the future relies upon which function can be offered for a consumer. Functionality and comfort are also provided with diverse silhouettes and details in order to precisely make clothes suitable for the body. The necessity of multi-functional fashion is growing more and more that is applicable to the future environment, which is changing with being converged a functionally-advanced material, scientific technology, and creative design (M. Kim, 2010).

'Baguette' T-shirt is the blended fabric of cotton and nylon, it can be said to be clothes that handled the process that a cylindrical fabric, which is lengthily weaved with flexible knitted goods, is selected by one-to-one



Figure 14. Baguette. 2001
-www.isseymiyake.com



Figure 15. The Transformable. 2001
-www.cpccompany.com



Figure 16. A-POC MAKING. 2001
-www.isseymiyake.com

meeting with a user and that the basic cutting is made, which can make it available for movement in a human body, and the process that a user oneself wears with deciding and adjusting neckline or sleeve length (Figure 14). A-POC becomes not only an object available for taking a rest with sitting or lying down, but also an object available for playing together (Figure 15). A product in A-POC appears as a wearable clothing and simultaneously as 'existence of playing together.' It is design that makes space in a concept of being laid, sit, and leant by a user with containing even a function of a chair. A work that is available for changing into Parka, Air-mattress, Tent, Armchair, Jacket in a polyurethane material and that has the waterproof function and the wind-breaking function (Figure 16). It is available for a change into Air-mattress by pumping air. In addition, it is available for a change into tent that has air-mattress by using thin nylon mesh attached to the inside of Parka and a light frame, which became carbon. Accordingly, it can be used as the sleeping space by transforming it into tent and mattress when night falls after moving with wearing it as parka in the daytime. It can be changed into armchair given taking a rest, thereby being a good case of multi-functional design that can be used with diverse functions according to an environmental change caused by mobility.

In this way, the contemporary fashion is being shown as multi-functional design available for performing many functions with being combined various technologies and creative arts such as an advanced material and a designer's creative idea. Multi-functionality gives novelty according to the formative diversification and the functional change, thereby having significance as saying of being able to satisfy the emotional need of

fashion. Hence, multi-functionality, which was shown in contemporary fashion, will be accepted as an important element that meets a consumer's demand in future fashion down the road.

3) Design through an exchange with system

Development in digital technology made it available for the compound of function and technology, which had seemed to be likely impossible. The development in digital technology is allowing designers to be devising system-based design and realizing it in reality. This is united and compounded, thereby being a sensor that responds to emotion or phenomenon of a human body. The design, which shows an exchange with system of being equipped in clothing, came to appear.

With focusing on aesthetic value that integrated experimental attitude with the application of modern technology into future life, an emotional need in modern people for novelty and change is satisfied by directly implementing high-tech environment on the human body and sympathizing with the human body (H. Na, 2008).

A skin dress in Philips that changes the clothing form and emitting light according to human emotion (Figure 17). It made a wearer's current sensitivity appear immediately on the surface of a clothing by attaching a sensor, which responds to a wearer's sensibility, to the elaborate twofold bubble lining. Installing 18 small projectors, which sense a person and an emotional excitement level, in the inside of clothing leads to affecting the surface of clothing, resulting in being shown in a clothing as if a person's expression changes (S. Lee, 2010). The smart second skin by Jenny Tilloston



Figure 17. Skin Dress in Philips. 2006
-www.design.philips.com



Figure 18. Smart second skin. 2008
-www.ecouterre.com



Figure 19. Philips Lumalive, Light-Emitting Textiles. 2007
-http://www.talk2myshirt.com/blog/archives/283

blows out fragrance by perceiving a wearer's emotion and responds with having scent depending on a wearer's atmosphere (Figure 18). This dress can deliver message with fragrance on what about a wearer's mood state, thereby being a shirt available for communication. Accordingly, it is the design of offering service that allows a counterpart to be capable of coping with a situation by grasping a wearer's condition of feeling. Also, it may ease and cure a wearer's condition by stimulating the sense of smell. Philips Lumalive inserted LED special thread into fabric, thereby having made the moving image available for appearing on T-shirt (Figure 19). It is a work that made it available for simple communication through

clothing. As the design that draws a direct exchange with a user through the changing process according to a user's participation in this way, it can be said to be design that makes a designer and a person close.

The design, which was combined technology in this way, is allowing clothing to play a role of an individual that exchanges with and expresses sensitivity by using high technology of responding to a human being's action and feeling.

2. Characteristics of interactive design shown in fashion

In terms of interactivity that was shown in

fashion, the color, image and morphological change in clothing depending on a morphological change or emotion based on a wearer's action or on a change in the surrounding environment were shown to be a method that allows a wearer to intervene positively in fashion and to express opinion unlike the traditional consumption habit that purchases clothes in line with trend with simply wearing the made clothes. This study analyzed by dividing the characteristics of interactivity, which was shown in contemporary fashion, into the playfulness of the experience and the variability of the form from the social-cultural aspect, and into the convergence in realistic environment from the scientific-technology aspect.

1) Playfulness of the experience

Modern people, who live in the society of being complex and various, came to seek a pleasure continuously in every aspect of the tired life. This playfulness can be mentioned to be an important flow of contemporary fashion. The playfulness in fashion is expressed humor individually and pleasantly and is developed with the amusing characteristic of creating novelty



Figure 20. Ek Thongprasert. 2010
-Daab, p.46

escaping from a traditionally aesthetic and functional part. The pleasurable experience the users obtain from fashion such as the dress that changes the silhouette depending on the wearer (Figure 20), as well as the Marni's t-shirts for the children's imaginary world 2013 charity project which includes kids to participate as designers in the development stage providing a fun experience (Figure 21).

The playfulness through interaction not only becomes space of experiencing the amusing experience inside the space called clothing, but also adds a play-like fun and offers a pleasure by inducing participation. Also, a consumer designs or makes a product creatively, thereby coming to experience a pleasure coming from creating own product. Thus, it is approaching consumers with strong individuality a little more attractively. The design, which has this playfulness of creating value of a fun through interaction caused by a wearer's new experience, is being recognized as a new attempt in fashion along with functional efficiency.

2) Variability of the Form

Fashion design through interaction is available



Figure 21. Marni's T-shirts. 2013
-www.Marni.com

for the formative diversification according to variability and gives novelty due to it. As the variability is what completes by applying a wearer's sensitivity and idea, it has a characteristic of being decided diverse forms and meanings in which a room for a morphological change is made by a user. The characteristic that variability has can be said to satisfy a consumers' expressional desire and to correspond to an emotional need. Also, the morphological transformation, which is determined by a user's direct manipulation, can be created variously. We can see that the jumper turning into a sleeping bag (Figure 22). This shows both versatility and its ability to adapt instantly depending on the users situation and demand. In Italy, a project team designed and produced a bag called "unfold a beautiful intimacy" which has the capability to embrace the user and its partner which is a new concept and display in the fashion design industry (Figure 23). As we can see in these 2 products, this may lead to satisfying the psychological and aesthetic needs. This change leads to having significance available for living up to the emotional need for newness and change.

3) Virtuality of the realistic environment



Figure 22. Sleeping Coat. 2007
-www.likecool.com/Sleeping_Coat

The contemporary fashion in the scientific aspect made it available for the convergence of function and technique owing to the development in digital technology, thereby having allowed the design of having multi-function with being integrated and compounded to appear (M. Kim, 2010). A meaning of virtuality in fashion is being expanded even into the smart service function of technological function in a clothing with a wearable computer. The influence of digital culture, which came to be available for connecting the virtual environment and the realistically physical environment at the same time owing to the development in digital technology is exercising the cultural and social influence (H. Kang, 2008) Designer Wei-chieh shih created laser suit using 200 laser diodes attached to a special jacket designed (Figure. 24) through communication by having a medium as virtual space called the inside of screen, which was made with computer graphic image in fashion design. Virtuality is shown with the modularization of a system in design that expresses a desire for escaping from reality in the virtual reality through the network connection on internet or web site. The virtuality, which was indicated in interaction, is a new form of visual



Figure 23. Unfold a beautiful intimacy. 2009
-www.veasyble.com

experience and allows a user to experience virtual reality by changing into active attitude.

The virtual environment with the integration of fashion and technology is making a fashion user

have direct experience and express an interactive exchange through the experience of transcending time and space in reality and virtuality.

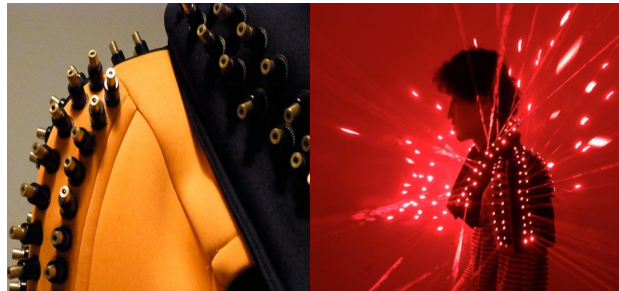


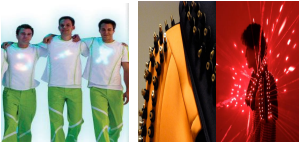


Figure 24. Laser Jacket. 2007
-<http://gizmodo.com/5530170>

Table 1. Characteristics of Interactivity Shown in Fashion

	Aspects	Characteristics	expression	Contents
Interactive design Fashion	Socio-cultural aspect	Playfulness of the experience	The creation of value in a pleasure through interaction between a wearer and a clothing. The amusing experience caused by new experience.	
		Variability of the form	A pursuit for convenience with a morphological transformation according to manipulation. The variability of a form and a meaning decided by a user.	
	Scientific-technological aspect	Virtuality of the realistic environment	The implementation of image beyond physical phenomenon that is possible in reality. The 'escape from daily life' with the expression of a desire for emerging from reality to virtual space	

VI. Conclusion

The fashion in the 21st century is being shown many attempts of attracting a user's experience and participation along with a flow of design such as person-centered, user interfaces, user experience, and interactivity.

As the participatory fashion design from a user's position is a pleasure coming from direct participation and experience, it can be considered to be linked to a play. This is shown with action that is expressed voluntarily and actively. In modern times, a user is being changed into the main agent of design. There is significance in that the experience through participation in fashion design allows a consumer to design or make a product creatively, thereby creating own product, resulting in approaching young consumers more attractively.

Based on this, the expression aspects of interactivity, which are shown in fashion, can be classified into customize design, multi-functional design, and design through an exchange with a system.

The customize design is being variously indicated the design in DIY method by which a customer designs or makes a product creatively. This seems to be a strategy for active participation by consumers who pursue a creative fun and individuality.

The multi-functional design has significance available for satisfying the emotional need for fashion because of being changed function through a user's participation and of giving 'novelty' with being combined creative idea, diverse technologies and arts.

The design through an exchange with a system can be said to be design that draws a direct exchange with a user through a system of

being equipped in clothing with the combination of digital technology and function.

According to this, this study considered the characteristics of interactivity fashion as follows on the basis of the user participation.

First, the playfulness of the experience is being shown with the amusing experience through creating value of a fun and having new experience by the interaction between a wearer and a clothing.

Second, the variability of the form is having changeability of a form and a meaning decided by a user with pursuing convenience through a morphological transformation according to manipulation.

Third, the virtuality of the realistic environment is containing a meaning of the 'escape from daily life' with the expression of a desire for emerging from reality to virtual space with implementing image beyond physical phenomenon that is possible in reality.

The interactivity fashion, which has the above characteristics, will be accepted as an important element that meets a consumer's demand in future fashion down the road.

A research of a work based on interactivity, which makes a mutual exchange of satisfying an internal desire caused by a user's active participation, is expected to lead to a follow-up research by directly inquiring into and developing fashion design that leads new communication and participation through this.

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