The Study of Mapping Coordination S/W Based on the Internet Shopping Mall for Silver Apparel[+]

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Abstract

The purpose of this study is to develop the effective customized elderly fashion marketing process based on the web site, where older customer will be able to choose various fabrics and to try them out. This aims to establish new prototype of internet shopping mall for customized elderly fashion clothing.

In this study, new method of product presentation on the online shopping mall is proposed to offer product information through 3D virtual reality. With the online shopping mall(SATC Mall) as a showcase, we presented virtual mapping system so that it enable the customers to select the fabrics and to see exactly how chosen fabric will look when applied to image of clothing. As an initial test of the application of simulation to measure 3D visualization of product, mapping software Vision Easy Map Pro Version 6.0(NedGraphics) Vision Easy Map Viewer Version 5.0(NedGraphics) were chosen and applied. By using this mapping system, the fabric change of the apparel product could be made on the internet shopping web site. However, this approach has been successful applied for presenting and customizing garment products. Future research will focus on the integration of mapping coordination into SATC Mall.

Key Words : Mapping Coordination, Silver Apparel, Virtual Reality, 3D Simulation

I. Introduction

The apparel industry is facing a need to change its paradigm so as to combine itself with the IT industry for the purpose of reducing production expenses, improving efficiency, rationalizing management, diversifying sales channels and, furthermore, and substituting the conventional ways with more effective new ones.

Also in the textile clothing industry, efforts are being made to combine line IT with intensive research at each step including production planning system, production system and B2C e-commerce and to check traditional old-fashioned information flows so as to get rid of obstacles to management.[1] Of these, the most noticeable is the development of 3D simulation visualization of apparel products for B2C e-commerce, in which

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individually custom-made products and commodities are mutually and interactively presented on internet shopping mall web sites with a view to mainly satisfying the desires of consumers.

The market of general online shopping malls is expanding as more consumers are purchasing their clothes from the malls; however, internet fashion shopping malls are providing their consumers with commodity information in a one-sided manner, which does not meet the expectations and desires of the consumers. In order to solve these problems, in recent times, research are actively conducted into an individually custom-made type clothes production system and a virtual wearing system is introduced so that consumers may virtually wear the apparel they have selected from online shopping malls before purchasing.[2]

This research was started from a need for the senior apparel industry to set up its future-oriented directions in order to meet the paradigms of a new age as the apparel industry strives to introduce effective systems into all its fields of production, sales and distribution for the purpose of securing its competitiveness. The increasing number of the aged and silver consumers are making diverse needs for senior apparel[3] and requiring the market to supply them with more kinds of but small quantities of products, compared to other age groups.[4] Moreover, sales strategies need be changed to adopt diverse sales channels such as internet fashion shopping malls which are rapidly growing due to the development of web communications in the new age. And also it is easy to anticipate that elderly people will also use e-commerce more and more for the future.[5]

Custom-made type clothes for silver generations are very urgently needed in the present age where peoples' physical shapes are changing, ready-made clothes have a poor sizing system,[6] and people favor various designs and where

people's average life span has been enlarged and so an aging society will come very soon. It implies that the current main users of internet shopping malls will be turned soon into silver generation users of the malls.[7] At this juncture, this research aims to investigate and analyze the present situation of the existing internet fashion shopping malls and the present condition of the research an development of a virtual wearing system. Also consider and suggest basic data for the development and application of prototypes of silver apparel internet shopping malls including how to present improved clothing commodities, with a view to reducing the danger concerning internet purchase of silver apparel.

The following are detailed research methods to utilize and pragmatize a real-time 3D mapping coordination system which is a content to encourage customers to interactively participate in internet shopping malls for senior apparel.

1) An experts panel develops and research on a real-time virtual reality system in the environment of internet shopping malls so as to come up with interactive and effective methods to present silver apparel commodities in a practical content which will allure more customers to purchase.

2) On the basis of the existing internet senior apparel shopping malls, the panel composes and proposes webpage design models for the development of prototypes of such internet shopping malls as will be able to realize 3D mapping coordination simulations.

3) 3D mapping simulation experiments are made and analyzed in order to determine the applicability of the developed design commodities to the senior apparel internet shopping malls by using relevant software programs after web-based mapping coordination S/W is chosen as the panel develops and research on the said virtual reality system.

II. Theoretical Review

1. Present situation of virtual reality markets

Virtual reality (VR) is an interactive 3-dimension environment produced via computers. It was developed through the integration of research on up-to-date technologies such as medicine, human engineering and computer engineering in order to reproduce the five senses of mankind. It began to be introduced along with multimedia several years ago and has been applied to e-commercial trade, shopping mall, real estate, interior, sightseeing, tourism, education, and PR material, etc. as its technologies have developed.[8)9)] The scale of the VR market is rapidly growing and its future prospect is very bright since online 2-dimensional images are changed into 3-dimensional ones so that the images may have a cubic effect and seem as an actual existence and that the information about the products may be better communicated to consumers, which directly contributes to an increase in the sales volume.[10)]

The introduction of virtual reality into the fashion industry is delayed compared to other fields because there need be such technologies as can demonstrate the actual feeing of fabrics and because of an economic problem or the expenses to be incurred. By the way, a small number of companies have introduced new selling system in which consumers need not personally visit actual shops but internet shopping malls where they can select the costumes they want and virtually wear them. Through such a system, consumers may visit internet shopping malls and completely dress their virtual models by clicking online the kind of shape, skin tone, hair style, etc. they desire and then, virtually wear the models with the ready-made products they prefer. You may visit the site (www.stylezone.com) and download the program called Style Zone where you can freely change the hair style, face look, body type, upper part of the body, arms, legs, countenance, and skin tone of your models as you please; choose your costumes; and real-time and virtually dress the models. Then, you will have more interest in a virtual wearing system since only a subscriber to the said system can participate in the online fashion community.

2. Virtual wearing system in Internet Shopping Mall

In Korea, an increasing number of online shopping malls are adopting web 3D solutions in order to provide their consumers with virtual shopping services. However, these services allow the visitors to simply browse the commodities displayed in virtual shops. In contrast, virtual wearing services were provided from web-sites such as www. fashionpia.com for Cheil Industries Inc., www.igns.co.kr for GNS 2001 of Ipse Co., Ltd., www.samtechinc.co.kr for SamN Tech Inc., and www.lavata.net for TwoNC Co. Ltd. from which the visitors could virtually wear fashion commodities. These services are not in operation any more probably due to technological and/or economical problems. Nevertheless, in 2006, the i-Fashion apparel Technology Center officially launched the industry, academia, research institutes and government cooperation project for innovating the textiles and fashion industry. The project aims to develop for clothes producers and distribute to clothes producers from 2007 the virtual reality technologies, with which the consumers can save their own body images scanned from a shop and reflect their virtual wearing on a virtual mirror. Now, related research are being conducted actively <Figure 1>.

<Figure 1> i-Fashion Apparel Technology Center
The Korean Agency for Technology and Standard,
academic research results report, 2005.

<Figure 2> KAIST Virtual Reality Research Institute
http://vr.kaist.ac.kr

In addition, as you see in <Figure 2>, many domestic research institutes are steadily conducting research on online virtual wearing systems. In other words, research and investments are being made for the purpose of improving 2-dimensional web images into 3-dimensional ones; simplifying the whole processes of order, production and sales so as to change the structure of the fashion industry; and reducing production costs so that the characteristics of apparel products may be communicated to the consumers more concretely and interestingly as the sales volume of internet shopping malls is quickly growing. In the case of EURATEX (The European Apparel and Textile Organization),[11)12)] the industry, academia, research institutes and government jointly set out the e-tailor project in 2000 and completed i-fashion in 2002 as part of their efforts to turn the stagnant fashion industry into a high-value added industry in Europe.

3. Trends of virtual wearing-related technology research

A report of research on virtual presentation and customization of commodities through internet shopping malls analyzes the strengths and weaknesses of 2D image-based methods and 3D model-based[13)] methods to present appropriate commodities to virtual shopping mall web sites where VR is combined with e-commerce and the report also suggests what to be improved.[14)] Suggested methods are classified differently according to the characteristics of commodities. 3D model methods are suggested for electronic products like mobile phones whose functions need be demonstrated more concretely; it is suggested that 2D images-based methods are better for costume match; and interactive presentation is also conducted so that the users may participate in product designs after the existing methods are improved.

Investigations into the trends of related research find that efforts are made to set up interactive and

interchangeable systems and to develop a more effective system for each process of the research when consumers purchase their costumes from online shopping malls on overall connected and combined customization production lines. What is to be ultimately developed include 3D human body scan, 3D CAD, 2D pattern connected with 3D CAD, connection with production process lines, and connection & combination with virtual wearing and order production lines from online shopping malls. The latest trend of the research is to develop a system in which all the process lines are connected and combined.[15] The results of such research and development have not yet been commercialized, but it is expected that internet fashion shopping malls will develop in such directions as to meet the demands from consumers as endeavors are made to partially introduce and apply the results to each field of the clothing industry.

III. Research Method

1. Research Method to Develop Prototypes

In order to develop prototypes, experts are divided according to their specialization fields and an appropriate panel is composed for each of the fields. The specialization fields of the experts are broadly grouped into a silver apparel design sphere, DB construction sphere for selected design products, 3D coordination sphere on the web, and site modeling sphere from internet shopping malls. The joint research team of the industry, academia, and research institutes is made up of a total of eight members including one researcher from KAIST who is the developer of 3D cloth simulation software, one designer from KAIST who is in charge of the patterns of the 3D cloth simulation software program, three software

related technicians from Isis Tech Co., Ltd. which is an IT software supplier, one person from Management & Technology Co., Ltd. which is an internet shopping malls related firm, and two designers from the SATC (Silver Apparel Practical Technology Center).

2. Research Method for 3D Mapping Simulations

The design products chosen for experiments on are 22 items in all including a kind of coat selling from SATC Mall, three kinds of T-shirts, three kinds of jumper, four kinds of pants, 10 kinds of suit, and one kind of training suit. The experts to evaluate the dressing model are 20 design professors, part-time instructors and doctoral course students including a panel of eight experts. The model (aged 71) for internet shopping malls was selected by the team of 20 experts, who evaluated the photos taken of a total of seven model candidates including a 55-year-old woman applicant who was a member of Sujeong Welfare Center in Seongnam City and a 71-year-old woman applicant from Seoul City, on January 26, 2007 when they were clothed in the costume of SATC-developed design silver apparel formal dress two-piece size 66. Pictures were taken from the front, sides and back of the selected model, who was dressed in about 20 commodities to be launched on the market. The pictures were first taken on January 29, 2007 and then on February 9, 2007 in order to improve bad images.

IV. Results & Discussion

1. Results of panel investigations into the development of prototypes

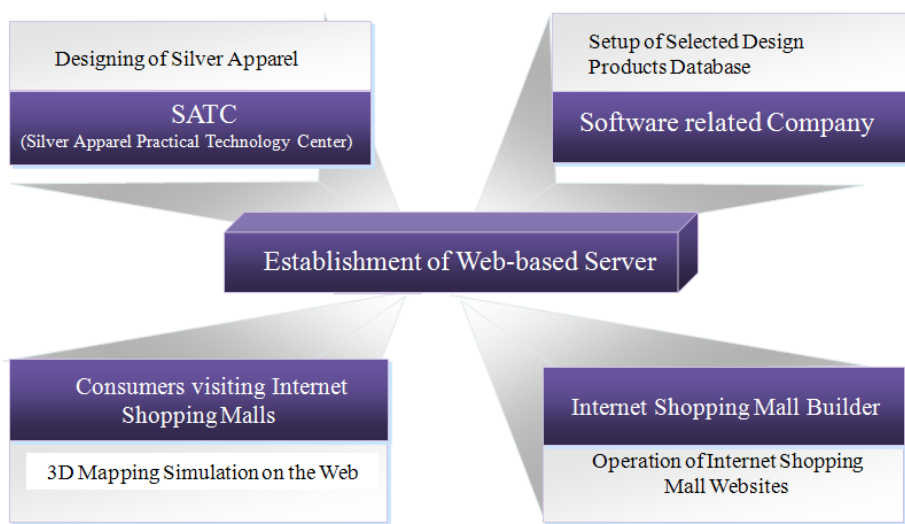1) 1st investigation by the experts panel

Experts in each field are invited to be counseled about the reproduction of web-based real-time 3D simulation commodities from silver apparel online shopping malls. The experts invited for this research are largely divided into silver apparel design sphere, DB construction sphere for selected design products, 3D coordination sphere on the web, and site modeling sphere for internet shopping malls. The experts were summoned for their 1st meeting and investigation, whose results are shown in <Figure 3>.

The findings of the investigation are as follows. First, 3D cloth simulations for internet shopping malls can be reproduced through the developed programs, but the operation of the simulations need be continuously managed by means of IT solution suppliers' server application programs. Second, there are problems concerning the operation of time for reproducing 3D simulation costumes from internet shopping malls by using developed 3D cloth simulation software programs. Third, it is necessary to suggest a mapping

simulation program for materializing 3D mapping simulations on the web, so as to develop a real-time coordination tool with which the pictures of not virtual wearing models but real models are taken and then, the consumers freely change their material sphere for the simulations on the web. With this program, the existing design products developed by SATC can be utilized for online internet shopping malls to produce the appropriate products through using the material ordered by consumers from among developed patterns.

2) 2nd, 3rd, 4th and 5th investigations by the experts panel

The experts were called for 2nd through 5th meetings to discuss the establishment of spheres in each field and the sharing of their roles, and agreements were derived from the meetings <Table 1>. The meetings, formed for considering the different opinions raised from each sphere of specialization during the 1st experts panel meeting, requested the SATC to take care of spheres such

<Figure 3> Configuration of the system based on the results of
the 1st investigation made by the experts panel

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as selecting designs, choosing materials, taking pictures of silver models worn in appropriate dresses, and internet shopping mall web pages design modeling. And also a decision was made to request internet shopping mall webpage producers to produce internet home pages and to operate web servers & internet shopping mall web servers for the purpose of online realization of 3D mapping coordination. Next, it was determined that prototypes should be produced through a joint research system of the industry, academia and research institutes after software-related IT firms would be selected as participating institutions to construct 3D mapping simulation software application DB for selected silver apparel design products.

The five times of meetings and discussions of the experts have compared & analyzed and decided on the IT firms or the producers of such web-based software as could real-time present interactive apparel commodities for, specifically, SATC Mall, so as to supply consumers with a concept of individually custom-made clothes and to utilize already developed design commodities. It is for the purpose that consumers can real-time select wearing model images for the design products suggested on the web and then choose other suggested materials and map them over the original images, in order that the consumers may see the virtual images of the wearing models dressed in the products made with the other materials. In short, it is a 3D mapping coordination method in which consumers will make an order after they personally coordinate and map on the web.

2. Configuration of 3D mapping coordination software systems

Many kinds of software and tools are needed to set up the internet shopping malls from which 3D simulations can be conducted so that consumers may visit the shopping malls and select a design they want and appoint the materials and colors they desire and then clothe cyber models with the dress. Such software and tools can be also used to dress real models with a product selected based on comprehensive opinions of the panel experts, which is silver apparel of a design developed through the Ned Graphics System (BLUE FOX Ned Graphics, Netherlands), and then to conduct 3D mapping after scanning the photos of the models or choosing the images of photographed fabrics. The existing various design CAD programs have such functions as to map some materials over 2D images and convert a designated sphere into the images of desired materials. However, this research chooses the Ned Graphics System equipped with the Easy Map SDK program which can set up spheres for the Easy Map Creator Pro program, do grid function-based works, and realize the simulation function of Easy Map Viewer on the web, since it requires such a program as has a function of real-time online mapping simulations.

First, a mapping coordination corner is designed and set up on the main page of the existing internet shopping malls so as to attract the attention and interest of the visitors to the webpage of SATC Mall so that they may start from the silver apparel selling web site and go down to lower menus. Second, on the one-depth page where are arranged the photo images of 22 apparel commodities, the navigation sphere is designed on the left so as help the visitors move to the commodity groups of upper garment, lower garment, two-piece, and training suit. Third, the two-depth page modeling comprises a total of four pages such as a page for such upper garments as coat, jumper and T-shirts; a page for

such lower garments as pants and skirts; a page for two-pieces; and a page for training suits. Fourth, on the three-depth page or the 3D mapping coordination simulation page, images can be navigated by clicking the images apportioned to the two-depth page or one-depth page in the above.

3. Results of 3D mapping simulations

In order to decide on the applicability of the products to exclusive shopping malls for silver apparel, photo images were taken of the selected models from the front, sides and back after the models were worn with a total of 22 kinds of design products. Applying such a system resulted in a satisfactory finding that the actual qualities of apparel materials were reproduced as if the models were dressed in real design commodities from 3D mapping simulations. 84 items of upper garment, 64 items of lower garment, and 117 items of suit were reproduced, from the mapping simulations over the front, sides and back of the original images,

4 kinds of other scanned materials for each of 7 kinds of upper garment designs including one kind of coat, one kind of T-shirts, and three kinds of jumper; 4 kinds of lower garment designs or pants; and 10 kinds of suit designs. Among them <Table 2> presents the results of 3D mapping simulations of suits representatively.

Mapping simulations are easily conducted by simply clicking the other materials saved on the data file of the Easy Map Viewer program (BLUE FOX Ned Graphics, Netherlands) after grid work for each design and mapping work, both of which are basic works, are finished with the Easy Map Creator Pro program. The following are the strengths of Easy Map Creator Pro and Easy Map Viewer, which are the web development tools chosen to make interactive mapping coordination available for SATC Mall which is an internet shopping mall.

First, mapping other materials over the objects whose 3D images are highlighted like costumes resulted in such clear images that they seemed as if they were the costumes produced with other

<Table 1> Results of the 2nd~5th investigations made by the experts panel

Roles shared among the researchers	Details of sphere sharing
Choosing and photographing the mapping commodities and the models	SATC should select the models to be dressed in developed design commodities, take pictures of their front, side and back images, and then provide various materials along with detailed design information to software-related firms.
Design modeling for internet shopping mall web-pages	SATC should set up webpage design modeling to add a 3D mapping coordination menu to the existing internet shopping malls and request homepage producers to produce the modeling.
Composing web-based 3D mapping simulation software	Software-related firms should request homepage producers to produce web solutions for the operation of web servers, for the purpose of online operation of web-based 3D mapping simulation software.
Constructing 3D mapping model simulation DB (S/W application) for selected designs	Software-related firms should complete basic working for 3D mapping simulations by using the file of scanned images of the commodities and materials developed and provided by SATC and request homepage producers to online embody the simulations by means of Easy Map SDK.

<Table 2> Results of 3D mapping simulations of suits

Image	Results of 3D mapping simulations of suits			
	case 1	case 2	case 3	case 4

materials. Second, it is possible that the images of the models can be taken from the front, sides, back or any other desired direction. Third, SATC Mall can utilize developed design products in many ways since various materials can be infinitely applied to the products now that their grid and sphere are set up.

The above-mentioned experiments find that this research is very much suitable to the purposes of supplying individually custom-made clothes and developing such contents as will encourage consumers' participation since the system developed in this research suggests such a method as real-time presents commodities to internet shopping malls with a focus on already researched, developed and produced design products, unlike the domestic and foreign internet shopping malls which utilize virtual wearing

software solutions and provide only images of the commodities to an interactive virtual wearing system without having produced commodities.

The mapping simulations for 22 items of silver apparel commodities map 3~5 kinds of other materials over each of the items. The results of the simulations, when compared with original images, give such a feeling that pictures are taken of the real costumes produced with other various materials and present satisfactory images of the commodities to be supplied to the consumers of internet shopping malls.

V. Conclusions

It is very significant that this research has been made for the first time in the silver apparel field on the mapping coordination using the web-based real-time virtual reality (VR) technologies in order to sell silver apparel which will hold a dominant position on internet shopping malls in the 21 century market. In particular, it is expected that the customization services available through a 3D image-based mapping coordination system in which consumers and sellers interactively communicate about product designs with each other on the web, will make a great contribution to the clothing producers in the present age which are attempting to change their production system from a mass production system to a multi-item but small quantity custom-made production system.

The silver apparel shopping malls applied with such web-based interactive 3D mapping coordination simulations may be prototypes which provide more detailed information on the commodities, compared to the existing domestic and foreign silver apparel internet shopping malls which are investigated in the above, for the following reasons:

First, unlike the existing silver apparel internet shopping malls which present ligament-worn images of apparel commodities or commodity photo images, the malls applied with VR technologies can provide consumers with wearing model images and more real images of the commodities. Second, they can provide consumers with conveniences in searching commodities since detailed information of the commodities is offered on the right side of the commodity images. Third, they can provide the clearest images of the commodities to online consumers, who really want to know about the quality of the materials of the commodities they are searching. Fourth, commodity categories are clearly classified for page design modeling so that the consumers may not experience complexity when they click to move to a lower internet page and they may not need to double click on the commodity category from the top menu bar and the left menu bar.

This research is expected to be utilized by silver apparel internet fashion shopping malls which are rapidly growing since it suggests effective methods for presenting 3D commodities and applying a 3D mapping coordination system to the web so that the commodities may be interactively presented real-time to the consumers. Furthermore, it is expected to be used by the silver apparel industry since it suggests such image presenting method as can communicate most realistically the fabric characteristics of apparel products and the qualities of the materials of individually custom-made silver apparel commodities to the consumers.

Undoubtedly, the presentation method which we used is still some disadvantage since sizing problem was not dealt with. However, this approach has been successfully applied for presenting and customizing garment products. Future research will focus on the integration of mapping coordination into SATC Mall.

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