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# The Function Requirement Analysis and Implementation of the Intelligent Fitting System

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## To cite this article:

Ruan Jinhua, Zheng Jingjing, Hu Shouzhong. The Function Requirement Analysis and Implementation of the Intelligent Fitting System *Automation, Control and Intelligent Systems*. Vol. 3, No. 1, 2015, pp. 1-5. doi: 10.11648/j.acis.20150301.11

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**Abstract:** The intelligent fitting system is the product of the development of science and technology, at the same time, a new consumption experience method appears with the increasing demands of consumer. The intelligent fitting system not only increase the customer's shopping experience by the interactive fitting system, but also set up the brand image for merchants and increase the competitiveness. Therefore, the research of the fitting system is a looming thing. This article, through the investigation and expert scoring, etc, describes its role in the process of sales. Via analyzing the value of the intelligent fitting system through the comprehensive analysis method to find out the exist problems and a method to improve the fitting system and a way to its implementation, hoping it have an promoting effect on the development of the intelligent fitting system.

**Keywords:** Fashion, The Intelligent Fitting System, Value Analysis

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## 1. Introduction

Along with the development of science and technology, the model of clothing retail is changing constantly. The fierce social competition, forcing the retailers to reform in retail models and the experience consumption which is changing from the initial drape to now the humanization designed intelligent fitting room, has always been changing. People's pursuit of a nice and comfortable fitting room has never stopped. The design style is changing with the change of the demand of people. Intelligence is the development trend of the fitting room.

The reality of how to balance the relationship between consumer demand and development cost of the intelligent fitting room, maximizing the value of the system, has become an important problem of the research of modern clothing retail enterprise.

The article, through comprehensive research methods, analyzed the element, influencing the "consumer experience", of customers, the need of retailers to the functional requirements of intelligent fitting system and the condition of function realization technology of the fitting system. Based on the original fitting system in the market, study and improve the design of the intelligent fitting system.

## 2. The Intelligent Fitting System

The intelligent fitting system, a kind of intelligent machines, provide "consumer experience" for customers during the process of the clothing retail. In the radio frequency identification technology (RFID), users, standing in front of the screen, do not need to touch screen only needs to control the system via hand gestures which can achieve interaction with the fitting mirror. The users just waving, the choice of clothes will be amazing natural wear on the user's body. Users, on the way, can easily replace different clothes by switching on the page. In addition, the virtual fitting system also provide high-definition cameras, developing close composite image between trying clothes, in a timely manner, and users. The user experience unprecedented shopping pleasure.

The intelligent fitting system is a set of integration platform composed by hardware and software, mainly including the fitting terminal, content management server and the Internet management. Besides the common functions of fitting room and the release of multimedia information, it also specially integrate the clothes attributes display, a discount promotion, the multi-machine networking management, and other functions, as well as access to the internet and emerging media such as Micro-Blog. The intelligent fitting system, through perfect union of the human body induction technology, network and digital display technology, give strong visual

impact, customer attraction and a sense of science and technology to the terminal clothing stores, shopping malls and other public places. It also provide the customer with high quality consuming experience and simpler management services. If chose their favorite clothes, the customer can scan to share to the micro letter, Micro-Blog and other social software. If determine to buy, the consumer can direct scanning to afford it.

But the smart design and the manufacture process of the intelligent fitting is complex, which have many technical difficulties such as how to realize the reality function simulation, how to balance the relationship between the customer demand and the cost, etc. The key to the intelligent fitting system design is improving it and making it conform to the principle of value engineering analysis, both economic benefit and satisfying the function of experience.

### 3. Mental Experience of Clothing Retail Fitting

The intelligent fitting system, through the change of people psychological experience, stimulate the desire of consumers. Consumer experience refers to that, under certain social economy condition and in a particular consumption environment, consumer personally complete a mode of special consumption ,which has a strangeness, freshness and novelty consumption object ,in order to obtain a novel stimulus, profoundly memorable consumer experience, improving the customer delivered value. Experience consumption subject, experience consumption object and consumption experience environment constitute the three elements of the consumer experience.

Market survey statistics show that every consumer spend about seven, eight minutes, on average, on the fitting room, more than fifty percent of the whole process of the clothing purchase. The female consumers in the fitting room was as high as seventy percent of the purchasing time. It is clear that the fitting room plays a critical role in the retail system. The purchase decision of consumer is made in the fitting room in a large percentage. In the act of the fitting, the customer, mainly through whether the clothing fit, it is to be improved and it can modify body type, to determine whether the clothing can satisfy the demands of their own wear. Therefore many consumers will be more carefully observe on its fabrics content, its feel, the price and the cost performance in the fitting room. Thus the fitting behavior will directly lead to the purchase behavior.

### 4. The Research of the Consumer Requirements of the Function of Intelligent System

The main method of collecting study materials is questionnaire survey, supplemented by interview method, to verify and understanding the analysis data in question. To the aspect of company employees, the research’s object is mainly the person who understand the fitting system, who shop more and retired people; The analysis results indicate that different consumer groups demand different function of the intelligent fitting system. Through the analysis of the data, researchers summarizes the functional requirements of different consumer groups. This research mainly uses SPSS20.0 to analysis on the data obtained (see table1).

Table 1. Statistics of the problems existed in the fitting room at present.

		response		Case
		N	percentage	percentage
Inconvenience	Difficult in finding proper clothing	269	27.60%	65.00%
	Troublesome in Change clothes	298	30.60%	72.00%
In the fitting process	The body’ privacy is leaked	188	19.30%	45.40%
	Protection			
	Destruction of makeup look	142	14.60%	34.30%
	others	77	7.90%	18.60%
Total		974	100.00%	235.30%
The problems in the fitting process reduce your purchase enthusiasm of clothing	The release of privacy, unsafe	218	20.50%	52.50%
	Lack of necessary equipment	216	20.30%	52.00%
	The fitting room small or disorder	274	25.80%	66.00%
	Unable to quickly find proper clothes	283	26.60%	68.20%
Others		71	6.70%	17.10%
Total		1062	100.00%	255.90%
What kind of Services should	Necessary equipment complete	294	33.00%	71.40%
	Privacy is protected	203	22.80%	49.30%
Shopping malls and clothing store services in terms of the fitting in your piont	Customer self-service fitting	322	36.10%	78.20%
	Others	72	8.10%	17.50%
Total		891	100.00%	216.30%

Use structure validity to analysis on the consumer demand for the intelligent functions of the fitting system. The mainly measurement method of the structure validity is the factor analysis method. This study will, therefore, identify the

functional requirements as three parts. In the rotating component matrix table, the joint degree, less than 0.650, will be deleted and then getting the final three common factor: "show clothes details", "but the proposed amendments to the

clothing" and "save the customer database data". The first factor is the display module and the later both is background processing module which are mainly operate through database management. Therefore this article named it as "data management"; The second common factor is "show trends and putting forward modified opinions". The factors make customers jointly with stylist participate in the popular trend forecast. So, this article named it as "resource sharing"; The third public factor is "simulate human". This article named it as "function of visual experience".

## 5. The Determination of "Objective Function" Based on Value Engineering System

In the consumer research, three functional requirements were extracted: the functions of database management, resource sharing and visual experience function. In the

functional requirements of consumers, the database management include displaying clothing details, possible proposed amendments to the clothing and keep customer database information; Resource sharing function include showing trends and putting forward modified opinions; Visual experience function include possible simulating the reality in the action, etc. Three functions, database management, promoting enterprise image and resource sharing, are retained in the enterprise research. Database management function include storing customer's database, displaying clothing details and recording customer's preferences; Propaganda enterprise capabilities include recommending customers on different clothing collocation; Resource sharing feature include displaying the sale record of each piece of clothing in each branch and the customer review. Investigation on comprehensive consumer and corporate demand for functions of the intelligent fitting system, the final results as shown in table2.

*Table 2. The determination of functional requirements in research.*

The general functional requirements	
The database management function	Display clothes details, possible proposed amendments to the clothes, store customer database, record customer's preferences
Resource sharing feature	Showing trends and putting forward modified opinions and the customer review
Visual experience function	Simulate the reality in the action, etc
Propaganda enterprise capabilities	Recommended customers different clothing collocation

*Table 3. The functional requirements in investigation determine the value of the function.*

Function	Programming cost (yuan)	Data cost (yuan)	Cost (yuan)	Cost index C (%)	Function index F (%)	Value (F/C)
Save the customer size	180	0	180	1.98	13.89	7.02
Record customer's preferences	360	360	720	7.92	13.19	1.67
Proposed amendments to the clothing	540	0	540	5.94	13.89	2.34
Display clothes details	720	90	810	8.91	12.5	1.4
Showing trends and putting forward to modify opinions	900	900	1800	19.8	11.11	0.56
Showing trends and putting forward modified opinions and the customer review	1080	540	1620	17.82	10.42	0.58
Recommended customers different clothing collocation	1260	720	1980	21.78	12.5	0.57
Simulate the reality in the action, etc	1440	0	1440	15.84	12.5	0.79
Total	9090yuan			100	100	

As can be seen from the consumer and the market demand, the more comprehensive of the function, the ranger the system will be used. However, the more functions, the higher the system development will cost, which will decrease system business value and it may not be accepted by the market.

Based on the main ideas of value engineering theory: achieve certain necessary functions at the lowest cost. The goal is to realize the necessary function of products or services reliably and improve the value of the analysis object with the lowest cost. In value engineering, there are three parts: the Value(V),the Function(F),and the Cost(C).The relations between them is:  $V = F/C$ ; Expressed in mathematical proportion is as follows: value = function/cost.

### 5.1. The Determination of Index of Function F

In this study, the method of quantitative is to replace functions with their important degree. We can use expert

scoring method to determine the important degree of each function. This method is to organize 5-10 experts and the relevant personnel as judges. The judges will compare the products or components according to the importance of them by one-to-one, important for 1 score, not important to 0.

Taking down the results of the products or components, and then calculating score average of the contestant personnel for the same product or component. With the sum divided by the average, obtaining the function coefficient. In this study, we will organize eight experts and relevant personnel to mark and calculate the function index of various components.

### 5.2. The Determination of Index of Function C

The table3 shows storing customers' size, recording customers' preferences, putting forward amendments to the clothing and the details of garments; the functions' value is higher than 1, so this few functions will be retained. But to the

displaying clothing fashion trend by putting forward modified opinions, displacing clothing sales, customer evaluation at each branch, and recommending customer different collocation, all the functions' value is lower than 1, so these features can be deleted. The value of these features of simulating the real people in action is lower than 1, but higher than 0.7, so after appropriate for cost reduction, the function can be retained.

After the rule out through survey and value engineering analysis, the five functions, saving the customers' size, the database record customers' preferences, possible putting forward amendments to the clothing and display clothing details and simulate the reality in action, are determined functions. According to the five functions, improve the intelligence of the original intelligent fitting system which is blend in these five functions. The "target" function of the system development in the enterprise.

## 6. Improvement Design of the Intelligent Fitting System

### 6.1. The Customer Using Process of the Original System

The figure 1 shows the customer' using process of the intelligent fitting system .

As shown in figure 2, the improved system of customers' using process as follows: three point need to be improved on the basis of the original system.

- 1) save the customer information database
- 2) possible proposed amendments to the clothing and evaluation
- 3) simulate the reality in action, scene

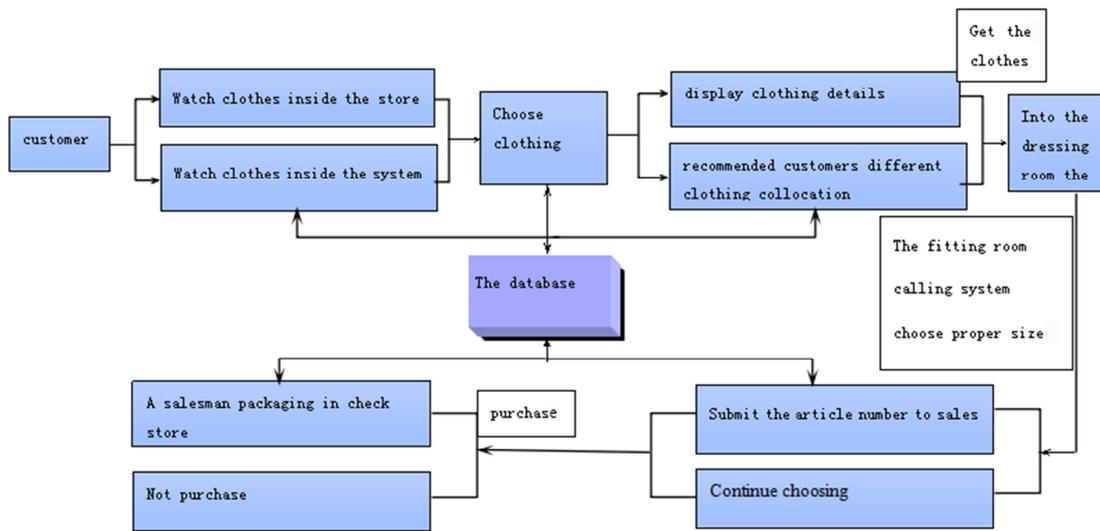


Figure 1. The customer' using process of the original system.

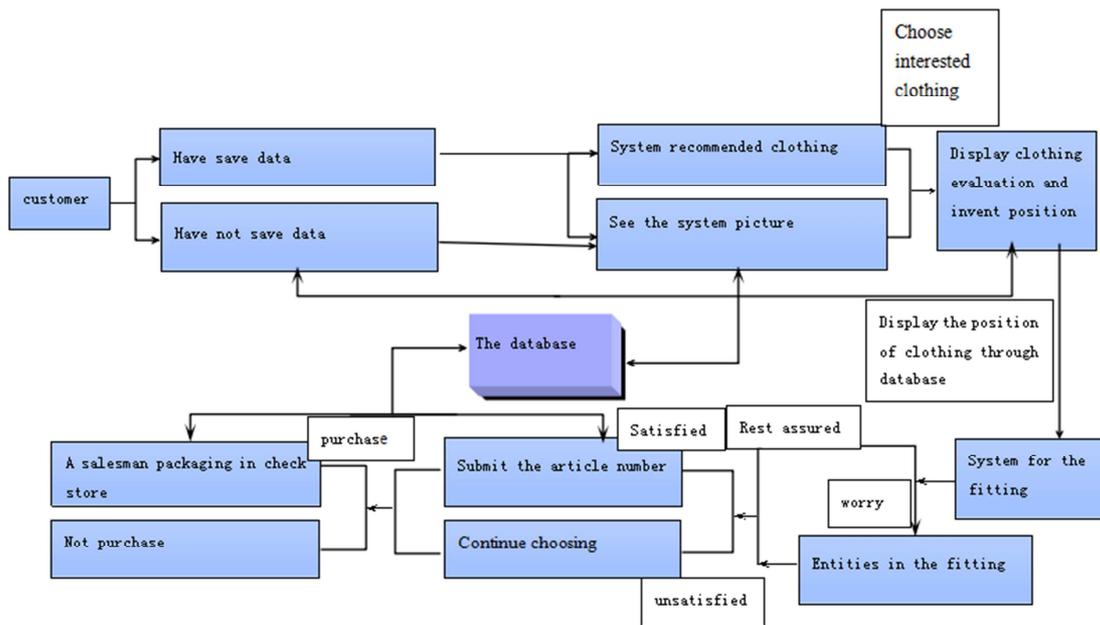


Figure 2. The improved system of customers' using process.

## 6.2. The Implementation of Function of the Modified Intelligent Fitting System

The realize of saving the customer information database and the evaluation of the proposed amendments to the clothing are mainly completed through the form of web and database. The system access to customer's size information and buying and trying information by client and effective integration and updating of background database information, directly showing the three-dimensional human body model and 3d fitting effect to the customer which help customers make buying decisions. After the customer determined to buy it, the purchasing information and trying information of customers, by automatic processing and format conversion, are sent directly to the background management system, so that the next time the customer purchase it could be generated by the customers' recommended list, designing the "o2o" practically intelligence fitting system.

To simulate reality in the action, our major build a 2d frame in Virtools to display all of the displaying clothing pictures. At the same time create a 2d frame used to display information, giving the corresponding materials. Clothing pictures in the gallery is used to control to change clothing and display status information area. Establish an array under level manager, which is named "clothing details", used to store each clothing style, price, material and location information, etc. Then setup script for the 2d frame of the clothing display box. The script is used to control state information displaying area. In 3D Max, all clothes that need to be changed ,mainly using BB module of the HIDE and SHOW module to realize the change of the characters, should be wore on the body, exported as Nmo format. While the display of each piece of clothing, you can hide other clothing, so as to realize the smooth of task switching. After implementing the change, you can, through changing the script respectively connecting to the clothing display boxes of different clothing pictures, achieve a simultaneous change and information display. Building the changing background of 2d frame in the interface, named background display box, is used to store different background. When the mouse or fingers slide to different backgrounds it can present a different background.

## 7. The Conclusion

In this article, the functions of the intelligent fitting system, starting from the functional requirements of intelligent fitting system, is determined by using the method of documentary investigation, questionnaire investigation and expert interview to consumers and business research, combining with the value engineering analysis method. Through the contrast analysis, we know we need to increase three functions which include storing customer database data on RFID system function, putting forward amendments to the clothing, the evaluation function and simulating the reality in the action, which is to improve the information of users and customers.

Complete the fitting system through the implement of

3dreconstruction, 3d virtual fitting body, the online fitting implementation, as well as the realization of the concept of interface and software interface. Start from the fabric simulation technology, the module and motion simulation technology, garment simulation dynamic virtual display technology and scene simulation technology to realize the three-dimensional human body fitting function. It will be a big trend in the development of intelligent fitting system, leading technology in intelligent fitting system is the leading apparel market.

Therefore, the research is prospective in the field of clothing, pointing out the direction of the development of future intelligent fitting system and the direction for the development of future clothing retailing forms. It is both opportunity and challenge for our country in the development of garment industry. We should seize the opportunity, meet the challenge and make Chinese intelligent fitting system a large step even a leading position.

## Acknowledgement

This study was funded by Science Technology Commission of Shanghai Municipality, the funded project No. 11510501600 and Municipal Education Commission of Shanghai, the funded project No.13ZS128.

Case percentage: case is the combined information of specific part of a project, the proportion of case in the total percentage is the case percentage.

Common factor: a corresponding measurement variables

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