

The Product Design of Emotional Intelligent Jewelry for Women

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Abstract— With the rapid development of smart wearable devices, more and more people are interested in smart wearable devices. Thanks to the convenience brought by intelligent products, people are becoming more and more receptive to them. Based on the design strategy proposed for its design style and unique function, this paper starts from the theory of women's intelligent jewelry. First of all, the origin and development of women's intelligent jewelry, supporting technology and other aspects are studied. Then through the study of emotion theory, the emotional needs and appearance preferences of women in intelligent jewelry design are further analyzed. Finally, the principles and methods of emotional design of female intelligent jewelry are obtained through questionnaire survey, and the corresponding evaluation system is formed, and the research results are verified by examples.

Keywords-female; smart accessories; emotional; aesthetic

1 INTRODUCTION

Based on today's mature science and technology, intelligent design is carried out on ordinary clothes, and innovative high-tech wearable devices such as smart watches and smart clothes are developed. With the rapid development of surgical technology, standardized computer hardware and software and Internet technology in China, various smart handheld devices begin to come into the public eye. In recent years, smart accessories business has attracted the attention of various enterprises, and major companies have also explored it as a development goal. Smart jewelry gradually landed, from the concept of vocabulary into research and development projects. Intelligence and fashion are synonymous with smart ornaments. It will effectively combine software algorithm calculation, electronic components and jewelry, and transform the traditional simple decorative ornaments into practical, intelligent development.

2 DEVELOPMENT STATUS OF FEMALE SMART ACCESSORIES

2.1 Women's smart jewelry wearing mode

1) *The head*: is the part where the human body gets the most sensory information, including a variety of sensory information such as hearing, seeing and smelling. Smart accessories can be worn on the head, such as spectacles, headdress and earrings.

2) *The neck*: is connected to the head and shoulders, and there are many sensory pathways in the neck. For neck decoration, people often use necklaces, and the smart ornaments are worn in the neck, such as clavicle chain and necklace etc.

3) *the four limbs*: Smart jewelry on limbs, represented by smart bracelets, is the most mature. People can provide more data for smart accessories through active limbs.

2.2 The Supporting Law of Smart Accessories

Relying on law: Moore's Law and universal computing are important relying on the development of Smart accessories.

1) *Moore's Law*:" When the price remains unchanged, the number of components that can be accommodated on an integrated circuit doubles roughly every 18 months, and the performance doubles, while the price drops by half." [1]

2) *Pervasive computing*: "The technologies involved in pervasive computing include mobile communication technology, small computing equipment manufacturing technology and micro operating system technology. Indirect linkage and lightweight computing are two important characteristics of pervasive computing. In its mode, users can access and process information anytime, anywhere and in any way. Users can wear it anytime, anywhere, and calculate changes in body data at any time, and then process the information they get. Therefore, smart jewelry is the best "harbor" for pervasive computing. [2]

2.3 Supporting Technology of Smart Accessories

1) Smart accessories application module

The existing smart accessories in the market are divided into four parts: shell, charging module, main control module and sensing module.

The master control module is an MCU master control system, which mainly controls the work of the master control module and the sensing module.

The charging module includes power management circuit, rechargeable battery and wireless charging receiving circuit.

The sensor module includes GPS module, security module and NFC module. The entertainment module is connected with the mobile app; The security module is used to protect the data in the smart jewelry; NFC module is used for the payment function of various activities; The GPS module is used to determine the wearer's location and transmit it to the phone app (Figure 1).

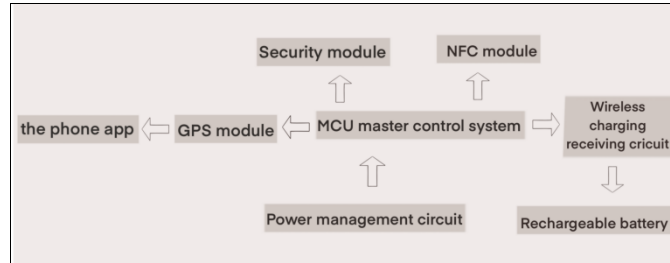


Figure 1. Smart accessories hardware block diagram

2) *Smart jewelry flow chart*

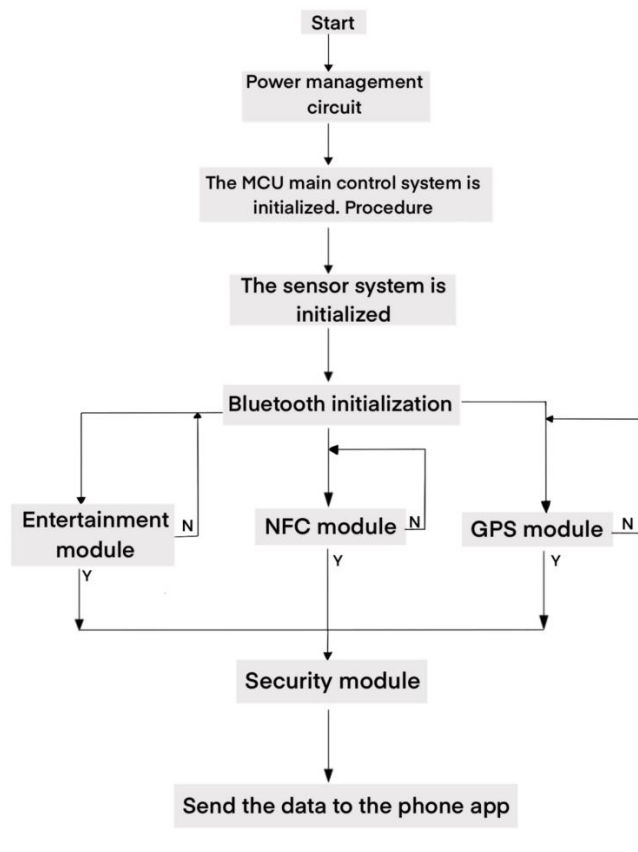


Figure 2. Flow chart of smart accessories

3 SUPPORTING THEORY OF FEMALE INTELLIGENT JEWELRY DESIGN

3.1 The three-level theory of emotional design

In the book Emotional Design, Professor Donald A. Norman, an American expert in cognitive psychology, "mentioned the three-level theory, which divides emotional design into three levels: instinctive, behavioral and reflective. [3]

1)*Instinctive level:*" The design of instinctive layer focuses on users' requirements for the material elements of specific products, including but not limited to the color, texture, material and structure of products. [4] In order to stimulate users' desire to buy, we design and study the color, material and shape of products. In short, it is to stimulate the purchasing power of female customers through the design of products. Therefore, excellent product appearance design is the top priority in the instinct level design.

2)*Behavior level:* "The design of behavior layer focuses on the human-computer interaction process with users, and takes comfort, efficiency, pleasure and other humanized factors as the design goal." [4] For smart accessories, good human-computer interaction is the root of the product and the key to its long-term development in the market. For smart products, whether the function is simple or complex, it requires user experience and operation. Therefore, function setting and operation mode are key points in the behavior level .

3)*Reflection level:* "The design of reflection level pays more attention to the symbolic meaning and social value of products, including users' value orientation, cultural concept, aesthetic ideal, etc." [4] The reflective layer is to make associative experience of the cultural background, social environment and other artistic values contained behind it through products. This level requires designers to accurately grasp user psychology and understand user preferences in the design process. [4]

4 EMOTIONAL DESIGN METHOD OF FEMALE SMART JEWELRY

4.1 Questionnaire survey

In order to understand women's demand for smart jewelry modeling, color and material, female students in our school were taken as the survey object, and 150 questionnaires were issued and recovered. Meet the requirements of the subject survey. Through the method of random distribution of questionnaire, the fashion college, food college, textile college conducted a random survey, understand the different aesthetic differences of female students of different majors. This investigation includes three aspects: the shape, material and color of intelligent jewelry.

Conclusion the data: According to the survey on women's aesthetic demand for the material, shape and color of smart jewelry products, the results show that the material data: women's choice of metal accounts for 41.08%, the Accounted for the highest, followed by acrylic 24.5%, ceramic 19.87% and crystal 14.57%.Shape data: geometric shape accounted for 50.99%,

roundness 25.17%, heterosexuality 23.84%;Color data: the female who likes plain color accounts for 64.9% of the total number of the survey, while the female who likes rich color accounts for 35.1% of the total number of the survey.

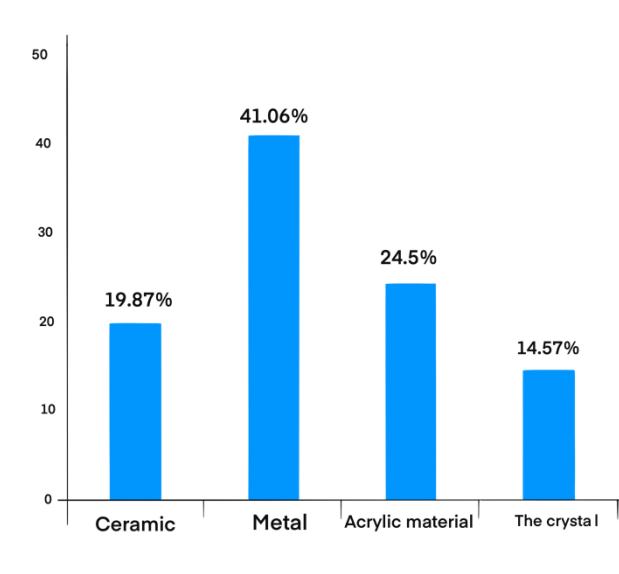


Figure 3. Material data of questionnaire Survey

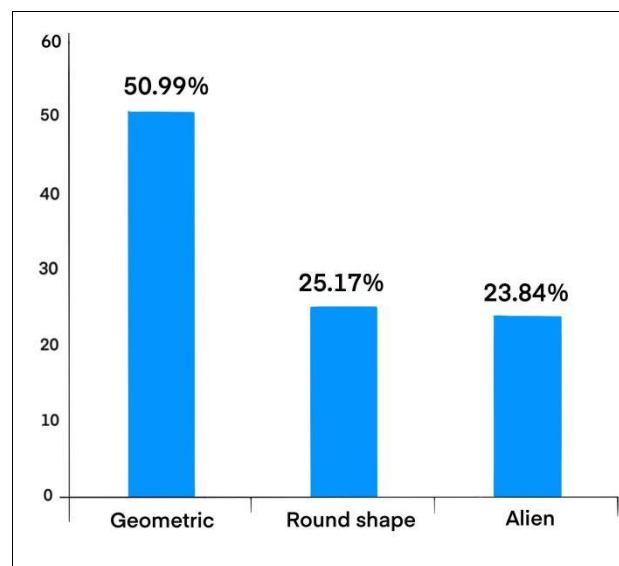


Figure 4. Modeling data of questionnaire survey

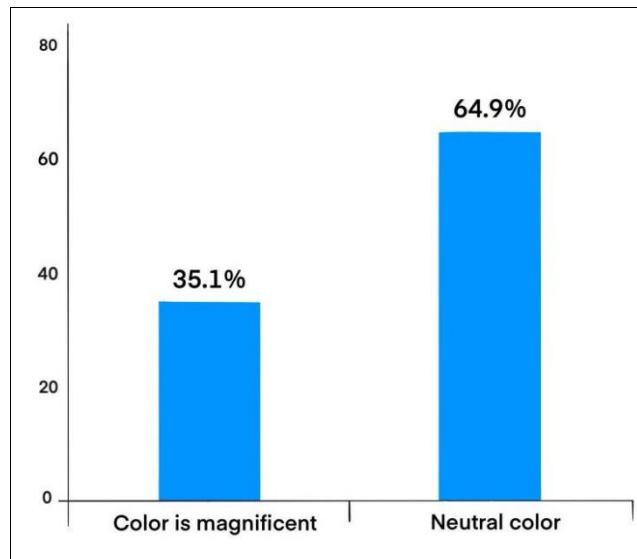


Figure 5. Color data of questionnaire survey

4.2 Analytic hierarchy process

Combined with the hierarchical analysis method mentioned above, the hierarchical analysis table is based on three levels: modelling, material, and color. Modeling, color and material are the basic layers, and the emotional words of the questionnaire are the expanded layers to make the hierarchical analysis table. As Figure 6

Analytic hierarchy table					
The root layer	Basic layer	Expanding layer	Shape layer	Essential elements	The technical features
Smart jewelry to meet the needs of women	Modelling	Geometric	Modeling extracts traditional geometric elements	Overall shape,local details	Geometric modeling with cultural elements as the main body
	Color	Color quietly elegant	Low color contrast	Overall tone ,local color matching	By local plating to change the metal's original color contrast
	The material	Smooth feeling	Metal material	Surface treatment	Metal surface polishing treatment

Figure 6. Hierarchical analysis table

5 DESIGN SCHEME

According to the results of questionnaire survey data and hierarchy analysis table, a smart jewelry for the neck is designed.

The design scheme, from the existing wearing methods of smart jewelry, chose to wear it on the neck. Reason one, the neck is distributed with numerous blood vessels, nerves and muscles, and is an important part of the body connected to the brain. Reason two, the neck wear can better collect the wearer's own data, which is convenient for the chip to process data. The design inspiration comes from the ancient jade cross strapin recent years, the rise of ancient style, based on ancient artifacts, imitate the state of the ancients, can better technique people's interest

in traditional culture, as a way to promote the inheritance and development of traditional Chinese culture, combining traditional culture with intelligent technology to better promote Chinese culture.

In terms of material selection, the main material is silver metal material, and the smart chip is embedded inside the necklace (as shown in Figure7). The upper and lower ends of the necklace can be decorated with blue gems. The metal shell implanted with the chip is in contact with the neck to obtain the wearer' s data information. It is equipped with a mobile phone application to input the reminder time in advance. When the set time is exceeded, the necklace will vibrate to remind the user of sedentary time. The final rendering effect (as shown in Figure8).

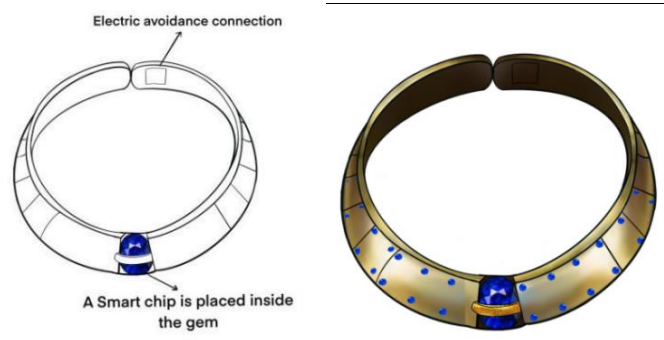


Figure 7. Intelligent collar product design diagram

In order to present the jewelry product more fully to you, NOMAD software modeling is used here. In the production process, firstly, each part of the jewelry is shaped out by creating the basic body of the software. Secondly, the texture of each part will be rendered by different effects to achieve a similar effect with the reality (Figure 8). Finally, the rendered product parts are put together and finally formed to achieve the perfection of the product through continuous adjustment.

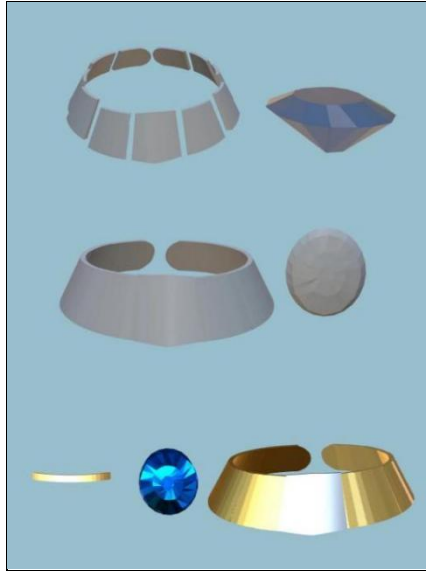


Figure 8. Modeling flow chart

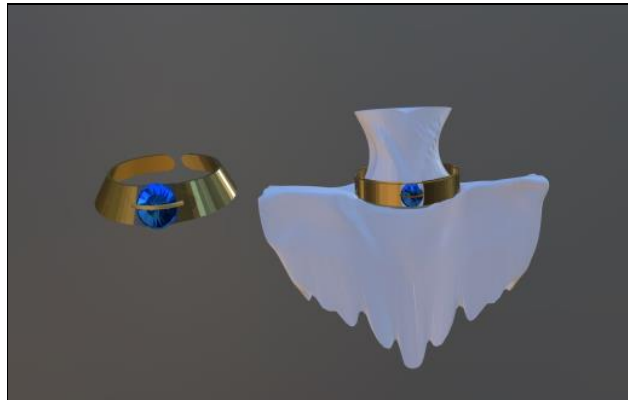


Figure 9. Smart collar finished product graph

6 CONCLUSION

At the initial stage of data collection, this paper first understands the background of smart jewelry. As a kind of nascent product, smart jewelry has little literature at home and abroad. Most information sources are from fashion magazines, technology forums, fashion news reports, etc. At the same time, the needs of female users in the market are investigated. With the deepening of the research, through the research and analysis of women's aesthetic needs, the final focus is on product design modeling, materials, colors and other aspects of in-depth research. Then the foothold of the paper was emotional, and finally completed the design and

research of smart wearable products in women's accessories, and obtained the corresponding design results.

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