Research on Public Facilities Design Based on Human-Computer Interaction Emotional Concept

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Abstract. In the current era, human-computer interaction design has penetrated into environmental design and it has played a huge role. At The application of planning in environmental design has become the focus of people's research. Public facilities are an important carrier of In addition to being practical, it also undertakes the task of beautifying the city. When new social phenomena and residents' needs change, under the restrictions, functional compounding of public facilities is the inevitable way. This article analyzes the status of public facilities an The reasons for the introduction of functional composites in the design of public facilities are discussed, and the integration of emotional c The article comprehensively analyzes and summarizes the research on the human-computer interaction design of public facilities in the env The integration of technology and technology is to provide users with a convenient and practical service experience on the basis of aestheti The product of a higher level of human needs, its application in design meets the emotional communication of people, people and product The design must be planned according to the characteristics of the overall environment, combining the colors and forms of the surrounding One consideration, so that it cannot only meet the emotional concept and interaction design of environmental design, but also give full pla Function and utility.

1. Introduction

With the advent of industrial 4.0 in the 21st century, emotional interaction design makes products more in line with our interaction [1]. What we often say to do electronic products is actually user experience [2]. This user experience is manifested in interactive design, which is designed to ensure its operating comfort, whether it conforms to the user's thinking habits, operating habits, and whether the appearance design conforms to ergonomics. After the human interaction design meets the basic human behaviors, This kind of design will take into account higher-level emotional design. After we know about interactive design, we can more easily understand emotional interactive design. It is no longer the relationship between human beings and design, but the relationship between human emotions and design.

2. Emotional concept

The word "Emotional Design" was proposed by Donald Norman in his book of the same name. In the book Designingfor Emotion, the author Aarron Walter linked emotional design with Maslow's hierarchy of human needs theory. Just as human physiology, safety, love and belonging, self-esteem and self-realization are the five levels of needs [3], product characteristics can also be divided into four levels
from low to high: functionality, dependency, usability and pleasure, and emotional design is in the top level of "pleasure" (Figure 1).

In "Emotion and Design", Donald expounds that emotional design is a creative act aimed at the emotional communication between people and objects. Designers can achieve resonance between people and objects by influencing people's sense of hearing, vision, touch, etc. through the shape, sound, touch, implication, shape, etc. of the design works. These resonance naturally arouse people's emotional feelings, thus completing the design goal. In order to achieve such an emotional design goal, one must first understand how works affect human emotions. Emotional design is a balance of three levels, namely instinct level, behavior level and reflection level.

![Fig. 1 Emotional Design](image)

2.1. Instinctive level design

With the rapid development of economy, the development of science and technology provides diverse and rich conditions for production and manufacturing, and the development of corresponding public environmental facilities [4].

Instinct-level design caters to people's sensory preferences for appearance, instinctively, if the visual design or the sensory design conforms to human instinct Public aesthetics, the higher the acceptance. Japanese Garden, French Classical Garden There are audiences in various styles such as gardens and modern gardens. These The essence of beauty is preserved in accordance with the aesthetics of most people. It is in harmony with the aesthetic habits and values of most people to resonate with Yellowstone Park is beautiful because it retains the most original natural features The facilities are in harmony with the landscape and are low-key under the landscape.

2.2. Behavioral level design

Public environmental facilities have been developing continuously with the changes of the fields, and are further moving towards intelligence. Moreover, advances in technological production methods have made it easy to imagine what was impossible to realize. The rise of computer operating system and the development of network software technology have led to the beginning of artificial self-service system. We can achieve what we want simply and quickly with every gesture.

Behavior level design is based on people's behavior habits and adapts to their The design emphasizes efficiency, performance, and joy of operation. This also in Understanding, excellent behavioral level design focuses on the functionality, usability When using public facilities such as parks and squares, there are some facilities th For example, tables and chairs or trash cans arranged according to certain rules. To design, these are by predicting how long people need to rest and rest time to Frequency, etc., which is exactly in line with people's habits and needs. And we al It’s not comfortable. Most of these parks let us walk around the park with garb There is still no place to rest our feet, or we are stuck in an awkward situation wh Small devices that make one want to try for yourself, such as fitness equipment, or A long pool to sit on, maybe plants and fish, or even a spherical shape sculptures, rotatable sculptures, stones,
these facilities allow us to interact with th It creates fun and enhances the emotional interaction between tourists and the la

2.3. Reflection-level design
Public facilities have been developed along with the history of the city. People Occasions have different requirements for the requirements of public facilities, an Meaning is often associated with environment, culture, identity, identity, etc., and Calculate goals. This type of design is related to the long-term feelings of custom In order to resonate with customers from the brand's unique semantic design, we His brand identity is quite familiar, and the image of this "product" has resonated People-oriented is the starting point of modern industrial design. Humanized include:

( 1 ) To meet the needs of people's basic life and safety during use.
( 2 ) Clear function, convenient operation, not affected by users
( 3 ) Protection of natural ecological environment and sustainable developme Based on the needs of users, provide simple, clear and effective services to sa Small input brings maximum output will be one of the development directions of
Simple, clear, effective, and fast to use, while avoiding the user's first use, careless Injury due to mishandling.
Large-scale industrial production is a condition for the emergence and existe The trend of standardization and modularization of industrial components is mai ( 1 ) Considering reducing production costs
Due to the variety of public environmental facilities design and the high dem Reduced the number of sets of production molds, standardized, modular, diversif Production provides a shortcut, greatly reducing the production cost of product d
( 2 ) Considering the protection of ecological environment
The factory produces standardized parts with high precision, high strength, st Unloading, while greatly improving production efficiency, it is also easy to mainta This not only facilitates pedestrians and vehicles, but also avoids noise and dust a For the protection of the ecological environment.
( 3 ) From the perspective of the times
As the public environmental facilities are a carrier of urban culture, they repre Production also reflects the level of modernization, industrialization, and econom The combination of original production and transportation of new materials best
( 4 ) Art and landscape
The design of public environmental facilities in modern cities is no longer just a single and independent product design. It has become more and more integrated into the overall artistic design of the surrounding environment of the city. More and more attention has been paid to the planning and combination after product design. Each product design is not limited to one form and color, but forms a series. In the planning and design of environmental facilities, chairs, garbage bins, street lamps, etc. are not limited to meeting the functional requirements .

3. Human-computer interaction design
Human-Computer Interaction-HCI: refers to the information exchange process between a person and a computer to complete a certain task in a certain interaction way [5] using a certain dialogue language. Interactive design is a design strategy to solve the problem of user experience by enhancing and enriching the interaction between users and products in their daily work and life. From the perspective of users, interactive design is a technology to explore how to make products effective, easy to use and pleasant to operate. It devotes itself to cognizing the target users and their needs, cognizing the behaviors of both parties when users interact with products, and cognizing the unique behaviors and psychological characteristics of "people". In the field of interactive design, human-computer interaction, as the most concerned and important research and component, is becoming an indispensable design principle and method in modern product design. By integrating human-computer interaction theory into product design, the usability of products and the interactive experience of users can be improved [6]. Human-
Computer interaction can be divided into several basic modes such as action interaction, voice interaction, visual interaction, virtual reality interaction and augmented reality interaction (fig. 2).

Fig. 2 human-computer interaction design

Human-computer interaction can be seen as an extension of industrial design "Language" or communication means that the main subject recognizes each other. Interacting technologies are widely used in the study of human-machine-environment. The process is simply divided into "input" and "output" [7]. Among them, input refers to operation, order release or maintenance, etc., emphasize the transformation of language, input to the machine; and output refers to the language that can be read by humans, such as prompts, warnings, failures, operating instructions, etc.

4. Investigation on the status of public facilities at home and abroad

4.1. Basic definition of public facilities
The term public facilities originated in the United Kingdom. The English word Furniture. "Public facilities are provided by the government or other social organizations.

Public buildings or equipment can be divided into urban health care, education, leisure culture, transportation, sports, administration and community services, so Financial services, etc. Public facilities are an essential element of urban life. During the design process of urban public facilities, practicality is the first principle. Besides, it is also the "face" of a city. Beautiful and distinctive public facilities can Aesthetic enjoyment can also enhance the city's cultural temperament. Therefore, Emphasis on aesthetics. Design elements are the key symbols in design. It can be seen as the face of society.

4.2. Public Facilities Development
Historically, public facilities can be traced back to the public places of worship. Small-scale urban drainage systems during the Ma period, the ancient Olympic A Later, with the rapid development of the city's economy and culture, after the rise It became more popular, but before the rise of humanistic theory, public facilities Special needs have not been deeply considered from the direction of caring for people. The practicality and economical are considered only to show the majesty. After the rise of the humanistic psychology school represented by Maslow, Roger I started to realize that the design of public facilities should be people-centered, Designed for a starting point.

With the gradual development of the city, buildings, streets, squares, docks, the community, parks and other public environmental spaces and leisure and entertainment, leisure and sports needs, There are a series of one-centered behavior activities such as places to rest, communal simple facilities such as public chairs, road signs, public trash cans, and street lights. The process has been further refined, and the functions of public facilities have evolved.
Shi is fundamentally different from the traditional small-scale public facilities that Price-based industrial mass-produced facility products have replaced spiritual an
Hand-made small-scale production of public environmental facilities. In develope It is synchronized and integrated into a system, and relevant laws and policies ha
In terms of distribution, there are gaps in the number and design level of pub At the beginning, the city center gradually evolved from an administrative center
According to the main stage of urban life. The coexistence of new and old urban In terms of the new urban area represented by the emerging development zone, The aging phenomenon of public facilities in districts or urbanized surrounding vi
In terms of function, public facilities are mostly oriented to a single function. Orientation, exclusive use. The functions of public facilities only meet the basic ne Therefore, the special purpose of urban public facilities is to limit the cost of the d The production process is designed to reduce costs.
In terms of design orientation, government agencies are transforming and pu In the past, the managers of public facilities - government departments mainly co Focus on service consumption. The design of public facilities places too much em Shi considered urban residents' needs and realized the social attributes of public The shift of business type has increased the emphasis on human factors in the de Public facilities naturally need to shift to "useful" and "use" [8].
No matter what kind of urban public facilities are developing unevenly in this In terms of scope, it is also unbalanced among cities. First, the economic foundati For the country, the relatively high level of industrialization in developed countrie The investment in construction will also increase accordingly. With the support of More perfect. In contrast, in developing countries, due to economic constraints, t It is relatively backward. After entering the 21st century, the biggest problem facing Discussions on environmental protection have e emerged in various countries, and And perfect. Urban public facilities urban space is one of the most important elem There is an interrelationship between the three realms, and the three of them tog
Different functions and cultural atmospheres in the same environment make it ea Convenience provides better help. Therefore, the quality of public facilities direct
An important design factor in urban spatial planning and urban environmental la The quality of public facilities will directly reflect the quality of the
s in most cities in China now lacks its l For: Urban public facilities cannot be coordinated with loca entire urban sp The city's spiritual culture and art bit [10].
In general, the design of public facilitie I climate, environment
Design, production and maintenance, the design style is the same, the design col The feeling of Zhang, instead of playing a role in beautifying the city and embellis sense. Secondly, the urban public facilities are too simple and mechanized. The d The indigenous culture and sense of history have been diluted by the trend of inc

5. Case study
Case 1: Children's activity space
Children's activity space is a detailed branch, a technical threshold and a cons Very high. Danish company Campanian ( Compan Playground Equipment's ) Compan represents t The level of design and construction of children's activity spaces has been cooper
Case 2: Public transit station:
The bus shelter at the bus station is convenient for people to wait and change. They provide space for waiting for short breaks and remind you of waiting. In addition, its appearance and creative design have also attracted more and more public attention.

6. Design positioning
The Changzhutan Riverside Scenery Belt is a place for public activities that integrate facilities mainly include public seats, public trash cans, public street lights, and public space. Putting safety on the first element of design, in addition to meeting its basic needs such as sun and rain. Combining the above, I hope to design a fresh and natural feeling. You can feel the natural freshness when you relax along the river scenery belt, so cool; let people have a shelter from the rain when it comes to sudden rain.

6.1. Functional positioning
For public seats, only individual chairs and double chairs are provided. Capable of adding water storage function. As for street lights, there are no street lights. Hope to add an indicator system on the pillar of the street light. The scenery belt

Enough for people to use as a tool for people to shade and shelter from rain, and in other words, there are no new functions added to the function, and they are still as drinking water kiosks are concerned,
the existing drinking water kiosks d Rainwater can also be collected outside the premises. For floor lamps, I hope to a

6.2. Positioning
Of all the flowers along the river scenery belt, the most commonly seen is the so- Bone blossoms, cosmos with buds, cosmos in bloom and cosmos are also bionic Seats, drinking kiosks and street lights.

6.3. Color registration
The colors are yellow, green with strong sense of fashion, and a small amount of

7. Scheme Design

8. Conclusion
Public facilities are an embodiment of a city's personality, and they need to m According to the investigation of the scenic belt along the river, we can see that t There is room for improvement. For example, the shape design of some public se The material of the seat to be considered did not take into account factors such a Summarize and analyze and learn the lessons of failed design in order to create a Scenery along the river with public facilities. Public facilities are designed to be re The existing public facilities along the riverside scenery belt, combined with the cl Environment and other factors have selected reasonable materials and added pla The most important thing of public facilities along the scenery belt along the rive The design of this public facility is not only to have a stylish and unique appearan Provide convenience and help for one, and reflect the existence of social harmon

In human-computer interaction design, humans and machines work hand in Cheng, the robot plays the role of labor. Both humans and machines play their ro Is a basic unit in the design of public facilities, which is very important for the fun Role. Different public facilities have different choices of design elements due to d Different, designers need to start from the actual situation and requirements of p

References
[1] Huang Xianqiang . Application Research of Interaction Design in Industrial Des
[2] Zheng Xiangfang . Research on Campus Landscape Facility Configuration [D].
[3] Xin Xiangyang . From user experience to experience design [J]. Packaging Engi
[4] Lan Yuqi , Liu Ye . Research on emotionalization of interactive products based Cheng , 2019, 40 (12): 23-28.
[5] Yang Jian . Innovative design of interactive science exhibits interface based on Studies , 2016.
[6] Bu Juanjuan, Mu Cunyuan. Instinctual level design in product design [J]. Art a11On ), 2008 (07): 129-131.
[7] Yuan Xiao. Application of vision guidance system in environmental design [D]
[8] Qiao Yuanyuan. Application of Human-Computer Interaction Technology in S Studies, 2013.
[9] Wang Lijuan. Research on Spatial Equity of Urban Public Service Facilities [D].
[10] Li Zhuo. Research on the application of regional culture in urban public facili
[11] Duan Jinjuan. Research on Experience Design of Public Environmental Facilit
[12] Lin Yunhan. Research on Human - Machine - Environment Interaction and Sy