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Multimodal Interaction Evaluation and Optimization Design of Smart Landscape Devices for Elderly People in Seaside Parks

Jingwen Yuan [1], Longlong Zhang [1] and Chul-Soo Kim [2,*]

[1] Department of Marine Design Convergence Engineering, Pukyong National University, Busan 48513, Republic of Korea
[2] Department of Industrial Design, Pukyong National University, Busan 48513, Republic of Korea
* Correspondence: kimchulsoo6@naver.com

Abstract: With the rapid development of science and technology, an era of intelligence has started in people's lives, and intelligent robots, intelligent home systems, intelligent parking systems and other products of intelligent technologies have been quietly applied to all aspects of modern life. Experiential and interactive media landscape installations based on intelligent technologies have also been introduced into seaside parks in this context. Intelligent technologies are utilized to innovate traditional landscape installations, break the traditional limitations of thinking, and change the way of interaction between landscape installations and the public in seaside parks. Thus, the public can create an interesting connection with the landscape installations to enhance the participation and experience of the public. Emotion recognition, as an integral part of AI, has received more and more attention from experts and scholars at home and abroad. The landscape installations in domestic seaside parks are becoming more and more intelligent, and are customized to meet the needs of special target groups, such as the elderly. In this paper, the intelligent setting of landscape installations is investigated using multimodal interaction. First, it explains in detail the multimodal interaction, landscape installations, and intelligence. It innovatively combines experiential and interactive media landscape installations based on intelligent technologies with seaside city parks and analyzes and summarizes the cases in China and abroad. Furthermore, it explores how interactive media landscape installations work in different seaside parks, and examines how they are designed and technically implemented. At the same time, a plan is formulated to optimize the landscape installations for different groups of people in the seaside parks. Finally, the key points for optimizing the design of intelligent landscape installations for the elderly are proposed, and experiments are conducted to analyze how the design of multimodal interaction enhances the consumption perceptions of the elderly consumer groups. The experiment demonstrates the superiority of multimodal interaction for intelligent landscape installations.

Keywords: older adults; seaside parks; multimodal interaction; intelligent landscape devices; evaluation optimization

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1. Introduction

Along with the progress and development of science and technology, in the seashore park landscape device, the use of information and communication technology, the park design platform and emotional service work organically combined with the concept of "Internet +", creating a new mode of park design services, improve the breadth and depth of emotional services, which is the inevitable choice of the park landscape device. This is an inevitable choice for park landscape installation. For this reason, a large number of scholars have proposed relevant research.

Among them, Li P utilized neural networks to analyze the intelligent landscape and site planning. Digital generation and construction utilizes relevant digital technology clusters to accomplish park design and construction activities. Parametric design has

caused a huge change in contemporary urban seaside parks, in the concept of designing park landscapes, in the design aids, and in the material form of park landscapes. It is an essential step in digital landscapes [1]. Ashour S has conducted a lot of research on the relationship between landscapes and people's well-being, evaluating the effects of different landscape installations on adults' moods, exploring theories of aesthetics and emotional response in park landscapes using Egypt as a case study, and using this as a basis for analyzing the effects of two visual design features in park landscapes on the adult's mindset, establishing a relationship matrix between mood categorization, quality of recovery, and each spatial element [2]. Rauf H L established a new idea of multidimensional urban park landscape design based on nonlinear analysis in view of the great differences in the current multidimensional urban park landscape design. The research project takes "multidimensional nonlinear" landscape design as the entry point and "multidimensional" landscape design theory as the guidance, and the simulation results show that the variance, covariance, and variance of the multimodal interaction model are relatively large. The results show that the use of "multidimensional nonlinear" landscape design can better express the visual characteristics of nonlinear landscape planning in a multidimensional way and improve the effectiveness of landscape planning [3]. A lot of the above literature has discussed the park landscape devices, but the technology is not deep enough for the intelligent reform of landscape devices.

This paper utilizes the research methods of a literature study, case analysis, and practical research to study the multimodal interaction of intelligent landscape devices in seaside parks. The literature research method: collect a large number of domestic and foreign related literature, understand the development history, development status, and research gaps of interactive media landscape devices, and find the research direction so as to realize the innovation in the research content. Case study method: collect all kinds of domestic and foreign interactive devices and interactive media landscape devices in different urban public space application cases, analyze the technical realization pathway, the creation process, the type of application space as well as the advantages and shortcomings, so as to better complete the design and landing of the actual program of interactive media landscape device in the seaside park. Advantages and shortcomings, so as to better complete the design and landing of the actual program of interactive media landscape device. Actual research method: theory comes from practice, and we must go out and conduct field research in order to find some real problems so as to solve and enhance using the design. Practice research method: any design is not a paper but is real and for the service of people, so the design cannot only stay on paper; instead, really hands-on practical work is needed in order to test the implementability of the design. At the same time, it is only in practice that problems can be found and solved, such as the rationality of the selection of materials, the feasibility of the interactive process, and the degree of coordination between the device and the space.

This paper is aimed at the elderly as a group because most of the elderly like to spend their retirement life in the seaside city, where there are generally many nursing homes, leisure park landscapes, and other spaces on the seaside, which can be used for activities and relaxation of the elderly group. Therefore, it is necessary to set up some intelligent interactive landscape devices in the landscape space of the seaside park for the elderly to easily interact with the environment and provide healthy living environment facilities. The purpose of this paper's research is to use intelligent technology to innovate traditional media landscape devices, break traditional thinking limitations, change the way of interaction between the landscape and the elderly in the public space of the seashore, and realize the transformation of the elderly from the identity of the audience who can only view from an aesthetic point of view in the past to the identity of the participant who can contact, control, and experience the device so that the elderly can feel and touch the landscape more truly and have an interesting connection with the landscape to improve the sense of participation of the masses and to enhance the vitality of the public space of the seashore. Multimodal human–computer interaction refers to the realization of information

exchange between humans and machines through sound, image, text, eye movement, touch, and other sensory modes. In this paper, the theory of multimodal interaction is applied to evaluate and optimize the design of landscape installations in seaside parks. The technology is more humanized, which can extremely improve the visiting experience of elderly people sightseeing in the seaside park, and it is also a major highlight to attract the elderly group compared with the traditional landscape setup.

2. Multimodal Interaction and Intelligent Landscape Installation

2.1. Multimodal Interaction

2.1.1. Multimodal Human–Computer Interaction

Multimodal human–computer interaction is a new type of technology that is different from traditional unimodal human–computer interaction [4]. HCI is also an emotional interaction. Multimodal HCI can effectively recognize and integrate multiple pieces of information and finally form comprehensive interaction information to provide users with a more natural and efficient interaction experience [5]. In real life, a multimodal human–machine computer system usually consists of multiple recognition devices. During human interaction, there are not only single information channels such as visual, tactile, auditory, olfactory, and gustatory, but also multiple information input/output modalities. Among them, the multimodal information input from human to computer and the multimodal information presentation from computer to human belongs to a comprehensive discipline that is closely related to cognitive psychology, ergonomics, multimedia technology, virtual reality technology, etc. [6]. The specific presentation is shown in Figure 1 below.

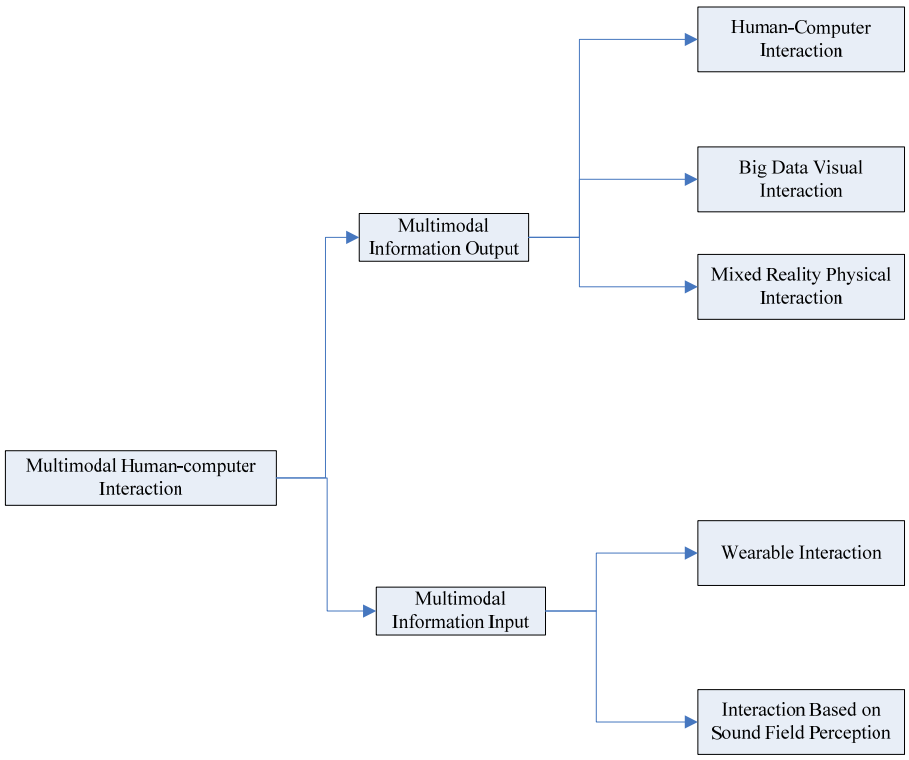


Figure 1. Classification of human–computer interaction.

As shown in Figure 2, multimodal user interface refers to the use of speech recognition, line-of-sight tracking, gesture input, and other new technologies on the basis of multimedia interface, so that the user can use a variety of forms or multiple channels to interact in a natural, parallel, and collaborative way, and the system can quickly capture the user's intention by integrating multi-channel precise and imprecise information, which effectively improves the naturalness and efficiency of human–computer interaction.

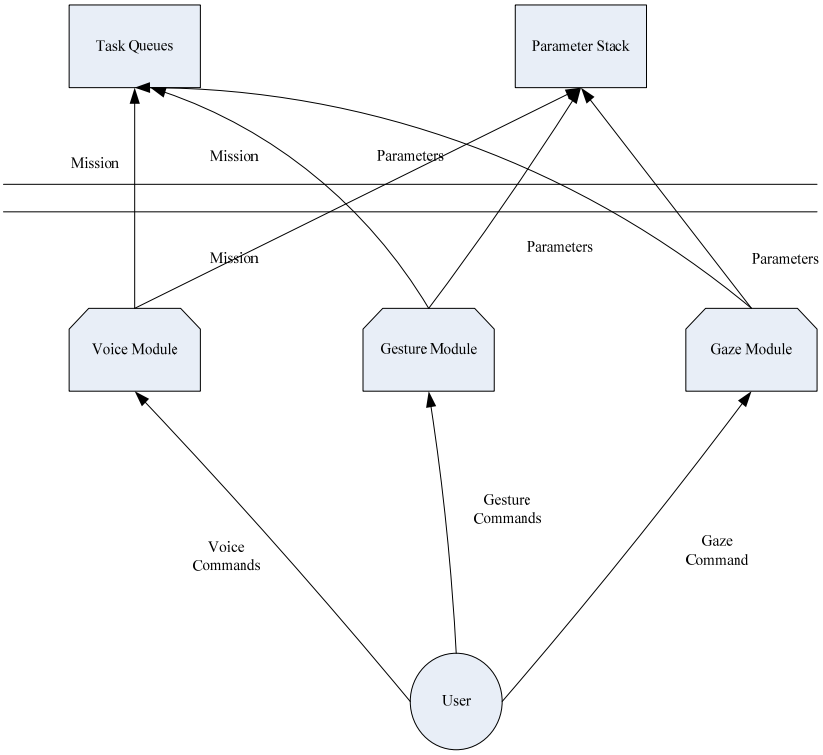


Figure 2. Multimodal user interface system.

1. Body Movement Interaction

In most cases, interactivity is implemented through sensors that sense changes in a person's position or body movements. The feedback from waving an arm or stretching the body is projected onto a specific interface. The feedback interface is usually mounted on a wall, floor, or an installation of a particular shape. It is also the most common type of interaction, and Kuflex's Quantum Space makes the viewer part of the game. As shown in Figure 3, when the viewer approaches the installation, it interacts one-to-one with the viewer's movements, creating a "silhouette" that corresponds to the viewer. Each movement causes the image to change, simulating the properties of elementary particles (gravity, magnetism, and viscosity).

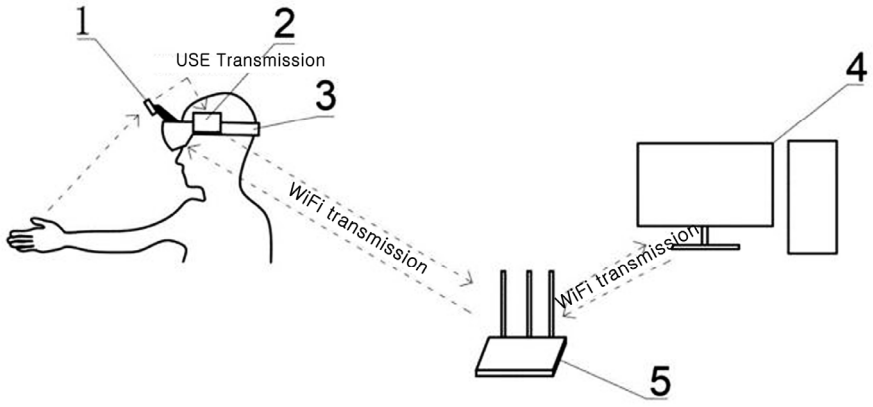


Figure 3. Body movement interaction process.

2. Gesture Interaction

In addition to utilizing the overall movement of the body as a means of interaction, artists also narrow down the medium of eliciting interaction to the hands. For example,

Design 1/O's "mimicry" allows participants to interact with the installation through gestures. A wave of the hands may produce a change in the installation. It greatly enhances the fun of the installation. Gesture recognition is one of the most important forms of interaction input in multimodal human–computer interaction, and gesture recognition is an important means of multi-view image recognition [7]. As shown in Figure 4, this method utilizes multiple cameras to capture images simultaneously, compares the differences between the images captured by multiple cameras at the same time, and calculates the depth information to obtain a three-dimensional image.

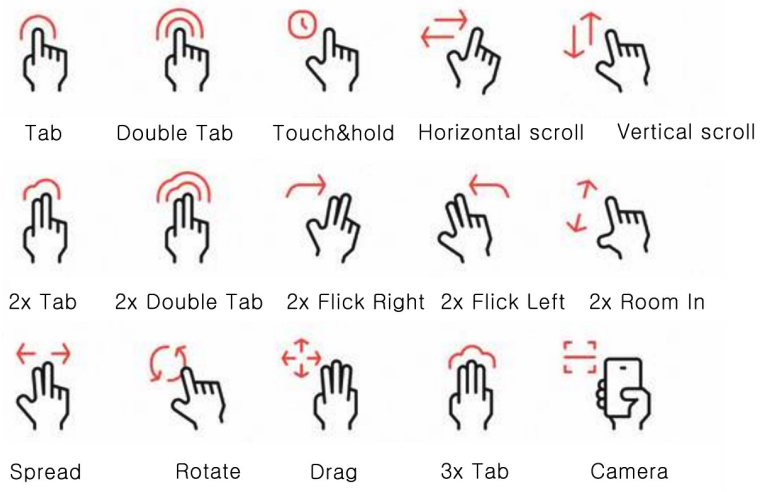


Figure 4. Gesture interaction process.

3. Touch Interaction

The popularity of touchscreen technology has enabled touch to become a common mode of interaction. Users can interact with the interface through touch, slide, and pinch-to-zoom gestures. Touch interaction is simple and intuitive, and is suited to touchscreen devices such as mobile devices and tablets. It offers a more direct method of operation, enabling users to accomplish tasks more quickly, such as zooming in and out, dragging and dropping, and turning pages. As shown in Figure 5, such devices are dominated by touch sensors, and when the viewer's hand touches the work, the corresponding feedback is projected on the touchscreen. Like Karina Smigla-Bobinski's work, "Kaleidoscope", whether it is a finger, a foot, or an entire body, pressing firmly onto the screen creates an ever-changing image.

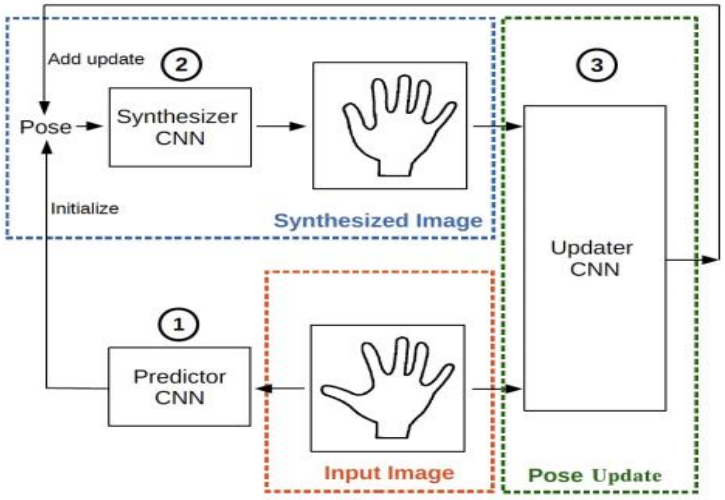


Figure 5. Touch interaction process.

4. Facial Interaction

Facial expression recognition technology refers to a technology that acquires facial expression information from the human face through computer vision technology and analyzes and recognizes such information. Based on human understanding and recognition of facial expressions, it extracts and analyzes the features of the human face through computer programs, thus recognizing and analyzing the facial expression. Facial expression recognition technology has been extensively applied to computer vision, image processing, human–computer interaction, and other fields. As shown in Figure 6, "Blinking" is a behavioral characteristic of living organisms. When the device captures the blinking moment of the viewer, the electronic eye on the wall will instantly repeat and learn the blinking behavior at this moment.

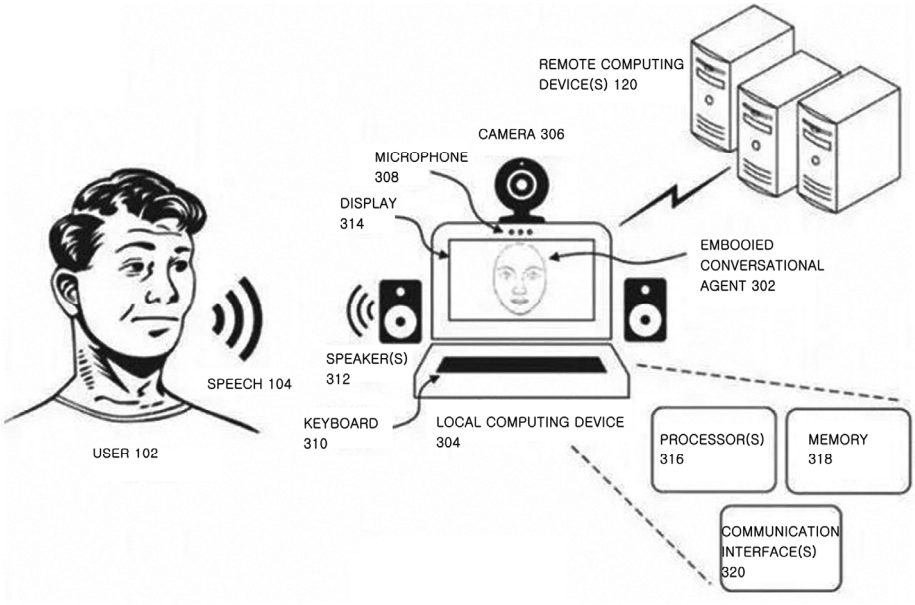


Figure 6. Facial interaction process.

5. Voice interaction

Voice interaction means that users can interact with computers by voice through speech recognition and speech synthesis technologies. Users can use voice commands to perform operations, such as voice search, voice control, and voice navigation. Voice interaction enables computers to be more intelligent, allowing users to complete tasks verbally without the use of a keyboard or mouse. As shown in Figure 7, the device converts the captured digital signals into text through speech recognition technology. This process requires parsing and comparing voice signals to identify the user's intentions and commands.

Figure 7. Sound interaction process.

2.1.2. Intelligent Multimodal Human–Computer Interaction Models Applied to the Elderly

The application of technologies in elderly care has always been the focus of researchers' attention. Based on the physiological and cognitive aging patterns of the elderly, it summarizes the evolution and development of the research methodology for elderly-friendly design and includes the elements of scientific and technological elderly-friendly design with more humanistic care. Three scenarios of intelligent technology supporting the elderly in taking photos, exercising, and outdoor activities are designed and analyzed, and the development direction to be concerned in the design process is discovered. The analysis shows that in the interaction design, the sensory state of the elderly should be fully considered, and an interface that is easy to use and user-friendly should be adopted, as well as a multimodal interaction approach. In terms of humanistic care, attention should be paid to the acceptance of technology and the emotional experience of the elderly in its use, which will facilitate the better integration of the elderly into the digital era. In the smart home, the new multimodal human–computer interaction mode that supports the elderly is to build a human–computer interaction prototype system for the smart home based on avatar. It combines speech processing and line-of-sight tracking functions, thus enabling dual-channel visual and auditory interaction [8,9]. Such interaction can effectively improve the interaction experience of the elderly.

1. Concepts related to elderly-friendly design

The concept of aging experience design was originally derived from the idea of barrier-free design, which was conceived by the United Nations International Conference on the Physically and Mentally Challenged in 1974 [10]. Disabled and elderly people were included in the target group of the barrier-free design. Before that, researchers in Europe and the United States had attempted to incorporate the idea of accessibility into the design by looking at human performance and human–machine relationships, which is considered to be the origin of human factors engineering.

By the 1980s, European, American, and Japanese researchers began to focus on the relationship and balance between humans and the environment. Ronald L. Mace of North Carolina State University in the United States advocated that there should be no difference in design in terms of age or gender. He argued that design should be inclusive and that people with disabilities and older people should not be treated unequally. He introduced the concept of universal design in his article and suggested that products, including architectural design, should satisfy the needs of all people to the greatest extent possible [11]. Around 1990, Mace and other designers proposed the seven principles of universal design (Principle 1: Equitable Use; Principle 2: Flexibility in Use; Principle 3: Simple and Intuitive Use; Principle 4: Perceptible Information; Principle 5: Tolerance for Error; Principle 6: Low Physical Effort; Principle 7: Size and Space for Approach and Use). At the same time, the guidelines also cover 3 bylaws and 37 evaluation indicators.

The introduction of universal design has had a profound impact on aging experience design. In 1985, American professor Pirkl James Joseph coined the concept of transgenerational design at a time when the notion of an aging population was initially emerging in the West [12]. Transgenerational design suggests that there should be products designed for ease of use at every stage of a person's life. He proposed that the social responsibility of designers should encompass aesthetics, technology, and humanistic care. This design concept emphasizes the elderly, and more specifically the process of aging.

Based on the barrier-free design, accessible design was first described in the Americans with Disabilities Act of 1991. Accessibility is more concerned with people with severe disabilities and hearing impairments, which also includes a segment of the elderly population. Early on, these designs were referred to as disability design, which was determined to be a negative term and discriminatory [13]. The ISO 71 (2001) standard interprets accessibility as a design standard that extends to people with limited abilities and facilitates their use of the product [14]. Accessibility has contributed greatly to the social inclusion of some people with disabilities in the community and has driven developments in areas such as building

technology. Since then, barrier-free design has advanced the study of elderly-friendly design and integrated more factors such as social support into design research.

In 1994, British scholar Roger Colema proposed the concept of inclusive design for the first time. Similar to the concept of universal design, inclusive design is a design approach that aims to take into account and reach as many people as possible [15]. Unlike universal design, inclusive design was initially conceived as a way to help designers and suppliers work together to ensure that their products and services meet as many different needs as possible, out of a concern for social justice. Inclusive design has both social and commercial values and is both a philosophy and a methodology. The University of Cambridge, together with other universities in the UK, has developed and established inclusive design tools and criteria to facilitate designers to think and act in a better way. Despite the fact that the concept of inclusive design is not targeted at the elderly, it has had a profound impact on elderly-friendly design, especially in the digital age.

The International Society for Gerontechnology, founded in 1997, formally proposed gerontechnology, which was dedicated to supporting the elderly to integrate into society in a healthy and comfortable state [16]. Although gerontechnology is technologically dependent, it is demand driven. In addition to the elderly themselves, other stakeholders who care for the elderly are also considered in the design of gerontechnology. At the same time, gerontechnology proposes to take care of the self-esteem of the elderly, not only in terms of products and services, but also in terms of their emotional needs.

In 2004, the concept of design for all was presented and explained by the European Institute for Design and Disability as an equal and inclusive approach to designing for human diversity [17]. Subsequently, the concept of user-centered design was introduced. Aging experience design, as it has developed to date, is an interdisciplinary and multifaceted field of study that involves design, psychology, sociology, human factors engineering, computers, and automation. These proposed design concepts and methodologies are initially intended to provide inclusive and friendly living environments for an aging society. Figure 8 illustrates the development process of elderly-friendly design.

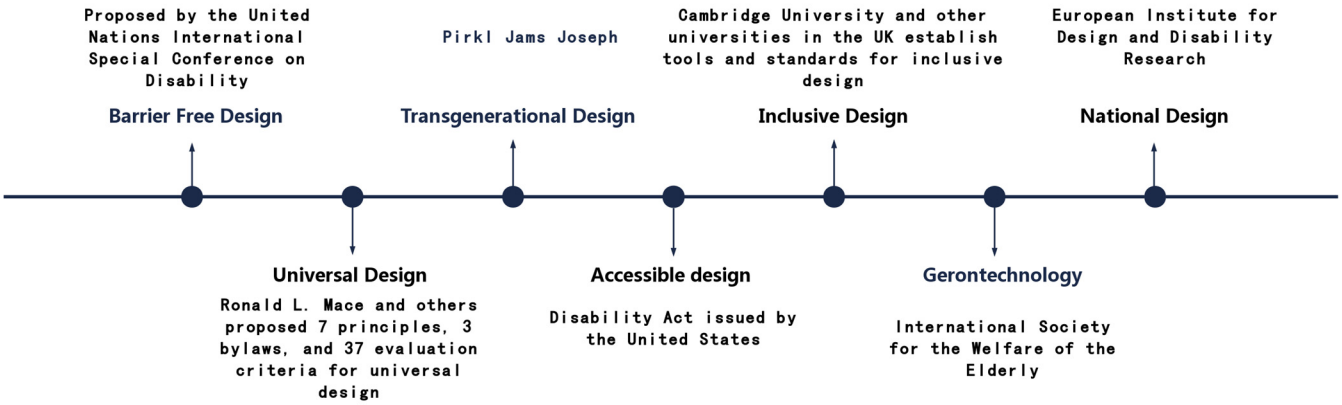


Figure 8. The evolution of design for aging.

2. Barriers to older people's use of smart products

Much research has been conducted on the acceptance of older adults' use of technologies, as well as on the complex factors that influence acceptance and the relationships between them. However, many more details are needed to capture the differences in older people's ability to use the Internet. The theory of digital inequality suggests that even when people surf the Internet, differences between them persist in critical areas, such as surfing skills. Data from a survey of Internet skills among older Americans explore whether the skills vary among this group and reveal considerable differences in Internet know-how. These are related to socioeconomic status and autonomy of use. The findings suggest that informing older adults about Internet use must be based on the socio-economic background of these users and the available access points. Most current home appliances do not have

features that are friendly to older people, such as multi-functional, digitally integrated operating systems. A number of factors affect the usability of products for older people, mostly the decline of perceptual ability and motor control, such as blurred vision and hand tremors. In terms of intelligent sports products, many studies have addressed the issue of social and sports games for older adults. Some studies try to persuade older adults to increase their physical activity through social and sports games. Also, several studies have examined the feasibility of older adults engaging in exercise using multimedia devices. Paas et al. propose a specific approach to multimedia design that addresses the problem of information overload by presenting selected segments of information prior to a holistic presentation. Related studies have shown that multimedia design does not take into full consideration the special needs, preferences, and skills of elderly users, which further hinders the learning and use of technologies by elderly users.

2.1.3. Recognition of Emotions by Artificial Intelligence

With the rapid development of AI technologies, emotion recognition technology, as one of the key components, has received extensive attention from many experts and scholars [18]. EEG (Electroencephalogram) is the expression of neurons inside the brain in the cerebral cortex tissue. EEG signals differ on human emotions, and they cannot be controlled by human initiative or activity. For this reason, it is highly reliable and feasible to recognize human emotions with physiological signals such as EEG.

For modern landscape design, "emotion" is similar to the "soul" of landscape design. This "soul" does not only refer to a customary connection formed between the landscape and the users during the use of the landscape, but also places the landscape in a special cultural and emotional setting. It may become an adequate medium of expression, serving as a specific emotional support and spiritual expression closely related to the user, such as correlation, progression, and deduction. In addition, it may also serve as a physical carrier, carrying the related content for elaboration, analysis, and derivation [19].

The inclusion of this content constitutes the basis for evaluating the connotation of the product in the landscape design. The concrete form (shape, meaning, semantics, and structural expression of the landscape) is the base point that connects the user and the landscape with the diversity of expressions of perceptual elements other than the basic behavior of usage such as visual sensory services [20]. Thus, from the user's point of view, these "points" serve as a solid foundation for the realization of spiritual values. The root of such a foundation is the fulfillment of spiritual values, as shown in Figure 9.

2.2. Seaside Park Landscape Installation

Landscape installation art combines installation art and landscape design, with strong visual impact and physical expressiveness. It may easily attract visual attention and allow the viewers to gaze at it in the landscape space, and thus become an important element in landscape design. It may be temporary or permanent; it may be a static art installation or a dynamic interactive installation. Currently, many marine cities at home and abroad attach great importance to the construction of the park landscape near the beach, the traditional landscape installation has been unable to meet the needs of the people's visit, a single modeling sculpture or obsolete guide plate has shown backward. Therefore, landscape art installations need to be towards high-tech interaction, stimulate public participation, enhance the user experience and the site of the infectious direction of further development, and this environment and the spirit of interaction between people or behavior, help to enhance the quality of the entire landscape environment, but also to enhance the unique atmosphere of the place, giving the site a distinctive personality and unique charm [21].

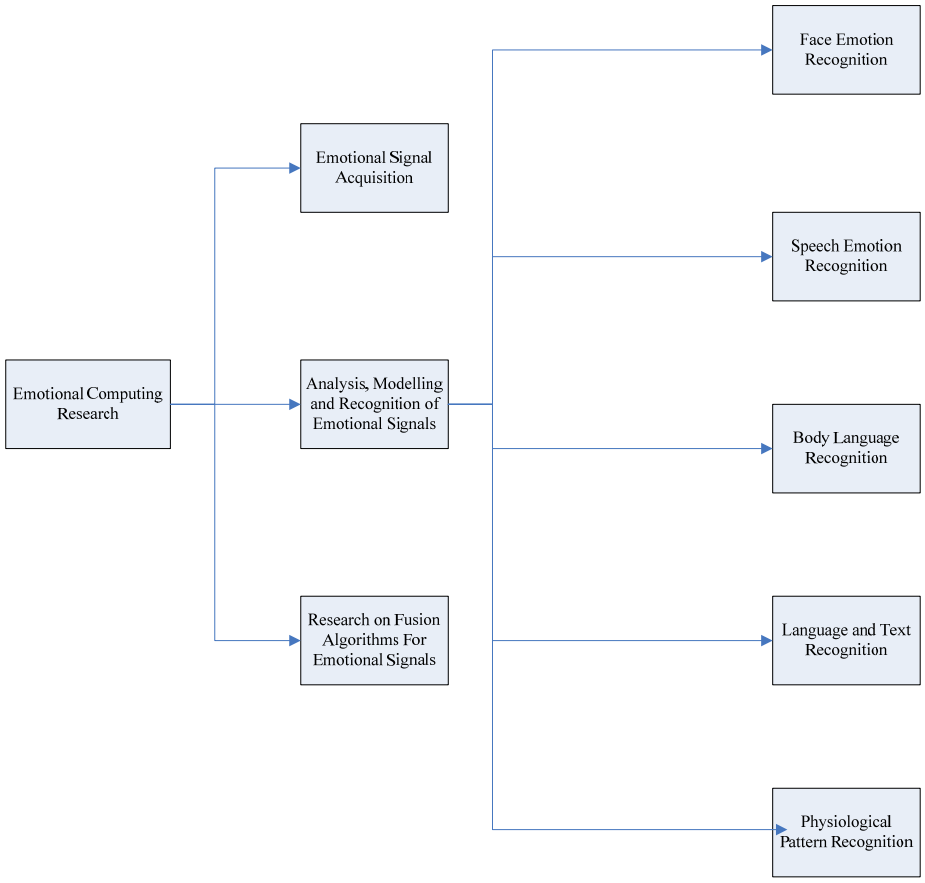
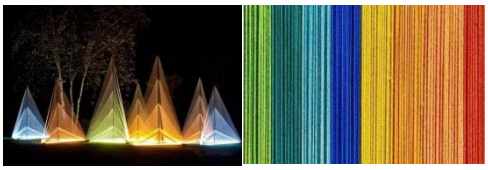


Figure 9. AI-based emotion and sentiment computation.

(1) Classification according to materials: The materials of interactive art installations can be mainly classified into three types: colorful cotton threads, glass and stainless steel according to their hardness and texture. As shown in Table 1.

Table 1. Material classification of interactive installation art.

	Delineation	**Conceptual**	**Legend**
Material Classification of Interactive Installation Art	Multicolored cotton thread	Constructing distinctive geometric shapes with different colors of cotton threads creates a light, delicate, and solid structure that also works well with light.	
	Fiberglass	More conventional materials, often used for light and shadow interactions, or sound interactions, tend to produce beautiful and moving effects.	
	Stainless steels	In interactive installation art, it is definitely the most widely used existence. Usually dynamic interaction, through the change of material angle and material reflection, to form different effects.	

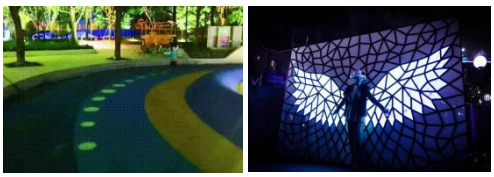
(2) Classification according to characteristics: Interactive devices can be categorized into four types, namely, interactive, spatial, multifaceted and complex, according to their display effects. As shown in Table 2.

Table 2. Characteristics of interactive installation art.

	Characterization	Conceptual
Characteristics of Interactive Installation Art	Interactivity	It allows for interactive behavior without having to directly touch the work, making it easy for everyone to enjoy and play.
	Spatiality	On the other hand, interactive installation art also adds the concept of time on top of three-dimensionality to the artistic display through four-dimensional space, which allows time to be deformed—evolved, stretched, dispersed—and allows movement and sound to come into focus, thus changing the way people see themselves and the way they see the world.
	Plurality	While traditional art forms mainly attract visitors through shapes and materials, interactive installations can create unique effects through light, sound, and movement in addition to static shapes.
	Sophistication	Compared to ordinary art forms, interactive installation art is more complex, including a variety of sensors, computer hardware, and software decorative materials, projection equipment, etc., in which there is no need to program.

(3) Classification according to form: There are three kinds of intelligent landscape devices: sound and light series, water fountain series and digital image series. As shown in Table 3.

Table 3. Smart park interactive devices.

	Categorization	Conceptual	Legend
Smart Park Interactive Installation	Acousto-optical Series	Sound and light are the main common characteristics in the existing interactive device, and the combination of sound, gesture, touch control, etc., form an all-round sensory experience. At present, the sound and light interactive device products in public parks are often combined with lighting and music, and new changes are constantly derived from the visual and auditory senses.	
	Water Fountain Series	Water-related interactive installations in parks are often landscape products such as fountains, fogs, and water curtains. This interactive installation is currently combined with sensory combinations such as lighted floor tiles, light strips, and hand gestures.	
	Digital Imaging Series	It contains interactive forms such as ground projection, holographic projection, architectural projection, interactive projection, phantom imaging, digital sand table projection, and so on. The installation is currently often ground and wall projections, presenting new landscape or spatial forms through stepping, touching, and other behaviors.	

2.3. The Necessity of Integrating Multimodal Interaction with the Design of Landscape Installations in Seaside Parks

First of all, the interactive and intelligent landscape installations can attract traffic and stimulate the vitality of the place. The installations are placed in the squares of the seaside parks to balance the density of the crowd and boost the economic development of the base as a whole. Secondly, the landscape installations are based on large-scale structures and street lamps as carriers, supporting the functions of rest and illumination. At the same time, a variety of intelligent sensing systems are utilized to form a multimodal interaction, so that their effects are unified and fit in with the overall landscape of the seaside park. In addition, through the application of intelligent technology, the landscape installations overcome the limitations of the traditional landscape, offering multi-sensory experiences of sight, sound, and touch and incorporating emotional design. It evokes the concept of advanced technology development in society and facilitates the formation of a good relationship between the social landscape and the environment. Meanwhile, some of the interactive media landscape installations consist of lamps in many forms. The change of light creates a vivid scene, and the combination of the installation with the narrow and slender space can produce a more interesting interactive experience for the public. In addition, after interacting with the installation, people will receive an "experience receipt" which assigns a physical presence to the "memory". They can also read the memories through the App at any time, so that they may be deeply impressed by the interactive experience and deepen their memories of the base.

First of all, by using emotional design and combining with intelligent technologies, the design conveys multimodal intelligent and interactive landscape installations such as "Wish Deliverer" and "City Listener", which represent "Sharing", "Entrusting" and "Memory", respectively. It adds a human touch to the installation, which reflects the emotional care of the installation to the public. Secondly, as shown in Figure 10, The combination of intelligent technologies with interactive experience methods, media expression carriers, and spatial environments gives "life" to the installation, creating a multi-sensory experience of sight, sound, and touch, and enriching the public's sense of participation and experience.

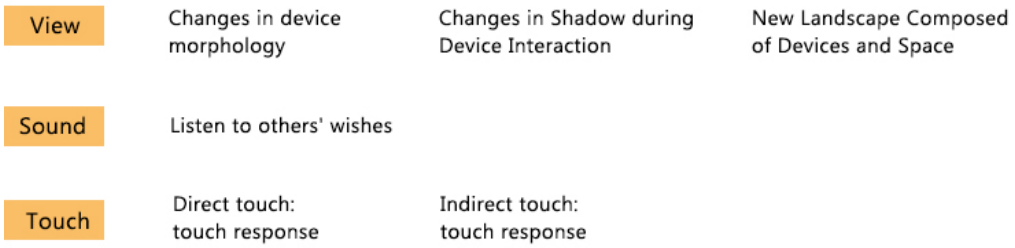


Figure 10. Multi-sensory experience.

As shown in Figure 11, finally, with different modes of interaction designed for the installations, people are encouraged to work together to produce different forms of installations. It not only embodies the interaction between people and the installations, but also the interaction between people, and stimulates communication among the public.

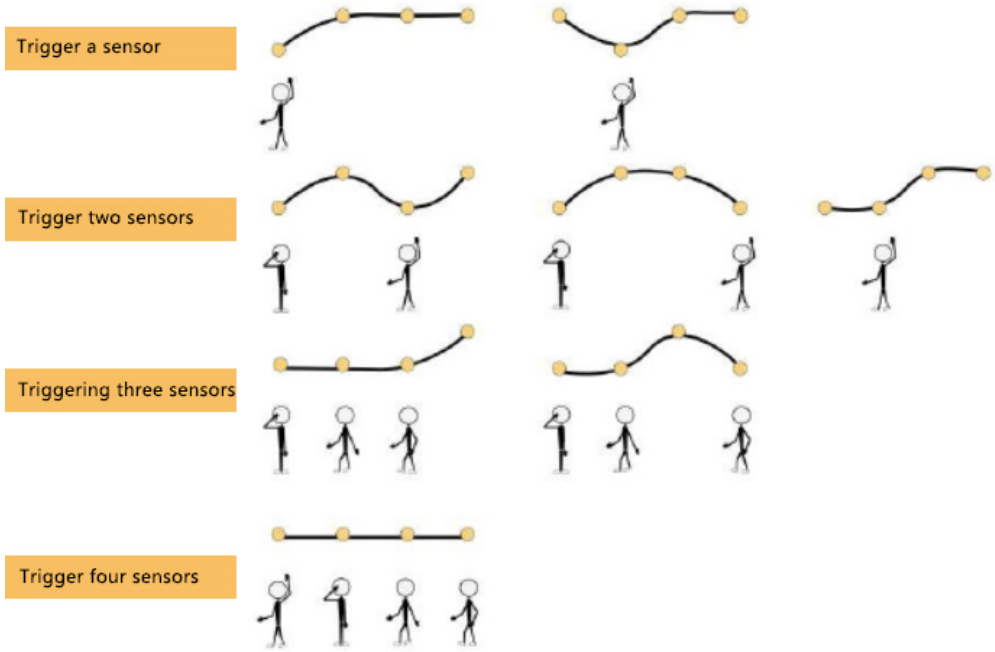


Figure 11. Multiple modes of interaction.

3. A Case Study on the Application of Intelligent Experiential Interactive Landscape Devices for the Elderly in Marine Parks

3.1. Case Selection Criteria and Analysis Methods

For intelligent experiential interactive landscape device, in order to realize the successful landing of the work, first of all, an intelligent experiential interactive landscape device is located in the seaside park to analyze and research, to understand the type of place, cultural background, and environmental status quo to the spatial needs of the design of the site to have a clear perception. Then, the conception of the interactive experience mode involves the selection of performance carrier and expression medium, according to the interactive mode to choose different performance methods, and then enter the realization of technology part, according to the design process of an interactive experience for the design of the hardware part and the software part of the design. This is the key to the difference between the intelligent interactive landscape and the traditional media landscape: the realization of the technology part of the designer has a higher technical professionalism and knowledge accumulation requirements. The realization of the technology has a high level of technical expertise and knowledge accumulation requirements for the designers, which is the decisive factor for the realization of the device on the ground. This chapter will study, summarize, and conclude the design process and technical realization of intelligent interactive landscape devices in marine parks.

The case of this study is the landscape device that highlights intelligent interaction for the elderly in the landscape space of the seaside park. Five representative interactive devices are summarized according to the physical adaptation conditions of the elderly. Considering the factors of the application of intelligent devices for the elderly, cell phone software intelligent module control is used to realize the operation of the device; considering the factors of the physical quality of the elderly, outdoor protection and safety devices are used to resist the bad weather; from the point of view of the psychological health of the elderly, healing interactive devices are used to realize the dual role of art display and physical and mental relaxation; and considering the factors of fitness and sports for the elderly, luminous induction devices are used to realize the interactive experience of sports. From the perspective of the mental health of the elderly, the healing interactive device is used to realize the dual role of art display and physical and mental relaxation; from the consideration of fitness and sports for the elderly, the luminous sensor device is used

to realize the interactive experience of sports. The sources of information for the above installations in the seashore park landscape include a literature survey and a seashore landscape survey. Based on the elements of intelligent interactive device performance extracted in Section 2, the devices were characterized and the degree of relevant content was labeled as 80–100% (●), 70–80% (◕), 50% (◑), and 20–30% (○). As shown in Table 4, the case object smart interaction device is as follows.

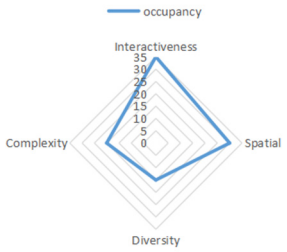
Table 4. Case object interaction device.

No	Device Name	Technology
A	Dynamic intelligent curtain	Programmable controller
B	Intelligent sun visor	solar power system
C	Luminous device	Digital manufacturing technology and traditional craftsmanship
D	Beach luminous induction sculpture	Code and hardware drivers
E	Intelligent luminous runway	Electronic sensor technology

3.2. Device Case Studies

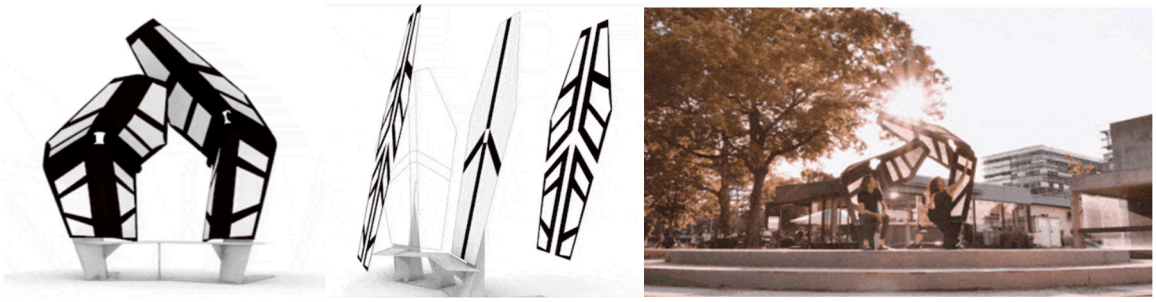
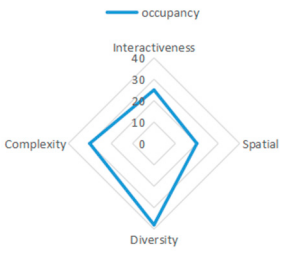
Each of the five representative interaction devices will be characterized and explained for the technical support of the smart device system. As shown in Table 5, the smart module device of cell phone software for the smart operation ability of the elderly.

Table 5. A: Dynamic intelligent curtain.

Outline		
As the elderly group is generally debilitated and slow in movement, this device can solve the role of outdoor shade and rain protection for the elderly. The dynamic smart curtain shed, which is operated using a drone, is controlled by robotic modules distributed on the structure, and programmable controllers, and these same modules can be adjusted in real time according to the weather conditions and the angle of the sun.		
Photograph		
Landscape Installation Characterization		
Interactivity		● Utilizing the two-way nature of information transfer between digital media and the audience. From a communication perspective, this mode of communication is not linear and unidirectional.
Spatiality		◕ The large-scale dynamic intelligent installation unfolds in the open space inside the park, and the overall form of the installation has spatial extensibility.
Plurality		○ The drone-operated robotic modules will have different application roles depending on the weather.
Sophistication		◑ The technology used in this device utilizes programmable controllers for control.

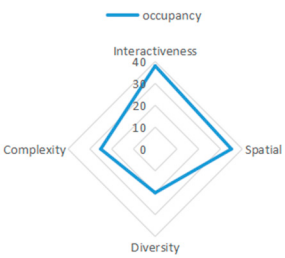
Outdoor protective safety devices for the physical fitness of the elderly, as shown in Table 6.

Table 6. B: Intelligent sun visor.

Outline		
To address the needs of the elderly in outdoor health activities, this device can provide different modes of protection and safety roles to facilitate the provision of short-stay and emergency measures. Its shape is inspired by the folding mechanism of the ladybug's wings and consists of two adjustable folding unit structures, which can be targeted to adjust the position according to the height and angle of the sun's irradiation.		
Photograph		
Landscape Installation Characterization		
Interactivity		◑ Intelligent deformation of the device by using a solar energy system.
Spatiality		○ According to its characteristic property of folding, this device creates a visual –spatial image creation.
Plurality		◕ This installation art combines insect shapes and intelligent scientific technology to realize the dual combination of decorative practicality of the installation.
Sophistication		● The technology used in this device utilizes solar technology for control.

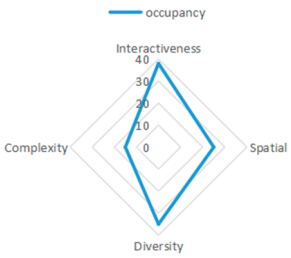
Curative devices targeting the mental health of older adults, as shown in Table 7.

Table 7. C: Luminous device.

Outline		
This installation provides a healing outdoor space for the elderly population, as most of them lack companionship and a sense of security; thus, this installation space can achieve a relaxing effect. It is made using modern digital fabrication techniques and traditional craftsmanship, resulting in a temporary art installation on the beach that glows and shines, and is viewed from different angles and at different points in time, giving it a different feel. Changes in weather and climatic conditions also have an effect on the production of light. The installation also shows people modern photographic techniques.		
Photograph		
Landscape Installation Characterization		
Interactivity		● Digital fabrication techniques are utilized to help the installation achieve different lighting effects and interactivity with the viewer.
Spatiality		◕ The installation carries out the creation of a spatial atmosphere from an optical point of view.
Plurality		○ The structure of the installation adopts traditional craftsmanship, combined with modern decorative means and technical cooperation.
Sophistication		◑ The technology used in this device utilizes digital manufacturing technology to control the photographic effect.

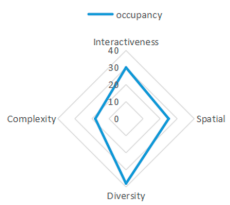
Light-emitting sensing devices for elderly people's movement, as shown in Table 8.

Table 8. D: Beach luminous induction sculpture.

Outline		
Designed for the partially disabled and elderly, this installation has a sensory device on the floor that can be touched by wheelchair rollers or crutches to create an interactive experience. Its design is inspired by the dynamic patterns created by organic systems found in nature. During the day, smooth dichroic surfaces reflect the sky and surroundings to create a surreal space. At night, the sculpture comes alive and glows as the viewer moves through the ever-changing luminous panels, driven by complex code and hardware, all customized by the artist.		
Photograph		
Landscape Installation Characterization		
Interactivity		● The installation's luminous panels reflect the colors of the sky during the day, and at night the viewer's interaction with the light creates the dynamics of the sculpture.
Spatiality		◑ The installation as a whole is in the shape of three circular apertures, which create a different sense of space in real time, depending on the color.
Plurality		◕ The device is driven by complex code and hardware, and the sculpture produces dynamic effects with multiple manifestations.
Sophistication		○ This unit panel not only has a reflective effect, but also has a hardware-driven mode.

Interactive sensing devices for the living conditions of the elderly, as shown in Table 9.

Table 9. E: Intelligent luminous runway.

Outline		
Aiming at the characteristics of the elderly who like to walk outdoors, the arrangement of this lighting device can bring the interactive experience of sports for the elderly and increase the fun of life and participation. This device integrates artificial intelligence technology with the results of sports research to enhance the interactive experience of the runway, and visitors can choose their own speed to challenge. Bouncing runway, light installations that generate interesting interaction with the audience between jumps, and sunflower lamps that can rotate with the flow of people.		
Photograph		
Landscape Installation Characterization		
Interactivity		◕ Produces an interactive experience of light in the movement of the viewer.
Spatiality		◑ The installation is characterized by spatial interaction formed by shapes with patterned features.
Plurality		● The device has dynamic functions such as illumination and rotation.
Sophistication		○ Exercise experiences have varying degrees of effectiveness.

3.3. Analytical Summary

As shown in Table 10, based on the results of the characterization of the five main cases, a comparative analysis has been carried out, in which the induction method, the type of application space, the advantages and the disadvantages are summarized separately.

Table 10. Comparative analysis of smart interactive device cases.

No	Case	Induction Method	Type of Application Space	Vantage	Not Sufficient
A	Dynamic intelligent curtain	Infrared sensor	Public square	Programmable controller technology applications for smart services for elderly health are advanced.	Lack of functionality
B	Intelligent sun visor	Infrared sensor	Public square	Biomimetic styling for a great experience. Provides space for emergency response for the elderly.	Weak interaction
C	Luminous device	Pushbutton switch	Sea–land	Innovative styling and materials are modern and traditional at the same time. Healing the hearts of the elderly.	Weak interaction
D	Beach luminous induction sculpture	Pressure sensors	Beaches	Promote human interaction. Targets a broader group of older persons.	Weakly adapted to the environment
E	Intelligent luminous runway	Pressure sensors	Coastal trail	Biomimetic design for a great experience. Increase the fun of life for the elderly.	Lack of functionality

The following conclusions can be drawn from the case studies of multimodal intelligent landscape installations at home and abroad:

(1) At present, the interactive media landscape installations' medium of expression is based on sound, light, and electricity, and a few of them utilize power devices. There are two main reasons for this situation. First, sound, light, and electricity help to create the atmosphere of the site [22]. It can set the environment of the place and enrich the landscape effect of the site. Second, because the intelligent and interactive landscape installations are displayed in the outdoor public space, there are many uncertainties in the outdoor environment. Sound, light, and electrical devices can be covered with waterproof materials to protect the circuits and prolong their service life. However, there could be gaps in the interface of the rod joints of the mechanical power unit, and rain and snow could easily enter the unit, causing damage to the circuits. Yet, it is likely to cause aesthetic fatigue if only sound, light, and electricity are used as the medium of expression. As a result, the design of interactive media should be combined with a variety of expression media to render the installation more innovative and interesting. In addition, new materials should be used to address the problem of post maintenance.

(2) The cases indicate that intelligent and interactive landscape installations not only feature the interactive experience available in interactive devices, but also provide the functions of illumination, access, and rest as urban infrastructure. Thus, the potential functions of the interactive media landscape installations should be fully exploited in their design.

(3) The sensing methods of intelligent and interactive landscape installations are dominated by pressure sensing and human infrared sensing. They represent direct and indirect contact between humans and the installation and are suitable for the design of most interactive media landscape installations. Hence, sensors may be selected depending on the interaction mode of the design program during the creation of interactive media landscape installations. This meets the needs of some of the elderly who are physically challenged to move around and completes the interactive experience of life for the elderly through intelligent systems and sensory devices.

(4) The intelligent and interactive landscape installations are primarily used in plazas and streets, and less in waterfronts and green spaces. The main reason is due to the characteristics of intelligent and interactive landscape installations, as they can make the site more crowded [23]. Placing interactive media landscape installations in parks, squares, and streets enables nearby shopping centers and stores to attract visitors, thus boosting consumption. At the same time, it also serves as a space for consumers to relax and have fun. Thus, interactive media landscape installations should be tailored depending on the nature of the place, so that the installations can play an active role in meeting the needs of the site.

(5) Intelligent interactive landscape devices are partially inadequate. Designers will landscape "anthropomorphization" so that the device has a "thought", providing people with a "people and devices" interactive experience, but for the "people and people" interaction. "People and people" interaction is less considered, especially in today's aging society; thus, we need to create more comfortable and convenient spaces for the elderly [24]. Therefore, in the initial design of interactive media landscape design needs to consider the relationship between people and people, through the design to promote human communication, in order to build good social relations.

4. Elderly-Based Interaction Perception Simulation Experiment and Landscape Device Optimization Scheme

4.1. Respondent Interaction Interface Perception

Compared to a single channel, data based on both voice and line-of-sight channels can better recognize user instructions. This experiment focuses on visual and auditory aspects, with an elderly population of 65 to 75 years old, including six males and four females, totaling ten participants. Participants participated in two sets of experimental interfaces. The first group was based on a single-channel interaction interface, and the second group was based on a multimodal interaction interface. Each person must complete 10 assignments, keep homework records, and observe their homework habits. Their homework was recorded and their homework habits were observed. The study found that 10 subjects performed 100 tasks, among which 89 tasks had the same direction of sound indication as eye gaze, while only 11 had inconsistent directions of sound indication and eye gaze. In response to the challenges of human visual and auditory perception, as well as the inconsistency between human visual and auditory perception tasks, a rule-based human visual and auditory perception model was used in the experiment to enhance the credibility of the system, as shown in Table 11.

Table 11. Task reasoning rules.

V	E	V==E	T
V = T1	E = T2	Yes	T = T1
V = T1	E = A	Yes	T = A
V = 0	E = T1	No	T = T1
V = T1	E = 0	No	T = T1
V = T1	E = T2	No	T = VR
V = D	E Anywhere	No	T = D

Among them, V represents voice and E represents line of sight; T represents the task and VR represents the start of speech recognition. When V and E both point to a certain task, but the two are inconsistent, the system would use voice to inquire about the user's task information and use the user's voice response as the judgment result. D represents a conversation, which started with an avatar. In this regard, research mainly focuses on automatic word segmentation, part-of-speech tagging, question pattern classification, keyword extraction, and rule-based sentence pattern matching [25]. By processing keyword

positioning and sentence pattern rule matching above, the content and type of the problem can be determined, and appropriate answers can be obtained through database query technology, thus enabling avatars to have a limited range of natural language understanding abilities based on intelligent landscape management content.

4.2. Evaluation and Analysis of the Effectiveness of Multimodal Interaction Design Based on Elderly People

$$Yi = (Pi, Ai, Di) \tag{1}$$

Pi refers to the degree of happiness of the subject during exercise; *Ai* refers to the degree of emotional relaxation in human–computer interaction; *Di* refers to the degree of user centricity.

The experimental results indicated that the average values of the three dimensions for the second set of interfaces are:

$$\overline{Y}_2 = \left(\overline{P}_2, \overline{A}_2, \overline{D}_2\right) = (22.34, 3.52, 10.7) \tag{2}$$

The average values of the three dimensions in the first interface are:

$$\overline{Y}_1 = \left(\overline{P}_1, \overline{A}_1, \overline{D}_1\right) = (10.01, 6.45, -1.41) \tag{3}$$

From Formulas (2) and (3), it can be seen that in the P-dimension, the average score of the second group of participants is higher than that of the first class of participants, indicating that the second group of participants has a significant advantage in sports happiness. On the A-axis, due to the more relaxed emotional performance of the second group, the emotional response is also relatively low. On the D-dimension, the average score of Group 2 is also significantly higher than that of Group 1. This is because Group 2 is user centered and not dominated by the program during task execution, resulting in a higher score of Group 2 than Group 1. This confirms the effectiveness of the multimodal interaction mode in helping elderly people complete intelligent operations, enabling elderly users to complete operations in a more relaxed state and obtain a higher sense of pleasure and achievement during the operation process [26].

4.3. Optimized Design Solution for Landscape Installations in Elderly-Based Seaside Parks

Through simulation experiments on the interaction perception of the elderly, the visual and auditory perception models of the elderly are derived to validate the optimal way to seek the design of outdoor landscape installations in seaside parks. Conclusions are drawn from the comparative case study of intelligent interactive experience devices to provide experience and direction for the trend of interactive device design that matches the behavior of the elderly. Based on the conclusions of the above study, the optimization scheme of the landscape device for the seaside park suitable for the elderly is derived [27].

4.3.1. Setting of the Interface of the AI Service Robot

Due to the poor cognitive ability of the elderly, when designing the interface for human–computer interaction, the interaction interface should follow the principles of simple and easy operation and reducing the memory burden of the elderly. Then, warm colors should be selected in the dialog box, the size of the text should be adjusted as needed, and the brightness of the background light should be increased appropriately or other auxiliary lighting should be added so that the elderly can visually distinguish the various colors and can arouse their empathy, so that they can have a certain impression of the whole interface [28].

4.3.2. Suggestions for Landscape Settings for the Elderly

(1) Barrier-free access design

According to the experimental conclusions on the effectiveness of multimodal interactive operation for the elderly, setting up barrier-free access at ramps and elevated platforms can meet the needs of the elderly for independent activities and realize interactive communication with landscape devices. In the accessibility design, the parts related to plane and vertical are designed to provide an accessible route for specific groups with mobility impairments.

(2) Injury-free design

Based on the consideration of factors affecting the physical health of the elderly, outdoor protective safety devices are installed to avoid possible injuries to the elderly in seaside park activities using an intelligent sensing system. In order to avoid the possibility of injury to the elderly after falls, slips, collisions, and other phenomena due to unsteady gait, weakness, and disorders caused by the decline in physical ability and other functional disorders.

(3) Self-help design

Based on the visual and auditory perception model in the intelligent interaction experience of the elderly, it is proposed to allow the elderly to use the software intelligent module control to realize the experiential needs of outdoor activities. In order to meet the needs of the patient due to the inability to complete fully independent activities, physical weakness, or treatment, the need for different equipment to achieve a certain activity with the help of the strength required.

(4) Paving design

Elderly people also have different outdoor activities due to their different physical qualities and living environments. For example, some blind and disabled people need sensory devices with intelligent recognition to interact with the environment. In the choice of paving materials, it is necessary to use non-slip and non-glare materials and to design a blind alley. The pavement at entrances, exits, steps and corners should be varied in color and pattern, and it is also necessary to use materials of different textures to divide the space.

(5) Vignette logo design

In a seaside park environment, the guidance system occupies an important role, therefore, signage design with intelligent systems can realize the communication experience between the elderly and the environment. Interactive communication of the elderly is realized through light indication, text indication, and intelligent robot voice. Because the eyesight of the elderly declines and they do not have a strong sense of direction, a good vignette sign design becomes very important. At the corner and end of the road, you can arrange some fascinating plants, colors, or vignettes.

(6) Lighting design

In the multimodal perception model for the elderly, vision occupies a major position. Lighting facilities with intelligent adjustments can give the elderly different degrees of sensory interaction, both physically and mentally. In terms of lighting design, the uniformity of illumination should be strengthened and glare should be avoided as much as possible. The illumination should be improved through a variety of light sources, a single overly bright light should not be used for illumination, and there should also be good shading of the lamps and lanterns. In terms of the selection of outdoor lamps and lanterns, transparent or translucent lampshades can be used, so that the elderly can be provided with a good and soft light environment.

5. Discussion

5.1. Comparison of Results from Related Literature

In many foreign countries, there are research centers specializing in interactive installation art, including the Interactive Art Center in Tokyo, Japan and the Academy of Media Arts in Cologne, Germany. The members of the research center are artists and technicians who are committed to creating new forms of artistic expression using intelligent technologies. There is also a lot of research on interactive media landscapes. They are also the driving force behind the rapid development of the interactive media landscape in foreign countries. Foreign research has been more intensive, detailed, and comprehensive on the application of interactive media landscapes in urban public spaces than domestic research. The article "FeelOpo: An Interactive Installation to Explore the 'Beat of Oporto'" published by Isabel Carvalho from Portugal, tells how to improve the cultural identity of the city by setting up interactive media installations in the urban public space [29]. Through the interaction between the installation and the visitors, the visitors can gain a deeper insight into the history of the development of the city, the famous tourist destinations as well as the significant events in history, so as to increase their knowledge of the history and culture of the city. As shown in Table 12.

Table 12. Foreign theoretical research results on the application of interactive media landscape installations.

Year	Author	Country	Topic	Research Results
2013	Robert Praxmarer	Austria	Urban Playfulness: Fostering Social Interaction in Public Space [30]	Improve the sense of cultural identity of the city through interactive projection devices, so that tourists can better understand the city.
2014	Enrico Nardelli	Italy	A Viewpoint on the Computing-Art Dialogue: The Classification of Interactive Digital Artworks [31]	Propose three factors for the application of interactive devices in urban public spaces: space, people, and rules. Enhance competition, collaboration, and exploration by adding new rules for interaction and gaming, and promote social interaction.
2018	Isabel Carvalho	Portugal	FeelOpo: An Interactive Installation to Explore the"Beat of Oporto" [29]	Propose the integration point between digital devices and urban public space design. Classify playable digital interventions in urban public spaces and conceptualize playable digital devices in public spaces.
2020	Chen, Gonsalves, Guaralda, Turkay, Kerr	Australia	Towards a Typology for Playable Digital Interventions in Urban Public Space [32]	Propose the viewpoint of dialogue between computer and art: an information technology system for audience participation in the production of artistic works.
2020	Karolina, Littwin	Germany	Signaling Smartness: Smart Cities and Digital Art in Public Spaces [33]	Discuss the application and development of digital art in urban public space and the relationship between digital art and smart city.

At the level of theoretical research. Domestic relative to foreign-related literature research information is less, and mainly on multimedia installation art as well as new media art research, interactive components are less. In the context of the increasingly serious aging around the world, the research on intelligent interactive landscape device systems for the elderly is still too little to provide a good senior living environment for the elderly to protect. A small portion of the literature that explicitly researches the object of interactive devices mainly researches the characteristics and expressions of interactive devices, and researches less on the realization way of technology, and the research object mainly focuses on the artworks in indoor space, and the literature that researches the application of the interactive media landscape devices in the seashore park landscapes is more scarce. As for the relevant foreign literature, the research on interactive landscape installations is earlier and a system has been formed, with a high degree of technical

specialization. It is an inevitable trend of the times to involve experiential media landscape installations based on intelligent technologies in the urban public space. However, there is a relative lack of research in this area in China. As a result, we should keep up with the pace of the times and promote theoretical and practical research on the application of interactive media landscape installations in urban public spaces in China. It can create a better interactive experience for the public and satisfy people's spiritual needs.

5.2. Research Innovations and Significance

In modern life, human interaction is an indispensable part of daily life. Seaside squares and parks are a venue for people to communicate and interact with each other. Also, intelligent and interactive landscape installations are an essential part of the public space in marine cities, representing the image of the place and embodying the culture of the place. However, with the enhancement of people's aesthetic taste, the current single media landscape can no longer satisfy the public's aesthetic demand. The interactive media landscape installations based on intelligent technologies have been introduced into the urban public space and the public's vision due to their novel expressions and various interactive methods, which offer multi-sensory experiences and aesthetic enjoyment to the public. This paper is aimed at the elderly group, and the purpose is to meet the new direction of landscape device design in the context of aging. Currently, the seaside city is gradually developing into a preferred place for the elderly to live, and in order to meet the demand for interactive integration and communication between the climate environment and the landscape environment, it becomes the future development trend to carry out a multimodal sensory experience of the intelligent landscape device in the seaside city. Based on the application of an intelligent technology experience interactive media landscape device in the seaside park landscape to explore innovative interactive media landscape device design process and the way of technology realization, the interactive media landscape device of the ocean city park space includes intelligent, humanized, diversified, personalized design creation, so as to stimulate the vitality of the urban public space, shaping the spatial image, and establish the spirit of the place.

Social significance: "Interactivity" is the fundamental attribute of intelligent and interactive landscape installations. Experiential, intelligent, and interactive landscape installations can enhance people's sense of involvement and encourage the public to interact with the installations. At the same time, they also provide opportunities for people to communicate with each other, thus contributing to the formation of favorable social relationships.

Economic significance: Experiential and intelligent and interactive landscape installations based on intelligent technologies are characterized by interactivity, openness, and high technology that are not available in traditional public art installations. As an emerging art form, it can instantly capture the public's attention and stimulate their desire to interact with it, thus boosting the popularity and vitality of the place. Putting such interesting interactive media landscape installations into commercial space can attract traffic and achieve the purpose of promoting consumption.

Cultural significance: Unlike traditional landscape, sculpture, public art installations, and other art forms, experiential, intelligent, and interactive landscape installations bring various interactive forms through the use of intelligent technologies, enabling the audience in the seaside park landscape to enjoy multi-sensory experiences of sight, sound, and touch. Novel and funny interactive media landscape installations break the routine of people's lives, enable the audience to acquire new aesthetic perceptions, satisfy their spiritual needs, enrich the urban culture, and shape the city name card.

5.3. Research Feasibility and Limitations and Future Research Lines

By analyzing the landscape of the seaside park in terms of spatial theme, spatial type, spatial history and culture, and spatial user distribution, we find out the advantages and existing problems of the place, so as to provide a feasible basis for the design of intelligent

landscape devices. Then, the morphology design of the intelligent device is carried out, and the prototype of the device morphology is extracted according to the spatial theme and the history and culture of the space, and the shape of the device is formed through the evolution of the morphology, so as to make the device and the space have the integrity rather than being a lonely and out-of-place individual. Next, we consider the scale of the installation according to the type of space and complete the exterior design of the installation [34]. Interaction modes are selected according to the type of space and the scale of the space. There are two types of interaction modes: single-person mode and multi-person mode. For smaller intimate spaces, single mode is chosen, and for large open parks with more foot traffic, multi-person mode is chosen. Then, according to the spatial needs of the intelligent device interactive experience mode and interactive process design, select the appropriate performance media and expression carrier, and, finally, use the interactive experience mode and the expected effect according to the technical part of the realization, the device connection, and assembly, so as to achieve the purpose of optimizing the seashore park environment with intelligent interactive landscape devices according to local conditions.

At present, the intelligent interactive landscape device is still in its infancy in China, and the related theoretical research is relatively small, although some actual design cases of interactive media landscape devices have already appeared in some developed cities; however, it is still at a lower level in terms of technical application, which is quite different from the development of today's science and technology. Therefore, most of the cases listed in this paper are from abroad, and the understanding of the cases is mainly from the network, which leads to certain limitations in the research and some of the views are relatively one-sided. In addition, the technical aspects of the interactive media landscape are limited by the professional direction, resulting in difficulties in the implementation of the device on the ground, but there is still a lot of room for upgrading, and when it is put into use in the future, it needs to be improved and innovated, integrating the latest technology, and enriching the user's interactive experience. The greatest charm of the interactive media landscape lies in the continuous innovation, with the times, in order to continue to revitalize the new vitality.

6. Conclusions

With the development of human society, the design method of modern landscape gardens is becoming more and more diversified, and people have higher and higher requirements for landscape gardens in modern cities. From children's theme parks to fitness plazas for the elderly, from green vignettes to paving arrangements, all of them reflect modern people's demand for a high quality of life. However, there are still many problems in modern landscape gardens, so the introduction of the current most advanced artificial intelligence technology into landscape gardens has become an important topic. With the aging of the population, modern landscape garden design is becoming more and more humanized, adding design elements that serve the elderly [35]. Multi-sensory interactive media landscape devices based on intelligent technology have a high sense of experience and strong interactivity, prompting people to be very happy to "communicate" with them, and through the study of some existing cases, it is found that the integration of interactive media landscape devices based on intelligent technology into ocean city parks and plazas can optimize the original beach park environment, attract people flow, and stimulate the site. It can optimize the environment of the original seaside park, attract a flow of people, stimulate the vitality of the site, and improve the site. In addition, the reasonable design of interactive devices can also highlight the theme of the urban seaside park, shape the culture of the venue, and form the role of the venue's business card. Therefore, this paper focuses on the design process of optimizing the landscape of seaside parks with experiential intelligent interactive landscape devices based on intelligent technology, as well as the ways to realize it. Through the study, the conclusions are as follows.

From the perspective of the elderly, the urban seaside park is analyzed in terms of spatial theme, spatial type, spatial history and culture, and spatial user distribution, respectively, to find out the advantages and existing problems of the place, so as to provide a basis for the design. Then, the form design of the device is carried out, and the prototype of the device form is extracted according to the theme of the space as well as the history and culture of the space, and the shape of the device is formed through the evolution of the form so that the device and the space have integrity rather than being a lonely and out-of-place individual. Thinking about an intelligent interactive mode device suitable for the elderly, we consider the scale of the device according to the type of space and complete the external design of the device from the perspective of health and multi-sensory experience. The interaction modes are selected according to the type of space and the scale of the space. There are three types of interactive modes, single-person mode and multi-person mode. For a small private space, choose the single mode, and for an open coastal park plaza with a large number of people, choose the multiplayer mode. Choose the multiplayer mode. Then, according to the spatial needs of the device's interactive experience mode and interactive process design, and choose the appropriate performance media, expression carrier, and finally use the interactive experience mode and the expected effect according to the technical part of the realization, device connection, and assembly, so as to achieve the purpose of optimizing the environment of urban parks with intelligent interactive landscape devices according to local conditions.

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