RESEARCH ARTICLE

Exploration and Application of Wisdom Garden in University Campus

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Abstract: The progress of modern science and technology promotes the development of wisdom gardens. However, the development of wisdom gardens not only relies on information technology, but also integrates people's perceptual cognition and emotional experience. This article will expand wisdom garden area to the campus, put forward the definition of campus wisdom garden, combine with the real demand of college campus and design campus wisdom garden system, from "technique" and "emotional experience", achieving a few big function design of campus wisdom garden. In view of the campus wisdom garden of ordos ecological environment vocational college, put forward the implementation strategy of campus wisdom garden, realize the interaction between information technology, human beings and the natural environment, create a modern garden landscape that "enhances perception" and "surreal experience" which expand the wisdom garden from the city to the campus, from the simple application of technology to the deeper level of research, and provide more possibilities for the development of the wisdom garden.
Keywords: Wisdom garden; Campus wisdom garden system; Technology; Emotional experience

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1. Introduction

At present, the construction of wisdom gardens has been successful in many cities in landscaping management, landscape design, plant and animal protection, diseases and insect pests, etc., which provide theoretical and practical basis for the construction of wisdom gardens on campus. This paper takes the campus smart garden as the research object, integrates modern information technology with campus green landscape, explores and applies the campus smart garden system, realizes the intelligent and scientific planting and maintenance management of campus green space, and endows the campus landscape with the function of green, intelligent and experience.

2. Definition of Campus Wisdom Garden

Wisdom campus landscape is the use of a new generation of information technology, such as big data cloud computing, Internet of things, 3D visualization, spatial information which is combined with green space landscape of campus, to form an interactive system which connects the man, the natural environment and the information technology, uses the way of wisdom and carrier to reproduce, perception and experience of landscape, creates realistic landscapes with perceptual experience beyond time and space [1].

3. Design of Campus Wisdom Garden System

3.1 Overall Design of Campus Wisdom Garden System

At present, the research of wisdom gardens mainly focuses on the application of information technology in the maintenance and management of green space landscape in cities, which has realized intelligence and high efficiency, but reduced the feeling and experience of landscape [2]. College campus is the teachers and students' learning environment, wisdom garden system of campus includes not only "technical" level, but also "emotion and experience level", which is not a show platform of information technology, but is used by us to realize the integration of the campus space information, intelligent maintenance and management of general function through using information technology. It is necessary to strengthen the interaction and connection

between the natural environment of campus and modern technology, enhance the experience and perception of teachers and students, promote people's sense of belonging and identity to the campus, and create a people-oriented campus wisdom garden.

3.2 Overall Structure of Campus Wisdom Garden System

As a place for teachers and students to live and study, the management and design of green space landscape on campus should be scientific and artistic, force on information technology while pay attention to the interaction between teachers and students, campus natural environment and information technology. Under the background of wisdom garden, this paper designs a wisdom garden system of university campus, which is divided into two levels: "technology" layer and "emotional experience" layer, including technical design and functional design. The overall framework is shown in the figure.

"Technology" Layer: it is the technical design of the system, providing technical support for the realization of emotional experience function, including spatial information integration technology, Internet of things technology, 3D virtual and visualization technology, etc., which is the foundation of campus intelligent garden system.

"Emotional Experience" Layer: it is the functional design of the system, including intelligent plant environment monitoring and watering system, intelligent soundscape system, intelligent waterscape system, intelligent scenery system, intelligent fragrance system, environment and plant interpretation system and VR experience system, and is the application and service layer of the intelligent garden system.

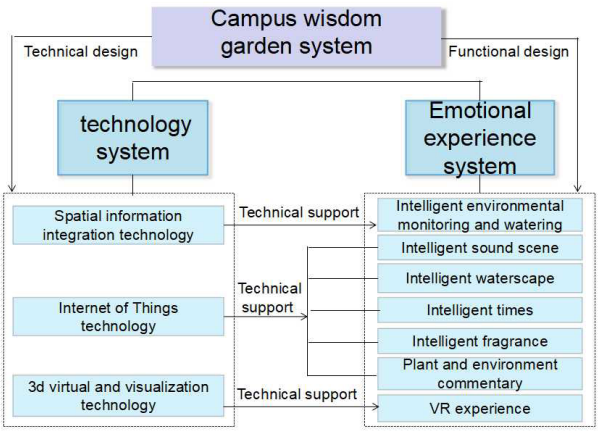

Figure 1. Frame structure of wisdom garden system

3.3 Functional Design of Campus Wisdom Garden System

3.3.1 Intelligent Plant Environment Monitoring and Watering System

Using spatial information integration and Internet of Things technology to collect plant and environment growth information and detect growth status through monitoring equipment. Using the Internet of things, such as monitor temperature and humidity sensors, soil, climate monitor, the plant information collection equipment, video monitoring equipment hardware technology to monitor plant growth environment humidity and temperature, soil fertility and moisture, the content of harmful gases such as carbon dioxide in the air testing, plant diseases and insect pests, and road landscape areas. On the basis of the hardware devices to collect data, software production plant dynamic growth model, the change of sunlight model, pest control, traffic model and so on. By analyzing the model of plant growth, soil moisture and green environment of the overall situation, choose suitable plants. According to different plant irrigation condition and the damage of the green area and the flow of people on the road, take water precise fertilization measures and improve the strategy. In addition, the above data can be accessed through computer and mobile APP, and view charts and dynamic images [3].

3.3.2 Intelligent Soundscape System

The intelligent technology of the Internet of things, such as sound and pressure sensor, is used to capture people's voice and footsteps, open the voice control system, and play the sound of nature in different environments and scenes, such as birds, frogs, water flow, etc., so that people have an immersive experience [4]. With the approach and distance of people, the sound of the system from big to small until disappearing, to achieve the function of controlling the sound size according to the distance. In places with specific historical memories or special events, people can be prompted to recall the site by playing sounds specific to history, so as to form a sense of site identity. In addition, through the digital processing of the software, data visualization and visualization, according to the dynamic decibel map of the scene sound, control the sound decibel of the environment or place, create a comfortable soundscape environment.

3.3.3 Intelligent Waterscape System

Activate the vitality of waterscape space by triggering the waterscape state through human behavior, such

as identifying body posture through sensors, raising or lowering the arm, controlling the height of the water column, using the pedal device or touch switch to control the fountain or spring in the waterscape. Through computer technology and fountain technology, the system pre-design the changes of waterscape and adjust the height of water column at intervals to attract people to approach the waterscape who will be surrounded by the waterscape, and walk out of the interactive experience process of waterscape [5]. In addition, the system can combine the non-physical factors in the environment, such as the bell or bell, with the waterscape. When the bell or bell reminds us, the fountain of the waterscape will be turned on, and the sound ends, and the fountain will stop, so as to realize the mutual connectivity between people, waterscape and the environment.

3.3.4 Intelligent Scene System

In the garden, the scenery is realized through the light, and the amount of light and shade in the environment is controlled according to the flow of people and sound. The temperature of the light is adjusted according to the different seasons and times which is combined with plants, paving and landscape pieces. Through projection technology, different patterns are projected onto the ground and wall to form a 3D three-dimensional picture. Intelligent technology can be used to make intelligent lamp wall to create light and shadow, and different pattern shadows are projected on the lamp wall by hollowing out [6].

3.3.5 Intelligent Fragrance System

Due to the flowering plants are affected by geography and climate, intelligence system fragrance is available in different season and scenario, which can release the pleasant aroma, such as release the grass, the scent of peach blossom in early spring and the plum flower fragrance is released when it snows. Building the scene of the season, so as to promote landscape artistic conception and make people into the environment.

3.3.6 Environmental and Plant Interpretation System

By the voice of the people and footsteps, it can open the environmental interpretation system when people reach a landscape nodes. And people can scan the landscape setting or plant language interpretation qr code through WeChat of mobile phone. Reading language explanation or text consult, deepen the understanding of the landscape and plants which also can be installed with reading voice you like in the mobile phone [7].

3.3.7 VR Experience System

Using 3D virtual and visualization technology to realize 360 panoramic display of campus. Setting up virtual scene to observe the oxygen molecules in the air, interact with different plants and animals, create dreamlike experience landscape [8]. Through VR devices and smart wearable devices, you can experience the characteristic landscapes of different regions at different times.

4. The Realization of Campus Wisdom Garden System of Ordos Vocational College of Eco-environment

Ordos Vocational College of Eco-environment is actively promoting the construction of wisdom campus. As a part of wisdom campus, the construction and implementation of smart garden system is of great significance to promote the construction of smart campus. In this paper, the satisfaction and experience of teachers and students to the campus green landscape of Ordos Vocational College of Eco-environment were investigated by questionnaire survey. Through understanding the questions of green space on campus and using wisdom garden system, put forward the promotion strategy to create “enhanced perception” and “surreal experience” of modern landscape experience for the teachers and students and realize the interaction between information technology, human and natural environment union on campus.

4.1 Strategies for Enhancing Plant Landscape

The campus of Ordos Vocational College of Eco-environment has a large vegetation planting area, but there are some problems such as single landscape construction and lack of diversity. In view of the problem of plant landscape, promotion strategies are proposed through intelligent means. First, choosing the rapid growth of green trees which are suitable for planting in the north to improve the configuration of plants and enrich the campus landscape. Second, the Internet of things and other modern information technology should be used to realize scientific planting and conservation management. Intelligent irrigation and soil fertility measurement can be realized through sensors and video monitoring equipment, insect information collection equipment, collect pest information which can timely discovery of plant pest status and realize intelligent pest control. Through video surveillance and other monitoring equipment, to achieve the monitoring of various green areas and roads. Third, through two-dimensional code language explanation technology to improve the plant science popularization sign system which can

make a mobile code sign including the plant family and genus name, species name, origin, growth habit, maintenance points, uses and plant related allusions. With the way of audio and text, to achieve the purpose of science popularization and education.

4.2 Waterscape Upgrade Strategy

The waterscape of Ordos Vocational College of Eco-environment belongs to the natural water system, which forms the central landscape of the campus together with the surrounding rockery, waterside pavilion, antique wall and small bridge. However, the lack of water circulation and ecological treatment design, no aquatic plants ,the waterscape is dry all year round are existing problems on campus waterscape, so the following improvement strategies are used to propose: First, improving the ecological treatment design of water body, planting aquatic plants with purification ability instead of the current cement pavement at the bottom of the pool, which can solve the problem of water quality control. Second, contacting people's behavior with waterscape state through wisdom technology. The water of the fountain is controlled by a peripheral device trample. When pedal is trampled, fountain, when no one to trample, stop. Or using physical touch technology, touch switch is set in the pool which can control one point to realize the interaction between waterscape and people, activate the vitality of space in the cheerful, lively atmosphere and save water resources, reduce operating costs at the same time. Third, increasing the opportunity for people to interact with the water landscape when people stand in front of the fountain raise or lower their arms to control the height of the water column through somatosensory interaction technology.

4.3 Road Landscape Promotion Strategy

The functional layout of road landscape in Ordos Vocational College of Eco-environment is reasonable, but the natural effect of waterscape and plant construction is not highlighted. In view of the existing problems of campus road landscape, intelligent means are used to propose the following promotion strategies: First, increase the visual effect of campus central waterscape and improve the utilization rate of waterscape through intelligent road warning board. Second, we should make use of the larger green area on both sides of the road to create different themes of plant landscape, such as the formation of "peach blossom Avenue", "Ginkgo avenue", "Huai Xiang Avenue" and other road landscape. Third, we should increase the nighttime landscape effect of roads, use intelligent lighting facilities, design different lighting shapes and themes according to the different changes of road shapes and terrain, and design different lighting patterns and themes combined with plant planting to adjust color and sensitivity, and create different landscape experiences and feelings. According to the camera analysis, the stay time of students on the road can be obtained, and the time of lighting on and lighting effect display can be automatically controlled to save resources, increase interest and improve the utilization rate of the road [9].

5. Conclusions

Campus smart garden is a new field of the development of smart garden. It needs the combination of smart technology and people's perceptual design, and the interaction between technology, human beings and natural environment. It is a new way of wisdom garden and a new trend of the development of wisdom garden. The future campus wisdom garden can be free from regional restrictions, space restrictions, and time restrictions to create "enhanced perception" and "surreal experience" modern garden landscape, to achieve the interaction and integration of percepters and landscape objects, and realize the wisdom, humanization and remoteness of campus landscape.

Foundation Project

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