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Research Article

Modern Intelligent Rural Landscape Design Based on Particle Swarm Optimization

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With the gradual maturity of the development of scientific and technological modernization, China's economic level has risen rapidly, and people's living conditions have been further improved. Emerging technologies such as artificial intelligence, Internet of things, and big data have brought new opportunities for China's urban construction and landscape design. Facing the development of modern science and technology, the application of landscape design in rural construction has become the main research object. In this paper, particle swarm optimization algorithm is used to study the modernization of rural landscape design. Starting with intelligent technology, particle swarm optimization algorithm is used to improve the traditional model of rural landscape design. Firstly, the control range of rural landscape lighting system is divided into regions, the user needs are processed, and the intelligent system of landscape lamps is further adjusted. It improves the problems of energy conservation and environmental protection in rural landscape design. Finally, based on the particle swarm optimization neural network supervision algorithm, the rural planning land is allocated intelligently. The intelligent design of sprinkler irrigation equipment in landscape architecture can adjust the sprinkler area and range according to the growth period of crops and achieve the purpose of real-time monitoring.

1. Introduction

In the Rural Revitalization Strategy, the traditional rural living environment is more complex. This kind of planning not only affects the transformation of rural living conditions but also limits the strategic development of new countryside [1]. How to improve rural living conditions has become the main research content. The development of new countryside supported by landscape construction has become one of the important ways to solve the problems [2]. The traditional rural landscape design concept rarely considers environmental protection, resulting in waste generated in landscape construction and polluting the local environment [3]. Under the background of the development of computer intelligence, electronic products have become a necessity of daily life. The demand for electricity is higher and higher, which is very easy to cause excessive energy consumption. Therefore, based on the above situation, we must formulate corresponding planning schemes for modern rural landscape design [4].

The concept of intelligent construction has become the mainstream direction of landscape design. Modern new rural landscape design needs to combine intelligent elements and cultural characteristics. In the process of rural landscape construction, it is necessary to adjust according to geographical location and integrate regional culture and intelligent equipment into the planning. Conduct field visits and visits to different regions to strengthen the understanding of regional characteristics, and plan land use schemes suitable for rural landscape on this basis [5]. In the process of planning and design, it is also necessary to comprehensively ensure regional development and maintain the balance between landscape construction and natural environment. Achieve the goal of environmental

protection and energy saving to the greatest extent. China has a huge cultural background, and art design comes from people's daily life. In modern rural landscape design and planning, we must integrate with traditional culture [6]. Show local characteristics, architectural styles, and customs, and further combine intelligent devices to realize the transformation of modern style. Rural landscape design should also better reflect the characteristics of modern rural areas, help agriculture produce, and improve rural production efficiency. Pure agricultural landscape is not suitable for the new rural development strategy. We need to turn the capital investment to the daily life of rural residents and agricultural production links to achieve the application purpose of intelligence, simplicity, and high efficiency [7, 8]. Modern rural landscape planning also needs to meet the aesthetic needs of the people. Reflect scientific and technological elements and cultural tiger elements, and consider the daily needs and interests of local residents [9].

2. Development Status of Particle Swarm Optimization Algorithm in Landscape Design

In recent years, the combination of modern technology and design thinking has appeared in China's landscape design, but the design idea is mainly based on experience imitation, lacking the design concept of independent innovation and personality. As most countries turn to environmental protection as the premise of sustainable economic development [10], this green economy has brought a huge impact on the landscape design industry. Countries have to start with the direction of modern environmental protection and change the design link of wasting energy in landscape construction [11]. Due to the difficulty of collecting data, the scheme cannot be combined with the actual situation in the process of landscape design, and the real situation of the region cannot be started, resulting in defects in the quality of landscape design [12, 13]. In order to optimize user data, scholars in various countries use particle swarm optimization algorithm to find the optimal path of intelligent design by combining neural network with data analysis.

In landscape design, Britain pays more attention to pattern distribution and ecological security [14]. Based on the comfort evaluation and data analysis of landscape design, the particle swarm optimization model is constructed, and the model is solved and calculated. The calculated data are applied to ecological environment protection and landscape scenario space planning. With the international development trend of Britain, the distribution of urban and rural landscape presents the current situation of heavy farmland in the west, and the east is the main planting area of agricultural fruit forest [15]. They use the spatial distribution function to form a dynamic characteristic curve and combine the concept of environmental protection to maximize the landscape design of comprehensive benefits [16]. The results show that the landscape spatial planning model based on particle swarm optimization algorithm can realize the dynamic division of land, automatically generate the pattern of landscape construction, and achieve the organic combination of quantity and space. This kind of landscape design optimization is one of the most effective ways at present.

For a long time, urban development in the United States has expanded aimlessly, which has hindered the use and development of land resources [17]. The ecosystem between rural and urban areas has been damaged by the environment, resulting in high-level pollution problems. With the process of industrialization and the development of modern science and technology, how to balance the ecological environment and rural construction has become the main research topic. In order to improve the contradictory relationship between economic development and landscape design, the research on landscape design changes and environmental problems is gradually increasing. Some scholars use particle swarm optimization algorithm to improve the traditional neural network to optimize the path of landscape design and rural planning. It greatly reduces the pollution coefficient generated in the design process and construction process [18].

China combines the environment with the needs of residents in the greening landscape design. Rural landscape footpaths can meet the leisure and entertainment activities in people's daily life. Therefore, the path optimization of landscape footpath is the main research object [19]. With the adoption of many optimization algorithms in landscape design at home and abroad, particle swarm optimization algorithm is relatively simple to operate and has strong flexibility [20, 21]. When processing the optimization data, we can get the feedback quickly and get the optimal solution through the step-by-step calculation of our own data. Therefore, this algorithm is also integrated into the process of landscape footpath design in China. Based on the application status of particle swarm optimization algorithm in landscape design in various countries, this paper studies it from the perspective of multiple needs of landscape design, combined with particle swarm optimization algorithm.

3. Research on Modern Intelligent Rural Landscape Design Based on Particle Swarm Optimization

3.1. Research on Intelligent Rural Landscape Lighting System Design Based on Particle Swarm Optimization. Modern intelligence refers to the use of computers and intelligent equipment to replace the technical types in production and labor on the basis of residents' behavior laws and living habits. It cannot be realized on the basis of artificial intelligence. The main idea of modern intelligent rural landscape design is that designers optimize and transform an area by combining culture, science, art design thinking, and modern equipment. Finally, an environmental atmosphere integrating rural natural life and modern science and technology will be realized. From the perspective of landscape design, it mainly includes garden landscaping, spatial planning, lighting facilities, and maintenance facilities. From the functional

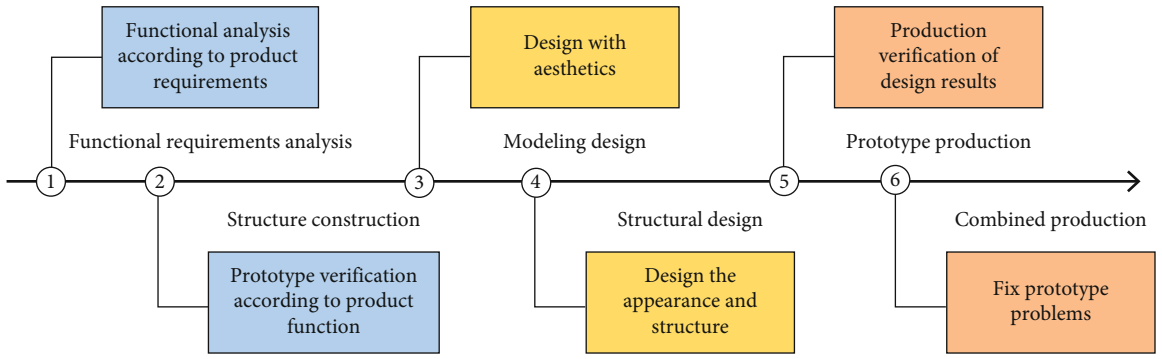

Figure 1: Functional design flowchart of rural landscape intelligent lighting system.

analysis of landscape design, this paper mainly studies the intelligent lighting design system of rural landscape. The lighting function needs to meet the performance of adjusting brightness, adjusting atmosphere, real-time interaction, and so on. This demand can be well reflected in combination with intelligent devices. Lighting design can meet people's visual needs and experience. In the landscape intelligent lighting system, the brightness and color of the light can be adjusted through the sensing equipment so that the lighting equipment can meet the functional requirements of interactivity. In the design process, we need to analyze and model according to the functional division. The whole design concept is shown in Figure 1.

As can be seen from Figure 1, firstly, the function analysis and demand analysis of rural landscape intelligent lighting system are carried out, and the model is built on the basis of functional requirements. Combined with the aesthetic design of the masses, the preliminary modeling is designed, and finally, the preliminary production of the original machine is carried out. Traditional landscape lamps cannot be controlled one by one, resulting in uneven distribution of lighting range. The light intensity and comfort in landscape architecture are poor. With the dynamic change of sunshine angle and range, in order to ensure that the lighting system in the landscape can change in real time, we use particle swarm optimization algorithm to process the dynamic data to realize the adjustment function of intelligent lamps. The principle of particle swarm optimization model is relatively simple, and the optimization efficiency is high, which can be well implemented in real scenes. Therefore, it has been widely used in the problems of information sharing and function optimization.

Firstly, it is assumed that the specific coordinates of the demand target are designed to be fixed, the particle position is at the beginning, and the speed is

$$\left(V_x, V_y\right). \tag{1}$$

The distance between the starting point and the particle position is calculated as follows:

$$S = \sqrt{{}'x - x_0\#^2 + {}'y - y_0\#^2}. \tag{2}$$

Among them, S represents the coefficient between distances. If the coefficient is higher, it means that the fitting degree is lower; otherwise, it is higher. Assuming that the action path of each particle is fixed, the velocity coefficient between the optimal paths is a constant. Then, the speed change is

$$V_{x\backslash y} = V_{x\backslash y} - r_1 \times c_1, x \backslash y > pb, \tag{3}$$

$$V_{x\backslash y} = V_{x\backslash y} + r_1 \times c_1, x \backslash y < pb. \tag{4}$$

Assuming that the variables between particle swarm can share the action path and position with each other, the optimal position of the above particles is gb, and the second cycle calculation is required after the first cycle. If the particles react to the demand, the target will gather around the target. In the simulation calculation, we found that particle swarm optimization can quickly find the best position of the function. The particle swarm optimization algorithm formula we finally adopted in the system calculation is as follows:

$$V''t+1\# = V_i''t\# + c_1 r_1 \left(pb_i''t\# - x_i''\#\right), \tag{5}$$

$$X''t+1\# = X_i''t\# + V_i''t + x_i''\#. \tag{6}$$

In the practical calculation application, we find that the calculation formula is different from the ideal optimization state, and then, add a weight iterative algorithm. Use the weight coefficient to improve the speed calculation formula:

$$V''t+1\# = \omega V_i''t\# + C_1 R_1 \left(pb''t\text{-}x_i''\#\right), \tag{7}$$

$$X''t+1\# = x_i''t + V''t+1\#. \tag{8}$$

After introducing the iteration coefficient, the structure of the formula does not change significantly, but the actual effect of the optimal path is more inclined to the application effect. According to the landscape lighting design standards and requirements, we have developed a comparison table as follows.

In this paper, the requirements for the lighting height near rural landscape residential buildings are high, and the standard numerical coefficient is also high. When the natural lighting effect coefficient is higher than the standard value,

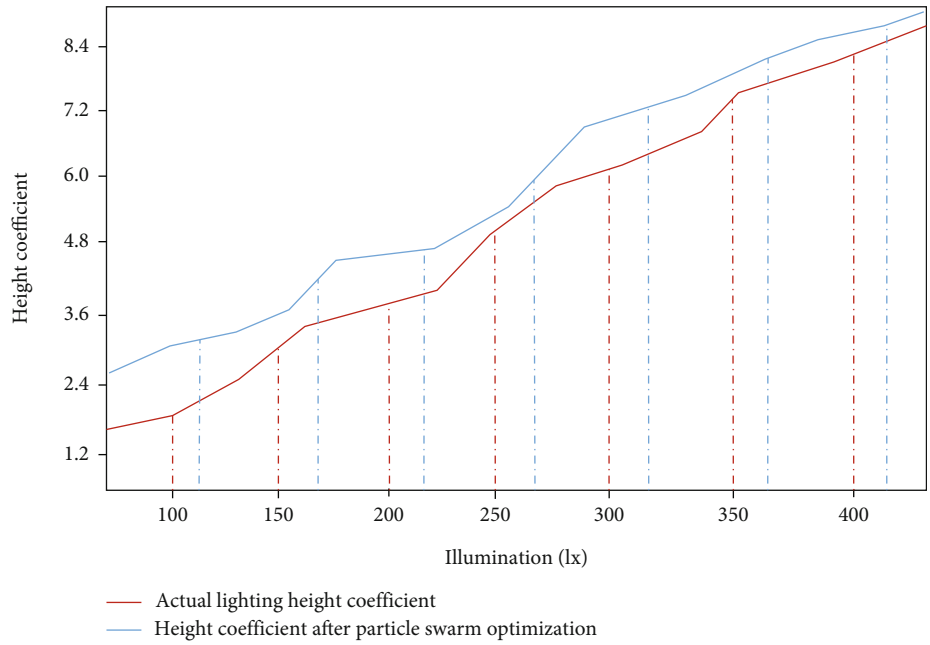

Figure 2: Comparison between actual lighting height coefficient and calculated height coefficient.

Table 1: Comparison table of lighting standards.

Construction site		Height (m)	Illuminance standard value (lx)
Residential building	Outside of a wall	0.75	300
	Eaves	0.75	150
Commercial building	Exhibition hall	0.75	300
	Pedestrian street	Ground	200
Entertainment architecture		0.75	300
Landscape		0.75	500

the light source of lighting equipment should be reduced accordingly. We calculate the error coefficient between the actual height and the standard height according to the optimized adaptation function of the lighting system. Assuming that the energy consumption of lighting fixtures is related to the amount of light, the sum of the amount of light coefficient can reflect the change of the consumption function. The calculation formula is as follows:

$$\left|\frac{E_i - E}{E}\right| \le 10\%, \tag{9}$$

$$G = \sum_{i=1}^{n} g_i, \tag{10}$$

$$f = \begin{cases} \left|\dfrac{E_i - E}{E}\right| \le 10\%, \\ \dfrac{1}{G}. \end{cases} \tag{11}$$

According to the above formula, we compared the change process of the actual lighting height coefficient and the calculated height coefficient, as shown in Figure 2(Table 1).

It can be seen from Figure 2 that the height change of particle swarm optimization is consistent with the actual height change. The error coefficient between curves is small, which means that the optimal path of this algorithm in lighting design is effective. We allocate the optimized lighting range to each lamp in the landscape design. The light source is adjusted by using wireless sensor equipment and intelligent monitoring technology. This way of adjusting the light effect can increase the control range. Because the effect of lighting system control and optimization is obvious, the illumination distribution of buildings in rural landscape design is more reasonable. The working diagram of the whole lighting system is as follows.

It can be seen from Figure 3 that the dimmer can distribute the utilization rate of artificial light source and natural light source to achieve the purpose of energy saving to the greatest extent. The lighting equipment in landscape design not only needs to meet the needs of intelligence but also needs to combine the aesthetics of users to improve the appearance competitiveness. In terms of performance, in addition to achieving interactivity, it is also necessary to design and manufacture from the durability of the equipment. According to the above research, we know that particle swarm optimization algorithm can effectively control the energy allocation of

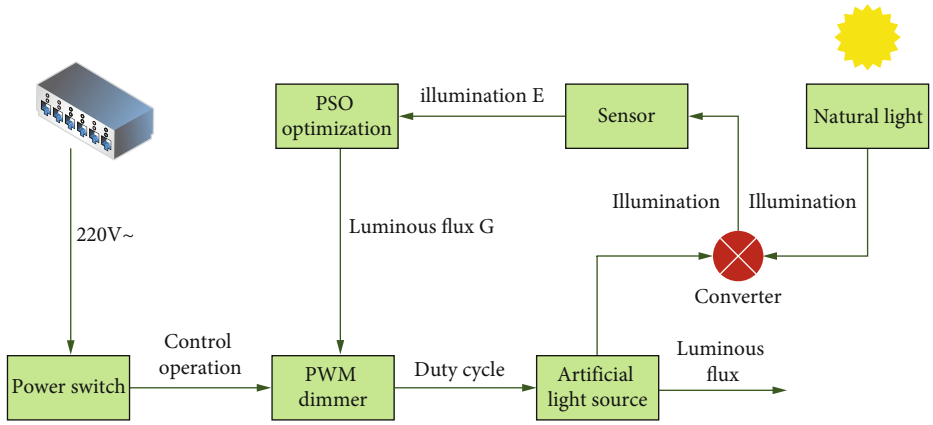

Figure 3: Working drawing of lighting system.

lighting system and has made further improvement in energy conservation and environmental protection.

3.2. Research on Intelligent Sprinkler Irrigation Design of Rural Landscape Based on Particle Swarm Optimization. With the demand of modern rural landscape development, agricultural production is the main link in landscape design. The demand for landscape design is inseparable from the needs of farmers for production. Sprinkler irrigation equipment uses water pressure and pipeline water supply to transform the form of water into fog under low-pressure environment and act on plants. Small mist droplets are formed during spraying. This method not only saves water but also is more widely used in practical application environment. Intelligent sprinkler irrigation design can not only provide water for crops but also ensure the moisture degree of soil and regulate the environment and temperature. Therefore, the function of intelligent sprinkler irrigation has high research value in rural landscape design. With the popularization of indoor and outdoor plant planting and distribution and intelligent irrigation system, how to improve the utilization rate of irrigation and reduce the use of water resources is an important content in our landscape design research.

Before the design and research of sprinkler irrigation system, we need to divide the rural land use. The traditional division adopts neural network monitoring algorithm, which has high cost and large error rate and is easy to be affected by the environment. Based on the above situation, this paper proposes to use particle swarm optimization neural network algorithm to change the accuracy and applicability of region division. We used the geographical location of a rural area in Xinxiang City as the experimental object. The whole area is located between 34~36 degrees north latitude and 113~115 degrees east longitude. It is near the Yellow River Basin and Taihang Mountain. The changes of average temperature and precipitation in this area are recorded day by day, as shown in Figure 4.

It can be seen from Figure 4 that the highest point of the annual average temperature in this area is between July and August, and the highest can reach 32°C. The lowest temperature is in January, reaching 2 degrees above zero. The change of annual precipitation is obvious. The precipitation value from July to September is the highest and the range is the widest. In this environment, we need to intelligently control the degree of sprinkler irrigation in combination with precipitation in rural landscape design. At present, the water pipeline of sprinkler irrigation equipment is often set up on the steel frame and the ground. The height and planting division of crops in different regions are different. The growth density of crop stems and leaves will also affect the effect of sprinkler irrigation. How to combine the annual precipitation and temperature to automatically improve the sprinkler irrigation time and distance is our main problem to be solved. On the other hand, we also need to pay attention to the spraying effect in the process of automatic control, whether we can take into account every corner. In view of the above situation, we used the data network transmission structure in the experiment and used various sensors and valves to control the water spray. Link up and down the physical sensor to obtain the information of crop temperature and humidity and control the switch of water valve according to the transmitted data. In the data transmission after the collection of regional temperature and humidity, we also need to pay attention to data correction. Filter and delete the data with large error with the actual results. The relative humidity is calculated as follows:

$$\mathrm{RH} = c_1 + c_2\mathrm{SO} + c_3 \cdot \mathrm{SO}^2{}_{\mathrm{rh}}. \tag{12}$$

In the formula, RH represents the corresponding coefficient of crop humidity at average temperature, and $\mathrm{SO}^2{}_{\mathrm{rh}}$ represents the coefficient value output by physical sensing equipment. If the measured temperature is quite different from the actual temperature, we also need to add the heating of the physical sensor:

$$\mathrm{RH}_{\mathrm{true}} = (\theta - 25) \cdot (t_1 + t_2 \cdot \mathrm{SO}) + \mathrm{SO}^2{}_{\mathrm{rh}}. \tag{13}$$

If there is a large difference between the temperature and the average coefficient, the current temperature value

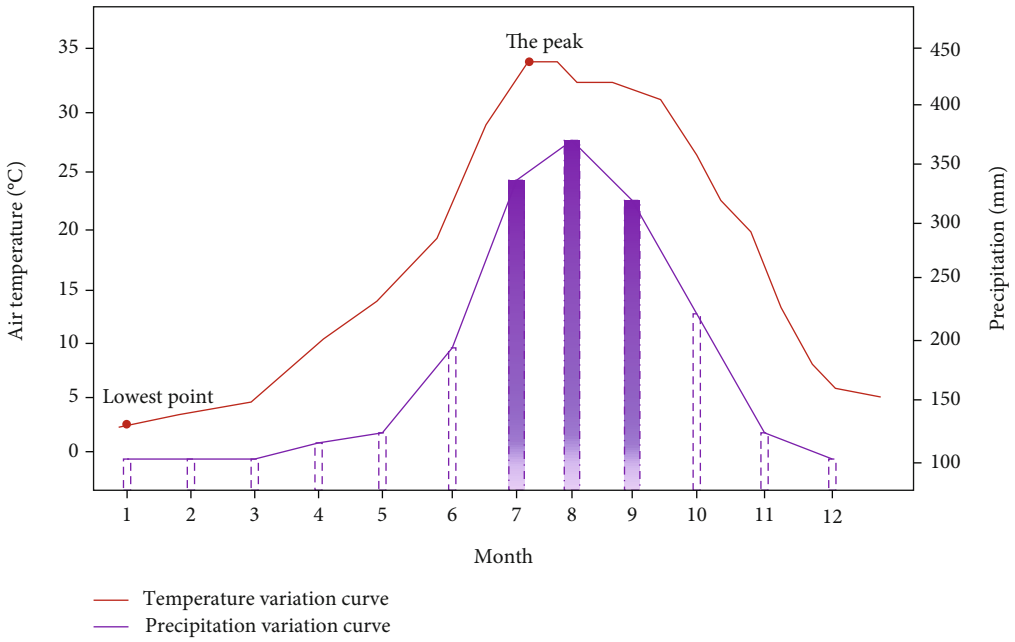

Figure 4: Change of temperature and average precipitation.

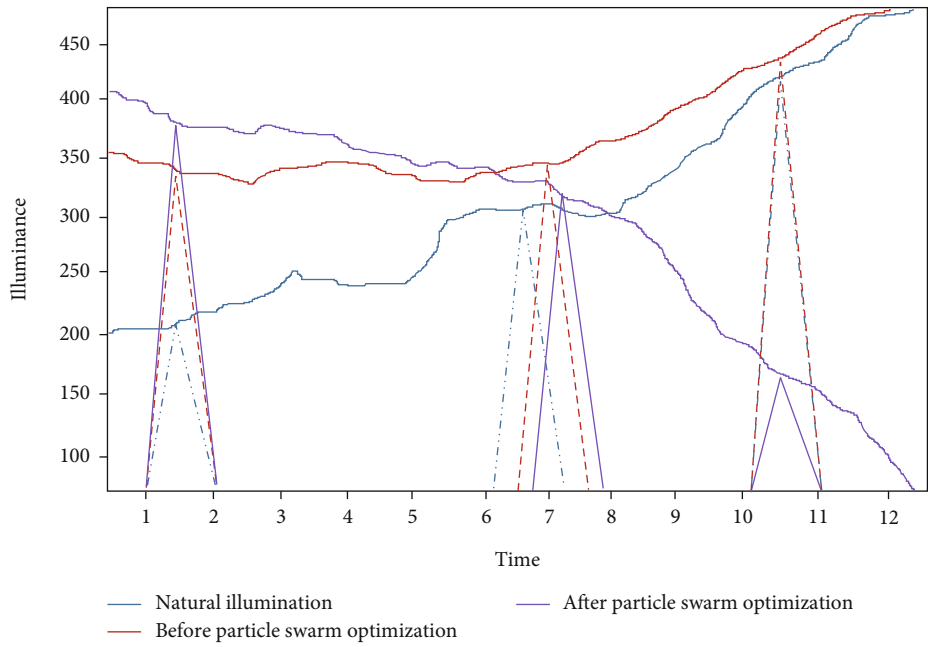

Figure 5: Natural illuminance and use of artificial light source before and after particle swarm optimization.

needs to be considered when calculating the absolute humidity. The final temperature calculation formula is converted from two steps as follows:

$$\mathrm{RH}_{\mathrm{true}} = \frac{c_1 + c_2 \cdot \mathrm{SO}_{\mathrm{RH}} + c_3}{(\theta - 25) \cdot (t_1 + t_2 \cdot \mathrm{SO}) + \mathrm{SO}^2{}_{\mathrm{RH}}}, \tag{14}$$

$$\theta = \theta_1 + \theta_2 \cdot \mathrm{SO}_{\theta}. \tag{15}$$

After calculation according to the above formula, the accurate values of outdoor temperature and humidity at this time can be obtained. The two-wire input interface is selected for the temperature sensor, which is combined with the light sensor to form an integrated circuit device. As a whole, it is applied in intelligent sprinkler irrigation equipment, which can control the irrigation valve according to the changes of ambient temperature and rainfall. The equipment has good stability effect, small volume, and high sensitivity in practical application. The water valve in the intelligent pouring equipment adopts the direct configuration of electromagnetic valve. When the whole equipment is connected to the power supply, it

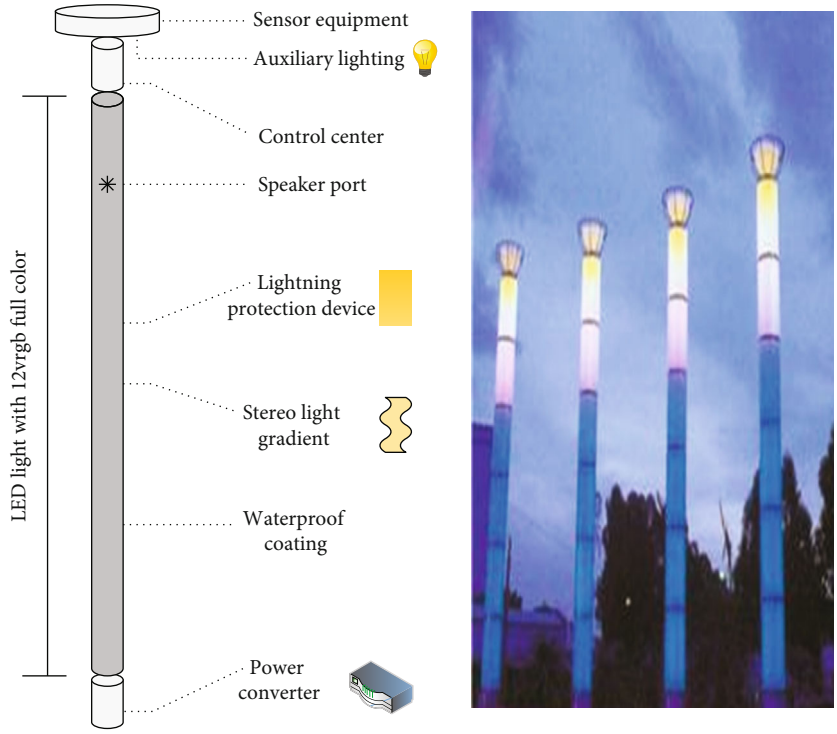

Figure 6: The internal structure and specific style of the equipment built by the model.

can generate electromagnetic energy to close and open. When the temperature and humidity are suitable for pouring, the solenoid valve will open automatically and close automatically when the temperature and humidity exceed the standard index. In order to avoid interference between equipment, we also added isolation plates in the driving equipment. In the process of signal transmission, the isolation plate can make the signal transmit stably and improve the work efficiency and accuracy.

4. Analysis of Research Results of Modern Intelligent Rural Landscape Design Based on Particle Swarm Optimization

This paper selects a rural area of Xinxiang City as the experimental site. Firstly, the basic geographical environment and natural features of the countryside are understood and analyzed. Make layout planning for the livable landscape and daily activity area and combine the agricultural irrigation problems raised by residents with landscape design. In traditional landscape design, the function of lighting system is relatively single, lacking real time and interaction. In order to better save resources and protect the environment, we have added intelligent lighting system to the modern rural landscape design model. Start with the lamps in each area, enhance the data analysis and observation of longitude and latitude, and intelligently adjust the lighting area and intensity in combination with time controller and sensing equipment, so as to realize the interactivity and flexibility of lighting equipment.

4.1. Design and Test Results of Modern Intelligent Lighting System. Taking the activity area with length and width of 100 meters as an example, the specific location is the same as the longitude and latitude of Xinxiang City. The maximum amount of each light source is 6500 lm, and the natural light change is set from 8 a.m. to 6 p.m. According to the above conditions, a global comparative analysis was used. Under the condition of ensuring the normal illumination of natural light, the behavior trajectory of lighting equipment is calculated by particle swarm optimization algorithm. In the specific experiment, we selected 10 different monitoring points for landscape architecture and compared the natural illumination and the use of artificial light source before and after particle swarm optimization, as shown in Figure 5.

It can be seen from Figure 5 that the illuminance before optimization partially overlaps with the natural illuminance, indicating that the lighting equipment still works when the natural light is sufficient. The illumination coefficient of the system optimized by particle swarm optimization algorithm decreases significantly, and there is no overlap. The above research shows that the intelligent lighting system can greatly save energy and improve the sustainable utilization to a new level. The main functions of intelligent landscape lamps include lighting, sensing, light breathing change, and light effect color. The internal structure and specific style of the equipment constructed according to the optimization model are shown in Figure 6.

As can be seen from Figure 6, when the whole equipment is not touched, the lamp shows a breathing state and the color begins to flow. The speed change path takes 15 seconds as a cycle. When people approach, the light is

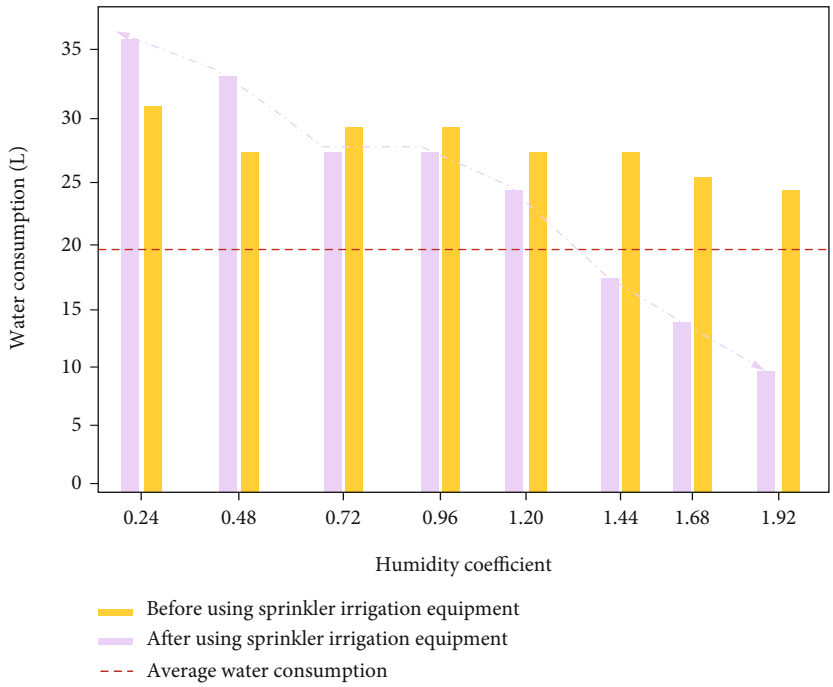

Figure 7: Variation of water resource utilization coefficient before and after using intelligent sprinkler irrigation equipment.

adjusted according to the natural light intensity to ensure the daily use and energy-saving needs.

4.2. Design and Test Results of Modern Intelligent Sprinkler Irrigation System. This paper also designs an intelligent sprinkler irrigation system. The overall structure of the equipment is composed of water transmission pipeline and spraying support. The whole incoming water pipeline is designed on the top of the spraying support and connected with the water valve and water pump. The spraying support also includes correction track, support framework, extension mechanism, temperature sensor, and humidity sensor. Taking a village in Xinxiang City as an example, we explore the changes in the use coefficient of water resources before and after the adoption of intelligent sprinkler irrigation equipment, as shown below.

It can be seen from Figure 7 that the local humidity changes regularly. Before using sprinkler irrigation equipment, the utilization coefficient of water resources increased dynamically and irregularly. After using intelligent sprinkler irrigation equipment, the overall average water consumption decreased significantly. The intelligent sprinkler irrigation structure is installed in an arc, which can realize the synchronization of spraying track and rotation direction. According to the growth cycle of crops, when the temperature and humidity need to be sprayed, the watering area and range are automatically adjusted. Considering the growth speed and height of crops, the density of branches and leaves will also affect the spraying effect. Therefore, we also added the function of automatic up and down adjustment in the design. Finally, in the power module, we use solar intelligent battery for power input. The conversion of electric energy and light energy is mainly carried out according to the duration of sunlight.

5. Conclusions

(1) In order to solve various problems in traditional rural reconstruction, this paper puts forward modern rural landscape design, combines intelligent equipment with regional culture, and creates a rural landscape garden that meets the needs of modern intelligence. Focus on how to use intelligent equipment to optimize living conditions and help maximize the benefits of agricultural production

(2) According to the research status of various countries, this paper studies and explores the modern rural landscape design based on particle swarm optimization algorithm. The particle swarm optimization algorithm is combined with the weight matrix to form the optimization calculation formula. The modern intelligent lighting system is designed to automatically change the light intensity according to the environment, save electricity, and facilitate rural life. This paper designs an intelligent sprinkler irrigation system with local temperature and humidity changes. According to the local natural environment, particle swarm optimization algorithm is used to partition the rural landscape land. According to the annual average temperature and humidity, the data is transmitted to the automatic sprinkler system to realize the purpose of intelligent irrigation. The results show that the actual data accuracy of particle swarm optimization algorithm is 98%

(3) The modern rural landscape design can realize energy conservation and environmental protection on the premise of ensuring the function

Data Availability

The figures and tables used to support the findings of this study are included in the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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References

[1] L. Chunyu, "Research on new rural landscape planning method based on characteristic protection strategy," *Sichuan Building Materials*, vol. 48, no. 2, pp. 62-63, 2022.

[2] Z. Zijin, "New rural landscape planning and design from the perspective of regional culture," *Rural Science and Technology*, vol. 13, no. 1, pp. 99–101, 2022.

[3] Z. Hongyu and Z. Hongling, "Key points of new rural landscape planning and design from the perspective of human settlements improvement," *Modern Agricultural Machinery*, vol. 6, pp. 37-38, 2021.

[4] S. Ying, "Application of computer technology in urban landscape design architectural," *Science*, vol. 38, no. 3, pp. 196–198, 2022.

[5] Z. Peipei, "Analysis on innovation strategy of modern urban landscape design," *Modern Agricultural Research*, vol. 28, no. 1, pp. 71–73, 2022.

[6] P. Jun, "Study on low cost control methods and technical measures for comprehensive improvement of rural landscape environment," *Journal of Shandong Agricultural University*, vol. 52, no. 6, pp. 1063–1068, 2021.

[7] L. Guorui, F. Zhen, X. Jiao, and L. Weidong, "Construction of ecological garden plant landscape under the background of new rural construction," *Modern Horticulture*, vol. 44, no. 20, pp. 60-61, 2021.

[8] T. Guangyuan, "On the development of landscape design in the digital media era," *China Newspaper Industry*, vol. 22, pp. 50-51, 2021.

[9] S. Wenbin, "Application of computer digital technology in urban landscape design," *Environmental Engineering*, vol. 39, no. 11, pp. 258–260, 2021.

[10] L. Na, "Research on the application of landscape art design in rural construction," *Journal of Irrigation and Drainage*, vol. 40, no. 10, article 153, 2021.

[11] L. Mei, "Research on rural landscape construction under the background of Rural Revitalization Strategy," *Heilongjiang Environmental Bulletin*, vol. 34, no. 2, pp. 38-39, 2021.

[12] W. Wenting, "Research on new rural landscape planning and design from the perspective of human settlements improvement," *Agricultural Economy*, vol. 4, pp. 53–55, 2021.

[13] L. Yanguo, "On the landscape design of new countryside," *Guangdong Sericulture*, vol. 55, no. 2, pp. 153-154, 2021.

[14] S. Yangyang, "Study on regional cultural characteristics in new rural landscape planning," *Beauty and the Times (Urban Edition)*, vol. 11, pp. 47-48, 2020.

[15] M. Wei, G. Tengxuan, L. Yijuan, Z. Dongning, and Z. Zhenguo, "Energy storage power allocation method of multi power distribution network based on particle swarm optimization," *Power Grid and Clean Energy*, vol. 37, no. 11, pp. 109–114, 2021.

[16] O. Dinghua and X. Jianguo, "Study on landscape pattern optimization in suburban areas of large cities based on particle swarm optimization – a case study of Longquanyi District," *Chengdu Geographical Research*, vol. 36, no. 3, pp. 553–572, 2017.

[17] F. Yongjiu, T. Xiaohua, and L. Miaolong, "Particle swarm intelligence stochastic cell model for urban form evolution and its application-a case study of Jiading District, Shanghai," *Journal of Earth Information Science*, vol. 12, no. 1, pp. 17–25, 2010.

[18] T. Xinmei, "Remote monitoring simulation of landscape lighting based on big data analysis," *Computer Simulation*, vol. 35, no. 12, pp. 384–387, 2018.

[19] G. Chuanyou, "Design and analysis of sprinkler irrigation device for garden soft landscape management," *Research on Agricultural Mechanization*, vol. 43, no. 10, pp. 28–32, 2021.

[20] H. Shengquan, Z. Chengbo, P. Zhang, K. Xiangmei, and W. Jiahao, "Design and analysis of an intelligent horticultural sprinkler irrigation device," *Zhifu Era*, vol. 3, article 245, 2019.

[21] Q. Ma, "Calculation method of logistics energy consumption in agricultural product supply chain based on structural equation model," *Mathematical Problems in Engineering*, vol. 2022, Article ID 7760056, 9 pages, 2022.