Research on the architectural design of the agricultural sightseeing tourist area

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ABSTRACT

This paper combines the intelligent computer-assisted technology to carry out the architectural design and planning of the agricultural sightseeing area, and mainly plans the electricity consumption system of the agricultural sightseeing area to ensure that the agricultural sightseeing area can provide tourists with a good sightseeing experience at night. Moreover, this paper conducts an end-point analysis of the circuit system and analyzes multiple parameters, and combines the construction power demand of agricultural tourism areas to conduct power model analysis. The computer control system integrates various factor control methods, uses advanced control technology and control strategies, and fully considers the relationship between the control variables to realise the automation, intelligence and energy-saving regulation of the greenhouse environment of the agricultural sightseeing area. Finally, this paper takes the greenhouse system as an example to analyze the architectural planning. From the research point of view, it can be known that the architectural design method of agricultural sightseeing tourism area constructed in this paper has certain effects.

Introduction

The tourism motivation of agricultural tourism tourists is the subjective factor of tourists for the tourism activities, and the tourism demand of agricultural tourism tourists is an objective factor that explains the tourism activities of tourists. The likely advantages of agri travel industry improvement reach out towards farmers, travel industry administrators, as well as rustic networks. Growing homestead activities; utilising farm-based items in novel besides inventive manners; growing new buyer market specialties; further developing homestead income streams; expanding consciousness of neighbourhood rural items and so on. Demand refers to the best product that people obtain through their own efforts in order to satisfy their personal desires. Tourists’ travel needs are characterised by specificity, integrity and diversification. A significant device for associations towards evaluates their own presentation as well as set needs for development is alluded as tourism with integrity. The cycle functions admirably for associations run through volunteers, paid staff else a mix of both. The diversification of essential tourism industry items in objections, paradoxically, includes offering more assorted items, which possibly adds esteem through widening the encounters of existing sightseers at the objective else drawing in various sorts of vacationers who may not in any case have stayed. Among them, the specificity of demand refers to the presence of personal preferences in the process of choosing tourist destinations, tourist time, tourist destinations, and tourist methods. The integrity of demand means that tourists have needs during the preparatory period of travel, during the process of travel activities, and the entire time period after travel. The diversification of demand refers to the differentiated demand of tourists for the provision of tourism services, tourism activities, etc. (Mou et al. 2017; Gao et al. 2020b).

Sightseeing agriculture in a broad sense refers to the agriculture that integrates agricultural production, ecology and leisure, established by extensive use of rural space, agricultural natural resources, rural folk customs and rural culture (Chakraborty and Elzarka 2019). It not only includes traditional agricultural production and management activities but also includes rural sightseeing and related tourism operations and tourism services. Moreover, it provides tourists with rural-style food, housing, transportation, play, shopping...
and other services and supplies to satisfy their yearning for natural landscapes and rural flavours (Guerra-Santin and Silvester 2017). Its basic connotations include: (1) Sightseeing agriculture is a kind of ecological tourism, and its development and planning and design should be based on landscape ecology. A bus-part of the field of manageable the travel industry is termed as an eco-tourism. Its apparent potential as a successful instrument for manageable improvement is the main motive behind why agricultural nations are presently accepting it as well as remembering it for their financial turn of events in addition to its protection methodologies. It adds to the protection of biodiversity; supports the prosperity of neighbourhood individuals; includes mindful activity with respect to vacationer as well as the travel industry; needs least conceivable utilisation of normal assets; advances little besides medium the travel industry ventures and so on. Therefore, cultural landscapes such as entertainment, accommodation and catering should be integrated into the natural landscape, rather than as an independent part. (2) Sightseeing agriculture is based on agriculture. Abandoning agriculture or using agriculture as an embellishment of scenic spots to develop cultural facilities will deviate from the true connotation of sightseeing agriculture. (3) Sightseeing agriculture is a special landscape in which human landscape and natural landscape are intertwined, so it has unique characteristics different from traditional agriculture and traditional tourism. (4) The main source of tourists is urban residents who are far away from nature and eager to get close to nature or foreign tourists with foreign cultural characteristics. Therefore, sightseeing agriculture is a branch derived from modern agriculture.

The landscape planning and design of the Sightseeing Agriculture Park should not only satisfy the principles of visual aesthetics but also follow the principle of harmony and follow certain natural laws and garden space organisation rules. The standard of workmanship that makes cohesiveness through focusing on the likenesses of isolated, however, related parts is termed as harmony principle. In particular, concordance utilises the components of craftsmanship (shading, line, shape, structure, esteem, space, surface) as a vehicle to make a feeling of harmony among in any case separate parts. The goal of the landscape design of the Sightseeing Agriculture Park is to create a ‘viewable, travelable, and habitable’ agricultural environment landscape, and build a ‘city-suburban-country-field’ space leisure system (Dodd et al. 2020).

For characteristic agricultural landscapes, it is necessary to go deep into layers, emphasising the individual characteristics of landscape elements at each stage, reflecting the transition from urban landscape to rural landscape, and forming a mutually integrated landscape sequence, which reflects together Advocating the theme of health, leisure and natural ecology. A geographic region, comprising together cultural as well as natural resources in addition to the natural life else domestic animals in that, related with a noteworthy occasion, individual, action else displaying other social else stylish qualities is called as cultural landscape. While a substantial and target wonder encapsulated through the nature of the actual variables of the climate is said to be as urban landscapes. It is a framework shaped through the connection betwixt the man as well as the metropolitan climate. In the overall planning stage, two aspects should be considered: On the one hand, it is necessary to emphasise the individual characteristics of the agricultural landscape, including the characteristic crop landscape, the landscape reflecting the regional characteristics, and the rural terroir combined with various participatory activities and recreational projects (Gao et al. 2020a). Humanities and other cultural landscapes, these landscape elements are missing in modern cities, and form a sharp contrast with modern urban landscapes. For urban residents, the agricultural landscape is full of mystery and great attraction, and sightseeing in the agricultural park has also become a way to release the body and mind, enrich knowledge, and improve health. On the other hand, while displaying the distinctive agricultural landscape, the tourist agricultural park should also form a dialogue with urban life. In other words, it is necessary to improve a communication mechanism so that the landscape elements of the tourist agricultural park maintain its pristine agricultural characteristics. It also adapts to the needs of modern tourism and leisure and organises the spatial sequence in a way that is more in line with modern aesthetic habits to achieve a more acceptable goal. The travel industry exercises as well as administrations attempted through Project Company with the end goal of the project in the concession area, including administrations intended for the activity besides the executives of the project facility, exercises, admittance towards cultural, relaxation offices, notable else regular locales, food as well as drink offices & administrations and so on.

This paper combines the intelligent computer-assisted technology to carry out the architectural design and planning of the agricultural sightseeing area. Moreover, this paper mainly plans the electricity consumption system of the agricultural sightseeing area to ensure that the agricultural sightseeing area can provide tourists with a good sightseeing experience at night, and combine experiments to evaluate the architectural design effect.
Related work

Sightseeing agriculture is the mutual integration and mutual support of agriculture and rural areas and the new eco-cultural tourism industry, and it is the refinement, marketisation and modernisation of agriculture. Moreover, it is also a new transformation of the tourism industry from a viewing type to a leisure and experience type, and it is a new development of the tourism industry. In the beginning, due to the mutual satisfaction of urban and rural needs, rural tourism was jointly created (Abuimara et al. 2019). Citizens need to go to the countryside to visit relatives and friends, gather style, sketch from life, go hunting, relax, and release pressure from work and life. Villagers can not only use rural natural resources to increase their economic income, but through cultural exchanges with citizens, farmers have learned the advanced culture of the city, updated their knowledge, changed their concepts, and strengthened their sense of innovation and modernity. Later, the government, research scholars, economists, agriculture, and tourism all participated to improve, promote, and standardise it, making it a comprehensive industry (Remmen et al. 2018). Sightseeing agriculture began in developed countries in Europe and America after World War II, and then fully developed in emerging economies such as Japan and Taiwan. By the 1970s, it had matured and formed a certain industrial scale (Endo et al. 2019).

Foreign tourism agriculture can be roughly divided into the following three development models. The first is traditional sightseeing agricultural tourism. It mainly uses agricultural production processes that are not familiar to urbanites as a selling point, attracting citizens to visit and experience, such as opening up characteristic orchards, vegetable gardens, tea gardens, and flower gardens near urban or scenic spots. It allows visitors to enter the garden to pick fruits, pull vegetables, tea, and enjoy flowers, participate in various agricultural activities, share the joy of harvesting agricultural products, and enjoy the fun of the countryside (Beausoleil-Morrison 2019; Alghamdi et al. 2020). The second is urban scientific and technological agricultural tourism. It is mainly based on high technology as an important feature, and establishes small agricultural, forestry, and animal husbandry production bases in the suburbs, and adopts modern agricultural science and technology for agricultural production, and integrates agricultural technology demonstration and agricultural science popularisation. Farmers can not only obtain part of the tourism economic income, but also take into account the functions of agricultural production and popular science education (Xiong et al. 2020). The third is recreational agricultural tourism. It mainly uses different agricultural resources, such as forests, pastures, orchards, ponds, etc., to attract tourists to go for leisure and vacation. Citizens can not only get close to nature, breathe fresh air, and admire the countryside and mountains, but they can also carry out various sightseeing and leisure activities such as agricultural experience, fishing, game tasting, accommodation, and amusement. Moreover, the citizens test the special farmhouse meals, live in the farmhouse courtyard huts, and experience the rural natural scenery and folk customs (Black 2018).

Developed countries in Europe and the United States have relatively high levels of social and economic development, large farms, relatively small agricultural populations, and a relatively high level of people’s needs. Therefore, tourism agriculture developed on this basis has its own characteristics (Hanson et al. 2018). From the perspective of the structural characteristics of the tourist source market of foreign tourism agriculture, the main body of the tourist source is the population with a higher level of education and better economic conditions (Zhang et al. 2014; Wati and Widiansyah 2020). Rural tourism is no longer a simple sightseeing tour, it has become a tourism behaviour that people demand at a higher level. They choose rural tourism, not because of its low fees, but to find a pure land of soul and original ecological natural cultural atmosphere. Moreover, they participate in agricultural labor and experience the process of agricultural production mainly in pursuit of spiritual pleasure, rather than material enjoyment (Lee and Cho 2017).

The development of tourism agriculture is closely related to the economic and social development, the improvement of living standards, and the transformation of lifestyles. With the continuous acceleration of the urbanisation process, the urban population has increased greatly, the pace of urban life has been accelerating, and the living space of citizens has been shrinking. The physical and psychological pressure brought by the city to people is increasing. Therefore, yearning for nature, returning to nature, pursuing fresh air, quiet environment, and pleasant pastoral life have become a new fashion in today’s urban life (Miller et al. 2018). Sightseeing agriculture is based on agriculture and rural areas, and faces urban citizens, introducing the business philosophy of ‘integration with nature, health and longevity’. Moreover, it builds a beautiful, intelligent, healthy and comfortable living environment, provides first-class tourism services, and reflects the new achievements of modern ecological agriculture science. At the same time, the development of sightseeing agriculture provides urban residents with opportunities to go to the countryside, experience agriculture, and
enjoy pastoral pleasures, guide urban residents to the countryside, promote urban-rural exchanges, and update farmers’ ideas and concepts, which not only enriches the material life of farmers, but also enriches the spiritual life of farmers (Xie and Gou 2017). In addition, through investment in rural areas such as capital, technology, and people’s journals, we can better protect and develop the rural natural environment and promote the coordinated development of urban and rural integration (Nguyen et al. 2017; Adilkhadjayev et al. 2019).

Rural tourism was made owing towards the satisfaction of urban as well as rural needs. Due to the mutual satisfaction of urban as well as rural needs, rural tourism was created. The main concept of the manuscript is to improve the architectural design of agricultural sightseeing tourist area in urban as well as rural areas. To accomplish the architectural design of agricultural sightseeing area, intelligent computer-assisted methodology is utilised. To operate end-point analysis of the circuit system by analyzing multiple parameters, and to operate power model analysis, this manuscript combines the construction power demand of agricultural tourism regions. To evaluate the agricultural planning, greenhouse framework is taken as a sample.

**Architecture and power system planning algorithms of agricultural sightseeing areas**

First of all, we plan and analyze the architectural power system model of the agricultural sightseeing area and analyze the system parameters. Essentially, a resistor that gives a controlled measure of current stream access towards a circuit. A few circuits, strikingly operation amps as well as other simple segments, should have a base measure of current streaming into them to create a steady yield. For a bipolar semiconductor (BJT) the predisposition resistor will keep up with enough current into the base so the semiconductor is neither immersed (completely on) or cut-off (completely off). Three kinds of predisposition can be recognised: data inclination, choice predisposition, besides frustrating. The specified three kinds of predisposition in addition to their potential arrangements are talked about utilising different models. The addition of bias resistance $R_B$.

On the one hand, after the resistance of $RB$ and the resistance of the bus equivalent input resistance $RIn$ are connected in parallel, $
\frac{1}{R_B} + \frac{1}{R_{in}} = \frac{1}{R_{CM}} \leq \frac{1}{375\Omega}$

must be satisfied, that is, there should be a minimum value of $RB$. On the other hand, the addition of $RB$ directly affects the driving capability of the bus. If the resistance of $R_B$ is too large, it will reduce the driving ability of the bus. Therefore, $R_B$ should have a maximum value. Next, we first use the equivalent resistance network to solve the minimum value of $R_B$, and then solve the upper limit of $R_B$ through the current limiting method. The place wherever the absolute obstruction associated either in equal else in series is termed as equivalent resistance. Electrical obstruction shows that how much energy will be required when we move the charges for example current through the circuit.

**Solving the minimum value of $R_B$**

As shown in Figure 1, the left side corresponds to the current flow diagram at point A, and the right side corresponds to the current flow diagram at point B. The solid line represents the current flowing into point B, and the dotted line represents the current flowing from point B. The logarithmic amount of all flows entering as well as leaving a hub should rise to zero is termed as Kirchhoff’s current law. It is frequently abbreviated as KCL. It is utilised to depict how a charge enters in addition to leaves a wire intersection point else hub on a wire. It is 1st law that arrangements with the protection of charge entering besides leaving an intersection. The two laws are Kirchhoff’s current law as well as voltage law. To preserve the electric charge is the main rule of current law. It expresses that the measure of current streaming into a hub is equivalent towards the number of ebbs as well as flows streaming out of it. For playing out the nodal investigation in Ohm’s law, KCL is utilised. Using Kirchhoff’s current law, the current equations at points A and B are established as follows:

$$\begin{align*}
A: & U_A - U_B = \frac{U_A - U_B}{R_B} + \frac{U_A - U_B}{R_{T1}} + \frac{U_A}{R_{in}} \\
B: & U_A - U_B = \frac{U_A - U_B}{R_{T2}} + \frac{U_A}{R_{T1}} = \frac{U_B}{R_{in}} + \frac{U_B}{R_B}
\end{align*}$$

Among them, $U_S$ is the power supply voltage of the bus ($V$), $U_A, U_B$ is the voltage of point A and point B respectively ($V$), $R_B$ is the bias resistance of the bus ($\Omega$), $R_{in}$ is the equivalent input resistance of the bus ($\Omega$), and $R_{T1}, R_{T2}$ is the terminal resistance of the near end and the far end of the bus, respectively ($\Omega$) (Imam et al. 2017).

By solving the voltages at points A and B, the voltage expression at point A can be obtained as:

$$U_A = R_{in} \left[ \frac{U_S - U_A}{R_B} - (U_A - U_B) \left( \frac{1}{R_{T1}} + \frac{1}{R_{T2}} \right) \right]$$

$$U_A = R_{in} \left[ \frac{U_S - U_A}{R_B} - (U_A - U_B) \left( \frac{1}{R_{T1}} + \frac{1}{R_{T2}} \right) \right]$$

$$U_A = R_{in} \left[ \frac{U_S - U_A}{R_B} - (U_A - U_B) \left( \frac{1}{R_{T1}} + \frac{1}{R_{T2}} \right) \right]$$
The voltage expression at point B is:

$$U_B = R_{In} \left[ (U_A - U_B) \left( \frac{1}{R_{T1}} + \frac{1}{R_{T2}} \right) - \frac{U_B}{R_B} \right]$$

(3)

The expression of the voltage difference $U_{AB}$ between the two points AB can be obtained as:

$$U_{AB} = U_A - U_B = R_{In} \left[ \frac{U_S - U_{AB}}{R_B} - 2U_{AB} \left( \frac{1}{R_{T1}} + \frac{1}{R_{T2}} \right) \right]$$

(4)

By simplifying the above formula, we can obtain (Vu et al. 2019; Pei et al. 2020):

$$U_{AB} = \frac{U_S}{R_B} = \frac{1}{2} \left( \frac{1}{R_{T1}} + \frac{1}{R_{T2}} \right) + \frac{1}{R_{In}} + \frac{1}{R_B}$$

(5)

It is worth noting that the ‘false start signal’ of the RS485 bus must occur in the most unideal case of the bus. Therefore, the bias resistance should be solved under the condition of the smallest power supply voltage and the largest noise interference voltage. When a single power supply $5V(\pm 5\%)$ is used, the minimum value of the supply voltage is $U_{S(min)} = 4.75V$. The bus voltage $U_{AB}$ is equal to the sum of the threshold voltage and the noise interference voltage, as shown in the following formula:

$$U_{AB} = U_{IT} + U_N$$

(6)

Among them, $U_{IT}$ is the bus threshold voltage, which is $200$ mV, $U_N$ is the interference voltage on the bus, which is generally less than $50$ mV, and the corresponding $U_{AB}$ is $250$ mV. In addition, before the bias resistor is added, the resistance values of $R_{T1}$ and $R_{T2}$ are equal, and both are equal to the characteristic impedance $Z_0(120\Omega)$ of the bus. After adding the bias resistor, in order to maintain the symmetry of the circuit, the resistance value of $R_{T2}$ and 2 bias resistors in parallel should be equal to $R_{T1}$, as shown in the following formula (Brunelli et al. 2021):

$$R_{T2} || 2R_B = R_{T1} = Z_0$$

(7)

We can obtain:

$$\frac{1}{R_{T2}} = \frac{1}{Z_0} - \frac{1}{2R_B}$$

(8)

The minimum value $R_{B(min)} = 556\Omega$ of the bias resistance can be calculated, and then the terminal resistance $R_{T2}$ can be solved, as follows:

$$R_{T2} = \frac{1}{\frac{1}{Z_0} \left( \frac{1}{2R_B} \right)}$$

(9)

When $Z_0$ and $R_B$ are introduced, $R_{T2} = 134\Omega$ can be obtained. An arrangement of favoured numbers inferred for use in electronic parts is said to be as E-series. It is additionally called as favoured qualities. E3, E6, 12, E24, E48, E96, and E192 is comprised in e-series, wherever the number get-togethers ‘E’ assigns the amount of significant worth ventures in every series. Despite the fact that it is hypothetically conceivable to deliver parts of any worth, practically speaking the requirement for stock improvement has come out on top to choose the E-series for resistors, inductors, Zener diodes, as well as capacitors. In practical engineering applications, we can refer to the E-96 series nominal resistance value code comparison table to select a similar resistance value $133\Omega$ as the resistance value of the bus near-end terminal resistance.

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**Figure 1.** Current flow diagram of bias resistance in agricultural tourism area.
Solving the maximum value of $R_B$

The act of forcing a breaking point on the current that might be conveyed towards a heap to secure the circuit creating else sending the current from hurtful impacts because of a short out or over-burden is termed as current limiting method. The expression ‘current restricting’ is likewise utilised to characterise a kind of overcurrent defensive gadget. Next, we limit the maximum value of $R_B$ through the current limiting method. In order to ensure the normal communication of the RS485 bus, the differential input voltage must meet $U_{AB} \geq 200\text{mV}$ when the output is high, so there is a minimum drive current on the bus.

When $R_B$ is not added, the resistance value after the two terminal resistors $m$ are connected is $Z_0^2$, that is, $n$. Then the total differential load $R_{\text{Diff}}$ corresponding to the RS485 bus can be expressed as:

$$R_{\text{Diff}} = \frac{Z_0}{2} R_m, N = 1, 2, \ldots, 32 \quad (10)$$

Among them, $Z_0$ is the characteristic impedance of the bus (120Ω), $R_m$ is the input impedance of the bus, and $N$ is the number of nodes on the bus. To ensure that the bus is pulled to a high level (200 mV) in an idle state, the corresponding minimum bias current is:

$$I_{\text{min}} = \frac{U_{IR}}{R_{\text{Diff}}}, N = 1, 2, \ldots, 32 \quad (11)$$

After adding the bias resistor, the maximum resistance of the bus corresponding to the minimum bias current is:

$$R_{\text{max}} = \frac{U_i}{I_{\text{min}}} = \frac{U_i}{U_{IR}} \left(\frac{Z_0}{2} \frac{R_m}{N}\right), N = 1, 2, \ldots, 32 \quad (12)$$

Further, the maximum value of the bias resistance can be obtained as:

$$R_{B\text{max}} = \frac{R_{\text{max}} - R_{\text{Diff}}}{2} = \left(\frac{U_i}{U_{IR}} - 1\right) \left(\frac{Z_0}{2} \frac{R_m}{N}\right), N = 1, 2, \ldots, 32 \quad (13)$$

Among them, $U_i$ is the bus power supply voltage (V), $U_{IR}$ is the bus threshold voltage (V), $Z_0$ is the characteristic impedance of the bus (Ω), $R_m$ is the input impedance of the interface chip (Ω), and $N$ is the number of network nodes. It can be seen from the above formula that the maximum value of the bias resistance is inversely proportional to the number of network nodes. In addition, after $R_B$ is added, the bus communication stability is improved, and the driving capability of the bus is reduced, so that the maximum number $N_{\text{max}}$ of nodes that the bus can support is reduced (Andrio et al. 2019).

A mechanical determination that characterises the electrical interface as well as actual layer for highlight point correspondence of electrical gadgets. The RS-485 standard takes into account long cabling distances in electrically boisterous conditions in addition to can uphold various gadgets on a similar transport. The specifications of RS485 bus: It has 4000 FT of maximum cable length, $-7\text{V}$ to $+12\text{V}$ of maximum driver output voltage, 32 driver 32 recvr of total number of drivers as well as receivers on one line and so on. The RS485 bus uses the concept of unit load to measure the drive capacity of the bus, which is represented by UL (Unit Load). It is speedier as well as conservative towards move a great deal of things all at once rather to move every single one of them separately is the main principle of unit load concept. As such this standard recommended that, the bigger the heap dealt with, the lower the expense per unit took care of. The standard stipulates that the 1UL driver chip must be able to drive 32 network nodes. The input impedance of the 1UL driver chip is 12kΩ, the input impedance of 1/2UL is 24kΩ, the input impedance of 1/4UL is 48kΩ, and the input impedance of 1/8UL is 96kΩ. Compared with standard operating conditions, the structure of the RS485 bus circuit after adding $R_T$ and $R_B$ has changed. Affected by $R_T$ and $R_B$, the maximum number of network nodes that can be assumed by the RS485 bus also changes accordingly. The relationship between these parameters can be described by the following formula (Petrou et al. 2019; Manogaran et al. 2021):

$$F(N_{\text{max}}) = f(R_m, R_T, R_B) \quad (14)$$

Among them, $N_{\text{max}}$ is the maximum number of nodes on the bus, and $R_m$ is the input impedance (Ω) of the interface chip, which takes values in, 12kΩ, 24kΩ, 48kΩ and 96kΩ. After the chip model is determined, $R_m$ has been determined. $R_T$ is the terminal resistance of the bus (Ω), $R_B$ is the bias resistance of the bus (Ω).

Taking 1 UL driver chip as an example, it can be known from the constraints of the bus that the maximum number $N_{\text{max}}$ of nodes on the bus should satisfy the relationship in the following formula.

$$\frac{N_{\text{max}}}{32} = \frac{R_{CM}}{R_m} \quad (15)$$

Before adding $R_B$, $R_m \geq R_{CM} = 375\Omega$, and when $R_m = R_{CM}$, $N_{\text{max}} = 32$ can be obtained. When $R_B$ is added, $R_m < R_{CM}$ is known, then $N_{\text{max}}$ is reduced accordingly. The calculation expression of $R_m$ can be obtained,
as shown in the following formula:

\[ R_{in} = \frac{1}{\frac{1}{R_{CM}} - \frac{1}{R_B}} \]  \hfill (16)

The calculation expression of the maximum number \( N_{\text{max}} \) of bus nodes is obtained as:

\[ N_{\text{max}} = 32 \frac{R_{CM}}{R_{in}} = 32 \left( 1 - \frac{R_{CM}}{R_B} \right) \]  \hfill (17)

\[ 556\Omega \leq R_B \leq 716\Omega \]

It can be seen from the above formula that when the chip model is determined, \( N_{\text{max}} \) is mainly affected by the bias resistance \( R_B \) and the larger the value of \( R_B \), the larger the corresponding value of \( N_{\text{max}} \). Then, when \( R_B = 716\Omega \), is the corresponding \( N_{\text{max}} \) the largest? actually not. Through further observation, it can be seen that when \( R_B = 716\Omega \), only one node can be mounted on the bus. Therefore, an optimal value can be found within the effective value range of \( R_B \). At this point, the bias resistor can be used to ensure the reliable communication of the RS485 bus. At the same time, the maximum number of network nodes of the bus can be obtained (Gibeaux et al. 2018; Balamurugan et al. 2020).

In order to reflect the relationship between \( R_B \) and \( N_{\text{max}} \) intuitively and clearly, the graphs are used to describe them, as shown in Figure 2(a,b), respectively. It can be seen from Figure 2(a) that as the number of network nodes gradually increases, the upper limit of the bias resistance drops from 716\( \Omega \) to 620\( \Omega \) or so, showing a linear decreasing trend. In Figure 2(b), the bias resistance starts from 560\( \Omega \), and the maximum value is 716\( \Omega \). At this point, the point (751, 16) in the upper right corner has lost its meaning. The resistance value of the bias resistor corresponding to this point is 671\( \Omega \), and the corresponding bus maximum network node is 14.

In the same way, the optimal bias resistance values corresponding to 1/2UL, 1/4UL, and 1/8UL can be obtained, as well as the maximum number of network nodes that the bus can bear under the action of the bias resistance. The intersection positions are (671, 28), (668, 56) and (672, 113) respectively. It is not difficult to find that, corresponding to different UL conditions, the optimal resistance value of the bias resistor is about 670\( \Omega \). In practical engineering applications, we can refer to the E-96 series nominal resistance code comparison table to select the 665\( \Omega \) close to the optimal value point as the bias resistance value.

**Architectural designs of the agricultural sightseeing area**

This paper is mainly to plan the power system of the agricultural sightseeing area and improve the architectural design effect of the agricultural sightseeing area.

The complete computer automatic control system for the greenhouse building environment of the agricultural sightseeing area includes various sensors, upper computer controllers, lower computer controllers, actuators and other devices. The computer control system integrates the control methods of various factors, uses advanced control technology and control strategies, and fully considers the relationship between the control variables to realise the automation, intelligence and energy-saving regulation of the greenhouse environment of the agricultural sightseeing area. The existing greenhouse building environment control system of agricultural sightseeing area in our country generally adopts master-slave computer control. The system is divided into four parts: data acquisition, data processing, output control and man-machine dialogue interface. An information securing framework (or DAS or DAQ) changes over states of being into computerised structure, for additional capacity and examination. Regularly, signals from sensors (here and there handled by sensor conditioners) are examined, changed over to advanced, in addition, to put away through a PC, else by an independent gadget. Information handling, control of information by a PC. It incorporates the change of crude information to machine-meaningful structure, stream of information through the CPU as well as memory to yield gadgets, besides organising or change of yield. Any utilisation of PCs to perform characterised procedure on information can be incorporated under information preparing. A man-machine discourse framework utilising an intelligent PC framework containing an information gadget for getting contribution from the client. A yield gadget producing yield towards the client. There is given an article framework which is a data source or store, else an order besides control gadget. The system first collects various environmental data through sensors, and proposes specific operation measures according to the predetermined control target and the designed algorithm, so as to control the corresponding actuator, so that the environmental parameters constantly tend to the target value.

The greenhouse building control system of a typical agricultural sightseeing area is shown in Figure 3.

The increase in the temperature of the greenhouse building in the agricultural sightseeing area is mainly through the power supply to heat the resistance wire, and the cooling is natural cooling. The increase in
humidity is mainly caused by the control relay to open the solenoid valve, so that the micro-sprinkler above the greenhouse building in the agricultural sightseeing area can spray water mist to humidify, and the dehumidification is also a natural dehumidification. The structure of the heating and humidification system of the greenhouse building in the agricultural sightseeing area is shown in Figure 4. Among them, UI is the

![Figure 2](image_url)  
**Figure 2.** The relationship between the number of bus network nodes and the bias resistance in the agricultural sightseeing area.

![Figure 3](image_url)  
**Figure 3.** Block diagram of the greenhouse building control system in the agricultural sightseeing area.
duty cycle of the switch tube, the input DC power is constant at 110 V, the resistance value of the resistance wire is 9Ω, U2 is the solenoid valve relay control pulse, the relay operating voltage is DC 12 V, and the solenoid valve operating voltage is AC 220 V, the frequency is 50 Hz, and the power is 25W.

A greenhouse is exceptionally valuable for the devoted landscaper, uncommon plant gatherer else farmer who needs to develop crops all year. A few elements are associated with arranging else building a fruitful nursery; however, the cycle doesn’t need to be extremely tedious otherwise costly. The primary prerequisites for an effective nursery are a legitimate area besides great ventilation, warming, cooling then watering frameworks. According to the actual conditions of the greenhouse construction in the agricultural sightseeing area and the required control accuracy, a humidification method that controls the spray of water mist by the micro-sprinkler is adopted. To forestall dryness that can cause aggravation in many pieces of the body, humidifier treatment is utilised which adds dampness to the air that can be

Figure 4. The structure diagram of the heating and humidification system of the greenhouse building in the agricultural sightseeing area.

Figure 5. The humidity control subsystem of the greenhouse building in the agricultural sightseeing area with spray humidification.
particularly useful in winter, at the time of climate as well as indoor warming frameworks can make the air dry. It can be especially viable for treating dryness of the skin, throat, nose as well as lips. They can likewise facilitate a portion of the side effects brought about through seasonal influenza else normal virus. The basic idea is to use the high-altitude reservoir outside the greenhouse building in the agricultural sightseeing area to supply water. The water in the pool reaches the solenoid valve after passing through the filter. By controlling the length of

Figure 6. Greenhouse structure in the agricultural sightseeing area.

Figure 7. Test system and overall structure diagram.

Table 1. Statistical table of architectural design evaluation of agricultural tourist areas.

| Dataset in number | Architectural design evaluation | Dataset in number | Architectural design evaluation | Dataset in number | Architectural design evaluation |
|-------------------|---------------------------------|-------------------|---------------------------------|-------------------|---------------------------------|
| 1                 | 92.7                            | 29                | 91.1                            | 57                | 91.6                            |
| 2                 | 94.7                            | 30                | 91.2                            | 58                | 94.7                            |
| 3                 | 95.1                            | 31                | 93.8                            | 59                | 93.3                            |
| 4                 | 96.1                            | 32                | 94.7                            | 60                | 93.9                            |
| 5                 | 92.3                            | 33                | 96.0                            | 61                | 92.3                            |
| 6                 | 92.6                            | 34                | 96.7                            | 62                | 91.5                            |
| 7                 | 93.7                            | 35                | 91.8                            | 63                | 91.7                            |
| 8                 | 94.5                            | 36                | 93.9                            | 64                | 93.8                            |
| 9                 | 92.9                            | 37                | 96.1                            | 65                | 91.5                            |
| 10                | 91.6                            | 38                | 92.3                            | 66                | 95.3                            |
| 11                | 96.1                            | 39                | 92.7                            | 67                | 94.8                            |
| 12                | 95.2                            | 40                | 93.4                            | 68                | 94.5                            |
| 13                | 95.5                            | 41                | 96.2                            | 69                | 94.4                            |
| 14                | 95.9                            | 42                | 96.2                            | 70                | 91.9                            |
| 15                | 95.7                            | 43                | 95.9                            | 71                | 92.3                            |
| 16                | 93.4                            | 44                | 96.1                            | 72                | 95.3                            |
| 17                | 92.0                            | 45                | 93.2                            | 73                | 92.4                            |
| 18                | 96.7                            | 46                | 91.6                            | 74                | 93.9                            |
| 19                | 97.0                            | 47                | 92.9                            | 75                | 96.7                            |
| 20                | 91.9                            | 48                | 93.3                            | 76                | 96.7                            |
| 21                | 91.6                            | 49                | 93.0                            | 77                | 95.7                            |
| 22                | 96.5                            | 50                | 93.6                            | 78                | 93.6                            |
| 23                | 95.1                            | 51                | 95.2                            | 79                | 95.0                            |
| 24                | 94.6                            | 52                | 92.5                            | 80                | 92.8                            |
| 25                | 91.9                            | 53                | 93.2                            | 81                | 93.3                            |
| 26                | 95.0                            | 54                | 91.4                            | 82                | 94.5                            |
| 27                | 94.5                            | 55                | 92.7                            | 83                | 91.2                            |
| 28                | 93.2                            | 56                | 95.8                            | 84                | 94.8                            |
the solenoid valve in a control cycle, the pulse width is controlled. Realise the control of humidity. The control pulse is calculated by the host computer according to the collected data and the designed control algorithm, and transmitted to the single-chip microcomputer through the serial port, and output by the PO.0 port of the single-chip microcomputer. During the high level of the pulse. The triode is turned on, the relay is closed, the main circuit of the control solenoid valve is turned on, and the solenoid valve is opened. Solenoid valves are control units which, at the time of electrically empowered else de-invigorated, either shut off else permit liquid stream. The actuator appears as an electromagnet. At the point when empowered, an attractive field develops which pulls an unclung else turned armature against the activity of a spring. The water pressure generated by the height difference between the reservoir and the nozzle causes the nozzle to spray water mist, thereby increasing the humidity. During the low level of the pulse, the transistor is turned off and the relay is turned on. The main circuit of the control solenoid valve is disconnected and the solenoid valve is closed to stop spraying. The principle of the humidity control system of the greenhouse building in the agricultural sightseeing area is shown in Figure 5.

The G-80 type greenhouse building structure in the agricultural sightseeing area is shown in Figure 6.

The whole test system includes three parts: data acquisition and communication system, heating subsystem and humidification subsystem. The main subsystems in perception satellites are said to be as heating subsystem. It is also known as thermal control subsystem (TCS). The capacity of TCS is to protect entire space apparatus as well as Payload segments in addition to subsystems inside their necessary temperature limits intended for every mission stage. The overall structure diagram of the system is shown in Figure 7.

**Table 2. Statistical table of tourist satisfaction of agricultural tourism areas.**

| Dataset in number | Satisfaction | Dataset in number | Satisfaction | Dataset in number | Satisfaction |
|-------------------|--------------|-------------------|--------------|-------------------|--------------|
| 1                 | 90.1         | 29                | 85.9         | 57                | 89.8         |
| 2                 | 87.1         | 30                | 91.8         | 58                | 86.6         |
| 3                 | 88.6         | 31                | 88.0         | 59                | 86.7         |
| 4                 | 85.2         | 32                | 90.4         | 60                | 88.7         |
| 5                 | 92.5         | 33                | 87.9         | 61                | 86.6         |
| 6                 | 85.9         | 34                | 87.0         | 62                | 89.4         |
| 7                 | 92.4         | 35                | 86.1         | 63                | 87.4         |
| 8                 | 89.3         | 36                | 87.1         | 64                | 91.1         |
| 9                 | 85.6         | 37                | 85.5         | 65                | 90.5         |
| 10                | 88.9         | 38                | 90.6         | 66                | 88.8         |
| 11                | 86.4         | 39                | 92.8         | 67                | 92.1         |
| 12                | 87.3         | 40                | 89.0         | 68                | 89.6         |
| 13                | 85.4         | 41                | 91.9         | 69                | 92.6         |
| 14                | 90.5         | 42                | 88.6         | 70                | 90.5         |
| 15                | 87.7         | 43                | 87.4         | 71                | 90.6         |
| 16                | 90.0         | 44                | 85.9         | 72                | 89.1         |
| 17                | 92.0         | 45                | 89.5         | 73                | 85.1         |
| 18                | 88.4         | 46                | 90.9         | 74                | 91.6         |
| 19                | 89.2         | 47                | 89.7         | 75                | 85.8         |
| 20                | 87.8         | 48                | 92.2         | 76                | 86.6         |
| 21                | 85.9         | 49                | 86.1         | 77                | 90.8         |
| 22                | 87.5         | 50                | 88.6         | 78                | 87.6         |
| 23                | 92.0         | 51                | 89.7         | 79                | 87.4         |
| 24                | 92.5         | 52                | 88.7         | 80                | 86.4         |
| 25                | 88.7         | 53                | 85.4         | 81                | 92.9         |
| 26                | 90.0         | 54                | 90.7         | 82                | 91.5         |
| 27                | 90.2         | 55                | 88.6         | 83                | 85.0         |
| 28                | 86.6         | 56                | 91.0         | 84                | 88.7         |
Experimental analysis of architectural design and planning of agricultural sightseeing areas

After constructing the architectural design system of the agricultural tourism area, the performance of the system constructed in this paper is verified. This paper constructs the general diagram structure of the test system as shown in Figure 7, and conducts simulation research on the system. Meanwhile, this paper uses multiple sets of data to study the structure of the building system and make statistics. The evaluation results of architectural planning and design in the agricultural sightseeing area are shown in Table 1 and Figure 8.

It can be seen from the above research that the effect of the architectural design and planning of the agricultural tourism area proposed in this paper is relatively obvious. Based on this, the satisfaction of tourists is investigated. The results are shown in Table 2 and Figure 9.

The experimental research shows that the agricultural sightseeing area constructed in this paper has extremely high satisfaction among tourists.

Conclusion

The need for agricultural tourism villages is the result of continuous progress and development of society. As the pressure of urban society continues to increase, people tend to seek a comfortable and close-to-nature lifestyle during short holidays. Moreover, people hope to feel the beauty of nature, leave the noisy and noisy city for a short time, and enter the simple and natural agricultural tourism village. Because people yearn for a simple life and a life of natural ecology, in recent years, large areas of agricultural tourism villages have emerged. However, there are certain shortcomings in the continuous rapid development of tourist villages. Based on test system like data acquisition, communication system as well as humidification subsystem, the performance of the system is built. To study the structure of the building system besides to create statistics, multiple sets of data are utilised. The statistical results are shown in Tables 1 and 2, respectively. This paper analyzes the architecture of the agricultural sightseeing area, and mainly analyzes the power system planning of the agricultural sightseeing area, and takes the greenhouse system as an example to analyze the architectural planning. From the research point of view, it can be known that the architectural design method of agricultural sightseeing tourism area constructed in this paper has certain effects.

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**References**

Abuimara T, O’Brien W, Gunay B, Carrizo JS. 2019. Towards occupant-centric simulation-aided building design: a case study. Build Res Inf. 47(8):866–882.

Adilkhodjayev AI, Mahamataliev IM, Shaumarov SS. 2019. Theoretical aspects of structural and simulation modeling of the macrostructure of composite building materials. J Tashkent Inst Rail Eng. 14(2):3–14.

Alghamdi AS, Polat K, Alghoson A, Alshdadi AA, Abd El-Latif AA. 2020. A novel blood pressure estimation method based on the classification of oscillometric waveforms using machine-learning methods. Appl Acoust. 164:107279. https://doi.org/10.1016/j.apacoust.2020.107279

Andrio P, Hospital A, Conejero J, Jordá L, Del Pino M, Codo L, Soland-Reyes S, Goble C, Lezzi D, Badia RM, Orozco M, Gelpi JL. 2019. Bioexcel building blocks, a software library for interoperable biomolecular simulation workflows. Sci Data. 6(1):1–8.

Balamurugan S, Muthu BA, Peng S-L, Wahab M. 2020. Call for papers: Big Data analytics for agricultural disaster management. Big Data. 8(6):544–545.

Beausoleil-Morrison I. 2019. Learning the fundamentals of building performance simulation through an experiential teaching approach. J Build Perform Simul. 12(3):308–325.

Black AD. 2018. Wor (l) d-building: simulation and metaphor at the Mars desert research station. J Linguist Anthropol. 28(2):137–155.

Brunelli A, de Silva F, Piro A, Parisi F, Sica S, Silvestri F, Cattari S. 2021. Numerical simulation of the seismic response and soil–structure interaction for a monitored masonry school building damaged by the 2016 central Italy earthquake. Bull Earthquake Eng. 19(2):1181–1211.

Chakraborty D, Elzarka H. 2019. Advanced machine learning techniques for building performance simulation: a comparative analysis. J Build Perform Simul. 12(2):193–207.

Dodd T, Yan C, Ivanov I. 2020. Simulation-Based methods for model building and refinement in cryoelectron microscopy. J Chem Inf Model. 60(5):2470–2483.

Endo N, Shimoda E, Goshome K, Yamane T, Nozu T, Maeda T. 2019. Simulation of design and operation of hydrogen energy utilization system for a zero emission building. Int J Hydrogen Energy. 44(14):7118–7124.

Gao J, Wang H, Shen H. 2020a. Smartly handling renewable energy instability in supporting a cloud datacenter. In: Yuan yuan Yang, editor. IEEE International Parallel and Distributed Processing Symposium (IPDPS). New Orleans, USA: IEEE; p. 769–778.

Gao J, Wang H, Shen H. 2020b. Task failure prediction in cloud data centers using deep learning. IEEE Trans Serv Comput. 1–12. https://doi.org/10.1109/TSC.2020.2993728

Gibieux S, Thomachot-Schneider C, Eyssautier-Chuine S, Marin B, Vazquez P. 2018. Simulation of acid weathering on natural and artificial building stones according to the current atmospheric SO 2/NO x rate. Environ Earth Sci. 77(9):1–19.

Guerra-Santini O, Silvester S. 2017. Development of Dutch occupancy and heating profiles for building simulation. Build Res Inf. 45(4):396–413.

Hanson K, Hernandez L, Banaski JA. 2018. Building simulation exercise capacity in Latin America to manage public health emergencies. Health Secur. 16(51):S98–S102.

Imam S, Coley DA, Walker I. 2017. The building performance gap: are modellers literate? Build Serv Eng Res Technol. 38(3):351–375.

Lee CW, Cho SJ. 2017. The development of converting program from sealed geological model to GMSH, COMSOL for building simulation grid. J Kor Earth Sci Soc. 38(1):80–90.

Manogaran G, Alazab M, Muhammad K, Albuquerque VH. 2021. Smart sensing based functional control for reducing uncertainties in agricultural farm data analysis. IEEE Sens J. 21(16):17469–17478. https://doi.org/10.1109/JSEN.2021.3054561

Miller C, Thomas D, Kämpf J, Schlueter A. 2018. Urban and building multiscale co-simulation: case study implementations at two university campuses. J Build Perform Simul. 11(3):309–321.

Mou B, He BJ, Zhao DX, Chau K-W. 2017. Numerical simulation of the effects of building dimensional variation on wind pressure distribution. Eng Appl Comput Fluid Mech. 11(1):293–309.

Nguyen N, Liu B, Wang S. 2017. Network under limited mobile sensors: new techniques for weighted target coverage and sensor connectivity. In: Jens Tölle, editor. IEEE 42nd conference on local computer networks (LCN). Singapore: IEEE; p. 471–479. https://doi.org/10.1109/LCN.2017.52

Pei JS, Carboni B, Lacarbonara W. 2020. Mem-models as building block for simulation and identification of hysteretic systems. Nonlinear Dyn. 100(2):973–998.

Petrou G, Mavrogianni A, Symonds P, Mylona A, Raslan R, Davies M. 2019. Can the choice of building performance simulation tool significantly alter the level of predicted indoor overheating risk in London flats? Build Serv Eng Res Technol. 40(1):30–46.

Rempen P, Lauster M, Mans M, Fuchs M, Osterhage T, Müller D. 2018. TEASER: an open tool for urban energy modelling of building stocks. J Build Perform Simul. 11(1):84–98.

Vu D-L, Nguyen T-K, Nguyen TN, Massacci F, Phung PH. 2019. A convolutional transformation network for malware classification. In: Vo Nguyen Quoc Bao, Hanoi Vietnam, editors. 6th NAFOSTED Conference on information and computer science (NICS). Hanoi, Vietnam: IEEE; p. 234–239. https://doi.org/10.1109/NICS48868.2019.9023876

Wati EK, Widiarynah N. 2020. Design of learning media: modeling & simulation of building thermal comfort optimization system in building physics course. J Pendidikan IPA Aided Civil Infrastruct Eng. 35(4):322–341.

Xiong C, Huang J, Lu X. 2020. Framework for city-scale building seismic resilience simulation and repair scheduling with labor constraints driven by time–history analysis. Comp-Aided Civil Infrastruct Eng. 35(4):322–341.

Zhang TJ, El-Latif AA, Amin M, Zaghlool A. 2014. Diffusion-substitution mechanism for color image encryption based on multiple chaotic systems. Adv Mat Res. 981:327–330.