

# Design of Urban Landscape Environment based on Computer Multimedia Simulation

Feng Hao<sup>1,2</sup>

<sup>1</sup>College of Life Sciences, China West Normal University,  
Nanchong, Sichuan, China

<sup>2</sup>Key Laboratory of Southwest China Wildlife Resources Conservation, Ministry of Education, China West Normal University, Nanchong, Sichuan, China  
[fenghao091779@163.com](mailto:fenghao091779@163.com)

## Abstract

*The integration of digital information has become an important strategy to promote the sustainable development of information construction and social economy. In this paper, the author analyzes the design of urban landscape environment based on computer multimedia simulation. By using digital means to deal with the present problems in the process of landscape design, designers can optimize the distribution of resources, and realize the multi-resolution, and the 3d modeling of the environment description. In general, computer aided method can solve the problems in urban landscape design, improve design efficiency and optimize the results, to will achieve the environment needs of landscape design, such as characteristic, diversity and comfort.*

**Keywords:** *Computer multimedia, Virtual reality, Urban landscape, Environmental design*

## 1. Introduction

Since twentieth Century, with the development of science and technology, computer information has been widely promoted. Computer networks play a vital role in our lives. We live in a world full of information resources, the computer network has become a close tool for people to contact each other. Life is originally diversified and complex, with the development of economy in the 21st century, the material base has been unable to meet people's demand for high quality living environment [1]. Landscape design and construction can not accurately grasp the geographical and cultural characteristics, to achieve the landscape characteristic, diversity, comfort environment needs. How to use and integrate the new design expression means to solve the landscape design is not enough to become a new problem in the landscape design industry [2-3]. Digital Landscape theory is one of the new theory, in the digital landscape design theory and environmental art design theory research will be more rich and development. Its application will have a great theoretical and practical significance in the design and planning of residential landscape environment in the future. "Digital Landscape" is a combination of high simulation model system and computer software and hardware system [4]. According to the way of man-machine combination, the design project is guided and tested. This system not only through the designers, planners and decision makers from the visual design of the project to detect, at the same time, also need to take the form of computer data analysis processing to get the final test report [5]. Has strong practical guiding significance in the design of the project, such as the operability of the project, the coordination of the surrounding environment, the design of the project scale, proportion, color matching and so on.

Digital information integration has become an important strategy to promote the sustainable development of information construction and the economic and Social Research Institute CUDI international city development that the city people and the relationship between digital city information system is the essence of it, in order to make the city can better play its role, is people-oriented, to reflect the operation system of the city through the city informatization in the city and close together, realize the optimization of the system. Information digitization has produced great changes in the process of landscape design, human computer communication, digital model creation, multimedia performance [6]. The core idea is to use digital means to deal with the problems in the process of landscape design, so as to optimize the distribution of resources and use, through access to massive geographic data, to implement the resolution, and describe the 3D map of the environment, in order to support and improve the quality of human life. At the same time, the design itself is more a manifestation of the language [7]. A new round of design trend is more emphasis on ecological applications, more reasonable structure, the integration of new materials, energy conservation. The combination of art and technology can produce unexpected results. The digital landscape through virtual reality, parameter control and ecological simulation, remote sensing monitoring technology of organic integration, and the development and application of database to evaluate the design, designed to avoid the risk, save resources, realize the sustainable development. This has a great effect on the realization of digital identification and reproduction.

## 2. Multimedia Digital Landscape

### 2.1. Multimedia computer simulation

Three dimensional model is often made of 3D modeling tools, but other methods can also achieve this purpose, such as the use of a certain algorithm, the use of hand can also be done. In general, we use the computer to form a virtual description in the form of electronic computing, but the paper can also be considered as a three-dimensional model. At present, there are many modeling software in the market, such as 3DMAX, Softimage, Maya, AutoCAD and so on [8]. They are the use of some basic geometric elements, through the series of geometric operations, to build a complex geometric scene. Using modeling software to build three-dimensional model mainly includes geometry modeling (Modeling Geometric), behavior modeling. Among them, the creation and description of the geometric modeling play the most important role in the construction of the virtual scene.

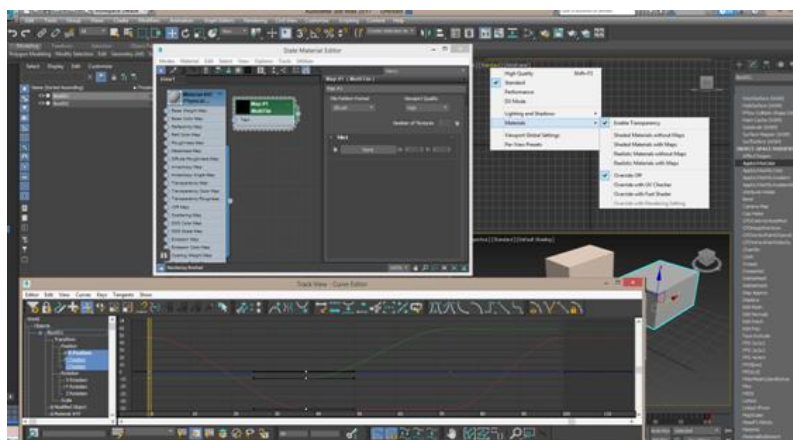
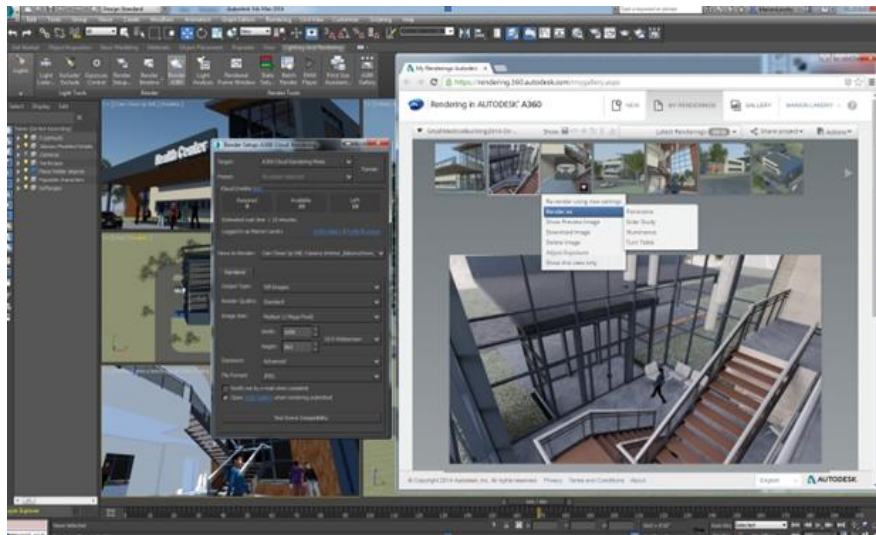


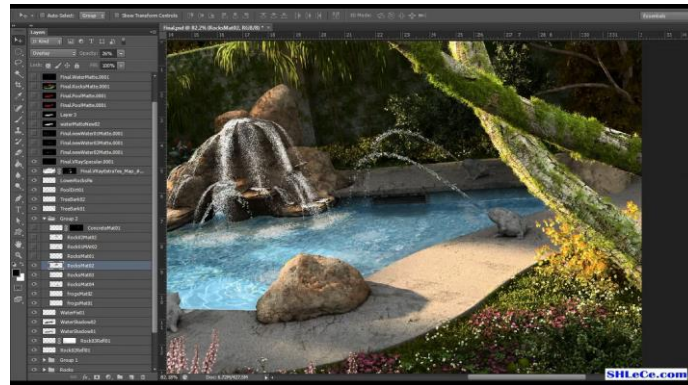
Figure 1. 3D simulation

The construction site by the three landscape began to simulate landscape environment, modeling and Simulation on topography, vegetation, water, air and building the landscape elements gradually deepen to the four landscape site, on the basis of the landscape elements of superposition effect of a special series, and the prediction of landscape features aftereffect. The landscape system is simulated and simulated, the study of the interaction between the various factors of the landscape and the role of the process, and the evolution of the landscape development trend forecast. Element simulation. Landscape design, commonly used in the production of three-dimensional model of the software for Max Sketchup, 3ds, ylcad, Rhino, etc.. It can be designed for plants, water, terrain, architecture, garden pieces, animals and other ideas to achieve. These tools make the designer's ideas no longer exist in our minds, but in a more intuitive way to appear in front of us, it is more multi perspective and more realistic, but also to depict more profound details. It is now a good helper for designers to express their ideas and guidance. Under the application of modern technology, the idea of landscape creation and planning is full of human's subjective initiative, while the planning process becomes more objective and scientific.



**Figure 2. The computer simulation**

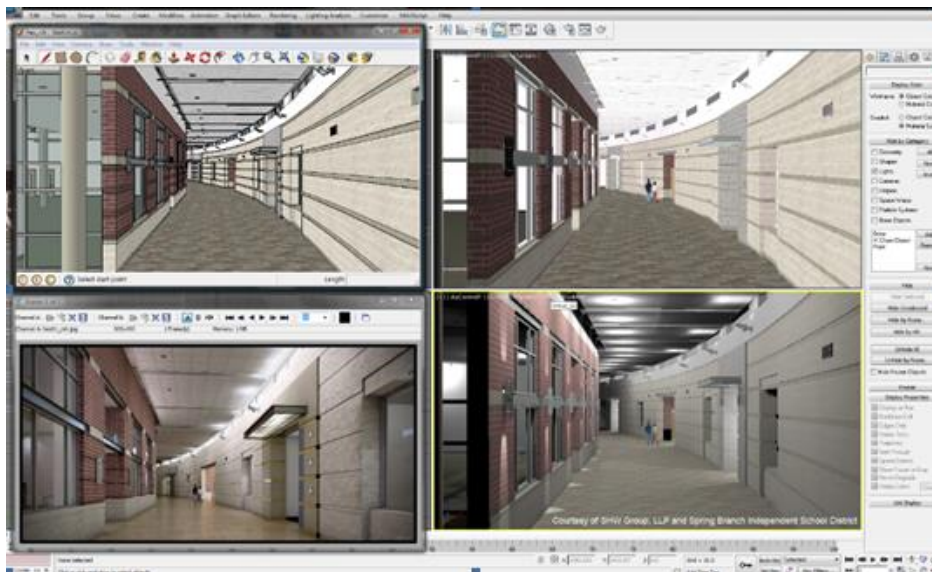
Along with the continuous innovation and progress of computer technology, computer graphics and animation art is formed by the combination of computer animation, computer animation technology has been applied from television advertising stunt to electronic play in various fields, from art design to product simulation. The concept of landscape animation as an independent animation application, not only refers to the building similar to the roaming "movie" type of animation, it is also the same language form "of the landscape, with its rich diversity of expression, to show the character of landscape, and the landscape of a dynamic simulation. The use of computer aided design software to create a three-dimensional model, and gives the model of the real world of a variety of materials, is a model of a realistic texture, a sense of body mass. Professional landscape visualization software based on maturity, such as the production of plant SpeedTree, making the natural landscape and ecological effects of the Vue simulation, can not only reflect the actual relative landscape effect, but also has great ornamental and intuitive. Through the comprehensive painting, music, film and other means of expression of the artistic expression of the plant, urban, cultural, architectural, natural and other landscape dynamic changes.



**Figure 3. The landscape design**

## 2.2. Landscape design visualization

Computer technology is playing an increasingly important role in the process of landscape design. Visualization of digital technology is a leader in computer technology, for the landscape design and expression has played a great role, so that the landscape design to a new stage. Sual I zat I (on Vi) is the use of computer graphics and image processing technology, the data is converted into graphics or images displayed on the screen, and interactive processing theory, methods and techniques. It involves computer graphics, image processing, computer vision, computer aided design and other fields, has become a research data representation, data processing, decision analysis and a series of problems such as the integrated technology.



**Figure 4. Computer information visualization**

Visualization in fact is to convert information into graphics, give people a more intuitive visual effects and meaning. Some software functions also led to a number of creative landscape design cannot be achieved, but people are constantly trying, trying to have a greater breakthrough. Geographic information system, geographic information visualization, 3D display technology, spatial data processing and object oriented programming methods are the prerequisites and keys of the research and development of 3D visualization system of geographic information. Visual digital technology in the management of data, analysis, prediction and other functions have been greatly improved,



but in the application of landscape design is not yet mature, to enhance the space is very large. Requires us to further the intrinsic value of the mining machine and the advantages.

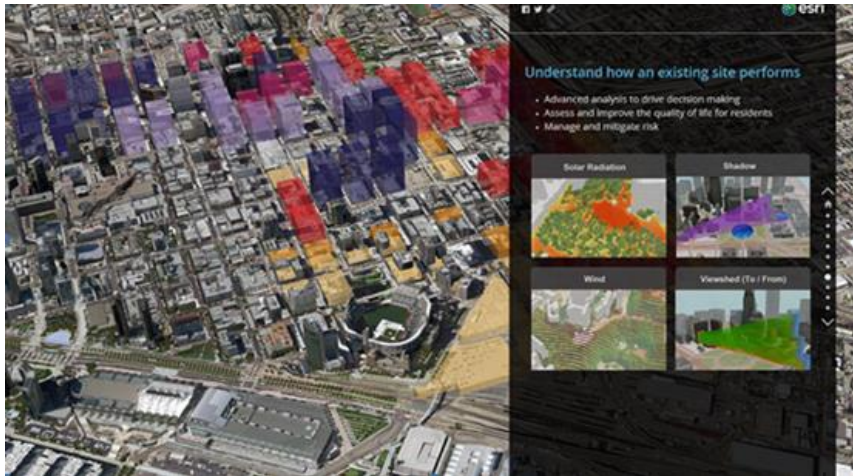


Figure 5. Geographic information system

### 3. The Influence of Multimedia Landscape on Residential Environment

#### 3.1. Characteristics of multimedia landscape design

Landscape design is an indispensable part of the urban landscape, which is a good living area, not only can optimize the environment, but also improve the spiritual quality of the residents in the residential area. People in reducing the pressure of work, to appease their emotions, and then to the residents of physical and mental health has played a good therapeutic effect, from the overall improvement of the overall quality of residential landscape. Landscape pattern is a manifestation of external features, which is a form of deep natural process and human activities. The formation of landscape pattern in residential areas is related to the physical geography, but also has a close relationship with many cultural factors, such as politics, philosophy, history and so on.

**(1) Intuitive:** digital landscape drawings of the whole design process with a variety of software updates, designers use such software can quickly create digital graphics all landscape needs in residential area, for example, to set the scene material through software, real effect not only to advance simulation involved in the landscape, can also be in order to further strengthen the artistic beauty of the landscape may provide; can use the software to directly establish the spatial relationship between the landscape design, at the same time it can be and the human geography corresponding expression, on the landscape design of the art review, in order to maximize the overall project coordination effect. The design of digital map to the superiors in convenient design. At the same time, but also convenient for later design processing, the most important is to help enhance the accuracy, improve the work efficiency of the construction of the project, but also enable the public to compare the visual image of the project solution.

**(2) Authenticity:** residential landscape design is refers through the digital virtual reality, parameter control and ecological simulation, monitoring technology of organic integration, and the development and application of database to evaluate the design, designed to avoid the risk, save resources, realize the sustainable development. The design of residential landscape planning and design drawings of various digital is the existence and use of digital mapping software design and planning, residential landscape photos and residential models are residential landscape design of digital information on the one hand, the information is all digital finishing with professional drawing under

house arrest processed form professional. The corresponding database. So as to form a complete database.

**(3) Interaction:** the general interaction of landscape is the change of landscape to the human. Popular terms is that people have changed the landscape, then the landscape also changes with the behavior of human change. People and people in the landscape due to various acts of contact and interaction with each other. The overall atmosphere and rhythm of the landscape. The landscape and environment, and must be "building mutual coordination, the process is essentially interactive. The more prominent interactive landscape and human or human relations: the audience, including users, appreciation, reviewers can be obtained (landscape or landscape) information content, the function, the artistic conception of landscape and expression. And then give feedback to the landscape management or landscape designers, the audience may even participate in the design and Simulation of single factor simulation; the landscape elements not only reflect the inherent law of each element exists, and to reveal the mutual coupling of organic elements, but also emphasizes the artistic rendering of landscape elements of simulation results.



**Figure 6. Virtual reality**

### **3.2. The influence of landscape environment**

(1) Style and environmental coordination. In the residential environment landscape design, need to consider factors: geographical characteristics, residential culture background and living areas surrounding environment, and consumer habits and preferences, so as to achieve the harmony style and residential environment. Now there are many people who cite the European architectural geometry of symmetry, open, spectacular style. The appearance of the European style, style residential lawn. Some of the features of appropriate reference at home and abroad residential landscape can be in the living environment, can enrich our residential style, meet the diversified aesthetic needs of residents, but should not be the pursuit of extreme climate". The designer will need regional culture and living environment to carry out a detailed investigation before the implementation of the scheme is given in the design process, so as to avoid the design style and environment coordination.

(2) Function and spatial diversity. Many designers often ignore the functional implementation of a residential area, but spend a lot of time to focus on some form of the wind, the way, the form and other issues, too much emphasis on the role of the visual image of the residential area construction. If designers do not care about the needs of households, but in creating a strong, shocking visual effects. Does not take into account the household environment construction in warm and comfortable space for outdoor activities, just be in a residential area of its formal beauty, but not from the function without tenants reasonable arrangement of private space, there will be such a

phenomenon: the lack of affinity with small space, the visual effect of the air expansion and monotonous.

(3) Ecological efficiency. Now there are many residential style on Greenwood grass, but neglected the arbor, shrub and grass layer of plant ecological community needs reasonable construction, the ecological vegetation structure of residential single, low ecological efficiency, and in the shade and light, expand the green area and building space, and Wai and transparent etc. the conflict is not resolved. Moreover, the maintenance of a large area of the lawn is to pay the cost of the more expensive. A lot of people think that the ecological residential area is a green area, the more it becomes "ecological", the higher the ecological efficiency. Thus causing more and more people pay more attention to the residential area greening, developers also conform to this trend, a residential area green hot phenomenon, a large number of blind pursuit of greening effect and greening rate.

(4) Humanized design. The goal of landscape design for residential area environment is to take into account the needs of the residents of human nature, and to live in a more high-quality living environment. Therefore, in the construction of residential areas need to take into account the residents in the physiological and psychological demands. However, many residential households humanized design and construction without considering this, mainly in the following aspects: the lack of communication between designers and users, do not respect the needs of the occupants, occupants need more public facilities for humanity, but too much Lin former Road, need a resting place, but it will be the road design too much. There is not enough attention to the living environment of the living environment. For example, in the sunshine, ventilation, dust, noise elimination of these general residential areas should be designed to take into account the factors are detailed expression.



**Figure 7. Residential environment**

### **3.3. Effect of comprehensive utilization of resources**

City Design in China is now gradually showing the phenomenon of great momentum, in the planning design, lack of system. Judging from the present situation, in 40s and 50s, China is now the old city district has been transformed into tall buildings, the suburbs continue to evolve into the city, the speed of urbanization has been a sharp increase. The original residential area into the back of the development of the city, villa houses, highways in the fields, scenic spots abound. The speed of urban change is unprecedented and shocking. At the same time, the lack of necessary cognitive and scientific planning and design. Cause some architectural design to stay on the surface, the lack of details. In the city planning and design, often adhere to the expansion of the building itself, before construction and construction without the "interactive communication", their relationship

gives the feeling of being cut, people do not feel creative, so the city although there are individual momentum but scattered unfunded.

Landscape design in the future will pay attention to the coordination of style and environment, pay attention to the function and space diversity, ecological efficiency and humanized design, and build a sustainable development of ecological housing. The specific performance in the following points: in the residential area green design should pay attention to the natural green landscape and artificial landscape coordination, reasonable design of plant communities, improve the green coverage, pay attention to ecological benefits. You can use wall planting climbing plants, improve the ecological benefits of residential areas, because this plant can be weakened to some extent in the architectural form stiff lines, which makes the space more beautiful. Unexpected results can be achieved in both visual and auditory sense. In the layout of space, not only to meet the people's physical and psychological scale of space utilization, the post landscape should also be suitable for cultural taste. Fully tap the physiological needs and psychological needs of people.



Figure 8. Sustainable landscape design

## 4. Urban Landscape Environment Design Approach

### 4.1. Integration of software and platform

Computer technology has brought every leap, the change in production technology, industrial design and art design discipline, its performance by means of the original text recorded by hand painting sketch, the computer brings efficient design tools, three-dimensional and real design according to the form we can put the software into plane graphics and images, 3D model, animation and media editing, virtual reality, auxiliary rendering. The various software has the characteristic of the data connection and complement each other also have the disadvantage of incompatibility.

The three-dimensional model building software, 3dsMax is currently the most widely used 3D animation software, a good human-computer interaction, image output, with dynamic and static according to need, can increase the effect of plug-ins, 3D object model to achieve a variety of realistic. Maya is the world's top three-dimensional animation software, turn the performance of three-dimensional animation. The emergence of new technologies and new methods to study landscape quantitative provide great help, we need some evaluation criteria and evaluation index system to evaluate the quality of living environment, which is a very important tool is the geographic information system and remote sensing technology. It plays an important role in the source of landscape data, landscape pattern analysis, landscape ecological monitoring, landscape ecological



planning and so on. WebGIS can make the data for more people to use the network is the docking of geographic information system. In the living environment is very important. The object is for the residential environment of social and economic, cultural and other aspects of a comprehensive, systematic and comprehensive study on the living environment, historical development, dynamic geographic information, spatial climate, ecological environment and infrastructure. To form the objective data, through the computer simulation technology to form two-dimensional or three-dimensional spatial data, the human living environment statistical analysis to achieve real-time, multi-dimensional, efficiency, human nature. Make the environmental landscape planning more reasonable and practical.



**Figure 9. Urban landscape rendering**

#### **4.2. Three dimensional model and dynamic rendering**

Modeling of 3D landscape model can be divided into the following process in making 3dsmax: 3D modeling, gives the simulation map material, Lighting, Animation, setting up the animation rendering synthesis output. The final render output can be combined with Brazil r/ s renderer, finalRender renderer, FinalShader renderer material plug-ins, VRay renderer and Mental Ray renderer and other components, light, material, animation, cartoon, and sent with the content such as map baking perfectly with this. Landscape simulation and simulation technology is a great challenge to the traditional landscape planning and design methods and ideas, but also an important development direction of modern landscape planning and design, is to adapt to the development of modern information technology, the forefront of change. The digital landscape technology with the core of computer graphics has become the key to the development of landscape simulation and development. The application of virtual reality can be divided into several parts of the technical process, simulation and simulation database: landscape planning and the surrounding area of the spatial database and the landscape planning computer aided system.

- The landscape simulation system in landscape simulation database, to analyze the landscape pattern and its surrounding the specification range, obtain statistical characteristics of landscape pattern; the same time to identify and obtain the dynamic process of landscape elements in the dynamic process of the internal conversion relationship. To identify the mechanism of induced landscape dynamic process and input one response mechanism.

- The simulation system: through the simulated landscape design and simulation and recognition of the scheme, the results of landscape planning and design on the dual characteristics of digital landscape and visual landscape display. Landscape planning and design features of the system: through landscape planning simulation and simulation system can provide multiple verification after the open space velocity space positioning, statistical analysis, computer query, landscape tracing and so on; the landscape planning is a very important content in computer aided design in landscape planning.

#### **4.3. Intelligent development of environmental design**

With the rapid development of network technology, digital and virtual technology has also been widely used in various industries, and greatly improve the efficiency of the work. Especially in the field of architectural design, the use of digital virtual technology, the designers can quickly ideas into digital video, and can be adjusted for the design without the whenever and wherever possible, at any time and place restrictions. From the visual point of view, the city landscape design for digital virtualization on a work of very high, not just a decoration process, and become the early integration within a specific area of humanities, economy, environment and other factors, become a system design, the use of digital technology to make the breakthrough the dimension of space constraints, can be directly out of the landscape design for the people to realize the multi dimension display.

In the context of the information society environment, the general public health concept of continuous improvement, so that they can be more and more aware of the impact of the level of landscape design for contemporary living environment. Landscape for a long time in the beautification of the human living environment, the expression of the human heart for the future, for life, for the United States of America. So our designers are through the use of digital technology, to promote the development of the landscape design industry, make the living environment of people, city, landscape and nature (social environment) can be truly integrated, for people to bring a higher aesthetic enjoyment.

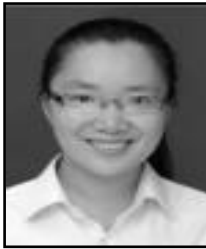
### **5. Conclusion**

Today's science and technology to promote economic development, the traditional residential space planning has been unable to meet people's demand for high quality living environment. Landscape design and construction can not accurately grasp the geographical and cultural characteristics, to achieve the landscape characteristic, diversity, comfort environment needs. How to use and integrate the new design expression means to solve the problems in the landscape design, improve design efficiency and optimize the results and become the problems faced by designers. In the computer aided design, the importance of information digitization in the landscape design process is becoming more and more obvious, mainly reflected in the human-computer interaction, digital model creation, multimedia performance. With the continuous improvement of the quality of the urban residential area development, the environment construction of the residential area is moving forward to the direction of the combination of the humanities, the technology and the emotion. People are no longer only concerned about Huxing, prices and other factors, and more focus on the overall quality of the house, residential environment is suitable and so on. The increasing social pressure, comfortable, natural, healthy living environment has become a common pursuit of people. The design of multimedia digital landscape is by means of virtual reality, parametric model, ecological simulation, remote sensing monitoring technology of organic integration, and the development and application of database to evaluate the design, designed to avoid the risk, save resources, realize the sustainable development.

## References

- [1] J. Choi, "Structural and parametric design of fuzzy inference systems using hierarchical fair competition-based parallel genetic algorithms and information granulation", *International Journal of Approximate Reasoning*, vol.49, (2008), pp. 631-648.
- [2] R. E. Skelton and F. Fraternali, "Minimum mass design of tensegrity bridges with parametric architecture and multiscale complexity", *Mechanics Research Communications*, vol.58, (2014), pp. 124-132.
- [3] S. Yasmin and I. Said, "Knowledge Integration between Planning and Landscape Architecture in Contributing to a Better Open Space", *Procedia - Social and Behavioral Sciences*, vol.170, (2015), pp. 545-556.
- [4] P. Tassinari and D. Torreggiani, "The FarmBuiLD model (farm building landscape design): First definition of parametric tools", *Journal of Cultural Heritage*, vol.12, (2011), pp. 485-493.
- [5] I. A. Kapetanakis and D. Kolokotsa, "Parametric analysis and assessment of the photovoltaics' landscape integration: Technical and legal aspects", *Renewable Energy*, vol.67, (2014), pp. 207-214.
- [6] W. Suyoto and A. Indraprastha, "Parametric Approach as a Tool for Decision-making in Planning and Design Process. Case study: Office Tower in Kebayoran Lama", *Procedia - Social and Behavioral Sciences*, vol.184, (2015), pp. 328-337.
- [7] B. Jankowski, "Functional Assessment of BIM Methodology Based on Implementation in Design and Construction Company", *Procedia Engineering*, vol.111, (2015), pp. 351-355.
- [8] C. Tagliaferro and M. Boeri, "Stated preference methods and landscape ecology indicators: An example of transdisciplinarity in landscape economic valuation", *Ecological Economics*, vol.27, (2016), pp. 11-22.

## Authors



Feng Hao (1979.09) Nanchong, Sichuan, China

Current position: Nanchong, Sichuan Province, China is the West China Normal University College of Life Sciences

Scientific interest: Her research area is the Chinese landscape design and landscape plant cultivation and conservation

Publications: More than 10 published

Experience: Her university teaching experience has been 14 years, hosted and participated in two research projects

