

Design space as synthesis of architecture and painting with the use of digital technology

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Abstract. The article discusses the use of computer technology tools for digital painting to achieve the synthesis of art, architecture and design. Noted that in search of architectural projects shown synthesis of Fine Arts, in the form of plastic and color computer processing of architectural elements, pictorial images, photographs, sculptural forms. The method used associative color-graphic transformation of natural forms, the project creates unusual shapes that meet current environmental concepts. It is shown that a computer architect - artist is engaged interesting creative process, embodying the idea of future works, creates virtual drawings, sketches, designs, using new electronic technologies in the field of visual works, promoting convergence and their penetration into modern art.

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Introduction

In recent years, both in training and in the real designing of modern architects and designers' digital technologies has become a major tool for solving creative problems of the organization of the architectural environment, in which people live, work and have a rest. It becomes topical the use of computer technology tools in the creation of architectural compositions in the form of paintings and monumental works, as one of the main components of the synthesis of the arts of the architectural environment. The use of electronic tools meets time demands, modern design techniques, promotes the synthesis of fine art with architecture, organically combining cultural and living space. [1]

Methods of Research

The paper used descriptive, comparative and analytical research methods.

Main Part

In creative projects of the beginning of XXI centuries the authors increasingly use the synthesis of modern architectural design, with fine arts and with

new computer technology programs. Technologies allow us in more variable and dynamic way to solve the problems of interaction between the element of landscape design, sculpture, modern forms of architecture, painting and small plastics of new materials, lighting design [2]. These synthetic works carry certain story content and specified technical parameters, which determine the function and purpose during designing the project or a complex of structures.

Electronic technologies accomplishments lies in the aϕ fact, that they create a variability of solutions, quickness of the implementation, they reveal wide facility of color solutions, the ability to discuss the project at the stage of sketches or providing finished projects in an interactive form to the customer in any region. Thereby the problem of rendering of designing service in the architectural field is solved dynamically. The expansion of tools using computer technologies productively affects the technical and creative possibilities when creating paintings and architecture objects, allows to save the individual style, freshness of the glance, originality of composite solutions, the originality of color means of expression. Computer technologies expand the possibility of

creating original, independent works of art in the architecture, sculpture and painting, they reflect the new vision of the designed space, they stimulate creativity in architect-artist, they contribute to the development of new techniques in the design of architectural environment. In design we use wide facilities of combining computer technologies in painting, architectural and design decorative works, creating a memorable art image of the designed object. Operating with works, related to architectural objects in 3D programs, the artist-architect has the possibility to consider an unlimited number of plastic and color options in different environmental situations and, consequently, to solve creative problems in different ways.

Computer artist-architect is engaged in an interesting creative process, virtually implementing the conception of future works, creates drawings, sketches, projects. For this it is necessary to study computer packages of graphics and architectural 3D modeling. When creating a digital painting we need to purchase basic, classical knowledge in creating paintings and expertise knowledge to build a computer image. Also it is necessary to have the ability to deal with unique tools, modifiers, software for creating backgrounds, texture mapping, and to have special visualization programs. This training creates wide opportunities for solving creative problem when creating new artistic images, inaccessible before, not only in painting, but also in the whole complex of artistic trends associated with architectural space. New electronic tools expand the boundaries of thinking, create the opportunity to the artistic experimentation to work, when creating of new forms of virtual reality. Teaching computer drawing and painting supposes not only knowing the methodology of the creative process of making an electronic artwork, but also the technological process of its rendering including computer strokes, texture fills, gradients, electronic brushes, interaction of paper, art layers, drawing on a trajectory, tracing, mixing graphic means. For example, using electronic brush Watercolor (Watercolor) it is easily to create a realistic watercolor composition, and using of electronic brushes Real Bristle on the tablet - we create a complete illusion of paintings on canvas.

In the Institute of Architecture and Design (Barnaul, Altai State Technical University of I.I. Polzunov) students under the guidance of teachers in the 2013 - 2014 created design proposals for ecovillages of a new type for the Altai region of Russia (Altai Krai and Altai Republic). In designing they used the following programs Artlantis, V-ray, Archicad, 3D-Max, Photoshop, Painter. They used the method of associative imaginative and color-graphic transformations of natural forms, in the projects they created unusual shapes that meet topical concepts of

nature affinity, ecological compatibility, fractal geometry, as corresponding to a unique place and revealing the modern senses of harmony, purity, respect, rest and movement in nature. A picturesque landscape of mountain and piedmont areas, with integrated architectural space architecture was represented in a number of exploratory projects of ecosettlements of a new type subject to local coloring, the predominant material textures and lighting (Figure 1-11).



Figure 1. Planning of the zones. Perspective complex with forms of fractal geometry.

Boyne of the projects (Fig. 1) ecovillage is intended as a beneficent community of people, adhering to the philosophy of environmental space. The main objective of the project becomes competent organization of the space with maximum preservation of primordial condition of the place. The concept of the project "naturalness of fractal geometry" was found during the analysis of the characteristics of the area. Teletskoe lake - a unique natural complex of our planet, in 1998 is included in the list of UNESCO World Heritage Sites. This lake is famous all over the world for the purity of its water. The structure of the purest water is fractal in geometry. Fractals can be seen in virtually every living and non-living natural phenomenon, such as: spider's web, snail shell, tree, snowflake. Summarizing the unique patterns of various snowflakes, the forms of water molecules, the fractal concept of the project was formed.



Figure 2. Zones and General plan. Perspective complex of natural forms.

The basis for forming ecovillage in another project (Fig. 2) is a bionic prototype - the butterfly wing. Elements reminiscent of the wing structure are used when creating the layout, territorial zoning, they also affect the form of the plans and facades of the buildings and structures: social and scientific center, houses, viewing platforms, entry areas, car parks. Houses have a grassy ground to maintain ecological balance and to replenish green territories, occupied by these houses, using international experience[3]. The houses are equipped with solar panels to generate electricity by ecological way. The form of the buildings does not contradict with the natural relief, but rather emphasize it. Viewing platforms identify the directions on the most scenic views of this area. On the facades white is prevails, besides green, symbolizing purity and harmony with the environment.

In one of the projects the ideal form is suggested for an ecovillage, located in the zone of the influence of federal resort Belokuriha in the Altai region (Figure 3,4). According to the author's conception of this project it provides in a perfect circle the creation of an autonomous (closed), ecological, technological, energy-efficient and saving life support cycle on the basis of harmonious and regard for the

environment, the use of biotechnological systems, providing bio-utilization of waste products, purification, nature protection, rational use of natural resources and considering the existing examples [4,5].



Figure 3. General plan of settlement. Section Belokuriha-2 and a bird's eye view.

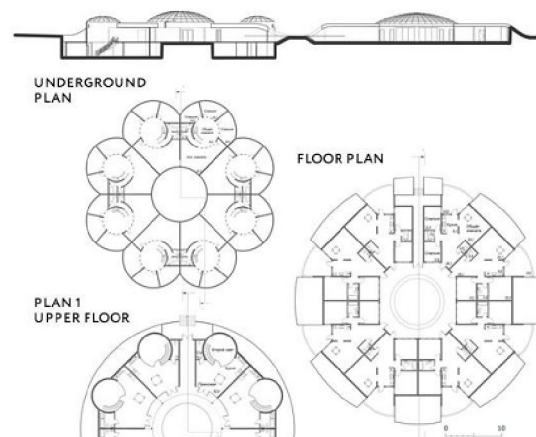


Figure 4. Buried row houses in relief.

The design tasks included strong and harmonious combination of human made artificial objects with the natural environment; reduction of energy consumption through good planning; maintaining and possibly improving of local ecosystems and the preservation of the existing surrounding natural landscapes.

The center of ecovillage - is a multifunctional public building that performs a multi-functional role of the scientific center, the center of the engineering communications and the main distribution center. The building consists of 4 main floors: the underground level is the parking and warehouses with offloading platforms, the ground floor contains the main urban services and recreational facilities, the second and third - Research Center with laboratories for different branches, conference halls, lecture, a large exhibition space, gallery. The top two levels is a conservatory.

Houses are designed with the most efficient use of space, which is achieved by blocking houses and without the use of private transport. The arrangement of deepened buildings with sprinkled roof at least 500 mm with vegetation reduces heat loss, blocked with 8 apartments in each block reduces the total built-up area, the apartments are interlocked around the space under the dome - the distribution area, in which you can arrange a pool or a conservatory.

Ponds, greenhouses, solar panels and solar power stations with a sufficient sunshine duration are 2083 hours per year. Reservoirs are used to clean waste water and waste products disposal. Along the perimeter of the settlement they are covered with greenhouses, where plants are grown on hydroponics using substrate. Environmentally safe way of wastewater purifying - using biological ponds, they work on the principle of a dispersed delivery of wastewater to the basin and its purification for 15 days as a result of bacterial activity (alga Chlorella) and fish (carp).

Local community centers are located in residential groups. Two ground levels is occupied by shops of food, household goods, pharmacies. Underground floor is occupied by local centers of engineering networks.

The following project under the motto "artificial relief" (Fig. 5) implements an experimental hybrid, a compromise between town building and landscape design. Within the framework of this project concept an artificial elevation of the territory toward natural relief increase is created. The edges of the visible part of the buildings' roofs smoothly blend with the surrounding landscape, passing to the landscaped area. All the external territory and the green roof - is a park for walks. Residential and public buildings differ in their appearance. A good area for building is formed of apartment and blocked houses, it shows a sparse or dense combination of living cells. The administrative and scientific areas show dynamism and active structure. In this project ecovillage is interpreted as an object of sustainable development, a laboratory of advanced environmental technologies and a showcase for vital activity stimulating "green" solutions, that not

only save energy, but also improve the quality of the environment[5].

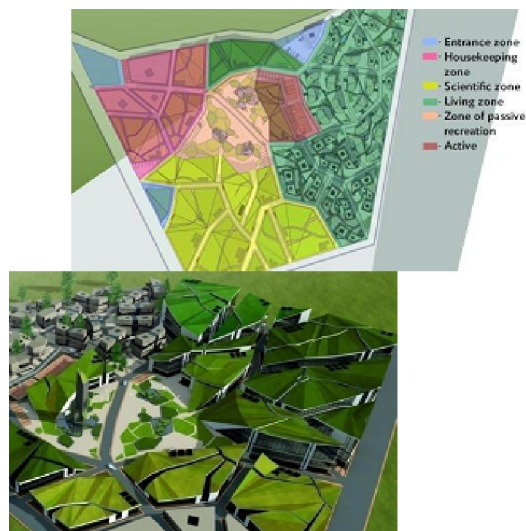


Figure 5. Zoning scheme. Bird's eye view.

A unique coloring, the nature of the Katun river valley forms a picture of the project "golden deer" (Figure 6-8) near the village Cheposh in the Altai Republic. Designing was conducted taking into account many factors, the main one was the traditional forms of natural, ecological approach, grounded in researches[6,7,8], transforming character endemics of the unique living world of Altai, the use of materials of natural elements, the color code of the relict area on the shore of a mountain river.

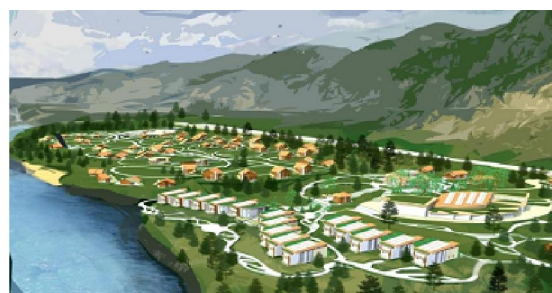


Figure 6. 3D visualization ecovillage as pictorial composition in nature, from the top by the river Katun.

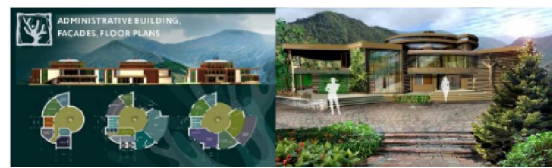


Figure 7. Administrative building. Perspective.



Figure 8. Row houses. Perspective.

In the project elements we use digital painting, on which we superimpose pictures using 3D technology that allows us to thoroughly work out the details, to simulate the textures of materials, lighting, to make shadows and reflections while maintaining a holistic perception. The work combines various electronic graphic packages such as, Corel DRAW, Painter, Photoshop, Matte painting solely to make photorealistic images of natural landscapes on the basis of specified environmental parameters and 3D models.

Studying electronic tools of these programs and the work methods expand the creative possibilities of the students and professionals in different branches of electronic art, and also contribute to the understanding of its role in the synthesis of fine art and architecture. Electronics and Tools such as, Marker (Marker), Pencil (Pencil), Pen (Pen), Chalk (Chalk) are almost indistinguishable from studio ones, especially when processing professional images into paintings. The combination of the principles of electronic technologies, artistic rules of painting, photography, architectural composition enables us to develop the creative work of the artist-architect, to implement his personality, creating new forms of art. In the project "Golden deer", for example, we combine traditional Russian art, with architecture and ecological approach, with green roofs are sprouting from the ground, vertical greenery and trees form, branches, rocks as structural elements houses (Fig. 9).

Concept of the unity with nature is supported in the used materials. Buildings are mainly made of cedar beams with partial natural stone revetment. Elements of the organization of the architectural environment are also made of local materials. Using natural textures, architectural forms, close to natural images, allows to realize a relationship between the natural environment and the architectural environment, through the reflection of nature in local ornaments, symbols [9,10].

Ecovillage is designed for 550 people one-time stay for all age groups. A year-round operation is assumed. Designing suppose gradual development of the area, in which merging with nature happens. While moving through the entrance area to the administrative and utility room and further deep into the territory, the unity with nature grows - residential houses and

recreational areas, sports facilities make us closer to nature. The blocked building area is intended for habitation in winter, away from the entrance, the area of individual housing continues, which contains houses of various living space and number of storeys for different numbers of people (2 to 6).

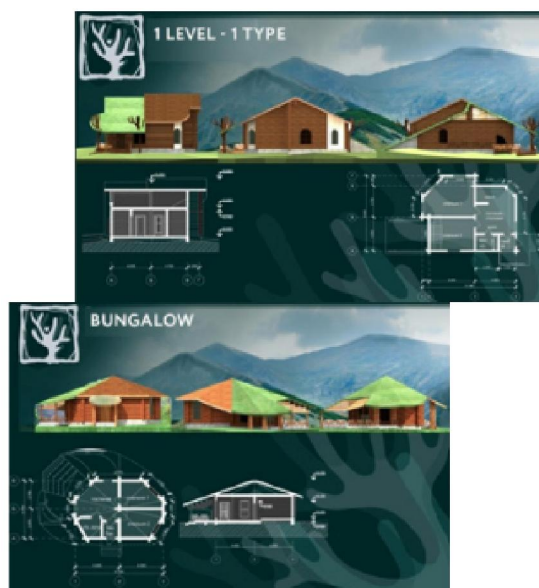


Figure 9. Elevations and 3D appearance of individual houses. Perspective.

Using of computer technologies of digital painting acts as a link between the architecture art, environmental, and product design, park sculpture (Figure 10-12).



Figure 10. Gazebo. Perspective.

The territory of the park has a lot of footpath and alleys, which are made of various natural materials (wood and stone paving, chip, gravel, decorative powder of crushed stone). Small forms largely implement the concept of unity with nature. Color scheme of the project contributes to attracting visitors, it continues the idea of the concept, color range used

for the architectural environment is a transformation of the colors of nature. Development of the color code is grouped by three criteria: mountains - the color of soil, cedar bark, pine bark, grass, rocks, light beige sandstone, blue-gray slate, marble, granite, serpentine, jasper; water - with shades of turquoise and blue; air - with colors of clouds, haze. These shades are used for elements of product design.



Figure 11. Painting 3D render parts of the park with elements of environmental design and sculptural park.



Figure 12. Print products and souvenirs.

Conclusion

Consideration of these examples of design showed that digital painting - a digital image according to the rules of art is synonymous to the term of computer art rendering or visualization of all the components of architectural projects, which suggests the unifying role of electronic technology in the synthesis of art and architecture.

Synthesis of arts types: painting, architecture and design will undoubtedly improve with the

development of electronic technologies as a new tool of the artist-architect. This requires special training in the basics of the theory and practice of computer art. Formation of the interest to computer art in preparing future professionals in our country is one of the tasks of higher architectural and artistic schools. It is important to keep the learning process of realistic painting and electronic balance in balance, to eliminate some contradictions. For example, between the academic approach to the fundamental teaching of painting techniques and the new computer graphic technologies with their practical applied mastering. Huge potential of electronic technologies in painting, architecture and design must surely be used in professional and educational process to solve new creative challenges, to make art discoveries of new sides of synthesis of arts in architecture.

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