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RENDER WINDOW PARAMETERS. SIZE OF THE IMAGE TO BE CREATED. PHOTO METRIC LIGHT SOURCES AND THEIR ADJUSTMENT. LIGHT TRACER.

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Abstract: This article details the rendering process and the use of light sources and types of light in this process to bring the final result of the project to a visual state. It also provides insight into rendering parameters and how to make a project visually close to real life.

Keywords: rendering, image, graphics programs, graphics, light, design thinking, vray, architecture, drawing, engineering graphics.

The effectiveness and real integrity of the image allows not only to interpret, but also to obtain its visualization. The general process is carried out with the help of visualizers. At the same time, it is possible to view scenes and tools of alternative renderers: Mental Ray, V-Ray, Corona Render, Brazil, etc., which ensures more clarity of the resulting images. The most popular alternative rendering tools are V-Ray (http://www.chaosgroup.com/) and Corona Renderer (https://corona-renderer.com/download), both developed and supported by Chaos Software. is considered The popularity of these renderers leads to one of the most in-house rendered rendering modules out of service, while providing the highest level of rendering on download. This allows you to create photorealistic images by simply extracting light sources and a relatively uncomplicated mood.

Theoretical aspects:

With the help of Vray and Corona, you can get pictures with all the main visual effects, that is, you can achieve real specular reflection, transparency and refraction of light rays, including the formation of the effect of caustics, which appears as a result of the passage of light rays through transparent curved objects. Simulate the diffuse lighting of the scene, simulate the effect of surface lighting, which is done by adjusting the global illumination (Global Illumination). Increase realism using the Depth of field effect - with this effect, the front and back of the focus blurs towards the specified focus point (that is, the parts that are out of focus of the camera). Create an effect that blurs fast-moving objects as if they were blurred (actually in a photo or movie frame), so their movement looks more natural. Rendering in VRay and Corona also provides detailed drawing of displacement maps to get the illusion of convex surfaces, VRayFur allows you to create surfaces covered with fur using the Hair and Fur tool (fur is created only during rendering and is not present in the scene, which simplifies the work) .

In this part of our guide, we will focus mainly on the capabilities and features of VRay. In our next parts, we will get acquainted with Corona Renderer capabilities and features in detail. The main difference between Scanline and VRay (as well as other alternative renderers) is that the physical properties of light are taken into account when rendering scenes, which makes the resulting images more accurate.

This was achieved by using photonic scene analysis and a number of technologies to create a global lighting effect and to calculate the effect of refractive caustics. These are the following technologies:

Using the Quasi-Monte Carlo method, combining the illumination of a hemisphere or a sphere around a point (the first for opaque surfaces, the second for transparent surfaces) with a separate calculation for each shadow point independently of all other points;

tracking the paths of light rays visible from the camera with the construction of light maps;

search for photons with the construction of photon maps (Photon map);

Generation of radiation maps based on indirect lighting calculations by interpolating the results to the rest of the scene only at some important points in the scene (ie, when objects overlap or where there are sharp GI shadows).

Any of these methods can be used to calculate the values of the first real reflection or the first scattering step (ie, when the light rays are counted at the point where the source rays are reflected only once; primary splitting). The first three methods can be used to calculate all realistic views from the second (when the light beam bounces off other surfaces two or more times until it reaches the design point; secondary bounce). The Monte Carlo method is the longest calculation method that provides a very high quality result even with a large number of small details in the scene. The fastest performance is achieved using photon analysis of light or light maps - the first of the methods is traditionally used in renders to calculate global lighting, and the second is specially developed for the Vray renderer and provides higher quality at a higher comparison speed (than photon analysis). For different inputs, the quality achieved by the same method can vary significantly. Thus, with photon analysis, the most accurate picture of light can only be obtained with a very large number of photons. The results of calculations using the Monte Carlo method directly depend on the number of samples (Subdivs) used in the approximation. The quality of lightmap construction depends on the number of paths drawn and so on. In order to get the desired look of the scene, you usually need to refer to several test instructions with different parameters and settings selected. Therefore, to speed up the testing process, many of the images, samples, etc. needed for the final rendering are installed only at the very last stage of the rendering.

To render a VRay, you must first make it the active renderer. Renderer selection is done in the RenderScene dialog, which is invoked by the Rendering => Render command or by pressing the F10 key. In this window, open the General tab, select Renderer, in the Assign Renderer line, click the Production button and select the VRay renderer from the drop-down list. After that, the Renderer tab in the Render Scene window will be completely updated, and additional objects, lights, cameras, materials, and procedural maps will be available in the scene. For example, the source list is populated with the VRay Light and VRay Sun light sources, which are directed and used to simulate sunlight (Figure 9.2). It should be noted that a separate source (light from the sky) for simulating skylight is not provided in VRay - instead, a special VRay Sky environment map is installed in the Environment layer (Render Scene window, Renderer tab). In terms of materials, there are several new types of materials - specially optimized for VRay, allowing faster lighting than standard 3d Max materials. VRay materials include the following materials.

VRayMtl is the core VRay stuff that allows you to apply different texture maps, manage reflections and refractions, insert warp and displacement maps, and more. and eventually touching any surface, including metal, wood, plastic, and glass;

VRay2SidedMtl - allows you to assign different materials to different sides of the same surface;

VRayFastSSS - provides simulation of two surface layers on top of each other, accelerating the effect of subsurface scattering;

VRayBlendMtl - allows you to mix several materials compatible with VRay and get a new unique material as a result;

VRayLightMtl - provides a soft glow to the surface and is therefore used to obtain self-illuminating objects;

VRayMtlWrapper - can simulate reflection / refraction for matte objects;

VRayOverrideMtl - provides the ability to attach multiple materials to an object at the same time: base material, GI material, mirror material and breakable material.

In addition to these, rendering through the VRay module allows you to use your own VRayShadow map to create shadows from standard light sources and Vray sources, which provides more visible shadows, and also uses a number of additional texture maps: VRayHDRI - high dynamic range images used to load (High Dynamic Range Images, HDRI) and map them to the environment; VRayMap - allows adding reflections and refractions to standard materials; VRayEdgesTex - Used to simulate wire-like materials and more.

Not all objects in the scene may participate in global lighting and acoustic rendering. Expanding the list of objects involved in calculations leads to a significant increase in rendering time, which is not always justified, since such calculations are not necessary for all objects. To determine whether the physical properties of light should be taken into account when displaying a particular object, it is necessary to select the properties of the object by calling the Vray Properties command from the context menu and changing the state of the commands in the Object Properties area. For example, the Generate GI and Receive Caustics checkboxes should be checked for all objects with a caustic effect, and the Generate GI and Receive GI checkboxes should be checked for objects that simulate reflected light (Get Global Illumination). To understand the basic principles of rendering with VRay and the nuances of reflection and warping, create a simple scene using two primitives in a plane. Try to render the scene with the standard renderer by pressing the F9 key - of course, there will be no distortions and reflections, as well as surface light scattering, because the corresponding materials are not created and the global lighting is not simulated by the standard renderer. On the General tab, set the dimensions of the output image to 480x640 pixels (OutputSize). Set VRay as the current scene renderer - in the Render Scene window that opens, press F10, expand Renderer role assignment, click the ellipsis button in the Production line and select VRay. If you do the surgery right after that, you'll see roughly the same result as what we showed you with Scanline.

Let's deal with reflections and rejections. Activate the ball material in the material editor and change the color in the Reflect box to dark gray. Render - the surface of the ball reflects the surrounding objects. As a rule, the color of this or that shade of gray is set in the Reflect field (if you set any other shade, for example, yellow or red, then you can get an unrealistic reflection of the corresponding shade), on the contrary, the level of reflection will be stronger. light color in the reflection area.

If desired, not only nearby objects can be reflected in the mirror, but also other spatial environment, for example, the walls of the room or the landscape (if the object is outside the room), and it is not absolutely necessary to create such a real environment - you can simply connect the appropriate texture map (VRayHDRI). Let's try to do it. In the Material Editor window, turn on an empty slot, click the GetMaterial button and select the VRayHDRI map -Fig. Click the Browse button and navigate to the 3ds Max\maps\HDRs folder (usually located in C:\Program Files\Autodesk\) and select the desired HDR file. In the Map Type field, set the Environment parameter to Spherical and increase the value in the Gamma field to 2.2. In the Render Scene window, turn on the Renderer tab and in the environment section, turn on the reflection / refraction check box and attach the newly created texture map, for this you need to drag it to the None button from the material editor window. Render the scene and now make sure the ball reflects not only the teapot, but the environment as well. Since ambient reflections are more intense than object reflections, reduce the strength of ambient reflections by setting the Multiplier value to 0.2. Reduce the value of the Reflect Glossiness parameter to 0.9 - the mirror will be blurred.

If desired, not only nearby objects can be reflected in the mirror, but also other spatial environment, for example, the walls of the room or the landscape (if the object is outside the room), and it is not absolutely necessary to create such a real environment - you can simply connect the appropriate texture map (VRayHDRI). Let's try to do it. In the Material Editor window, turn on an empty slot, click GetMaterial and select the VRayHDRI map. Click Browse and now we're going to experiment with a little reduction, but to do this we're going to change the scene - we're going to remove the teapot and replace it with a slightly modified TorusKnot fixture. Create a new VRayMtl material, change its Diffusion color to optional (we chose burgundy) and set the Refract field to light gray. Assign these materials to the items lying on the plane. In the Render Scene window in the Image Collection (Antialiasing) section, select the Adaptive QMC anti aliasing type with the Mitchell-Netravali filter - this is more reasonable, since this type of antialiasing requires less memory than the antialiasing of the usual Adaptive section. In the Color Mapping section, set the Gamma field to 2.2 - this will make the highlights and darks less distinct. Render - objects will be transparent and look like glass objects, but they still look far from reality.

Photometric light sources:

The behavior of photometric light sources is based on the real properties of light, which allows for the organization of physically accurate lighting. They are capable of almost perfectly creating any real light source:

From a 100W light bulb to the sun. Photometric light sources work best when used in conjunction with global lighting.

For example, 3ds Max provides the following photometric lights:

Point - (point);

Linear - (linear);

Area - (Field);

IES Sun - (source simulating sunlight);

IES Sky - (a source that imitates heavenly light);

As their name suggests, point, line, and region light sources emit light from various geometric shapes. For example, a point source emits light from a point in space, a line source - from a line of a certain length, and a region source - from a surface of a certain volume.

Like normal light sources, there are two types of photometric light sources: target and free. The main difference between them is that there is only the first point of the target, which is automatically illuminated even when they are moving. Let's take a look at these resources.

3ds Max includes the following photometric target resources:

Target Point is a point light source that emits light with equal intensity in all directions. In the viewports, this source is shown as a small yellow sphere;

Target Linear - Simulates the behavior of linear light sources such as linear lights. In projection windows, this source is displayed as a straight line segment with a sphere in the middle. The segment length corresponds to the length of the simulated light source, which can be changed;

Target Area - allows you to simulate flat light sources (eg windows, screens, flat lights) that cannot be ignored in the scene. In viewports, this resource is displayed as a rectangle with a sphere in the center. This rectangle can be resized to match the dimensions of the simulated real light source.

Point, line, and surface lighting parameters are similar to standard lighting settings in most respects, except for the Intensity/Color/Distribution spread (Figure 9.7). This function is similar to the Intensity/Color/Attenuation of standard lights, but the attenuation of photometric sources is automatically calculated, so in this departure the attenuation settings are replaced by distribution settings. The Distribution drop-down list contains four types of light distribution: Isotropic, Spotlight, Diffuse, and Web.

The available brightness intensity distribution may vary depending on the type of light source. With isotropic scattering, light spreads out equally in all directions and gradually fades away from the source. This distribution is only available for the point light source. With spotlight distribution, light is emitted in a cone similar to the beam of a standard light source. With diffuse scattering, diffuse light is emitted from a virtual surface, the light intensity is maximum in the direction perpendicular to this surface, and the light intensity is minimum in the direction parallel to this surface. This distribution is only available for region and linear light sources. In Internet (Web) distribution, light is emitted according to the scheme, which is located in a special external file. These files are usually provided by lighting manufacturers and can be found online. If Web is selected, additional web option options will appear where you can select the desired file. This distribution is available for all three photometric light sources mentioned above. In the Color field, you can set the color of the photometric beam in two ways. First, the color can be selected based on the color properties of a real-world light source, whose name can be displayed in the drop-down list. Second, color rendering can be determined by the color temperature of the light source in Kelvin. To do this, set the switch to Kelvin (Kelvin) and set the value corresponding to the color temperature in the field next to the switch. If a light type is selected from the drop-down list, the color change on the right side of the Kelvin options window will be updated to reflect the specified light color. For example, an incandescent lamp is usually light beige in color, while a mercury-phosphor light is light green in color. When you select the Kelvin option, the color shift will also update to reflect the change in color of the light source. The intensity field defines the intensity or brightness of a light source in physical terms: lumens (lm), candela (CD), or lux (lux). Total fluorescent output is measured in lumens, which is usually displayed on the bulb's packaging next to the bulb. In candlesticks, the intensity of light emitted by a point light source in the direction perpendicular to the unit of time is measured. Lux measures brightness or light intensity at a given distance from the light source. In the Multiplier parameter field, a multiplier or factor is defined that determines the intensity of the photometric light source, like standard lights. IES Sky and IES Sun photometric illuminators simulate light from the sky and sunlight, respectively. Unlike regular Skylight, IES Sky can take into account the presence of clouds in the sky. To strengthen the theoretical material in practice, complete the exercise "Illumination with photometric sources" from the practical section of this chapter. The lighting is set individually for each created scene. Unfortunately, there are no ready-made recipes for setting up light sources.

References:

1. Mardov, S. X. (2021, November). Modern Electronic Methods of Controlling Students' Knowledge in the Field of Construction Drawing. In "ONLINE-CONFERENCES" PLATFORM (pp. 18-26).
2. Xudoykulovich, M. S., & Saidaxatovna, R. F. (2021). Xasanboy o’g’li NA Evristic teaching technology and its practical application which in theaching of draftsmanship. Middle European Scientific Bulletin, 12, 458-462.
3. Khudoykulovich, M. S. kizi, FZX.(2021). Content of the Science of Architecture Construction and Its Current Status of Teaching. International Journal of Innovative Analyses and Emerging Technology, 1(7), 106-114.
4. Xudoykulovich, M. S., & Qizi, F. Z. H. (2021). Methods of using graphic programs in the field of construction drawing. ACADEMICIA: An International Multidisciplinary Research Journal, 11(10), 1297-1306.
5. Xudoykulovich, M. S. (2021, October). The status of teaching the subject" construction drawing" in higher education institutions. In Archive of Conferences (pp. 105-108).
6. Mardov, S. K., Khasanova, M. N., & Absalomov, E. (2022). Pedagogical and psychological basis of teaching architecture drawing in types of education. In Euro-Asia Conferences (pp. 32-35).
7. Xudoykulovich, M. S. (2021). THE STATUS OF TEACHING THE SUBJECT. In CONSTRUCTION DRAWING" IN HIGHER EDUCATION INSTITUTIONS." Archive of Conferences.
8. Mardov, S. K., & kizi Farxatova, Z. X. (2022, February). The practical significance of design and its types. In Euro-Asia Conferences (pp. 54-57).
9. Мардов, С. (2022). Qurilish chizmachiligi fanini o ‘qitishda grafik dasturlardan foydalanishda talabalarning fazoviy tasavvurini rivojlantirishning bugungi holati va muammolari. Общество и инновации, 3(1), 155-163.

10. Mardov, S. X. (2021). The practical importance of graphic programs and their descriptions in the development of student space imagination in teaching the subject of construction drawing. ISJ Theoretical & Applied Science, 12(104), 680-684.
11. Mardov, S. K., & kizi Farxatova, Z. X. (2022, March). Design and art. In Euro-Asia Conferences (pp. 58-61).
12. Mardov, S. K. (2022). kizi Farxatova, Zilolaxon Xikmat. Methodology of Development on the basis of Graphic Programs in Increasing Student Space Imagination and Graphic Literacy in Teaching Construction Drawing. European journal of innovation in nonformal education, 2(2), 312-319.
13. Xudoykulovich, M. S. (2022). CURRENT STATUS AND PROBLEMS OF STUDENTS'SPATIAL IMAGINATION DEVELOPMENT WHEN USING GRAPHIC PROGRAMS IN TEACHING THE SCIENCE OF CONSTRUCTION DRAWING. Berlin Studies Transnational Journal of Science and Humanities, 2(1.5 Pedagogical sciences).
14. Mardov, S. X. (2021). Current Status of Developing Students' Space Imagination in the Use of Graphic Software in Teaching Architectural Drawings,". International Journal of Advanced Research in Science, Engineering and Technology, 8(10).
15. Mardov, S. K. kizi Farxatova, ZX (2022, February). THE PRACTICAL SIGNIFICANCE OF DESIGN AND ITS TYPES. In Euro-Asia Conferences (pp. 54-57).
16. Mardov, S., Hamroqulova, M., & Nurmatov, E. (2022). Qurilish chizmachiligi fanini o „qitishda talabalar fazoviy tasavvurini grafik dasturlar asosida rivojlantirish metodikasini takomillashtirish. Жамият ва инновациялар, 3 (1), 180–190.
17. Mardov, S. (2022). Qurilish chizmachiligi fanini o ‘qitishda grafik dasturlardan foydalanishda talabalarning fazoviy tasavvurini rivojlantirishning bugungi holati va muammolari. Жамият ва инновациялар, 3(1), 155-163.
18. Mardov, S. K., & kizi Farxatova, Z. X. (2022). DESIGN AND ART. Euro-Asia Conferences, 58–61.
19. Mardov, S. K., Khasanova, M. N., & Absalomov, E. (2022). PEDAGOGICAL AND PSYCHOLOGICAL BASIS OF TEACHING ARCHITECTURE DRAWING IN TYPES OF EDUCATION. Euro-Asia Conferences, 32–35.
20. Mardov, S. K. kizi Farxatova. Zilolaxon Xikmat.
21. Valiyev, A. N., Mardov, S. X., & Barkasheva, B. O ‘QUVCHILARDA CHIZMANI O ‘QISH KO ‘NIKMASINI RIVOJLANTIRISHDA MAQBUL USULLARDAN FOYDALANISH. ИННОВАЦИОН ФАН-ТАЪЛИМ ТИЗИМИНИ РИВОЖЛАНТИРИШНИНГ БАРКАМОЛ АВЛОДНИ ВОЯГА ЕТКАЗИШДАГИ РОЛИ ВА АҲАМИЯТИ, 226.
22. Valiyev, A. N., Mardov, S. X., & Ramazonova, G. O ‘QUVCHILARNING FAZOVIY TASAVVURINI RIVOJLANTIRISHDA DIDAKTIK O ‘YIN TEXNOLOGIYASINING AMALIY AHAMIYATI. ИННОВАЦИОН ФАН-ТАЪЛИМ ТИЗИМИНИ РИВОЖЛАНТИРИШНИНГ БАРКАМОЛ АВЛОДНИ ВОЯГА ЕТКАЗИШДАГИ РОЛИ ВА АҲАМИЯТИ, 223.
23. Мардов, С. (2023). Pedagogical description of the development of creativity and spatial imagination of the students of the subject “Construction drawing” using graphic programs. Современные тенденции инновационного развития науки и образования в глобальном мире, 1(3), 329–334. https://doi.org/10.47689/STARS.university-pp329-334
24. Mardov, S. X., Xasanova, M. N., & qizi Farxatova, Z. X. (2022). DIZAYN VA SAN’AT. UMUMINSONIY VA MILLIY QADRIYATLAR: TIL, TA’LIM VA MADANIYAT, 1, 35-39.