



3D VISUALIZATION TECHNOLOGY

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Abstract:

Three-dimensional (3D) visualization is the process of creating the three-dimensional object using a special computer program. Today computer graphics technologies such as 3D visualization technology are becoming more and more in demand. The technology has earned popularity among designers because it allows creating three-dimensional objects of any shape. It is widely used throughout the world to create the interiors of houses, offices, hotels, etc. This paper provides a brief introduction to 3D visualization.

Keywords: 3D Visualization Technology; Computer Graphics Technology; Virtual Reality.

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1. Introduction

Visualization has existed from the first creation of maps. Combining different technologies such as image processing, computer graphics, and simulation, computers can help us present information in a new way to understand and solve problems. Today, there are several visualization techniques and lots of software which can be used for the visualization process [1].

The term "3D visualization" is often used to mean the same thing as 3D graphics, 3D rendering, or computer-generated imagery. 3D visualization is any method that is used in creating images to communicate a message. This technology is changing the way we design. It is enabling 3D artists to produce realistic 3D renderings of buildings, allowing clients to have a virtual walkthrough of a building yet to be constructed. It helps them to manipulate designs in real time [2]. Virtual reality is an innovation of 3D technologies. The most common 3D developers use CAD systems such as AutoCAD, IntelliCAD, MicroStation, Artlantis, Archi CAD, and 3D Studio Max.

2. Visualization Process

The process of visualization occurs in several stages [3]:

- Creation of a 3D model of an object: The creation process starts with a careful measurement of the size of the object. This way we obtain 3D data of the points on the object.
- Texturing: This step is the core step of visualization. The data is converted to graphics elements or texture information.

- Setting the camera, choosing a good angle: This allows the object to be studied in every detail from any angle.
- 3D rendering: Rendering is the process of turning models into 2D images with 3D effects. Rendering produces the finished image of a three-dimensional model in a “flat” version. Its speed depends on the power of the computer. As the processing power of computers gets more powerful, the capabilities of rendering artists, architects, and designers to produce images, videos, and interactive multimedia grow faster than ever before.
- Display: The rendered image is finally provided to the user through a display device.

3. Applications

Many industries such as architecture, engineering, construction, advertising, and medical have incorporated 3D visualization technologies into their design and production processes. Common applications of 3D visualization include the following:

- Architecture: 3D visualization technology is used in architecture and construction to design of facilities of very different types and create the interiors of houses, offices, hotels, restaurants, etc. The benefit of 3D Visualization technology in this field is creating a sense of presence. This allows a customer to have a virtual tour of all the rooms of the building.
- Automotive Industry: The automotive industry has started to adopt 3D visualization technology to bring vehicle construction to the next level. For example, Ford Motor has used 3D technology for a variety of different applications. Engineers at Ford use sophisticated 3D mapping technology to observe problems in the surface paint coating [4].
- Design Industry: The technology allows architects to have a virtual walkthrough of a building yet to be constructed. Rendering artists are starting to use this technology in creating canned virtual experiences that let people inhabit an unbuilt work of art or architecture.
- Medical Images: In spite of the fact that 3D visualization is still in its early development, the technology has revolutionized medicine. 3D visualization is applied in medical diagnoses and clinic therapy. The development of the medical imaging and computer-aided technology has led to the visualization of the medical images from 2D to 3D. Such medical imaging helps in visualizing internal organs or the body. Images of hard-to-image structures such as nerve bundles and muscle fibers are creating important new areas of study [5].

Several other industries and fields can also benefit from 3D visualization: pharmaceutical, electromagnetics, geography, cartography, geology, fashion, and others. 3D visualization is also used in printed advertising products, the creation of videos, scientific and educational projects, online stores, GIS, the development of interior and exterior design, etc.

4. Benefits and Challenges

The key benefit of 3D visualization technology is that it allows the customer to see how your interior will look like in reality. For example, being able to see a newly built home or office will

save time and energy and allow the builder to make all the necessary changes to the taste of the customer. 3D visualization can be used to create interactive and animated anatomic models of particular parts of human body. This may be used in teaching medical students [6]. However, most visualization techniques require expensive software. They require a lot of time to create [7]. And it takes a long time to study the computer visualization technology.

5. Conclusion

With the help of 3D modeling, visualization, and prototyping, one can model and design a product easily. 3D printers are getting cheaper and easier to use. Although traditional photography may not go away, businesses today require visual with an alternative solution: 3D visualization. 3D visualization can be valuable in teaching students. Engineering students can rapidly design and model prototypes. Medical students can visualize internal organs or the body.

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