

Introduction to 3D

Introduction

- What Are Two Dimensional Shapes?
 - A two-dimensional (2D) shape can be defined as a flat figure or a shape that has two dimensions—length and width.
- Advantages of 2D Graphics?
 - **Being cost-efficient:** 2D animation is cheaper than creating 3D objects.
 - **Quicker development:** sophisticated software available to designers, the process of creating images can run quickly.
 - **Easy-to-run software:** the software for creating 2D animation is more comfortable for downloading, using, and maintaining.

Introduction

- Disadvantages of 2D Graphics
 - Less Dynamic in nature.
 - More time Consuming.
- What is 3D Graphics?
 - 3D means three-dimensional, i.e. something that has width, height and depth (length). Our physical environment is three-dimensional and we move around in 3D every day.
 - Humans are able to perceive the spatial relationship between objects just by looking at them because we have 3D perception, also known as depth perception.

What is 3D Modelling?

- 3D modelling is the process of creating three-dimensional representations of an object or a surface. 3D models are made within computer-based 3D modelling software.
- During the 3D modelling process, you can determine an object's size, shape, and texture. The process works with points, lines, and polygons to create the 3D shapes within the software.
- How does 3D modelling work?
 - A 3D model is essentially made up of vertices, which come together to form a mesh and act as the core of the 3D model. Each point on the model can be manipulated to change the shape. By using coordinate data, the software identifies the location of each vertical and horizontal point, all relative to a reference point.
 - The most common way to begin making a 3D model is to start with a basic shape – a cube, box, sphere and start molding and refining it into what you desire.

Why to use 3D Modelling?

- Realistic, Quick & Easy
- Expand the Design
- Easy Corrections & Remodeling
- Increases Quality & Efficiency
- Better for Project Approvals
- Measurements
- Eliminate Language Barrier

What is 3D modelling used for?

- Game development: 3D models are used to create characters, settings, props, and entire worlds within video games. Virtual reality games fully immerse you in the game experience, creating entire three-dimensional worlds to dive into.
- 3D printing: it is frequently used within healthcare which has life-changing effects. It has been used to make custom-built prosthetics and implants and to create anatomically correct models for surgical planning.

What is 3D modelling used for?

- Architecture: 3D modelling can reveal potential issues with building structures that 2D plans could not show and is key to modern building design.
- Animation: Animators use 3D models for a clean, seamless effect when creating movies and TV shows. Throughout the process, 3D modelling is used to create scenery, characters, props, and much more.

3D Drawing

- A great deal of information is needed to display a 3-D **scene**. Scenes consist of **objects** that in turn contain many small elements such as blocks, cylinders, spheres, or cones. The more elements contained in an object, the more complicated its structure will be and, usually, the finer its resolution and smoothness.
- Objects and elements in 3-D space carry with them **properties** such as shape, color, texture, shading, and location. A scene contains many different objects. Imagine a scene with a table, chairs, and a background. Zoom into one of the objects—the chair, for example, in Figure, it has 11 objects made up of various blocks and rectangles. Objects are created by **modeling** them using a 3-D application.



Figure A chair modeled in 3-D is made up of various blocks and rectangles.

3D Drawing

- To model an object that you want to place into your scene, you must start with a **shape**. You can create a shape from scratch, or you can import a previously made shape from a library of geometric shapes called **primitives**, typically blocks, cylinders, spheres, and cones.
- In most 3-D applications, you can create any 2-D shape with a drawing tool or place the outline of a letter, then extrude or lathe it into the third dimension along the z axis.
- When you **extrude** a plane surface, its shape extends some distance, either perpendicular to the shape's outline or along a defined path. When you **lathe** a shape, a profile of the shape is **rotated** around a defined axis (you can set the direction) to create the 3-D object.

3D Drawing

- Once you have created a 3-D object, you can apply textures and colors to it to make it seem more realistic, whether rough and coarse or shiny and smooth.
- To model a scene, you place all of your objects into 3-D space. Some complex scenes may contain hundreds (if not thousands) of elements. In modeling your scene, you can also set up one or more lights that will create diffuse or sharp shades and shadows on your objects and will also reflect, or **flare**, where the light is most intense. Then you can add a background and set a camera view, the location and angle from which you will view the final rendered scene.

3D Drawing

- Shading can usually be applied in several ways. **Flat** shading is the fastest for the computer to render and is most often used in preview mode. **Gouraud** shading , **Phong** shading and **ray tracing** take longer to render but provide photo-realistic images.
- When you have completed the modeling of your scene or an object in it, you then must render it for final output. **Rendering** is when the computer finally uses intricate algorithms to apply the effects you have specified on the objects you have created.