Design Course

Basic Texturing - Part 2

Level: Introductory

by
Prof. Sumant Rao and Nitin Anand
IDC, IIT Bombay

Source:
https://www.dsource.in/course/basic-texturing-part-2

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Source:
https://www.dsource.in/course/basic-texturing-part-2/introduction

Introduction

In the previous module ie Basic Texturing Part 1. we have learned how a material is assigned to an object. But how do we create a good texture? To do that one has to understand what are the different properties of the material of an object and how light behaves on each material. Let us try and understand these properties from real world examples.

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Properties of Materials

Some of the material properties might be easy to understand but there are many that aren't that obvious. Even those that are obvious may have aspects that you may overlook. Understanding these properties will make all the difference between your 3D images looking 'artificial' or 'wrong' instead of 'beautiful' or 'real'. It is clear that you need to do this if you need to make your 3D images to look real, to be used as the environment or a character which is part of a live sequence. It is equally important to understand this even if it is a totally fictitious, 'artificial' environment. The challenge here is to make this animated world feel believable. Good materials and lighting are critical to make this possible.

Diffuse Color

Specularity

Glossiness

Reflection

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Transparency

Refraction

Transluscence

Self-Illumination

Surface Roughness

Surface Undulation

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https://www.dsource.in/course/basic-texturing-part-2/properties-materials/diffuse-color

Diffuse Color

The colour of an object is perhaps the most simplest property to understand. In part 1 you have seen examples of this (the earth, milk carton, tin can). But besides colour, it is also important to see how this colour texture reacts to light falling on it or in other words how it 'diffuses' the light to produce the colour and shading of the surface. So the diffuse property deals with the colors of the surface and the intensity with which it is illuminated by light falling on it.

In this picture, there are two similar objects. One on the right appears darker than the one on the left. This is because it diffuses less light as compared to the other.

Keep in mind that the diffuse property is not just the colour texture of the object, but also how bright this colour appears when lit. This shading is what gives it the 3D appearance. It is perhaps the first and most important step in 'rendering' good 3D images.

Some of the light that falls on the surface tends to get reflected back. This produces the effect of highlights on the object. Let's have a closer look to understand the nature of these highlights. There are two main properties of the surface material that are responsible for this, specularity and glossiness.

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Specularity

This is the intensity of the light reflected off the surface.

One can see the reflection of light in this picture on the right of the porcelain pot but besides this, also observe the shiny feel over most of the surface. In these parts, even though the reflection of the light is not strong enough for you to identify it as such, you can still feel it. Compare this to the surface in the diffuse property section image.

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Glossiness

Depending on the smoothness of a surface, it will scatter the reflected light in different directions. Look at this picture of the two bottles. One is glass and the other is a wood-like texture. The glass surface is very smooth. So the reflected light is hardly scattered and looks shiny. The woody surface is rough and scatters the light in all directions creating a non-shiny, 'matte' surface.

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For a matte surface, the amount of scatter is more. There can still be highlights, but they will be spread out over a large region. For a smooth or 'glossy' surface, the scatter is very little. The highlights, in this case, will be very sharp and shiny. This property is 'glossiness'.

In this picture, you can compare a Glossy and matte surface

So the highlights on the surface of the object will be a combination of its specularity and glossiness.

Another property that goes somewhat hand in hand with a surface with high specularity and glossiness is it's ability to reflect it's surrounding, This property is Reflection.

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Reflection

Different surfaces will have the ability to reflect their surroundings.

Reflection on Car

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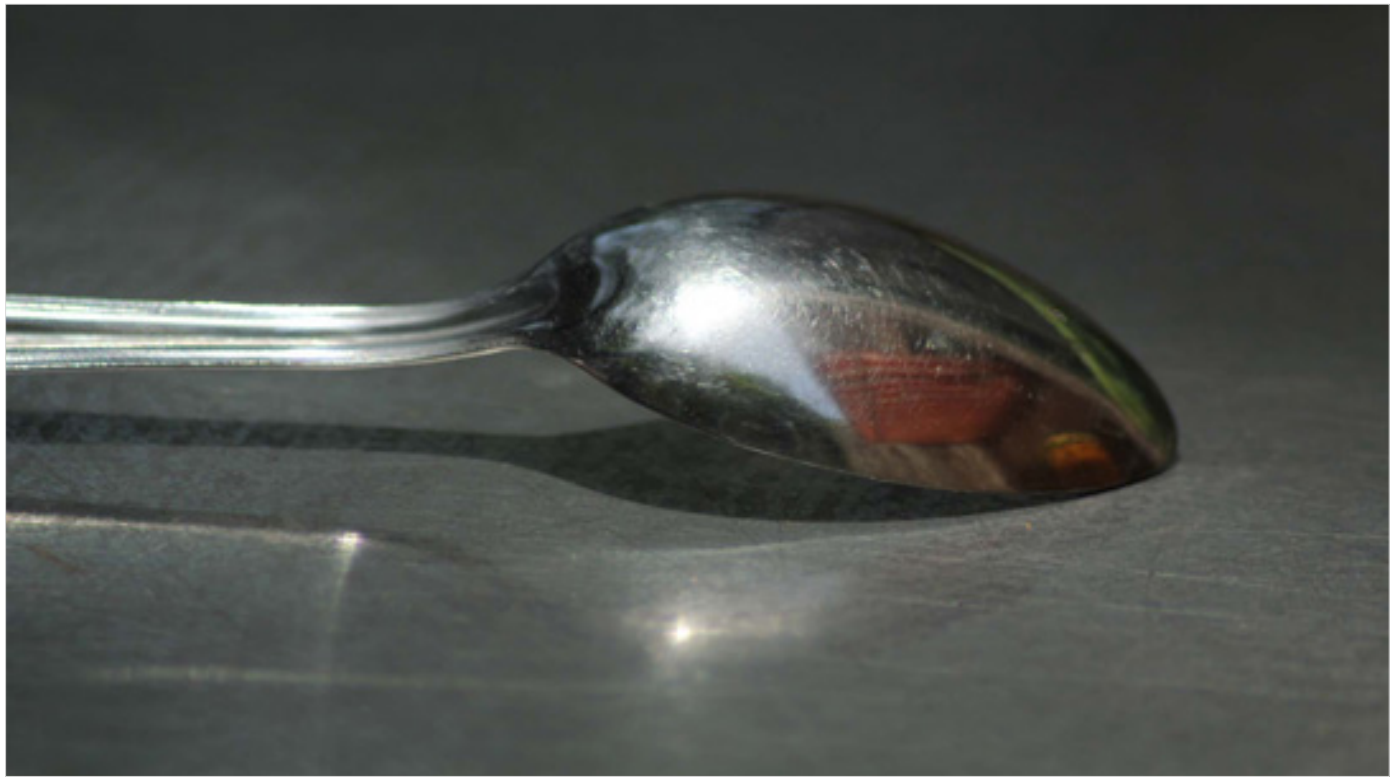

Reflection on a Spoon and a Metal Surface

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Transparency

An object surface can also be transparent as in this picture of various bottles.

Notice though, that the bottles are transparent but opaque where the label is With transparency, you can observe other properties of object materials, like Refraction and Transluscence.

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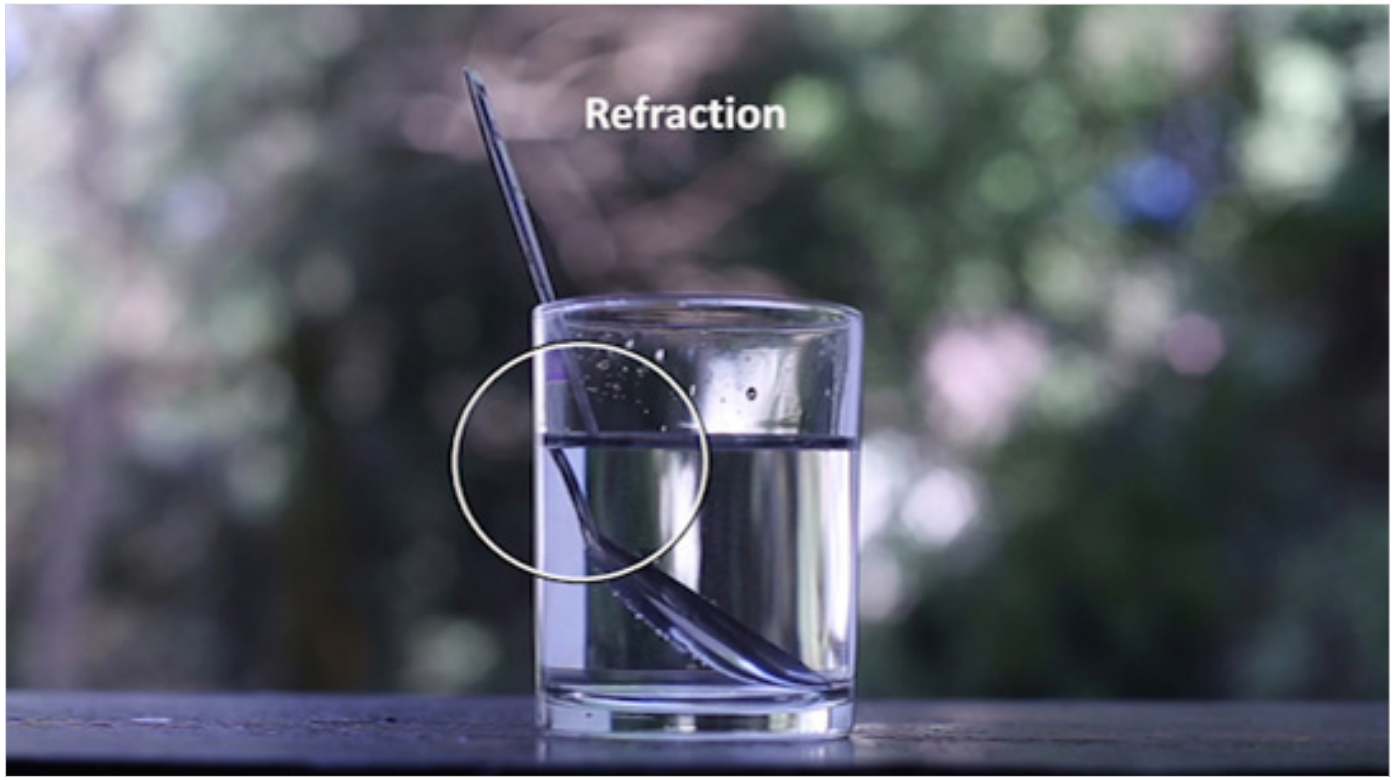
Refraction

This is the property of a transparent material to bend light as it enters it creating interesting distortions of the surrounding environment. The amount of distortion depends on the refractive index of the material.



The spoon appears to be broken due to refraction of the light as it passes through the glass and then the water in the glass.

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Transluscence

This is the slight glowy feel that some objects like jelly seem to have. This is because some amount of the light falling on it is transmitted through a medium, scattered internally and even passed through to the other side (and even the same side) making it light up.

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Self-Illumination

Self-Illumination or Incandescence:
Objects like a light bulb, a neon sign, backlit hoardings or the sun do not need other lights to light them up. This is self-illumination or incandescence.

The Picture of a Glowing Bulb

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Surface Roughness

The surface of different materials are not always smooth and can have a roughness as in leather or bumps on it like the pimples on a basketball.

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Pimples on a Basketball

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Surface Undulation

The surface can also show prominent up and down displacement like the ripples on water or the wrinkles of the skin, muscles, veins, etc. This might feel similar to the roughness, but might need a different treatment to simulate this in 3D depending on how much the undulation is or how close we are to the surface.

Surface of Skin

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Wrinkles on the Skin

Spend some time observing various materials and appreciating these and maybe other properties not given above. In the next module, we will see how these have been implemented in 3D software.

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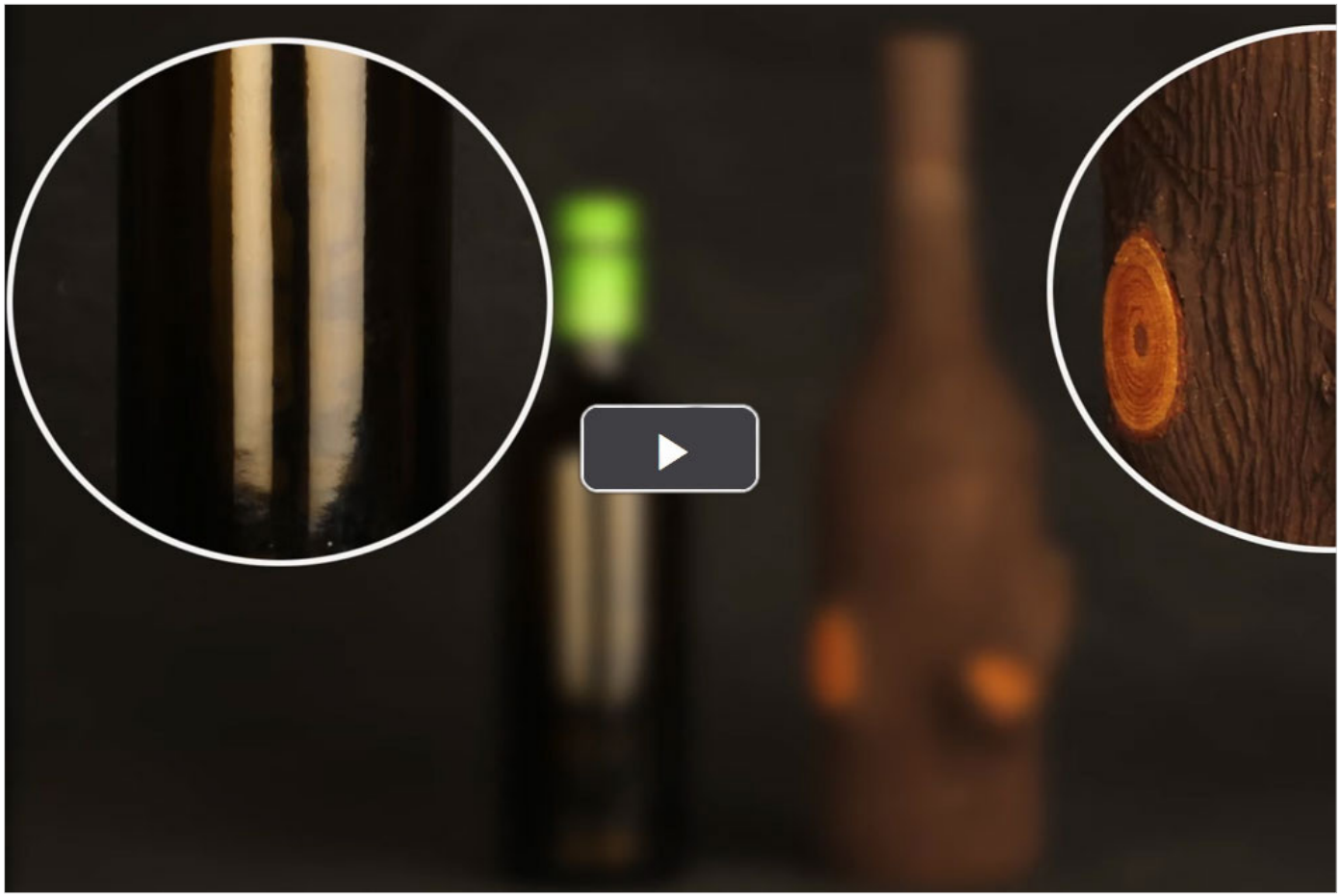
Video



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Contact Details

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