

Computer Graphics Learning Materials

<https://cgllearn.codelight.eu/pub>

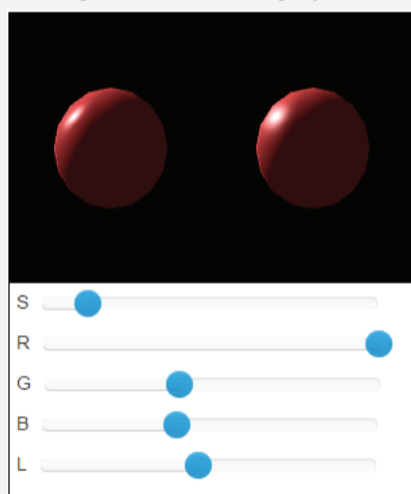
The Computer Graphics Learning Materials were created for the Computer Graphics (MTAT.03.015) course by a number of people. The material is supported by a custom learning environment CGLearn. We have made publicly available portions of the material and tasks that deal with computer graphics algorithms.

Publicly available material consists of 14 different topics that have 37 interactive examples and 26 homework tasks, which also indicate the average difficulty and time spent as estimated by students. The interactive examples were built using the Three.js graphics library.

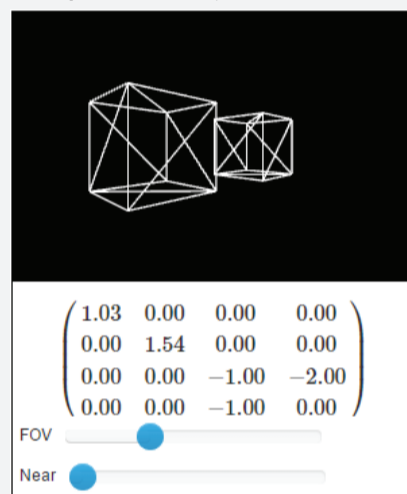
Topics and Examples

The available topics start with an introduction to geometry and transformations, which are used to represent and transform the objects in a 3D space. Next we proceed to projection that transforms the 3D space to a 2D screen space. After that the material covers different shading and lighting techniques, then moves on to texturing and blending.

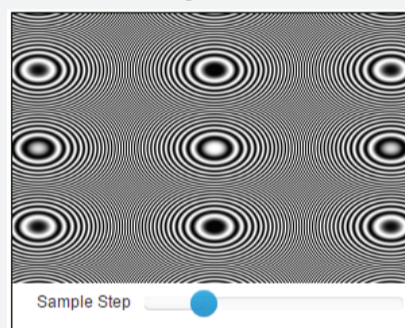
Phong vs Blinn-Phong Specular



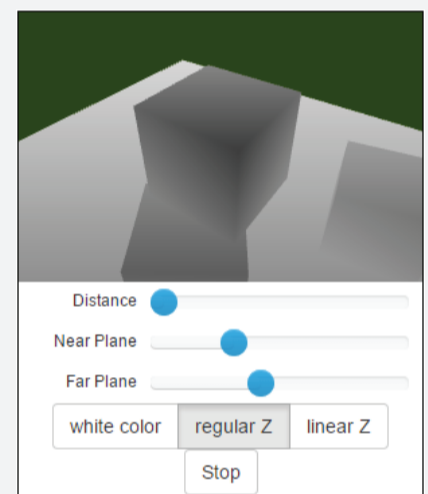
Perspective Projection



Moire Aliasing

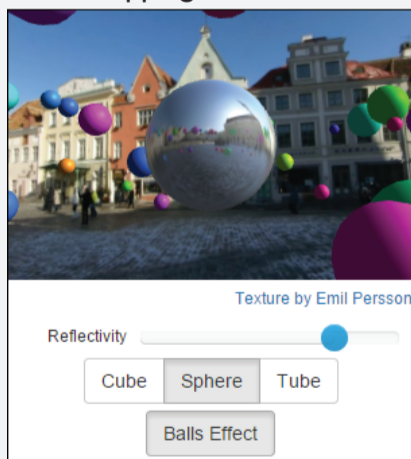


Z-Buffer

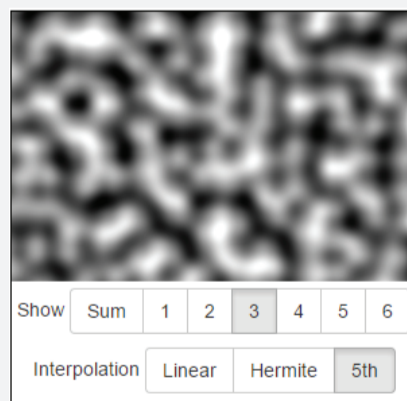


Second half of the topics start with environment mapping techniques. Then we cover a number of curves and splines. Procedural Generation topic covers noise, Lindenmayer systems and particle systems. Material concludes with ray tracing methods for rendering and global illumination. Last topic covers several shadow rendering techniques.

Cube Mapping



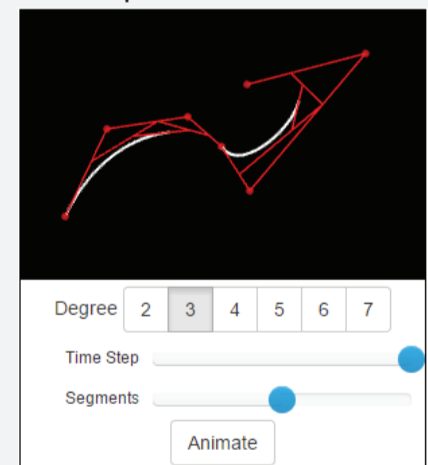
Perlin Noise



Lindenmayer Tree



Bezier Spline



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