

COURSE	Name	: 3D Modelling Design
	Code	: EE185651
	Credit(s)	: 2
	Semester	: (Elective Course)

Description of Course

In this course, students will learn about the interactive concept of computer 3D design modeling and its implementation in the computer program. Topics taught include basic 3D modeling, 2D coordinates, 3D coordinates, rotational transformation, scale transformation, translational translation, view, projection, lighting, shading, mapping texture, raster, animasi and ray tracing, implementation using OpenGL.

Learning Outcomes

Knowledge

(P01) Mastering the concepts and principles of science in a comprehensive manner, and to develop procedures and strategies needed for the analysis and design of systems related to the field of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics as a preparation for further education or professional career.

Specific Skill

(KK01) Being able to formulate engineering problems with new ideas for the development of technology in power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

General Skill

(KU11) Being able to implement information and communication technology in the context of execution of his/her work.

Attitude

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.
(S12) Working together to be able to make the most of his/her potential.

Course Learning Outcomes

Knowledge

Able to explain the concept of 3D model design and the implementation to 2D screen computer screen.

Specific Skill

Able to analyze local coordinate system relations between 3D objects to build objects of complex objects.

General Skill

Able to implement 3D modeling concepts using OpenGL.

Attitude

Demonstrating attitude of being responsible for the work in his area of expertise independently.
Working together to be able to make the most of their potential.

Main Subjects

1. Basic Concepts of 3D Modeling: Basic OpenGL, Lines, Polygons, and Color.
2. 2D / 3D transformation: 2D / 3D coordinates, translation, scaling, rotation, and combination.
3. Viewing and Projection: Virtual Camera Concept, FPS Camera, Third Person Camera, Perspective Projection, and Orthogonal Projection.
4. Lighting and Shading: Lighting Concepts, Ambient Lighting, Diffuse Lighting, Specular Lighting, Phong Shading, and Phong-Blinn Shading.
5. Texture Mapping: Basic Texture Mapping, 2D Texture, 3D Texture, Texture Filtering, Mipmaps, and Non-Color Texture.
6. Rasterization: Scan Conversion, DDA, Bresenham, Rasterization for Polygon, and Antialiasing.
7. Programmable Graphics Hardware: Basic Shader Programming, Vertex Shader, Pixel / Fragment Shader, and Geometry Shader.
8. 2D / 3D Animation: Basic 2D / 3D Animation, Keyframe Animation, Computer Animation, Quaternions, Motion Capture, and Physically Based Animation.
9. Ray Tracing, Spatial Data Structures, and Global Illumination: Basic Concepts of Ray Tracing, BRDF, Radiosity, Photon Mapping, Precomputed Radiance Transfer (PRT), Subsurface Scattering, Hierarchical Bounding Volume, Regular Grids, Octrees, and BSP Trees.

Reference(s)

- [1] Raghu Ramakrishnan and Johannes Gerhrke. 2003. Database Management Systems, 3 edition, McGraw-Hill. ISBN: 978-0071231510.
- [2] Principles Of Distributed Database Systems, Third Edition 2011. M. Tamer Özsu • Patrick Valduriez

Prerequisite(s)

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