Computer Graphics

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Administration

• **Slot K** (Tu 5-6, W 5-6, F 5-6) Room IIA 201

• **Exams:**
  • 2 Minors (30%-35%), 1 Major (30%)

• **Assignments:**
  • 3-4 Programming Assignments (35%-40%)

• **TA(s):**
  • Abhishek Agarwal
  • Sangeetha Krishnan
  • Dangeti Kumar

• **Web Page**
  
  http://www.cse.iitd.ac.in/~pkalra/csl781
Books/Material

- Fundamental of Interactive Computer Graphics by Foley, van Dam, Feiner, and Hughes, Addison-Wesley (International Edition)
- Advanced Animation and Rendering Techniques (Theory and Practice)
Contents

- Introduction/Preliminaries
- Raster Graphics
- Clipping
- Transformations
- Curves and Surfaces
- Rendering
- Animation
Introduction

*Computer Graphics* is the use of computer to define, store, manipulate, interrogate, and present pictorial output.

A picture is 10,000 worth words!

**Scope:**
- Industry
- Art
- Entertainment
- Education
- Medicine
Basic Elements

• Modeling
  • Shape (geometry)

• Rendering
  • Display (shading, illumination, color, texture…)

• Animation
  • Movement (dynamics)
Basic Elements

• Modeling
Basic Elements

• Modeling
Modeling

Modeling as reverse engineering

Scanner

3D Geometry

Rendering

Courtesy Dr. Niloy Mitra
Basic Elements

- Rendering
Basic Elements

• Rendering
Basic Elements

• Animation
History

- 1963: Sutherland First Graphics Workstation
- 1969: First SIGGRAPH (ACM)
- Early 1970’s: Raster Graphics, Shading, Illumination
- Late 1970’s: Texture Mapping, Ray Tracing
- Early 1980’s: Realism in Rendering
- Late 1980’s: Physically Based Animation
- 1989: Tin Toy (Pixar) wins Academy Award
- 1990’s: Interaction, Scientific Visualization, Virtual Reality, Augmented Reality, Multimedia, etc.
- 2000’s: Real-time Visualization of Large Data Sets, Data Compression, Vision and Graphics, etc.
Applications

• Engineering
Applications

• Design

Architectural Design

Google Earth
Applications

- Medical
- Bio-graphics
Applications

• Entertainment
Representation

3D object representation
Graphics Rendering Pipeline

• Rendering is the conversion of a scene into an image:

3D Scene  Rendering  2D Image
Graphics Rendering Pipeline

Modeling Transformation
- Model 1
- Model 2
- Model n

3DWorld Scene

Viewing Transformation
- V

2D Scene

2D Image

Rasterization

Projection

3D View Scene