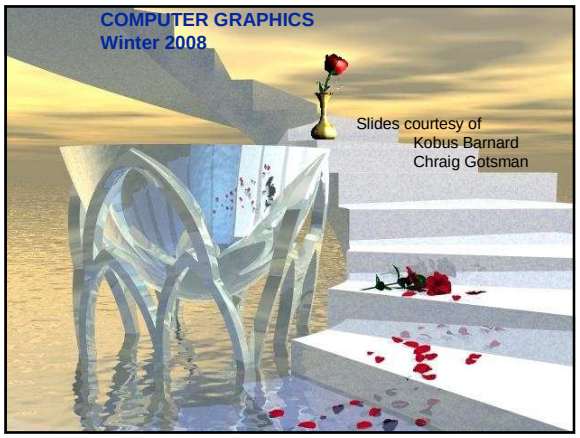


Teaching Staff

- **Lecturer**: Alon Efrat
  - Mon 12:30-14:30
  - Contact info:
    - Gould-Simpson, Tel: 626-8047, Mon 14:30-15:30
    - `alon@cs.technion.ac.il`
    - `http://www.cs.arizona.edu/~alon`
- **Teaching Assistant**: Leonard D Brown
  - Thu 9:30-10:30 (Taub 7)
  - Contact info:

2

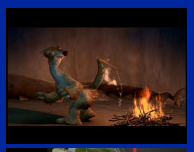
Grading Policy

- **See course webpage**

3

Computer Graphics

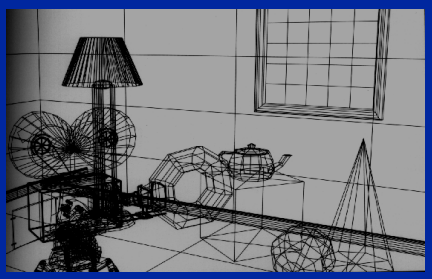
Synthesis of static/dynamic 2D images from 3D geometry using computers.



4

3D Graphics

- Geometric model



5

3D Graphics

- Rendering

6

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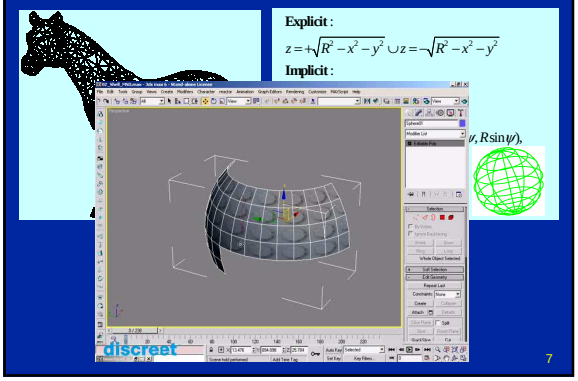
Generating 3D Geometry



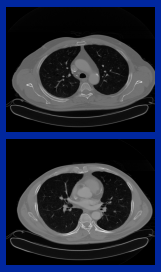
7

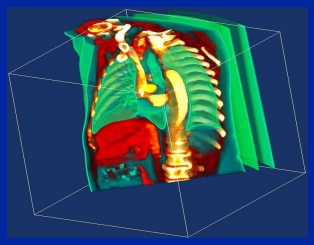
Generating 3D Geometry

Digitization

8

Generating 3D Geometry



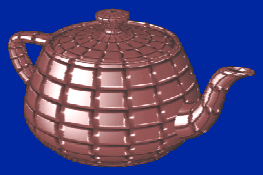


3D model from CT images

9

Rendering

- Material Properties
  - Fog
  - Texture
  - Reflectivity
  - Refraction



10

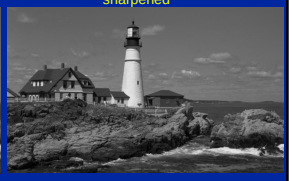
Image Processing and Computer Vision

- Image enhancement
- Feature extraction
- Pattern recognition
- 3D model extraction

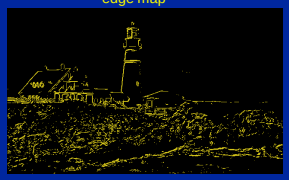
11

original

sharpened



edge map



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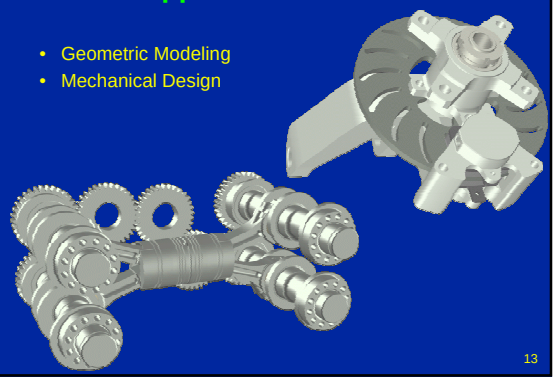
Applications

- Geometric Modeling
- Mechanical Design



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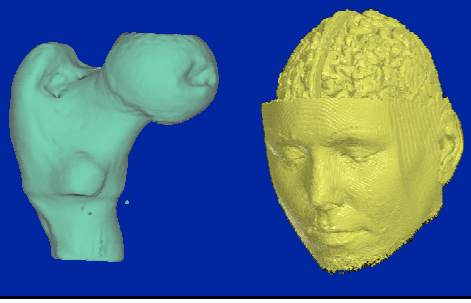
Applications

- Medical



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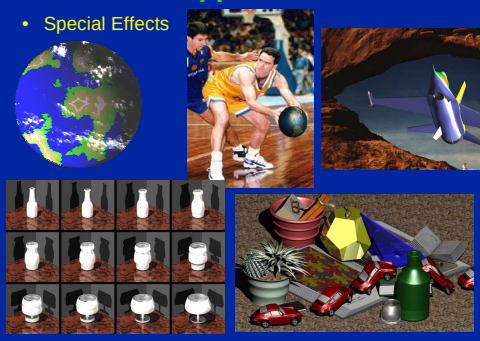
Applications

- Special Effects



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Applications

- Computer Games

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Applications

- Images
  - Design
  - Advertising
  - Art

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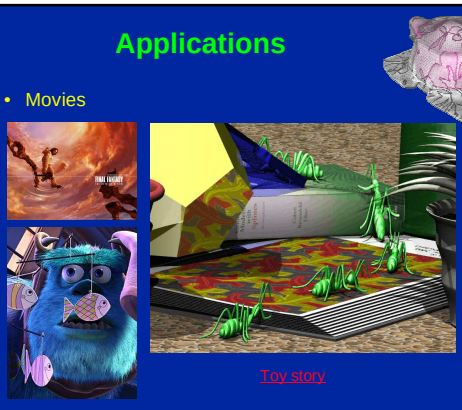
Applications

- Movies



Toy story

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Applications

- Online experience

CNN

Nokia

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Syllabus

- Introduction
  - OpenGL
- Geometry & Transformations
- Scan Conversion
- Clipping
- Polygon Fill
- Hidden Surface Removal
- Geometric Data Structures
- Geometric Modeling
- Shading
- Color Theory (briefly)
- Shadows
- Texture Mapping
- Ray Tracing
- Antialiasing
- VRML
- Cool Stuff. GPU

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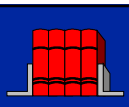
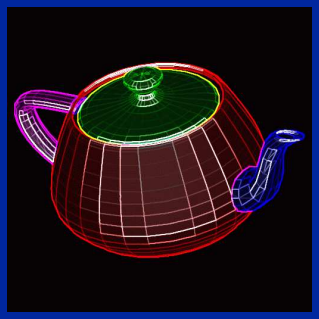
Literature



- **Computer Graphics - Principles and Practice (Second Edition).**
  J.D.Foley, A.Van-Dam, S.K.Feiner and J.F.Hughes, Addison-Wesley, 1990.
- **Advanced Animation and Rendering Techniques**
  A.Watt and M.Watt, Addison-Wesley, 1992.
- **OpenGL Programming Guide**
  J. Neider, T. Davis and W. Mason, Addison-Wesley, 1994.

21

Hidden Surface Removal



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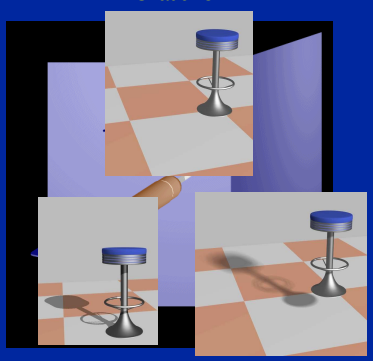
Shadows



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Texture Mapping

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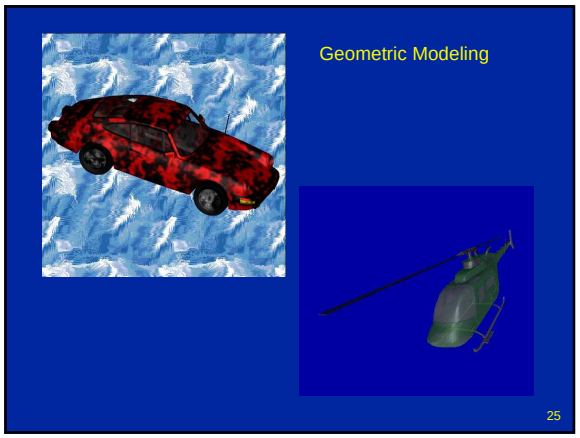

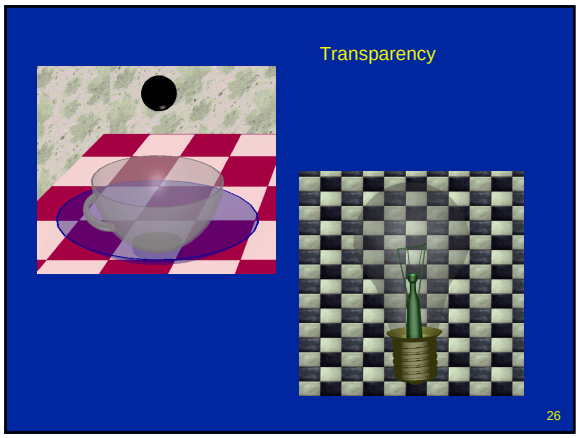

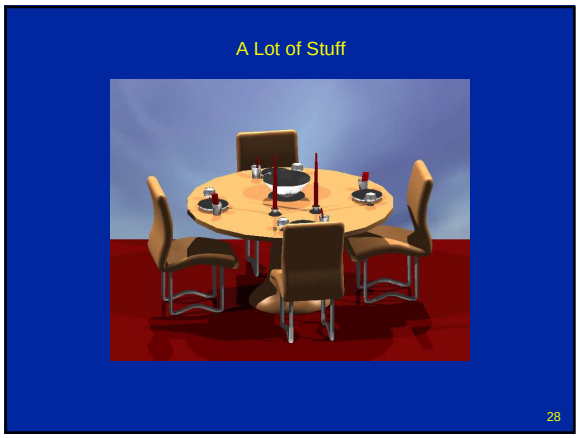

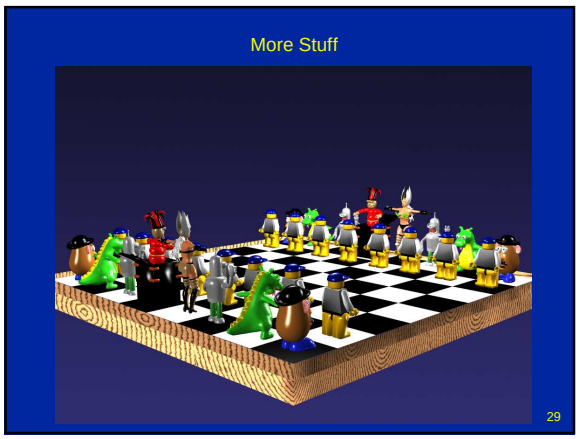

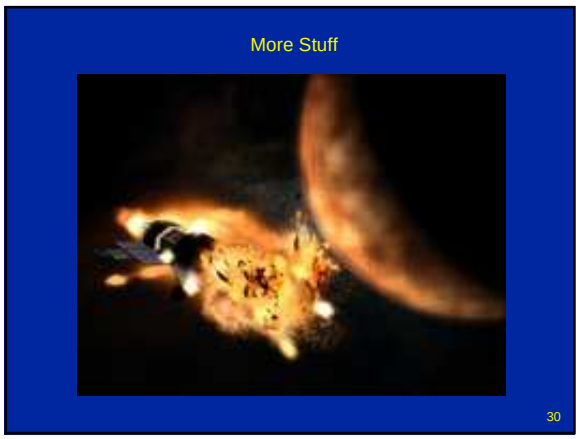

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mental images

"OFFICE FURNITURE SERIES "YPSILON""
Customer: Rosenthal AG
Design: Cini Boeri
Visualization: buenck+fehse, Berlin
Image rendered with mental ray.

31

mental images

"NATOSAAL"
© mental images, 1998
Simulation of Global Illumination in
a room with 150 area light sources.
Image rendered with mental ray.

32

mental images

"FIGHT CLUB"
© 20th Century Fox International, 1999
3D Animation and Visual Effects by
BUF Compagnie, Paris
Image rendered with mental ray.

33

34

mental images

"Image from RIVEN"
© 1997 Cyan, Inc.
Image rendered with mental ray.

35

mental images

"THE ART OF INSTANT SEDUCTION"
Design: Stefan Hoehnerloh
Animation: buenck+fehse, Berlin
Image rendered with mental ray.

36

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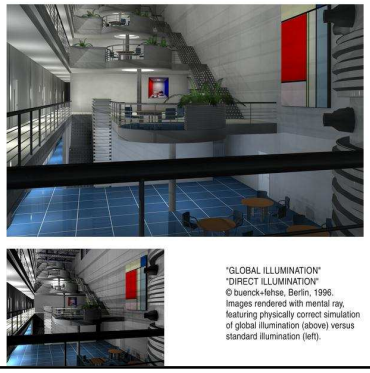
mental images



"GLOBAL ILLUMINATION"
"DIRECT ILLUMINATION"
© buenck+lehse, Berlin, 1996.
Images rendered with mental ray,
featuring physically correct simulation
of global illumination (above) versus
standard illumination (left).

37

mental images

"SUBURBAN FAST TRAIN
STATION NAMED
"WILHELM LEUSCHNER PLATZ"
IN LEIPZIG"
First Prize of the competition
Customer/Design: Max Dudler
Visualization: buenck+lehse, Berlin
Image rendered with mental ray.

38

mental images

"U5"
Subway Station "Berliner Rathaus"
© 1999 buenck+lehse, Berlin
Design: Richard Rogers Partnership and
Collignon Fischoetter Architekten
Image rendered with mental ray.

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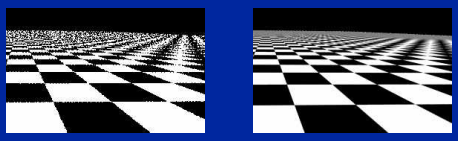
(Anti-)Aliasing



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