Computer Graphics
(컴퓨터 그래픽스, HY23945)

COLLEGE OF COMPUTING

HANYANG ERICA

Q YOUN HONG (홍규연)

Teaching Staff

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- Webpage:
  - https://learning.hanyang.ac.kr/courses/135262 (in LMS)

수업 방법

- 강의:
  - 이론: 화 13:00 ~ 15:00, 제 1공학관 304 강의실
  - 실습: 금 16:00 ~ 18:00, 학연산클러스터지원센터 512호 AI실습실

- 성적:
  - 중간고사(30%) + 기말고사(30%) + 과제 (30%) + 출석 (10%)

- 과제 (30%):
  - Review tasks (10%)
  - Programming assignments (20%)

Prerequisites

- C/C++ programming skills
  - We will use OpenGL library

- Basic data structures
  - Linked list, arrays

- Math knowledge
  - Linear algebra (선형대수) – vector/matrix operations
  - Calculus (미적분학) – derivatives,….

과제 (Assignments)

1. Review Task (10%)
   - 이론/실습 수업 후 내용 점검
   - 지각 제출 받지 않음

2. Programming Assignment (20%)
   - 4번의 프로그래밍 과제 예상
   - 늦게 제출할 경우 감점 (1일당 5점씩), 3일 이상 늦을 경우 받지 않음

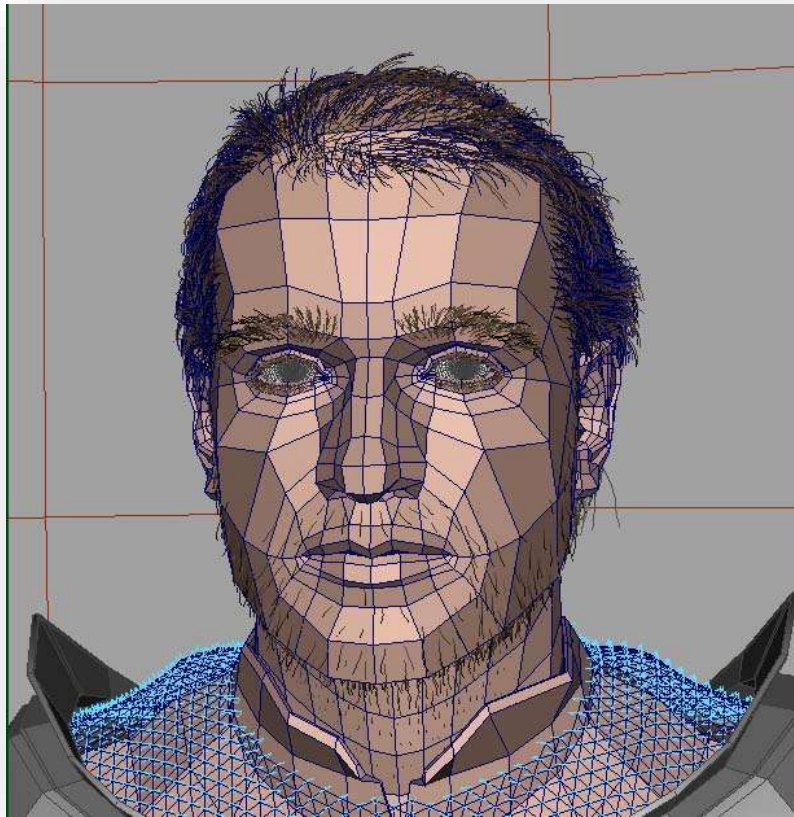❖ 모든 숙제는 개별 과제

❖ 과제는 LMS를 통해 공지, 제출

❖ **No collaboration! – Only as permitted to use code by the staff of the course**

Introduction

Computer Graphics

- What is computer graphics?

"*Creation/manipulation of images with the use of computers*"

Computer Graphics

- What is computer graphics?

"Creation/manipulation of images with the use of computers"

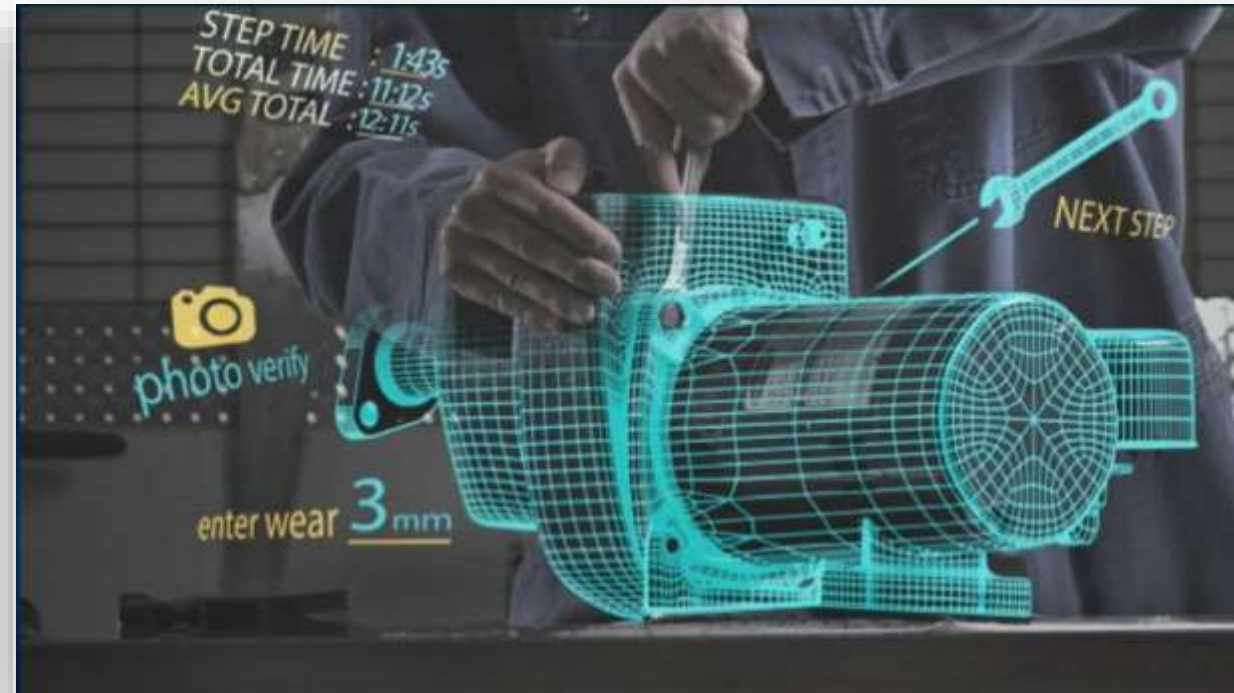# Computer Graphics Areas

Modeling

Rendering

Animation
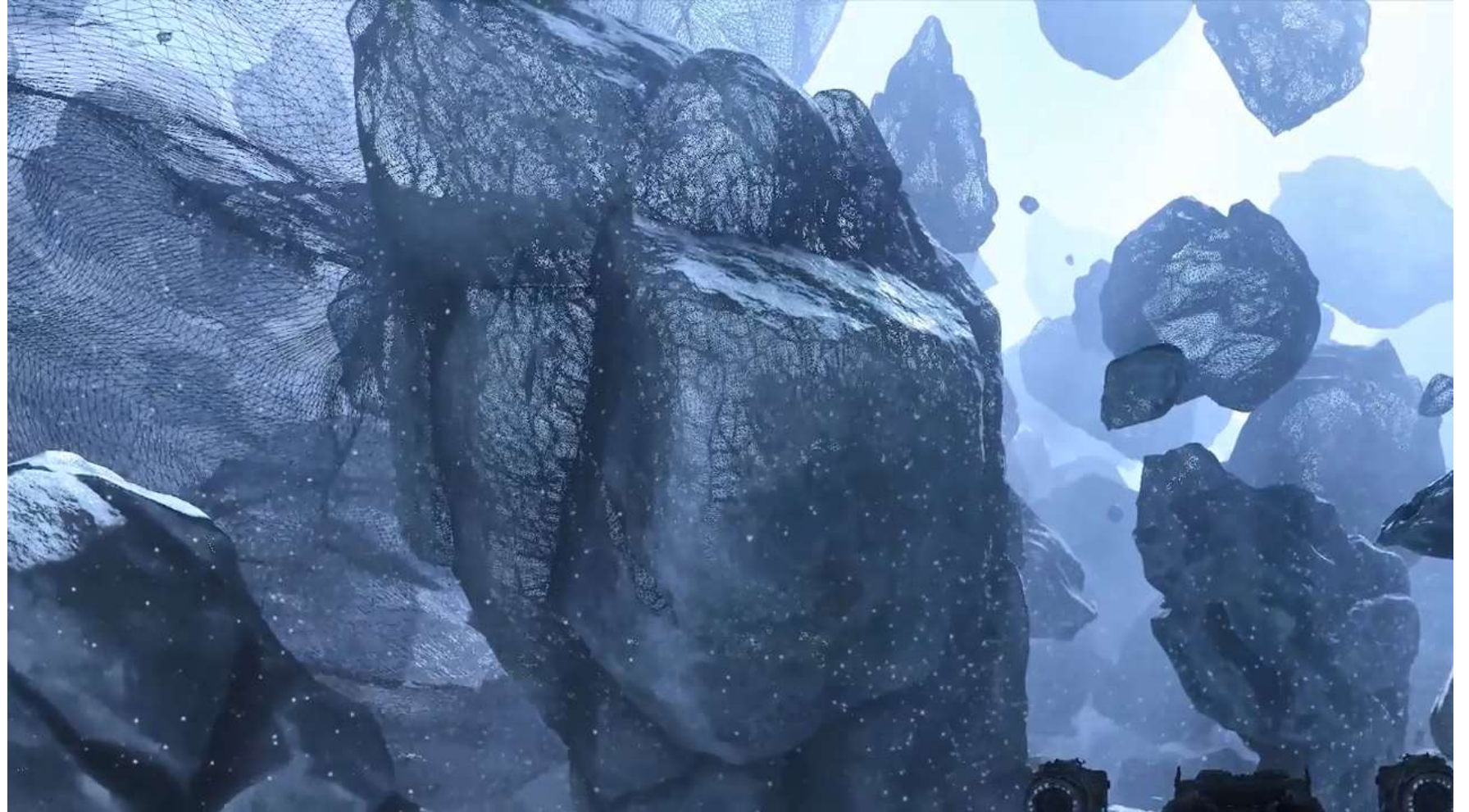
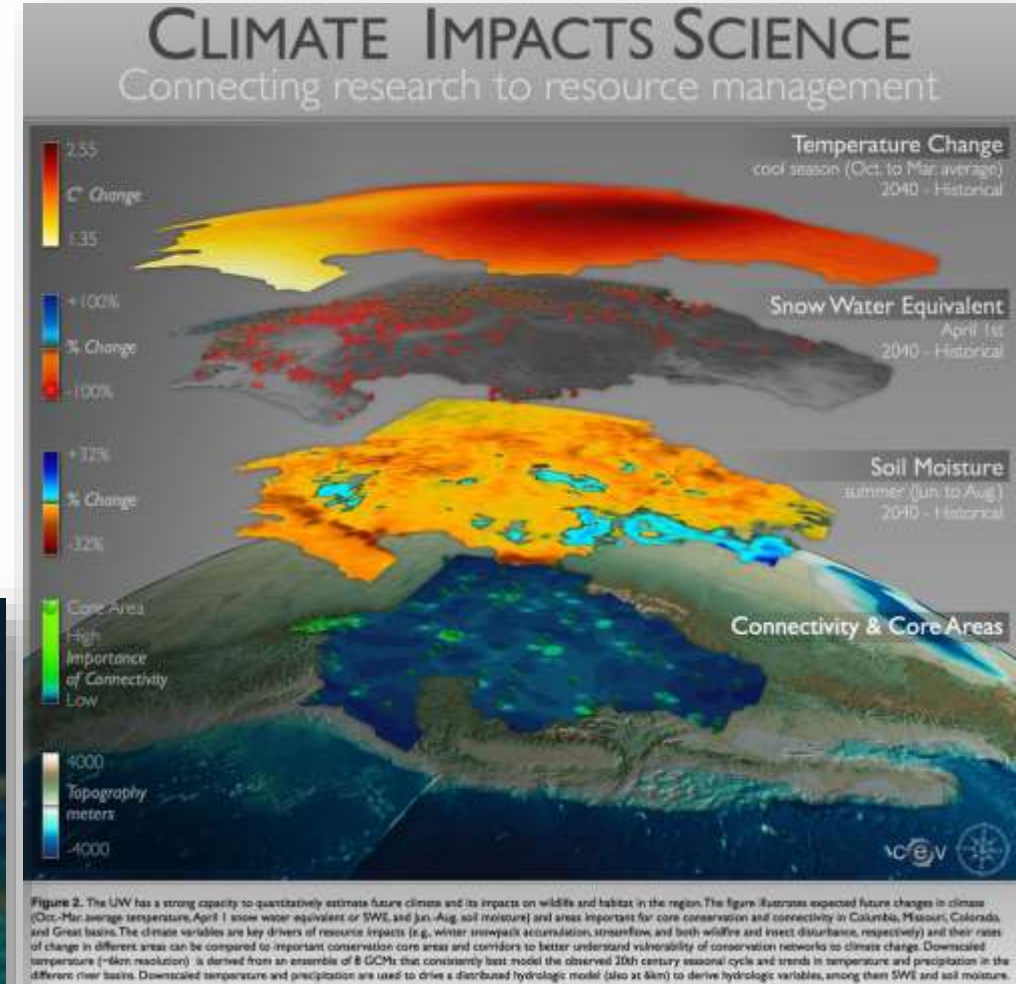# Computer Graphics: Related Areas

User Interaction

Computer Graphics: Related Areas
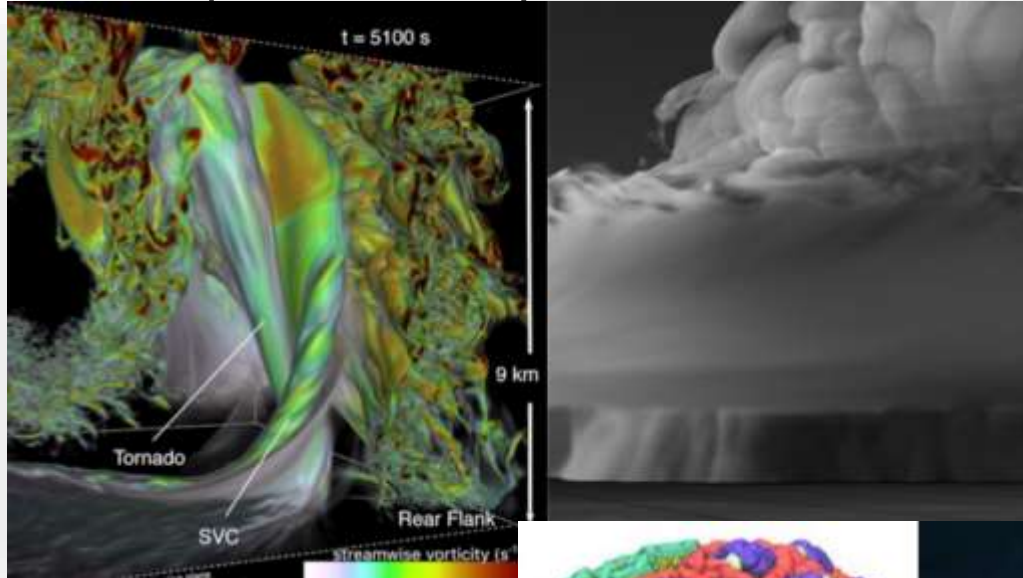
Mixed Reality (Virtual Reality/Augmented Reaility)

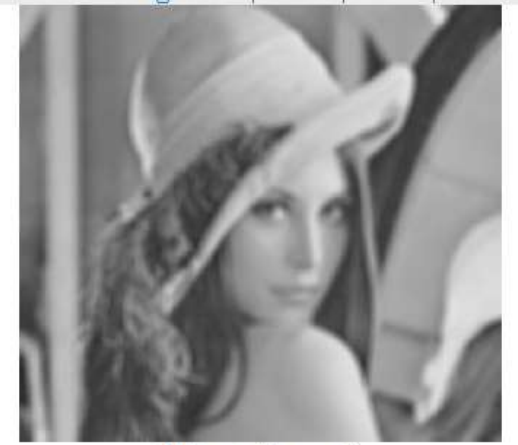# Computer Graphics: Related Areas

(Scientific) Visualization
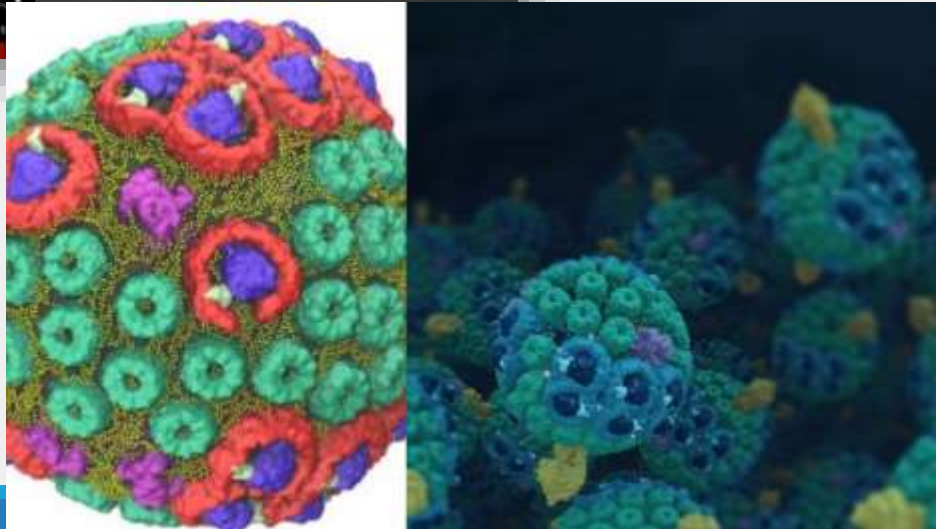
Computer Graphics: Related Areas
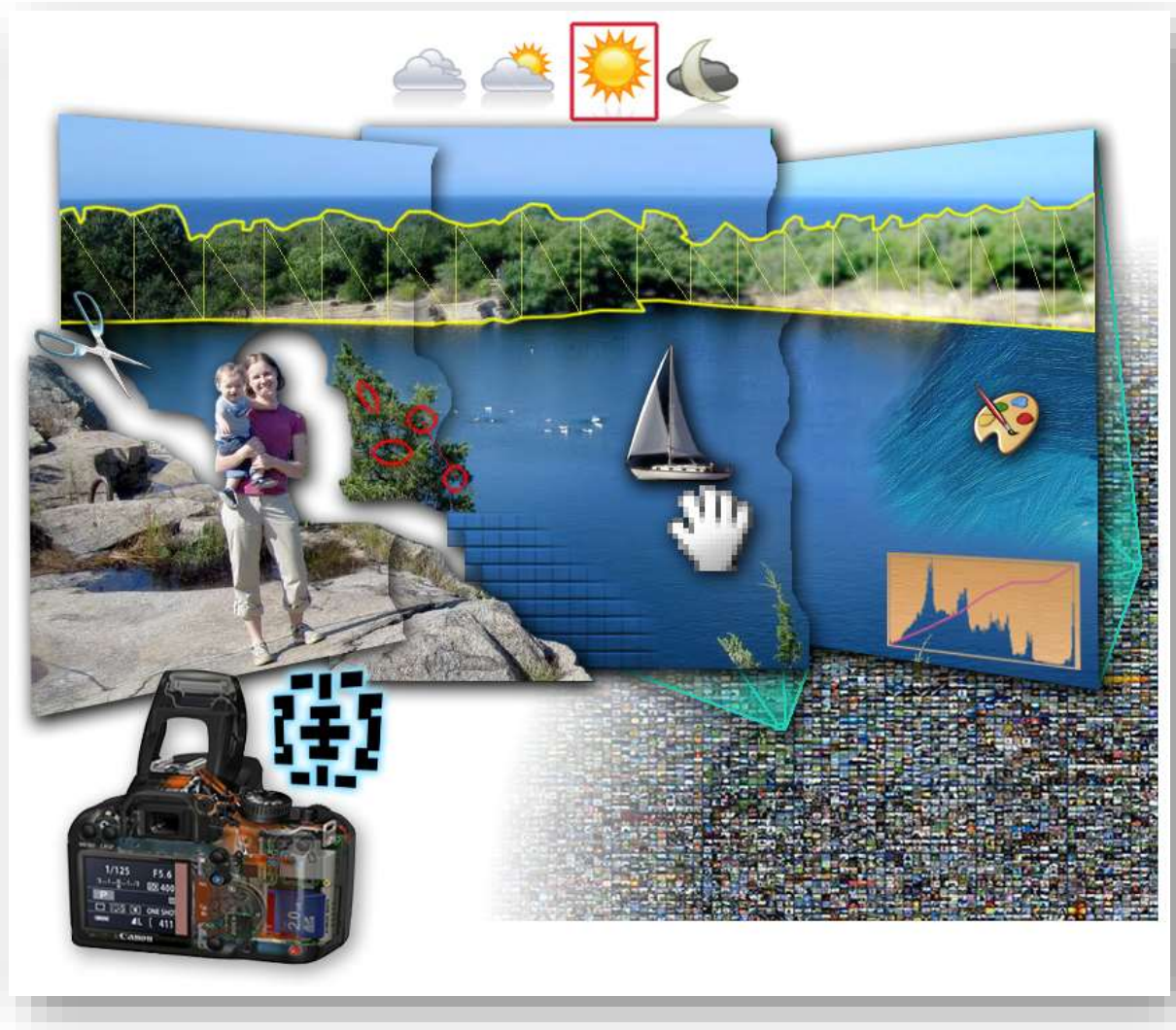
Image Processing

Original Image

Distorted image 1

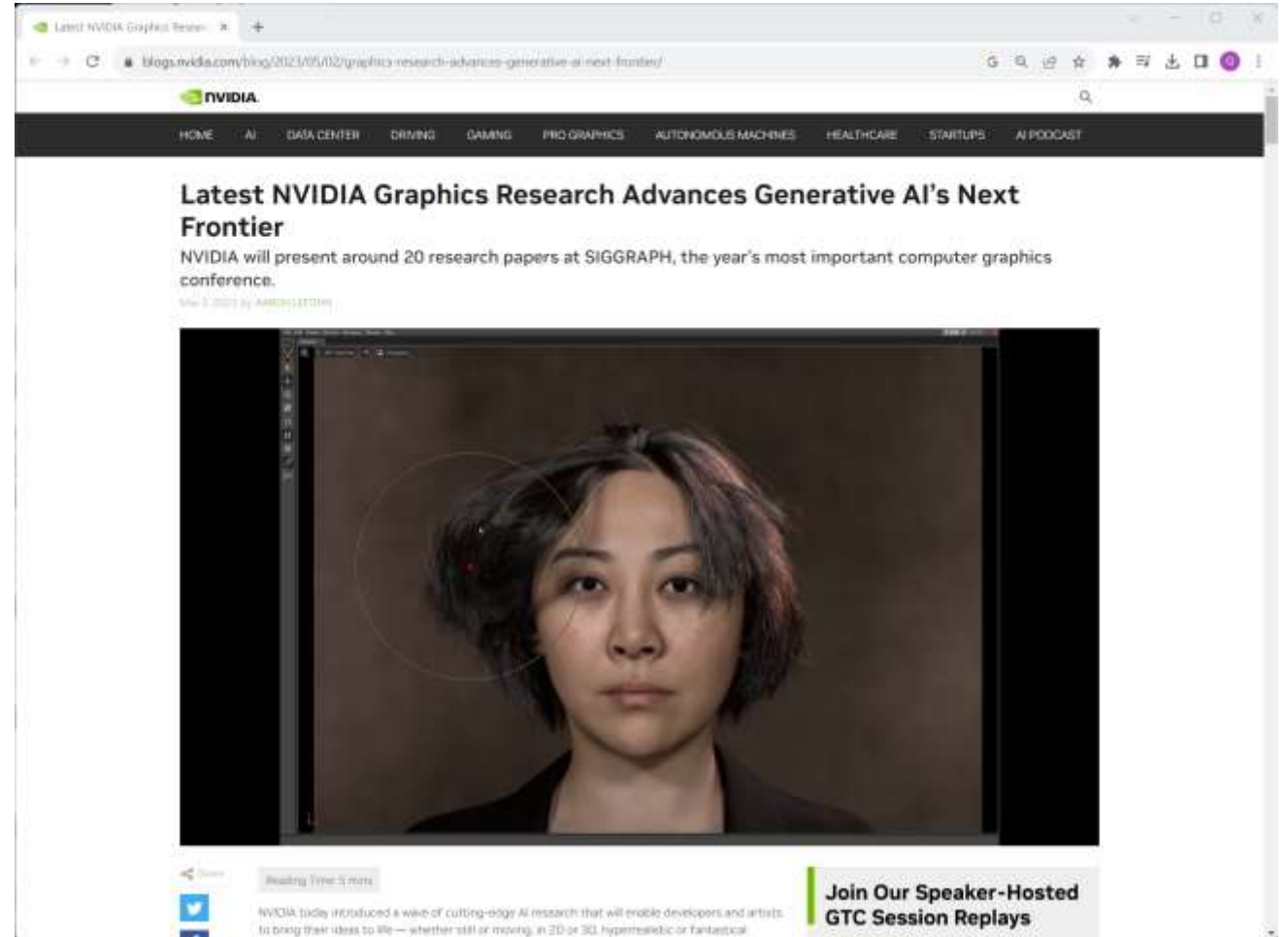# Computer Graphics: Related Areas

3D Scanning

Computer Graphics: Related Areas

Computational Photography
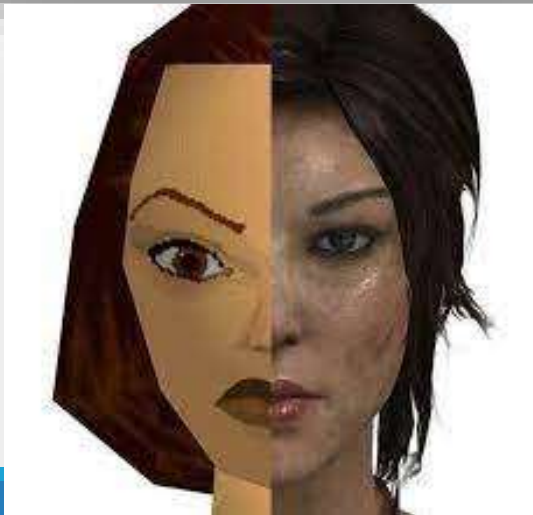
Computer Graphics: Related Areas

Artificial Intelligence (AI)

(from: https://blogs.nvidia.com/blog/2023/05/02/graphics-research-advances-generative-ai-next-frontier)

Applications of Computer Graphics

Video games

Applications of Computer Graphics
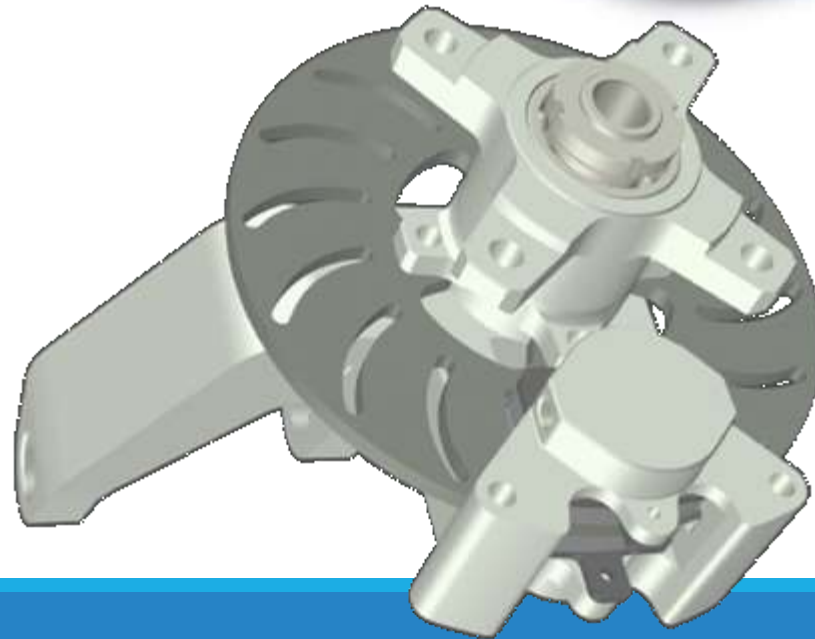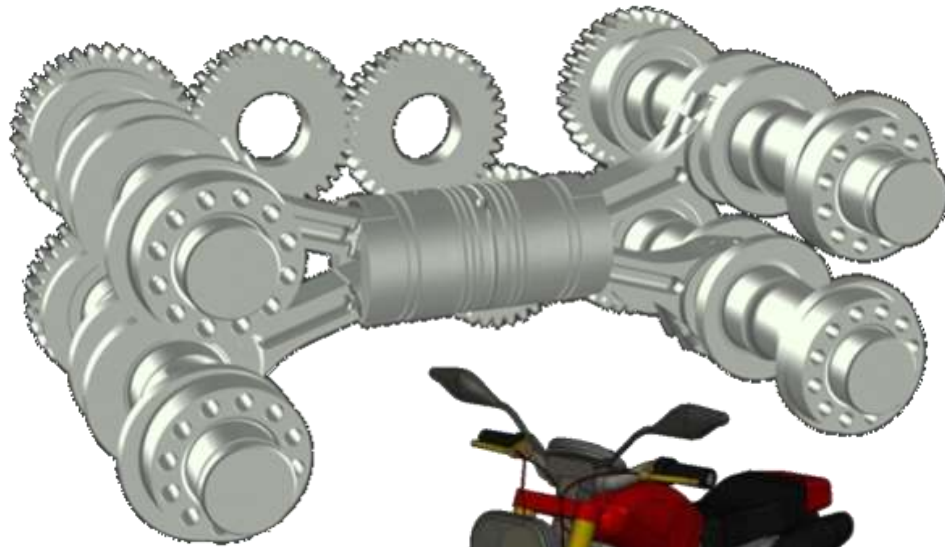
Cartoons

Applications of Computer Graphics

Visual effects

Applications of Computer Graphics

Animated Films

Pixar/Disney

Applications of Computer Graphics

Computer-Aided (Geometric) Design (CAD)

Applications of Computer Graphics

Computer-Aided Manufacturing (CAM)

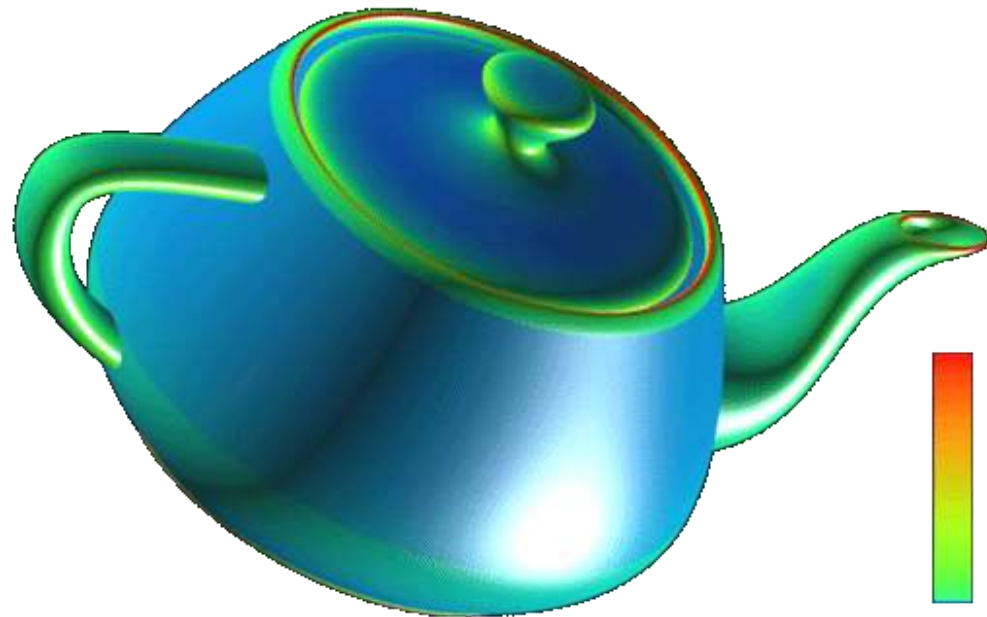Subtractive manufacturing
(NC Machining)

Additive manufacturing
(3D Printing)

3D Printing Applications

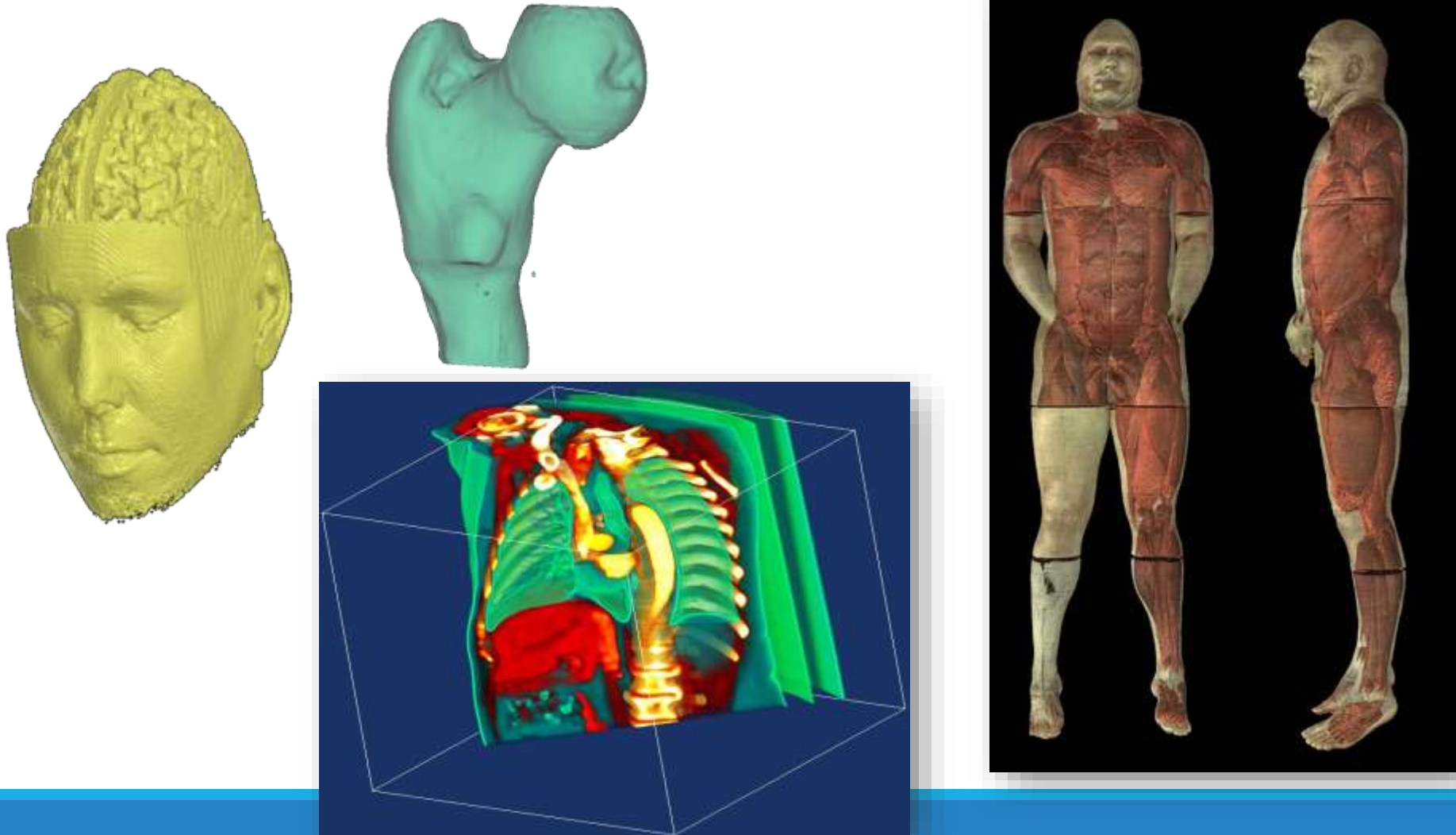# Applications of Computer Graphics
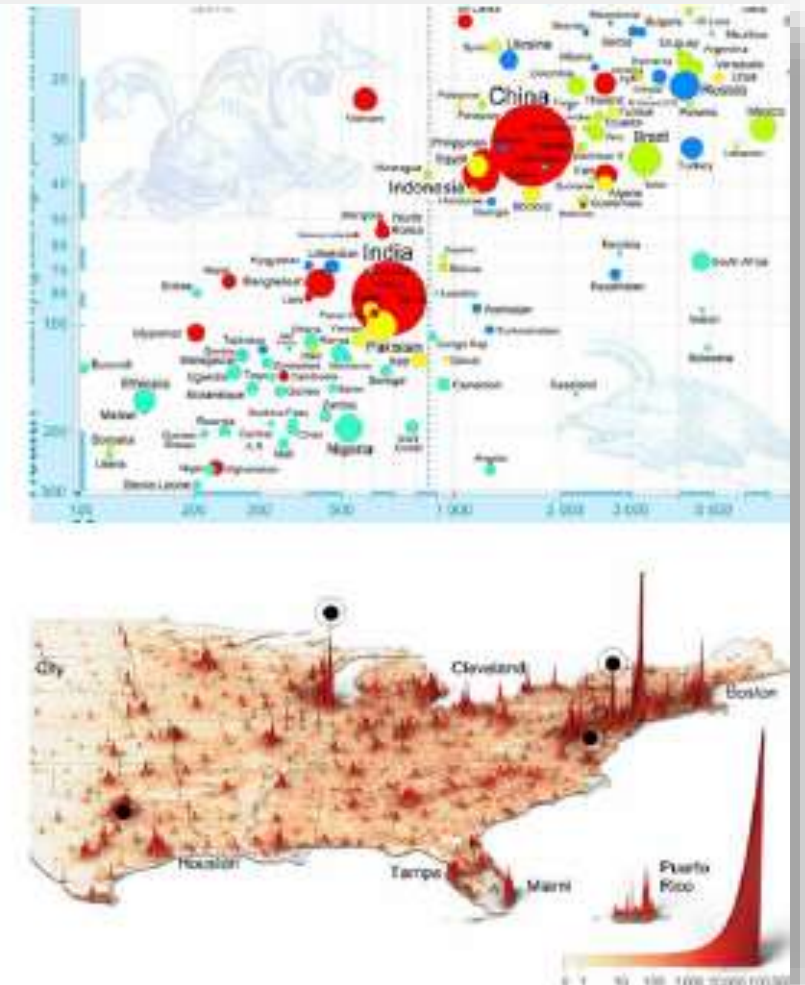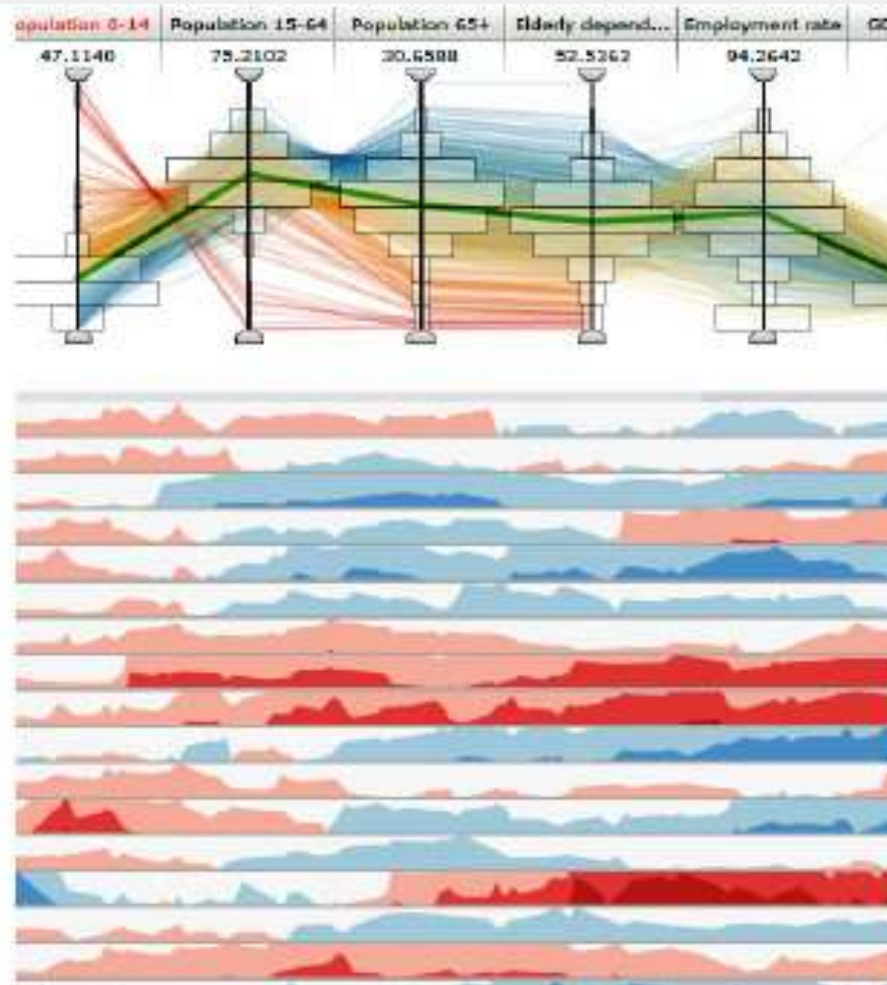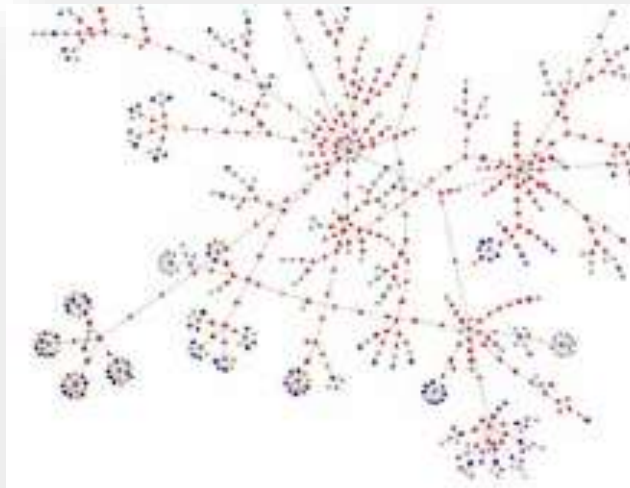
Simulation (Analysis)
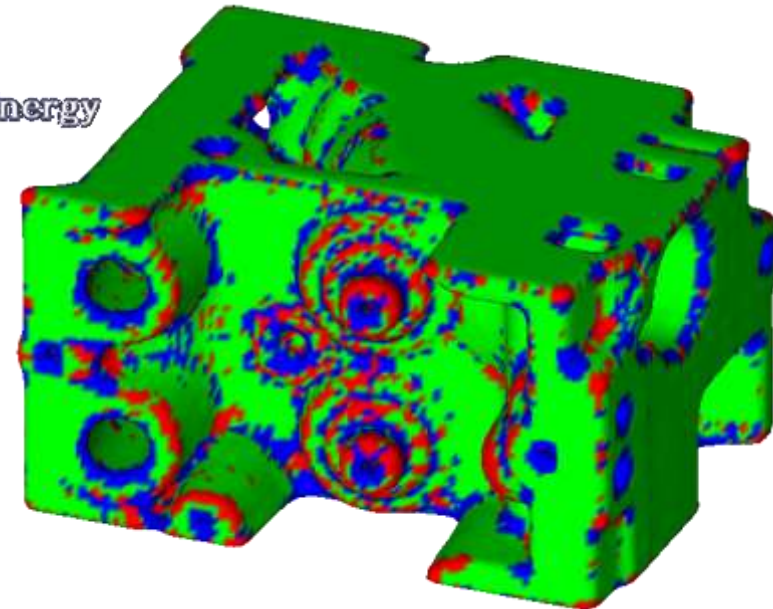
Applications of Computer Graphics

Medical Imaging

Applications of Computer Graphics

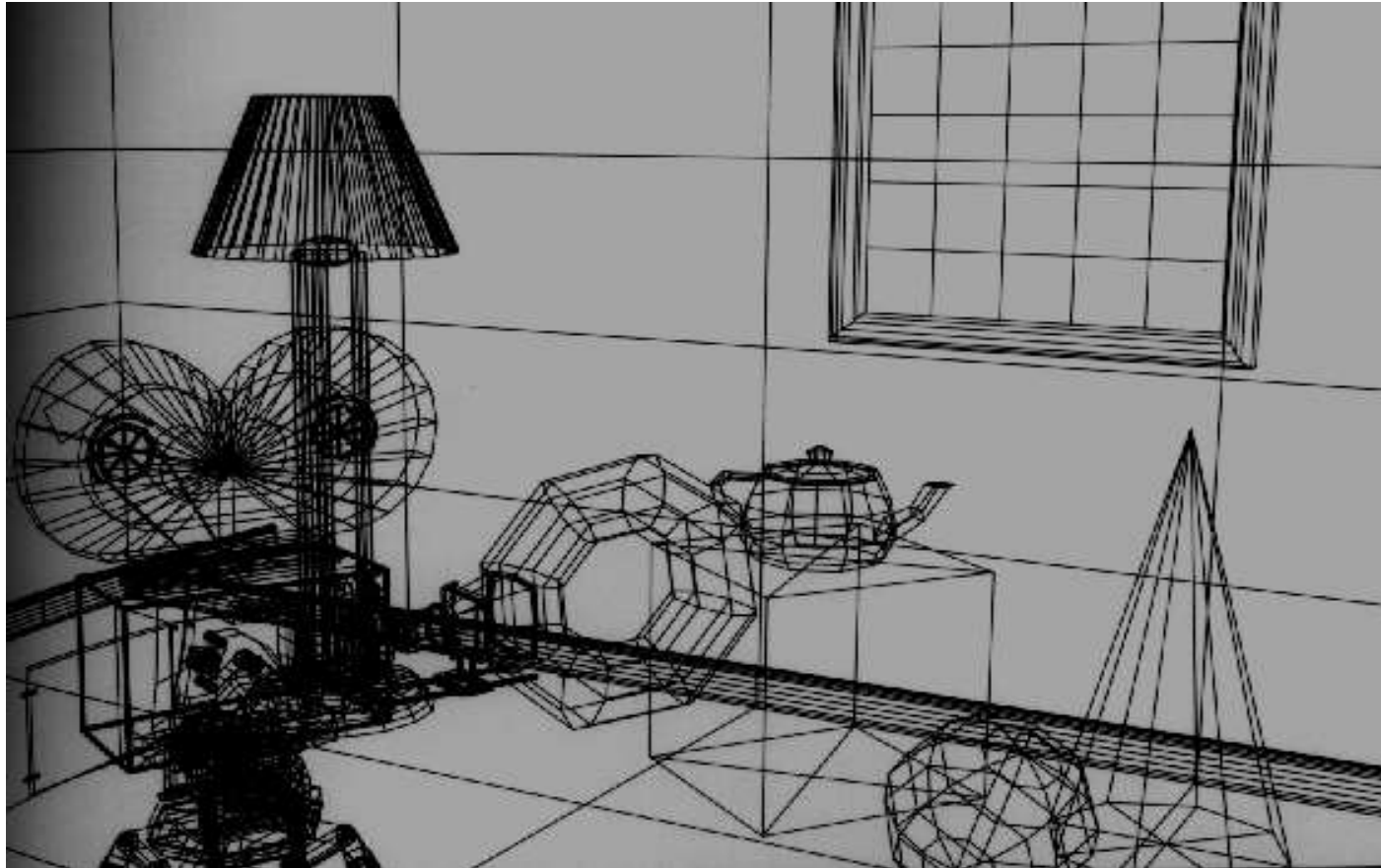## Information Visualization

강의 소개

- 컴퓨터 그래픽스의 기초 이론과 그 이론의 수학 배경 지식 학습
  - 기하 및 공간 변환
  - 렌더링 파이프라인
  - 조명, 쉐이딩 등의 물체 표면 표현 방법
  - Advanced topics in computer graphics

- 그래픽스 프로그래밍 학습
  - C/C++ 기반의 OpenGL 라이브러리를 이용

강의 소개

Wireframe drawing:
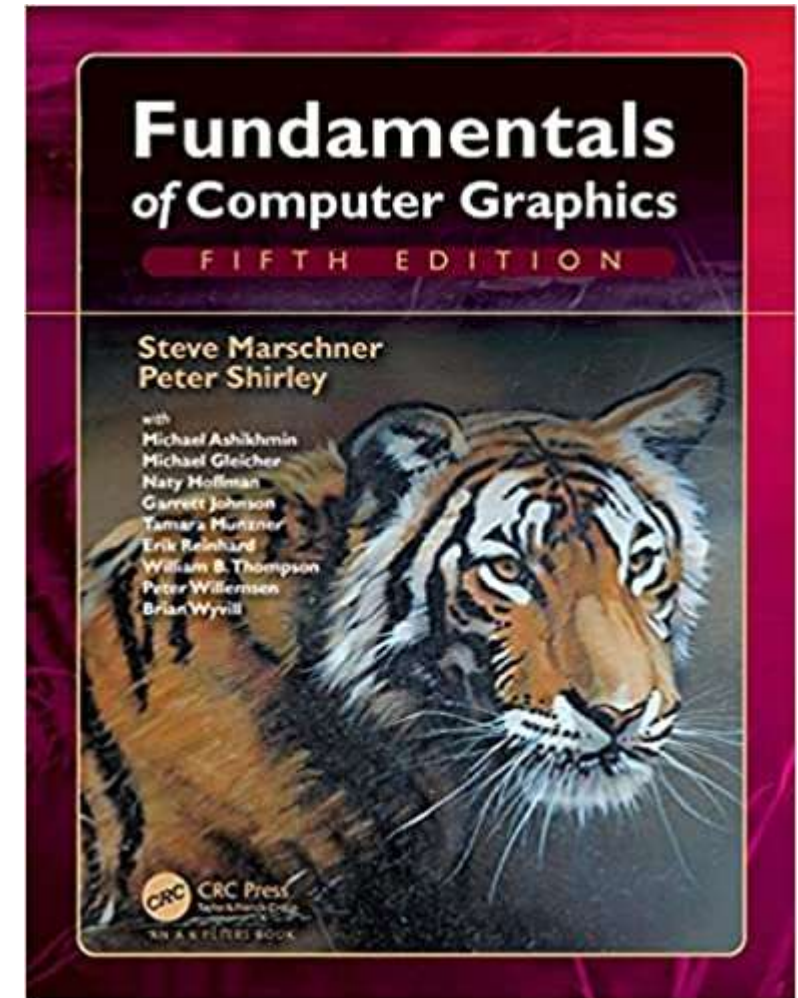
강의 소개

Photo-realistic rendering:

강의 소개

- Material Properties
  - Fog
  - Texture
  - Reflectivity
  - Refraction

References

- **Fundamentals of Computer Graphics 5th edition by S. Marschner and P. Shirley, A K Peters/CRC Press, 2021**

- Computer Graphics – Principles and Practice by J.D. Foley, S.K. Feiner and J.F. Hughes, 2013

- Real-Time Rendering by E. Haines, N. Hoffman and T.A. Moller, 2018

References

- **Interactive Computer Graphics – A Top Down Approach with Shader-based OpenGL**, 6ed. by E. Angel and D. Shreiner