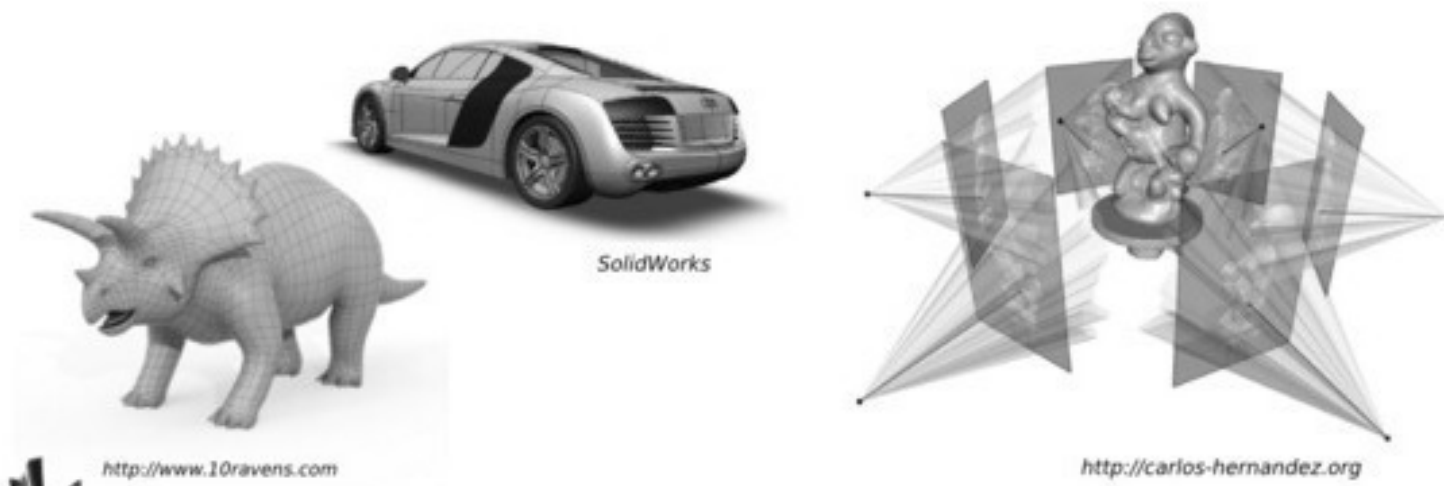


Application domains of CG

Modeling



Animation



Rendering

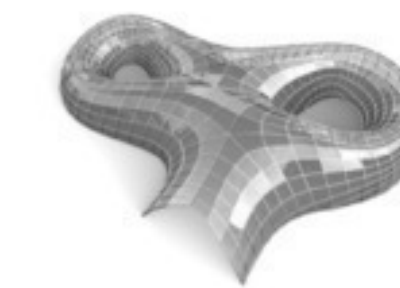


000

Applications of 3D

Emerging domain

- Entertainment (Video Games, Cinema, ...)
- Simulation, Computing, Data Analysis
- Design, prototyping, reconstruction
- Interaction (VR, Augmented Reality, ...)



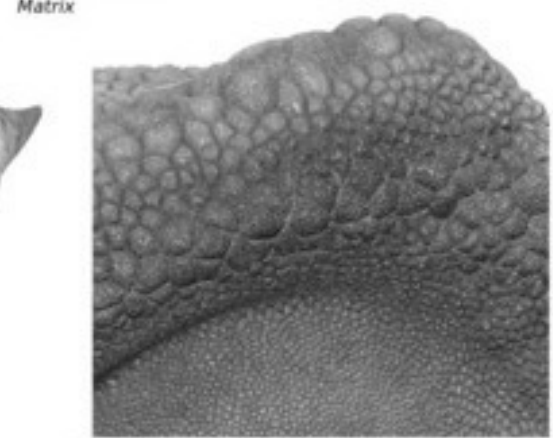
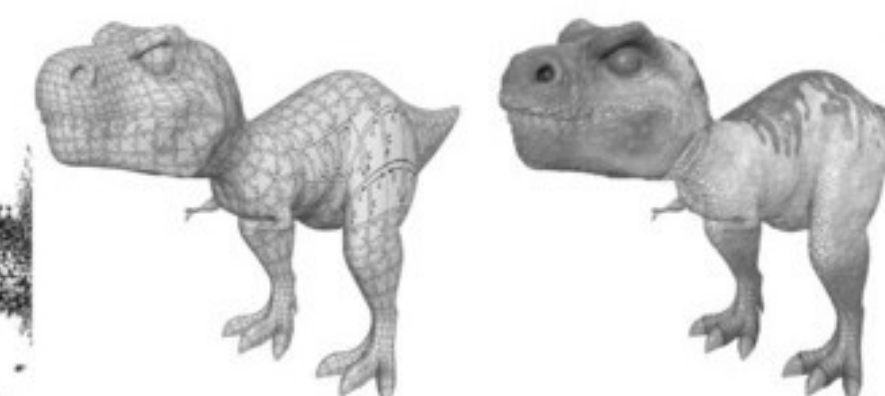
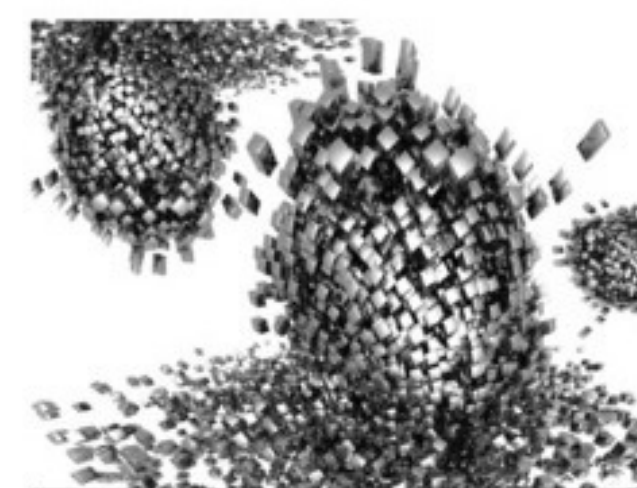
001

Entertainment: Video Games



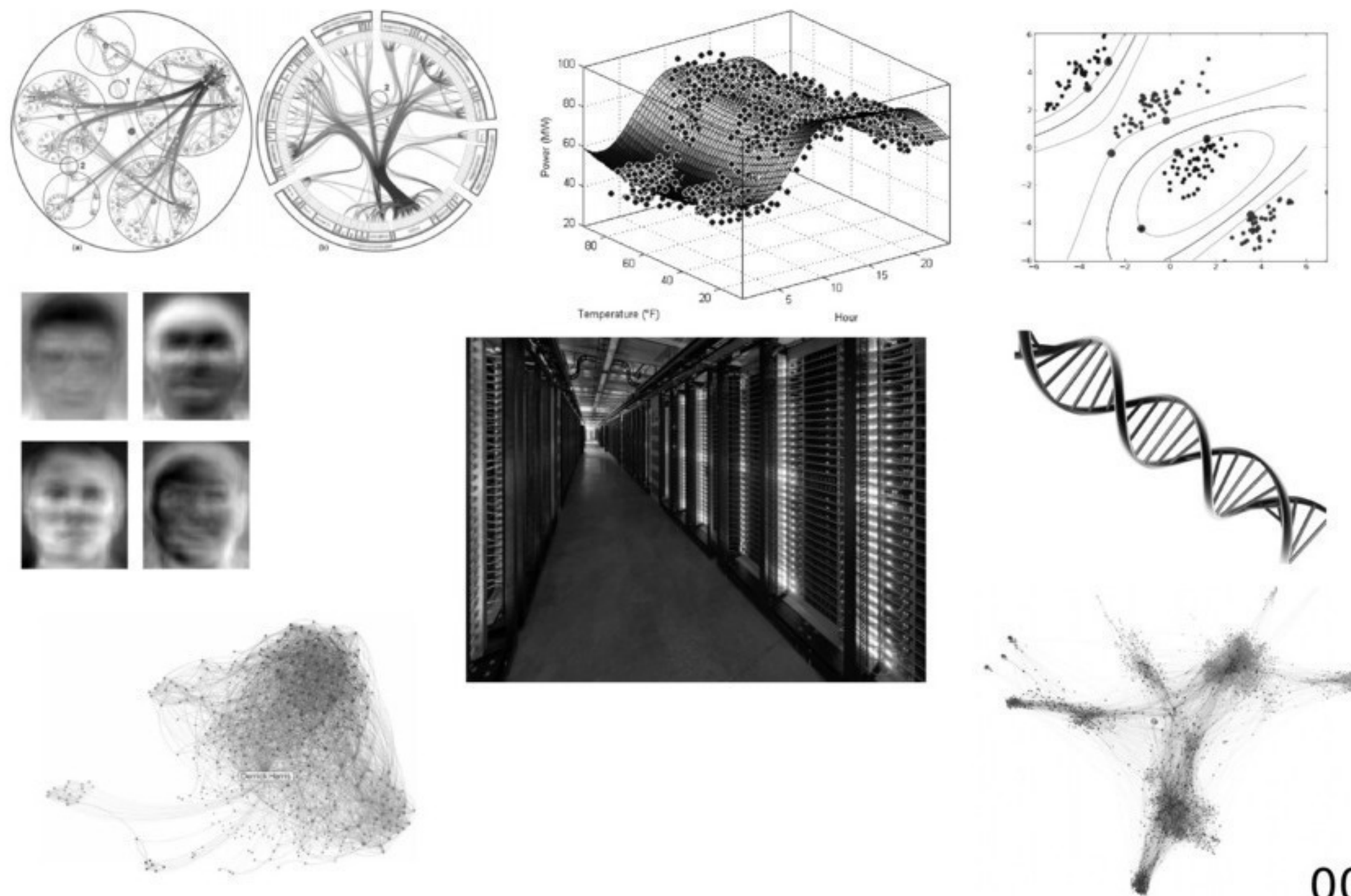
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Entertainment: Cinema



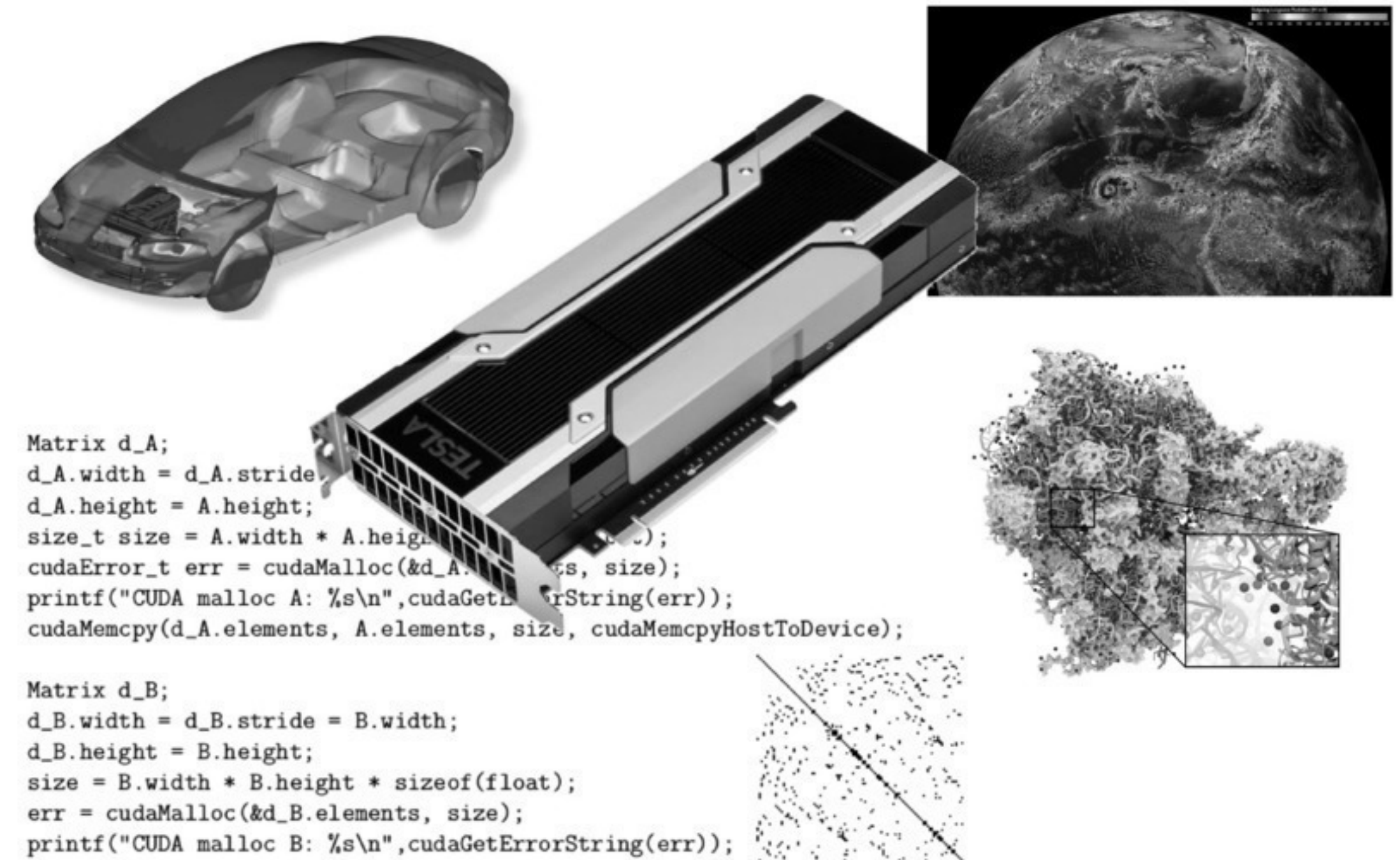
003

Data Analysis: Big Data



008

Data analysis: GPGPU



009

Simulation, Computing, Data Analysis

Jobs areas

Computing
Physics/medical domain
Data Analysis
Optimization
Scientific visualization
(scalar/vector fields, ...)
Big Data
GPU



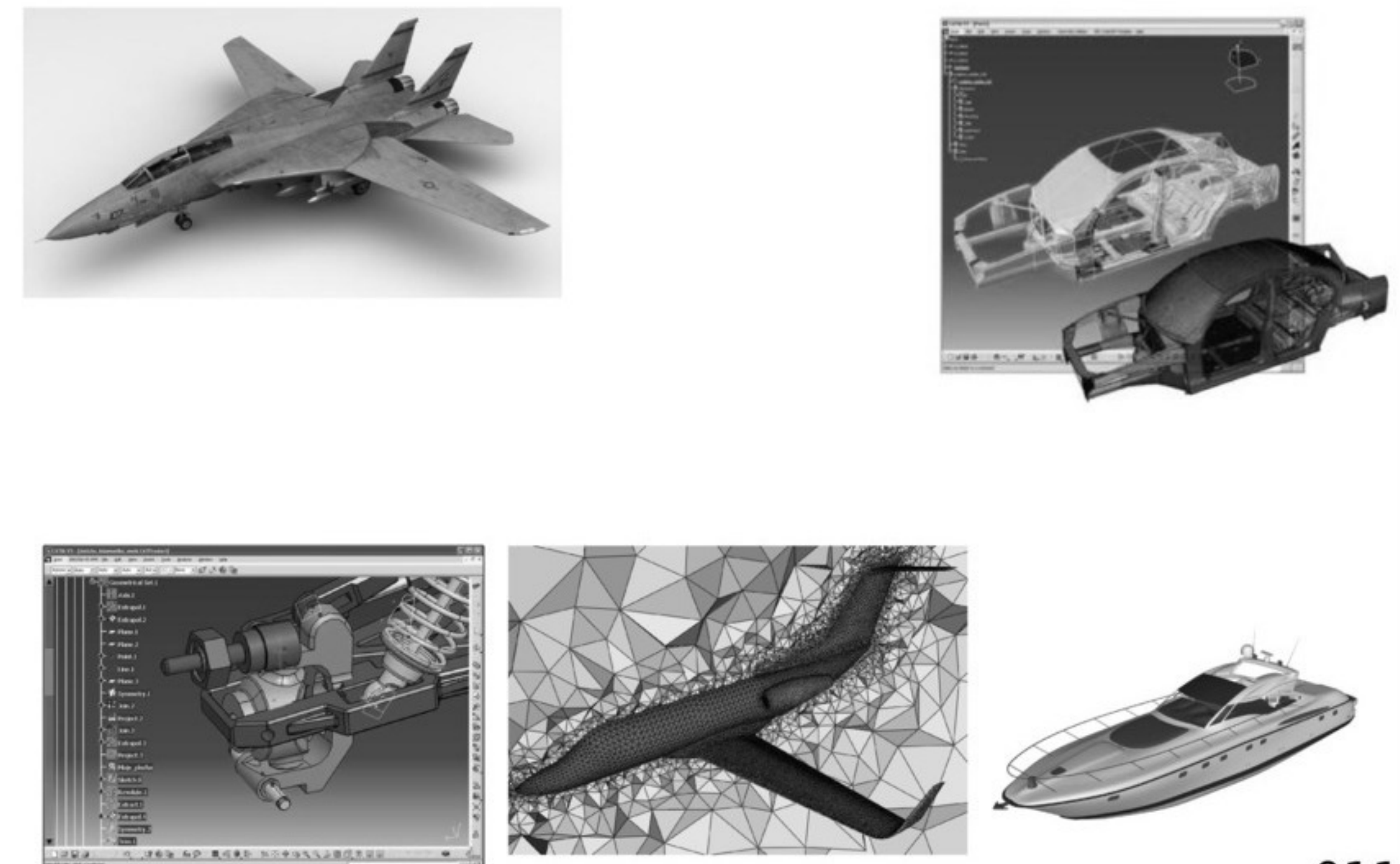
Internships ex.

Brain imaging
(*Scient. Comp. II*)
3D tooth visualization
(*Michigan Univ.*)
3D Visualization
(*GE Healthcare*)
Registration
(*Michelin*)
Data analysis
(*L'Oreal*)
Hair Simulation
(*LIRIS*)



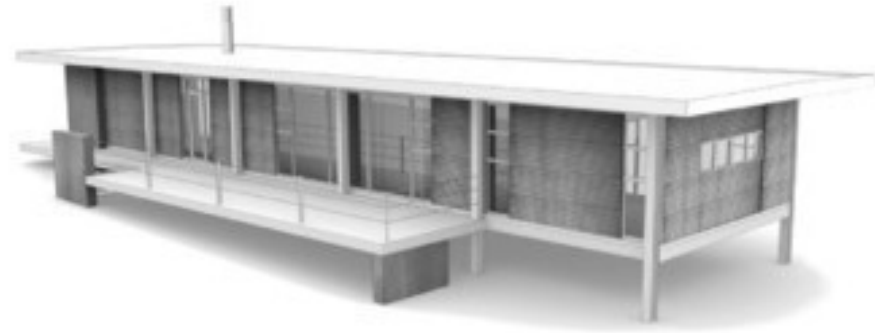
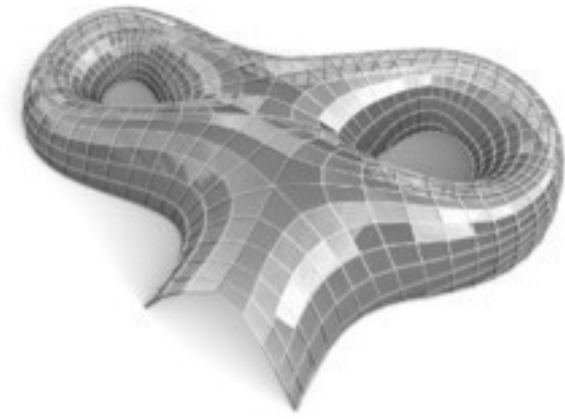
010

Design: CAD



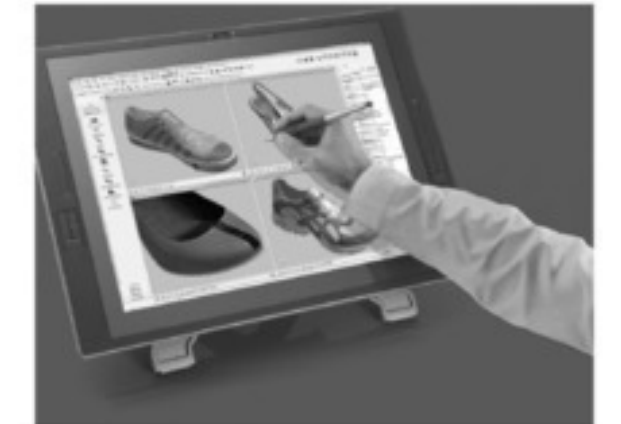
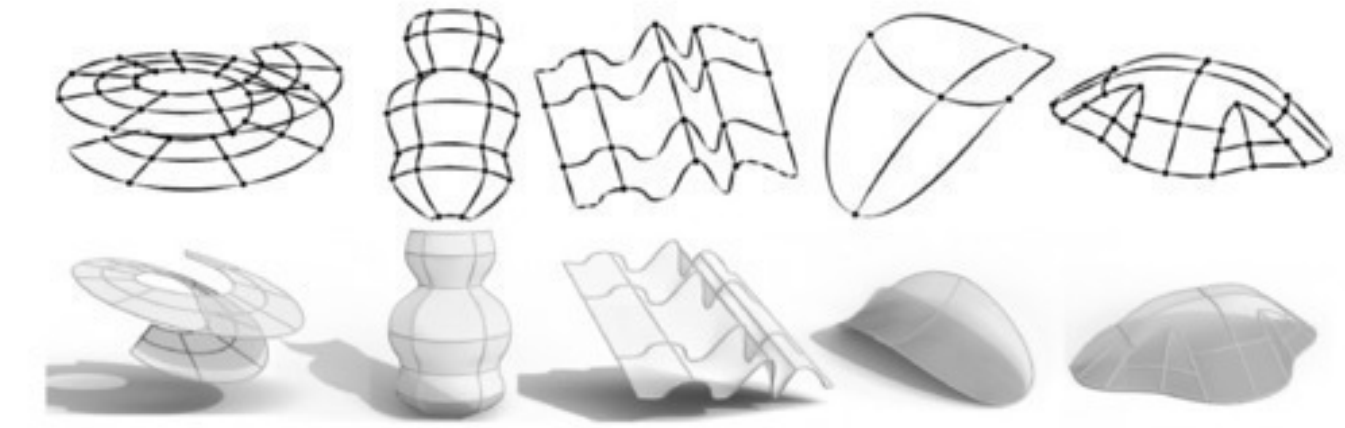
011

Design: Architecture



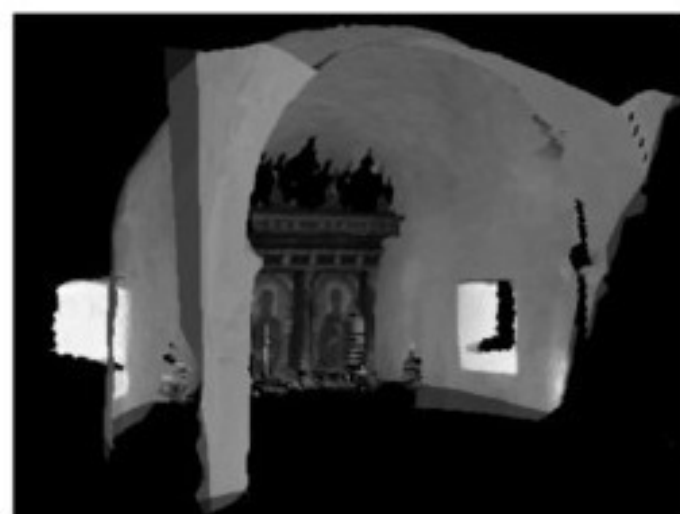
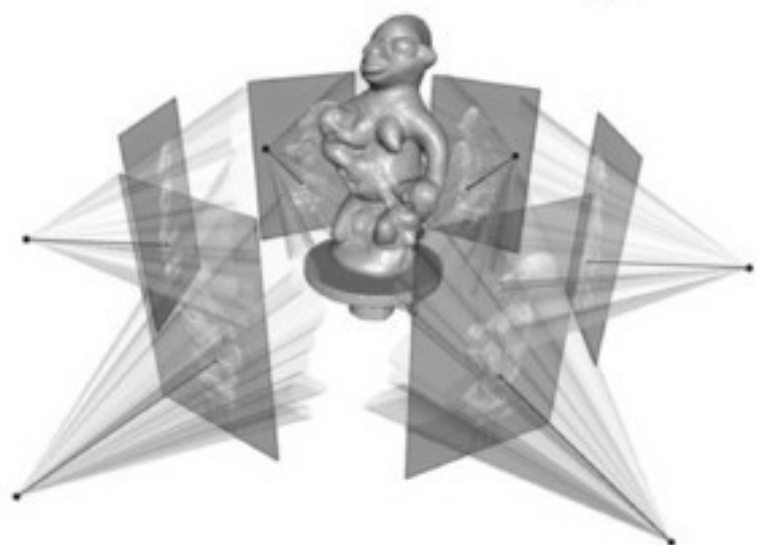
012

Design: Prototyping



013

Design: 3D Reconstruction



014

Design: Cultural heritage

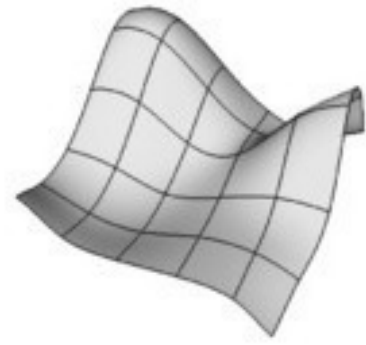


015

Design

Jobs areas

Mesh
Lasers
Reconstruction
Interaction, HCI
Mechanics
Curve & Surfaces



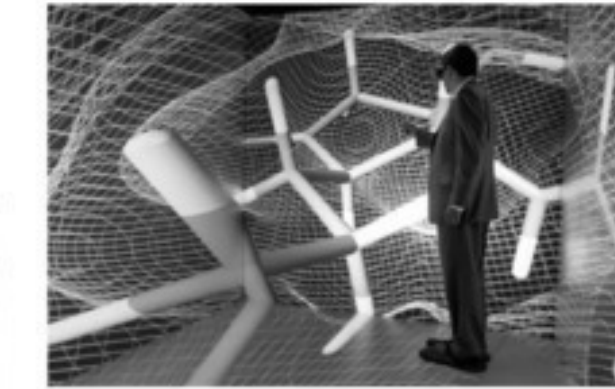
Internships ex.

3D Reconstruction
(Kagoshima Univ.)
Virtual sculpting
(LIRIS)
3D scenes
(Technodigit)
3D video capture
(Thales)
Collision handling
(Delcam)
3D Modeling
(Rauscher)
3D Glass
(Rodenstock)



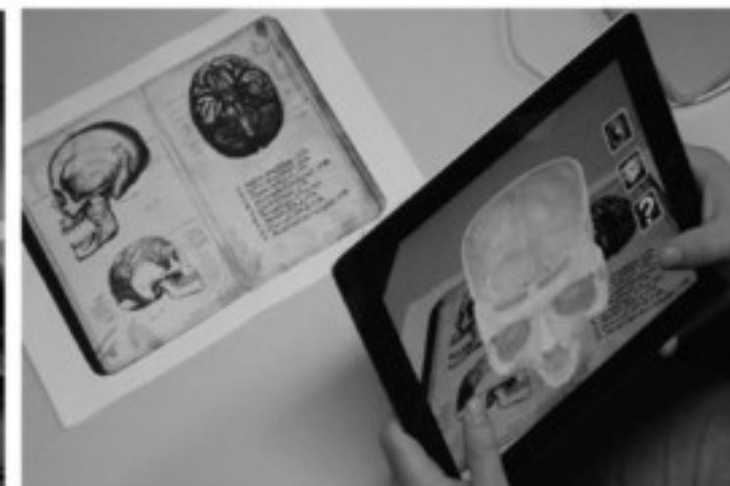
016

Interaction: Virtual Reality (VR)



017

Interaction: Augmented Reality



018

Interaction

Jobs areas

3D Reconstruction
Fast simulation
HCI
Lasers
Smartphone dev.



Internships ex.

Aug. Reality for Medical
(Kitware)
Aug. Reality for city modeling
(Wikitude)
Sketching Software
(Dassault)
Virtual city
(LIRIS)
A350 air system modeling
(Airbus)
Android aug. reality system
(CEA)



019

Overview of the lectures

3D Modeling

3D modeling methods
Explicit approaches (mesh,parametric,subdivision)
Implicit approaches (voxels, parametric, point sets)
Fractals

Smooth surface & differential geometry
Meshes
Structure
Data structure and halfedge, CGAL
Subdivision algorithm
Mesh smoothing

Computational geometry
Convex Hull
Delaunay triangulation

Animation

Physically Based Animation
Numerical solution to ODE (explicit, implicit approaches)
Cloth simulation
Collision detection structures

Geometric Surface Deformation
Rigid transformations
Skinning

Rendering

Ray tracing
Principle
Common objects (plane, sphere, implicit surfaces)
Effects (shadowing, caustics, etc)

Visualization
Type of fields
Marching squares/cubes
Volume rendering

Introduction to OpenGL
Drawing a triangle
Passing uniform argument
Interpolation
Shading