

Introduction to spaghetti and meatballs



What is Computer Graphics?

Computers...

accept, process, transform and present information.

Computer Graphics...

involves technology to accept, process, transform and present information in a visual form.

Ok but... what is the course really about?

Graphics algorithms

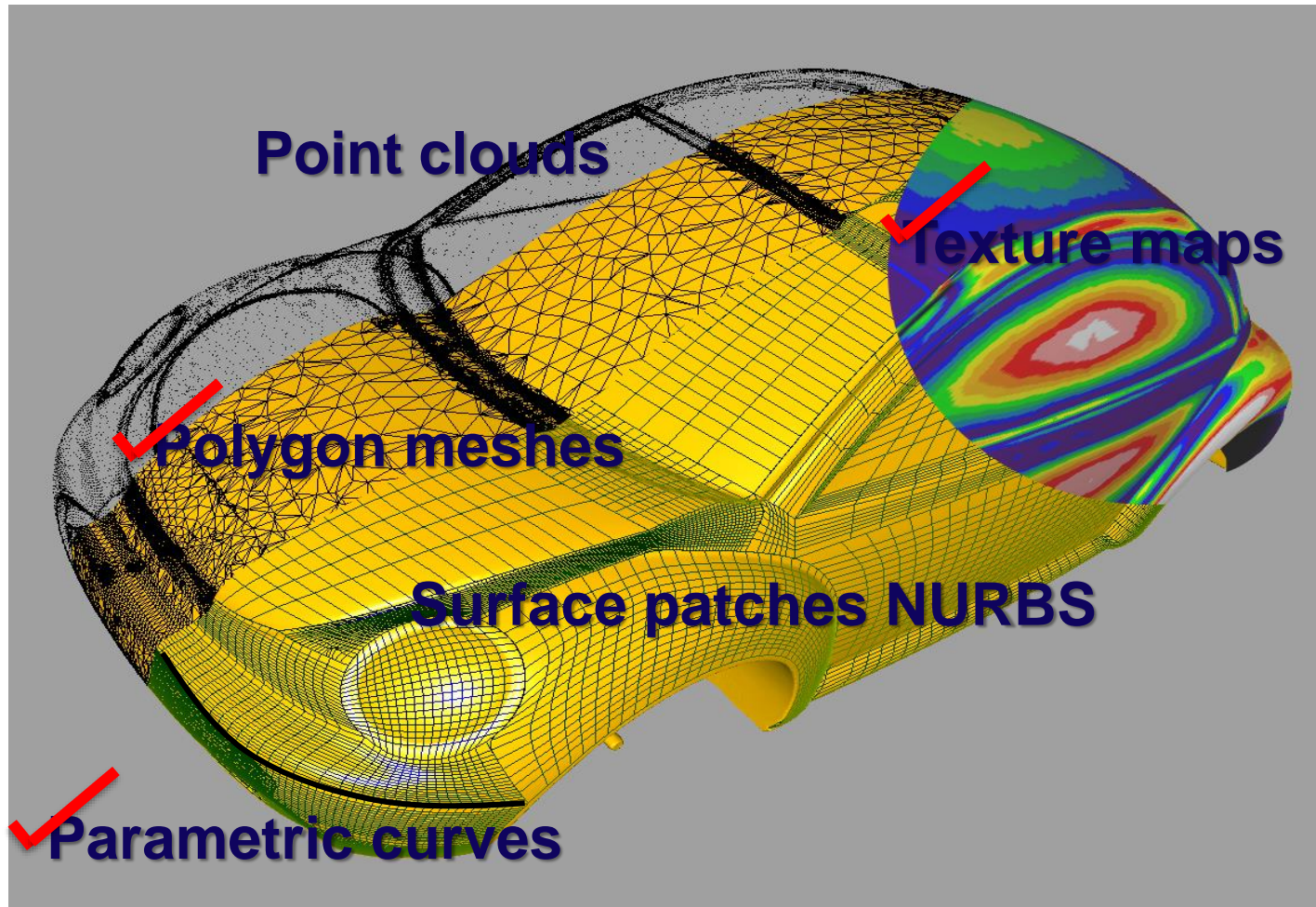
Graphics data structures

Graphical design and programming

Modeling, Animation, Rendering

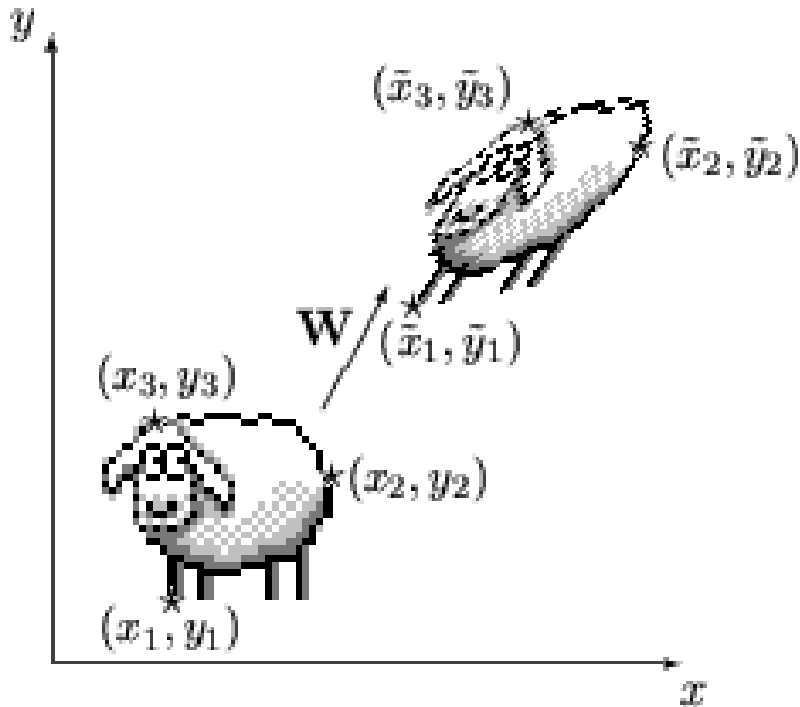
Elements of CG (modeling)

How do we represent an object geometrically on a computer?

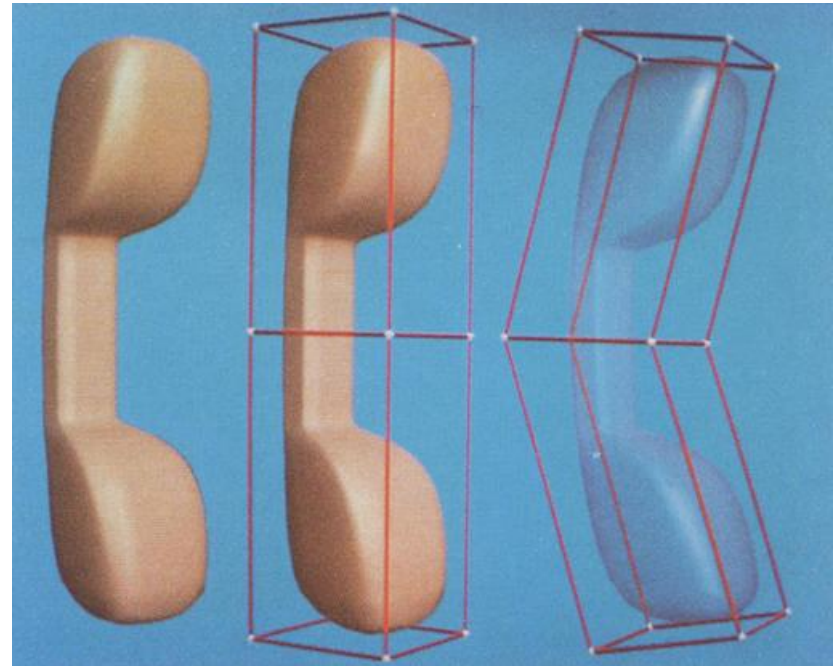


Elements of CG (modeling/transformation)

How can one change a digital model?

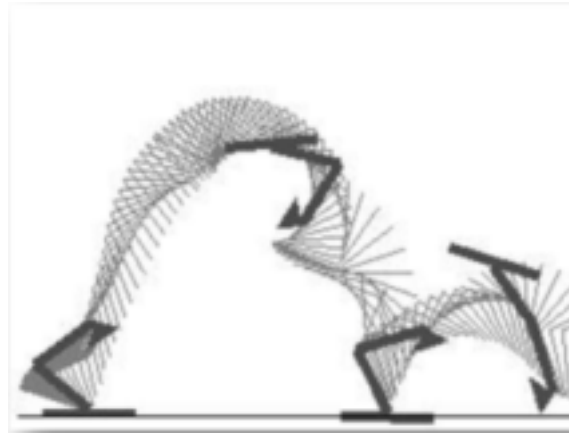


✓ **Affine transform**

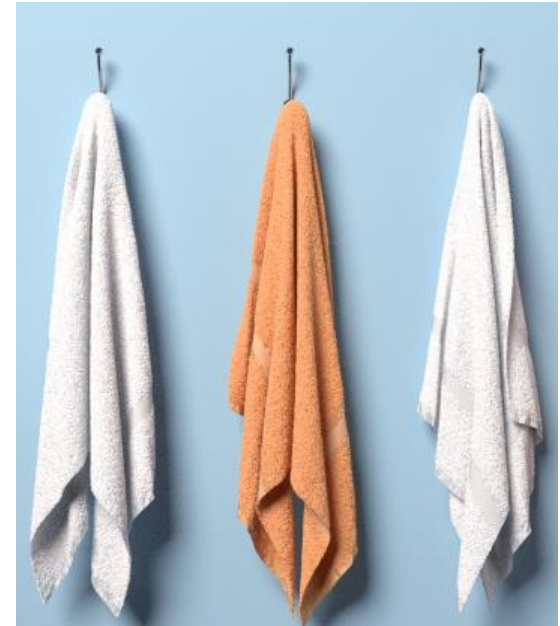


Free-form deformation (FFD)

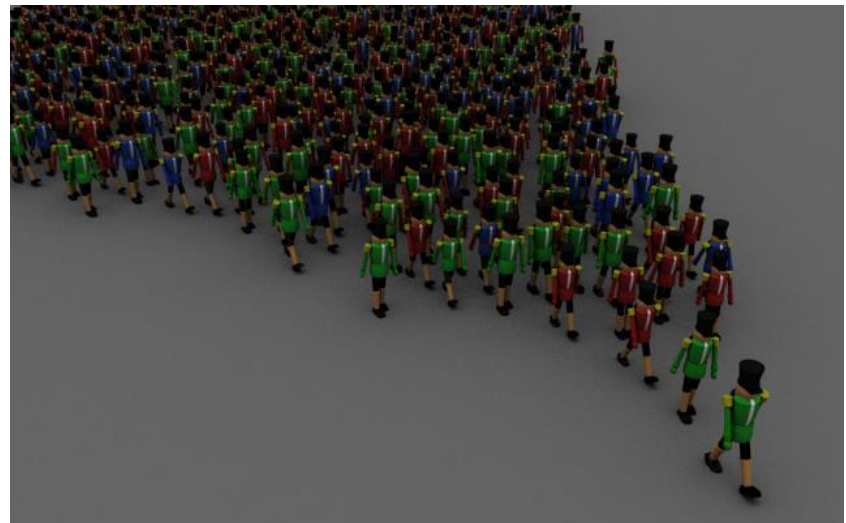
Graphics Pipeline: Animation



✓ Physical simulation



✓ Key-Framing



Behavior rules

Elements of CG (rendering)

✓ How does one present a digital scene?

Scene Graph: Hierarchical description of objects and parts of objects relative to each other.

Lighting: Where are the lights in the scene?

Cameras: Where is the scene viewed from (pin-hole model)?

Projection: How is the scene projected onto an image (parallel vs. perspective)?

Visibility

Clipping

Scan Conversion

Illumination

Textures

Special Effects



Key topics

Rasterization: line drawing.

Homographies, Linear, Affine, Conformal, Rigid Transforms.

Cameras and Projection (perspective).

Graphics pipeline. Obj -> World -> Eye -> View -> Display.

Visibility (BSP).

Lighting (directional, point).

Shading (Gouraud, Phong).

Local illumination (Phong).

Global illumination (Ray-tracing)

More global illum. (caustics, stochastic effects, radiosity).

Animation: keyframes, interpolation (linear, bilinear).

Curves (basis matrix, functions, continuity, control)...

Hermite, Catmull-romm, Bezier.