Overview

* rep & manipulation of image data by a comp
* various technologies used to create & manipulate images
* the sub-field of comp sci which studies methods for digitally synthesizing and manipulating visual content
* 3D Core Graphics System (Core) was 1st graphical standard to be developed
  + conceptual framework

1. Name two innovations that Ivan Sutherland is credited with.
   1. Sketchpad Software
      1. using a light pen, sketchpad allowed you to draw simple shapes on comp screen, save them, recall them later
      2. light pen had photoelectric cell in tip
      3. cell emit electronic pulse when it was placed in front of comp screen
      4. screen’s electron gun fired directly
   2. head-mounted display (HMD)
      1. displayed 2 sep wireframe images, one for each eye
      2. allowed viewer to see comp scene in stereoscopic 3D
   3. software modeled objects
      1. model of a car, one could change the size of the tires w/o affecting the rest of the car
      2. it could stretch body of car w/o deforming the tires
2. What does Siggraph stand for?
   1. Special Interest Group in Graphics
      1. organizes conferences, graphic standards, & publications w/i field of comp graphics
      2. ACM group
3. How does Gouraud shading differ from Blinn-Phong shading?
   1. Gourad
      1. interpolation method
      2. produce continuous shading of surfaces rep by polygon meshes
      3. achieve continuous lighting on triangle surfaces
      4. less processing than Phong shading
      5. if a mesh covers more pixels in screen space than it has vertices, interpolating color values from samples of expensive lighting calculations at vertices is less processor intensive than performing the lighting calculation for each pixel as in Phong shading
      6. Gouraud shading will instead produce a highlight continuously fading in and out across neighboring portions of the model, peaking in intensity when the intended specular highlight passes over a vertex of the model

Description

* estimate to surface normal of each vertex in a polygonal 3D model is either specified for each vertex or found by averaging the surface normals of the polygons that meet at each vertex
* lighting computations performed to produce color intensities at vertices
* for each screen pixel that is covered by the polygonal mesh, color intensities can then be interpolated w/ the color values calculated at the vertices
  1. Blinn-Phong
     1. default shading model in OpenGL
     2. carried out on each vertex as it passes down the graphics pipeline
     3. pixel values betw vertices are interpolated by Gourad shading by default

1. What country introduced CG TV series?
   1. France - “La Vie des betes”
2. What is the "uncanny valley"?
   1. hypothesis in the field of robotics 7 3D computer animation, when human replicas look & act almost but not perfectly, like actual human beings it causes a response of revulsion among human observers. The valley refers to the dip in a graph of the comfort level of humans as a function of a robot’s human likeness
3. How did GPUs and Shaders advance CG?
   1. GPU - pre-rendered graphics scientifically photorealistic & realtime graphics on a high-end system may simulate photorealism to the untrained eye
   2. Shaders manipulate pixels, vertices, textures
4. What is the advantage of vector graphics over raster graphics?
   1. raster graphics - rep of images as an array of pixels and is typically used for the representation of photographic images
   2. vector graphics consists in encoding info about shapes & colors that comprise the image, which can allow for more flexibility in rendering
5. Contrast key frame, procedural and expression-based animation.
   1. key-frame
      1. each storing a value at a given time, per attribute to be animated.
      2. The 2D/3D graphics software will change with each keyframe, creating an editable curve of a value mapped over time, in which results in animation
   2. procedural
      1. consolidates related elements of animated entities into sets of attributes, useful for creating [particle](http://en.wikipedia.org/wiki/Particle_system) effects and [crowd simulations](http://en.wikipedia.org/wiki/Crowd_simulation)
   3. expression-based animation
      1. allows an evaluated result returned from a user-defined logical expression, coupled with mathematics, to automate animation in a predictable way (convenient for controlling bone behavior beyond what a [hierarchy](http://en.wikipedia.org/wiki/Hierarchy) offers in [skeletal system](http://en.wikipedia.org/wiki/Skeletal_animation) set up