VERTEX BUFFER OBJECTS

vertex buffer objects are objects containing vertex data that can be used directly from the graphics hardware without consulting system memory first

vertex buffer objects will reside in the graphics hardware

vertex buffer objects offer a harder, but more efficient implementation of graphical asset access

GL\_ARRAY\_BUFFER vs. GL\_ELEMENT\_ARRAY\_BUFFER

GL\_ARRAY\_BUFFER target for buffer objects represents the intent to use that buffer object for vertex attribute data

GL\_ELEMENT\_ARRAY\_BUFFER is used to indicate the buffer you're presenting contains the indices of each element in the "other" ( GL\_ARRAY\_BUFFER ) buffer.

Drawarrays faster than drawelements, as long as shared verticies are not used

In general the DrawElements method should be faster, because if Vertices are shared by two or more faces (and it should be like that), than they aren't send trough the bus twice or more.

OpenGL "Transparency":

ITS REALLY BLENDING

WHATS THE DIFFERENCE? real transparency is subtractive color process, red through pure green glass is black - opengl transparency will make red through green a shade of yellow.

WHEN DO WE CARE? when we want to see inside something, we will use transparency. it will not replicate what would really happen, but is a good way to display different layers

HOW TO ASK FOR TRANSPARENCY? - enable blend, make zbuffer read only, get how much of what will be written to destination, re-enable z buffer and disable blend.

GLM

What is it? - set of c++ classes and functions to fill programming gaps in basic vector and matrix mathematics

Why do we care? OPengl transformation functions are deprecated, new libraries with better implementations exist

glLoadMatrixf() - loads a specified matrix into opengl

glmultiMatrixf() - can view different model matrices,and projection matrices

Geometric Modeling

Meshes. - collection of verticies faces and edges that define the shape of a 3d object

Lattices. - ??????????????????????????????????????????????????????????????????????????????????????????????

Bézier curves. - two dimensional curve with graphical applications - can be altered by moving handles

The fact that Bézier surfaces exist, and the bicubic ones are sculpted with 16 points.

Constructive solid geometry (CSG). - modeling using boolean operators (union, intersection, difference, etc...

Simplified euler's formula = F – E + V = 2

Rendering:

What the Rendering Equation means (you don't need to know the equation itself). - light shining from point is equal to light emitted by the point plus the reflectivity of all light arriving from other points

Two types of rendering: start at the object, start at the eye.

- start at object is what we've been doing, start with geometry and project it to the pixels

- start at eye - ray tracing

OpenGL rendering: Painter's method, Z-buffer.

-Painter's method = Sort your polygons in 3D by depth and draw them back-to-front.

-z buffer - stores depth of pixel, only allow closest pixel in xy range to be seen

Local versus Global illumination.

-local - appearance of object is only affected by own characteristics of light sources

-global - if object is affected by appearance of other objects, then you have global illumination

Radiosity: what it is good at, what it isn't, how it models light transport, system of equations.

-Good at - models real world lighting

-bad at - does not account for specular reflections

-how it models - gathers light intensity from all other surfaces

-system of equations - ??????????????????????????????????????????????????????????????????????????????????????????????

Ray-tracing: what it is good at, what it isn't, how it models light transport, intersectng a ray with a xxx.

What is ray tracing good at - light reflection

what isnt it good at - will reflect infinite times unless told otherwise

how it models - rays bounce off of objects until they meet the eye

intersecting a ray with a xxx - ??????????????????????????????????????????????????????????????????????????????????????????????

Sub-surface scattering: what materials is it good for creating the illusion of?. - skin, wax, milk

Animation:

Key Framing: why do it this way? -takes object, translates it over series of frames makes a smooth transition

Forward kinematics: what it is, why do it this way. - uses equations to compute position of end effector, to get co-ordinate of end effector from given angles of all joints

Inverse kinematics (IK): what it is, why do it this way. - to locate a particular co-ordinate in space, you need to know all joint angles of all links. to get all joints angle from given co-ordinate(s), path trajectory plan

Particle systems: what they are, the three elements of doing it, what effects you can create this way. - uses small sprites to simulate an effect -- Emit, Display, Update -- pouring sand, snow, rain, water vapor.

Physics: why do it this way, springs, chains/strings, cloth, Jello. - collision, series of smaller nodes using springs between other nodes, can react to changes in position

Functional animation: what it is, how it is done, why do it this way, its use in collision avoidance. - makes object want to move towards position, repellers can prevent. agents are given repulsion values to offput actor from reaching end point

Motion Capture (MoCap): what it is, why do it this way. - put mocap balls on people to capture faces reactions, etc to make more lifelike

3D Printing:

-its an additive process

Additive versus subtractive manufacturing. - additive adds as it goes producing less waste, subtractive takes a bigger chunk and removes unneeded.

The STL file format. - lists all triangles in the object, triangles make up the 3d model

Overhangs. - can fall over, printer or human can account for and change how object prints

The four rules for making STL files. -

1. only triangles

2. legal solid, definite inside and outside, no missing face pieces

3. don't overlap, use boolean unions

4. each edge in the mesh must be bound to 2 and only 2 triangles (vertex to vertex rule)

Definition of the Vertex-to-Vertex rule.

Simplified Euler's Formula (yes, you need to know this one: F-E+V=2).

Stereographics:

Horizontal parallax - presents to different horizontal position to left and right eyes

Vertical parallax - presents to different vertical position for left and right eyes

Plane of zero parallax - where 3d projects to the same window location for each eye, objects in front of it appear to 'pop out'

Non-symmetric viewing volumes left and right eyes must be proportionally adjusted to account for matching scene translation (left eye +e, right eye -e)

Different ways of channeling the images into each eye - 3d r/g glasses, polarizing glasses, stereo mirror, seperate left and right eye windows

ChromaDepth - can be viewed as 2d or 3d without distortions, or discolorizations