CS4620/5620: Lecture 21

Texture Mapping

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Announcements

• Extra office hours

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Projector Function: Arbitrary Surfaces
• Non-parametric surfaces: project to parametric surface

box mapping

cylindrical mapping

planar mapping

Images courtesy Tito Pagan

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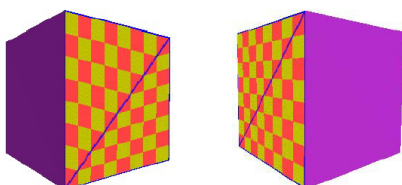© 2011 Kavita Bala • 3
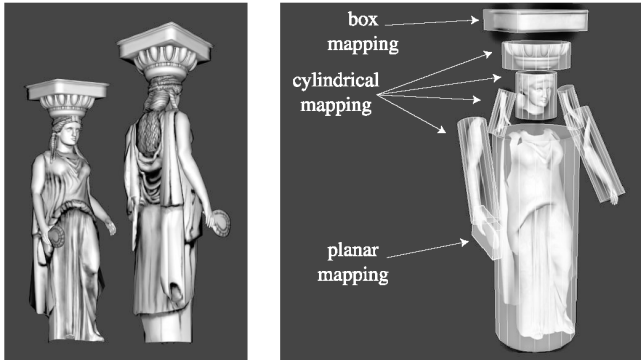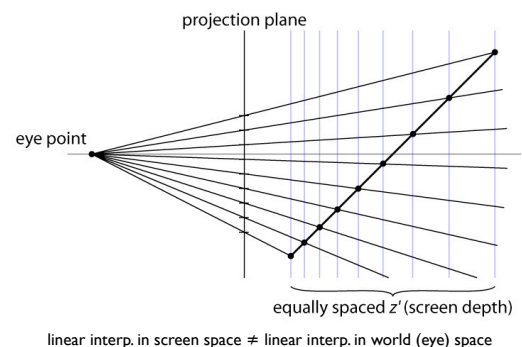

Projector Functions: User-Specified

• Distortion in direction perpendicular to projection
• Approach
  – Unwrap mesh
    ▪ Set of planar projections
    ▪ Minimize the distortion
  – Smaller textures for each of the projections
  – Pack it into a larger texture

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Perspective-Correct Texturing

• In hardware rendering
  • Must be careful to interpolate texture coordinates correctly

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Interpolating in projection

projection plane

eye point

equally spaced z' (screen depth)

linear interp. in screen space ≠ linear interp. in world (eye) space
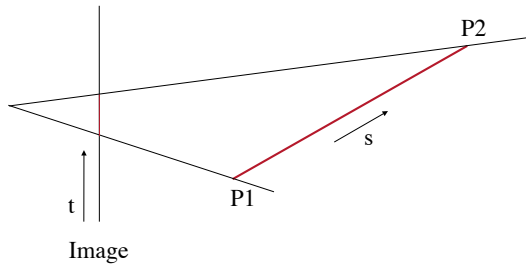
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Perspective-Correct Texturing

- Derivation
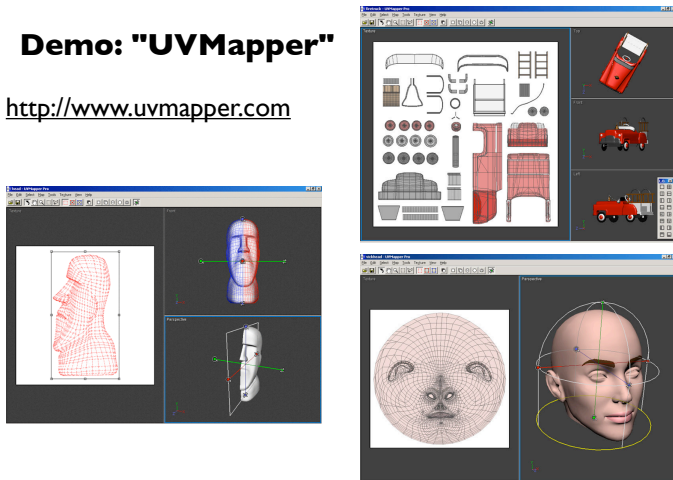
Perspective-Correct Texturing

http://upload.wikimedia.org/wikipedia/commons/5/57/Perspective_correct_texture_mapping.jpg

- See section 11.3.1 "Perspective Correct Textures"
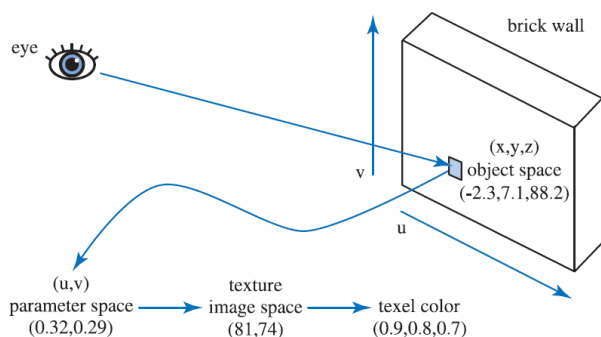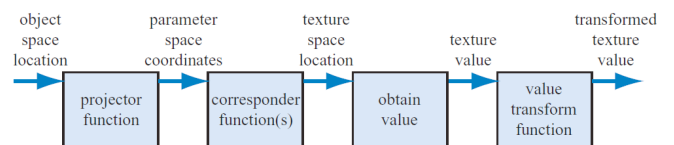- Linearly interpolate (u,v)/depth not just (u,v)

Demo: "UVMapper"

http://www.uvmapper.com

Projector Function: Arbitrary Surfaces

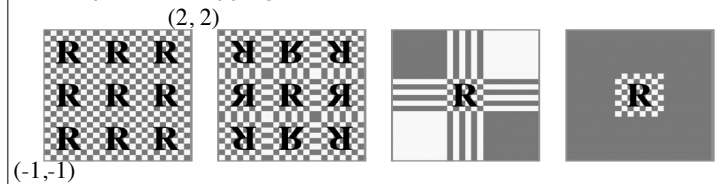## How does it work?

Texture Pipeline

Corresponder Function

- Why?
  - Flexibility

- Examples:
  - Select a subset of the image for texturing
  - Decide what happens at boundaries

Corresponder Function

- In OpenGL: wrapping mode

- Wrap: Repeats
- Mirror
  - Repeats but mirrored every other time; continuity across edges
- Clamp: Clamped to edge of texture
- Border: Clamped to border color

Corresponder function example

- Mapping from *S* to *D* can be many-to-one
  - that is, every surface point gets only one color assigned
  - but it is OK (and in fact useful) for multiple surface points to be mapped to the same texture point
    - e.g. repeating tiles