

Environment Mapping

CS418 Computer Graphics

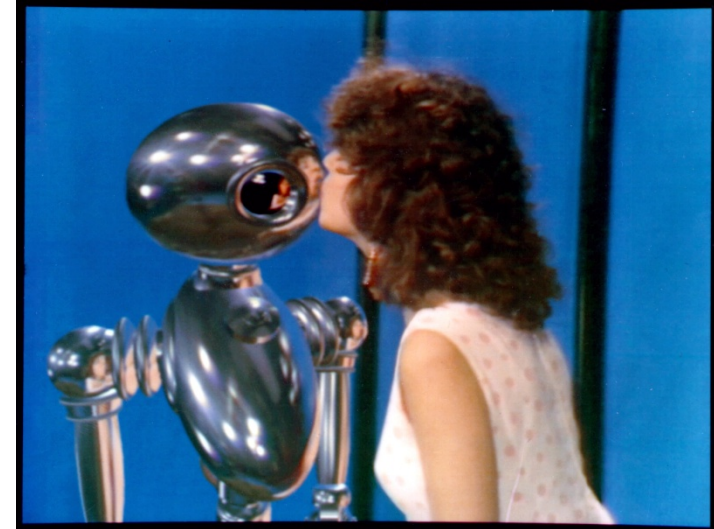
John C. Hart

Environment Mapping



Environment Mapping

- Stores view from a point in all directions
- When rendering a fragment, compute reflection vector for eye (like the light reflection vector for specular reflection)
- Lookup prestored color and display that color as the reflection
- How can we store a precomputed view in all directions as a texture map?
- See the Story of Reflection Mapping:
<http://debevec.org/ReflectionMapping/>

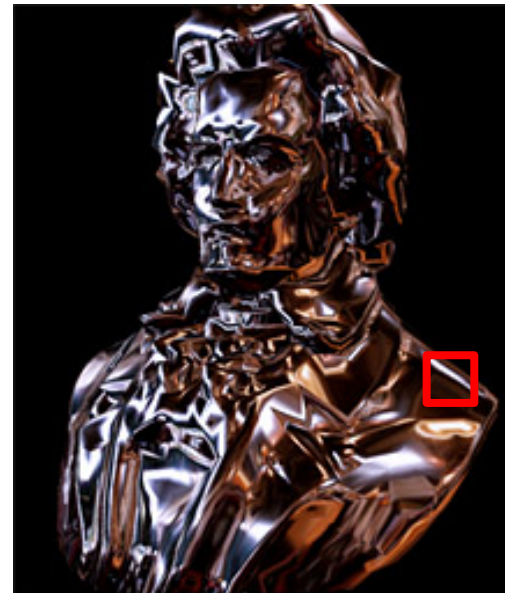


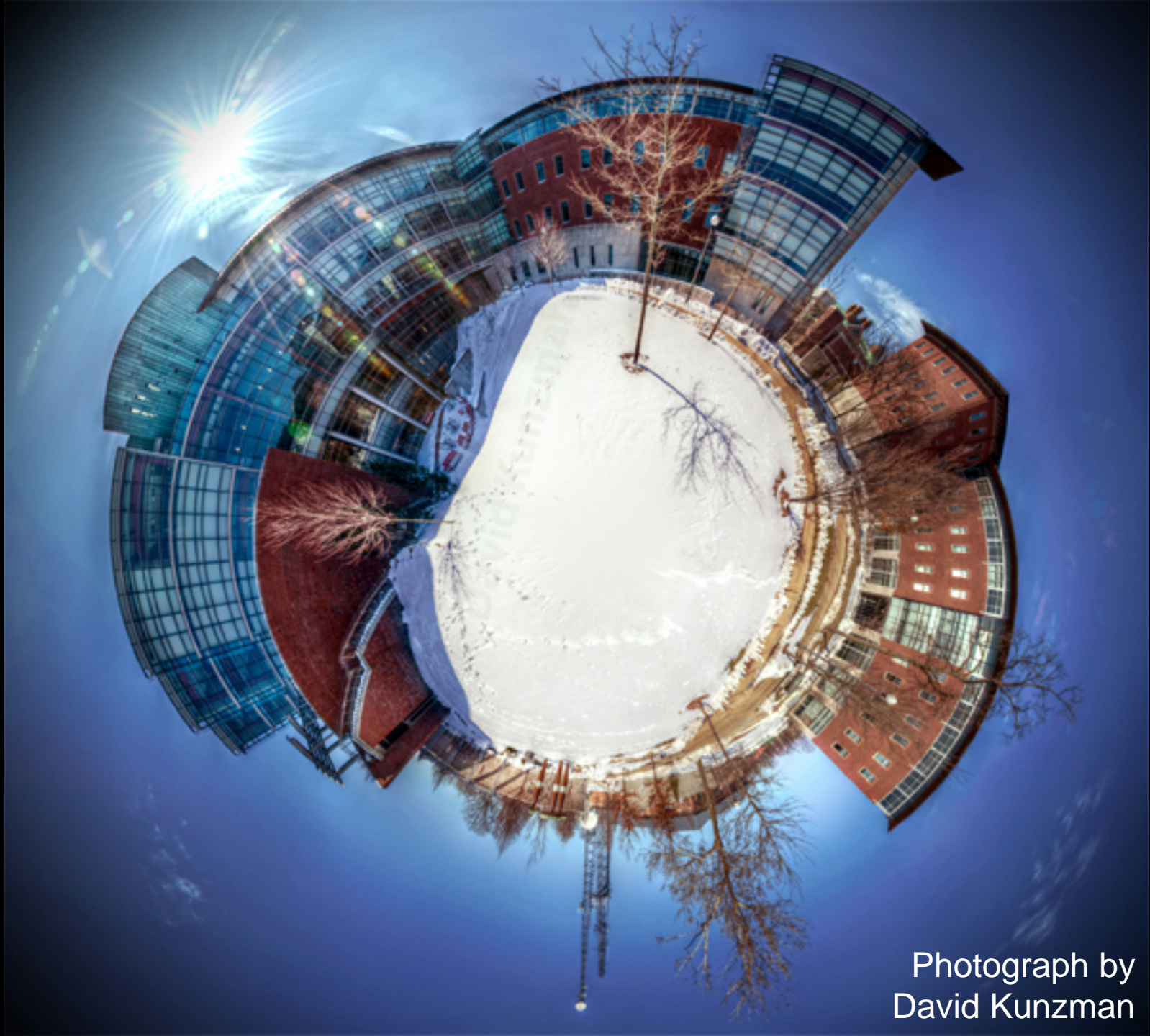
Sphere Map Idea

- Photograph a reflective sphere (like a garden gazing ball) in whatever environment you like
- All possible normals you can see appear somewhere on the sphere
- Store image of reflective sphere as texture map
- When rendering a point on a reflective object, find the point on the sphere with the same surface normal, and display the sphere's color on the object
- Need to convert surface normal to texture coordinates

$\mathbf{n} = (n_x, n_y, n_z)$ in viewing coordinates

$s = (n_x + 1)/2, \quad t = (n_y + 1)/2$

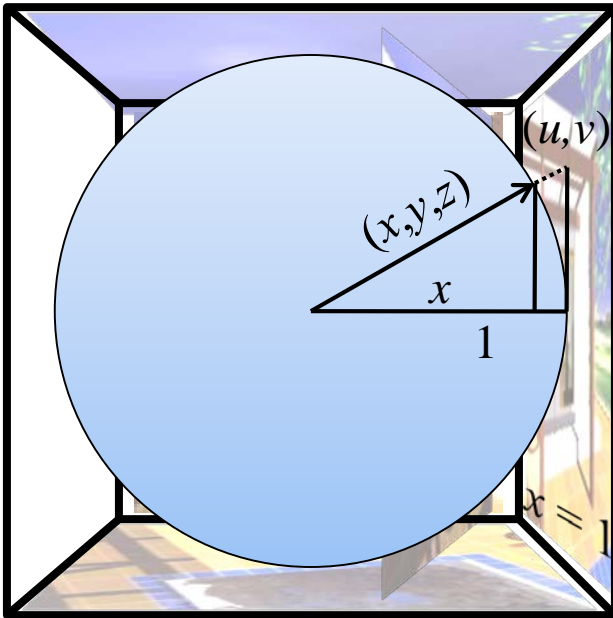
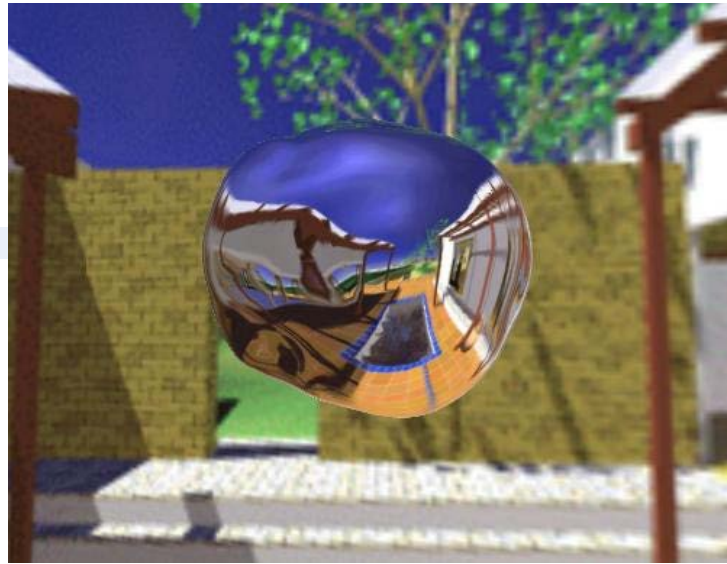




Photograph by
David Kunzman

Cube Map

- Sphere map creates distortion near the edges of the sphere
- Can use six different texture images to form a cube map



$$u = y/x$$
$$v = z/x$$

