Texture Mapping

CSCI 4229/5229

Computer Graphics

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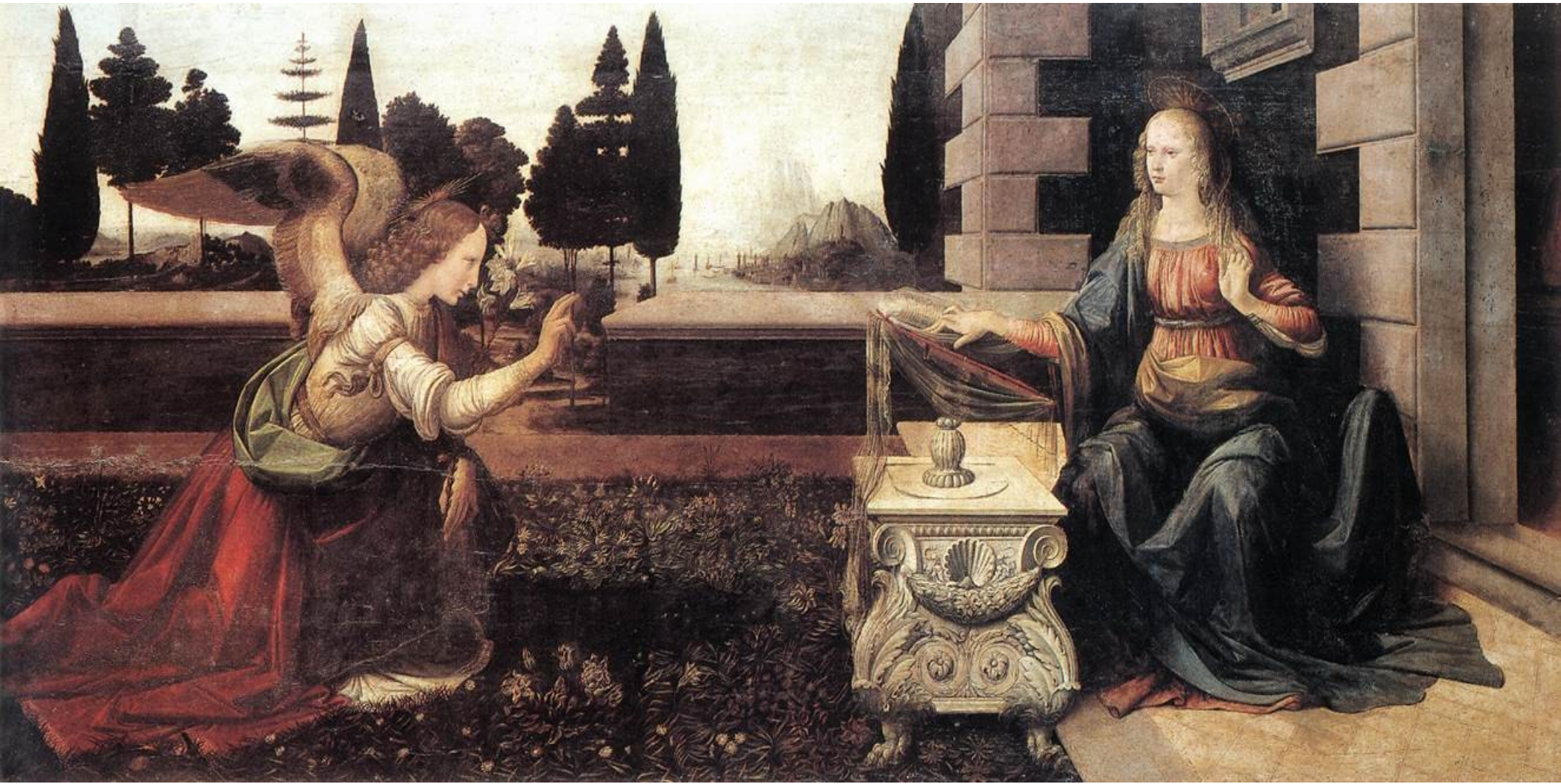
What are texture maps?

- Bitmap images used to assign fine texture to displayed surfaces
- Used to make surfaces appear more realistic
- Must move with the surfaces
- Can be stretched or repeated

Annunciation
Leonardo da Vinci (1472)



OpenGL Texture Types

- Images are draped over polygon surfaces
- 1D, 2D and 3D textures
  - (*s*,*t*,*r*,*q*) coordinates
  - 2D uses (*s*,*t*), *q* is the homogeneous *w*
- 1D, 2D and 3D textures set separately
- 2D textures most commonly used

OpenGL Texture Calls

- glGenTextures
  - Returns unused texture name(s)
- glBindTexture
  - Sets the active (current) texture
- glTexImage*
  - Copies image to texture memory
- glTexCoord*
  - Sets texture coordinates for vertex
- glTexEnv*, glTexParameter*
  - Control application of textures

Creating a Texture

- glGenTextures(1,&texname);
  - Returns unique texture name
- glBindTexture(GL_TEXTURE_2D,texname);
  - First use – allocates memory and makes current
- glTexImage2D(GL_TEXTURE_2D,0,3,dx,dy, 0,GL_RGB,GL_UNSIGNED_BYTE,image);
  - Copies RGB *image* to texture memory (size *dx* x*dy*)
  - Image size must be power of two before OpenGL 2

Setting the Texture Properties

glTexParameteri(GL_TEXTURE_2D, GL_TEXTURE_MAG_FILTER,GL_LINEAR);

- How to maginfy texture

glTexParameteri(GL_TEXTURE_2D, GL_TEXTURE_MIN_FILTER,GL_LINEAR);

- How to minify texture

glTexEnvi(GL_TEXTURE_2D, GL_TEXTURE_ENV_MODE,GL_MODULATE);

- How textures interact with underlying surface

Applying a Texture Map

```
glBindTexture(GL_TEXTURE_2D,texname);
glBegin(GL_POLYGON);
for (i=0;i<n;i++)
{
   glTexCoord2d(r[i],s[i]);
   glVertex3d(x[i],y[i],z[i]);
}
glEnd();
```