

Texture Mapping

15-462 Computer Graphics

Sept 24, 2013

Prasanth Somasundar

Originally by Jitu Das

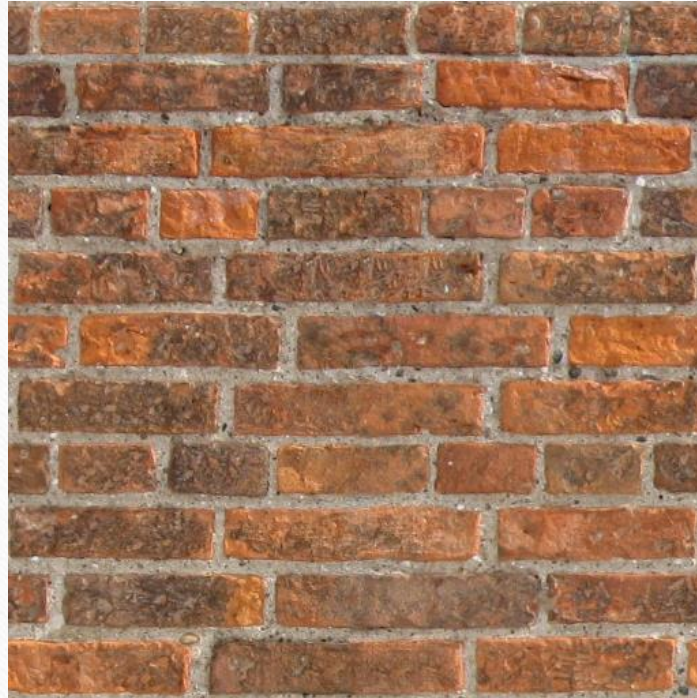
Overview

- Quick Reminders
- Texture Mapping

Reminders

- Homework 1 due Thursday
- Project 2 due Tuesday
- Get started

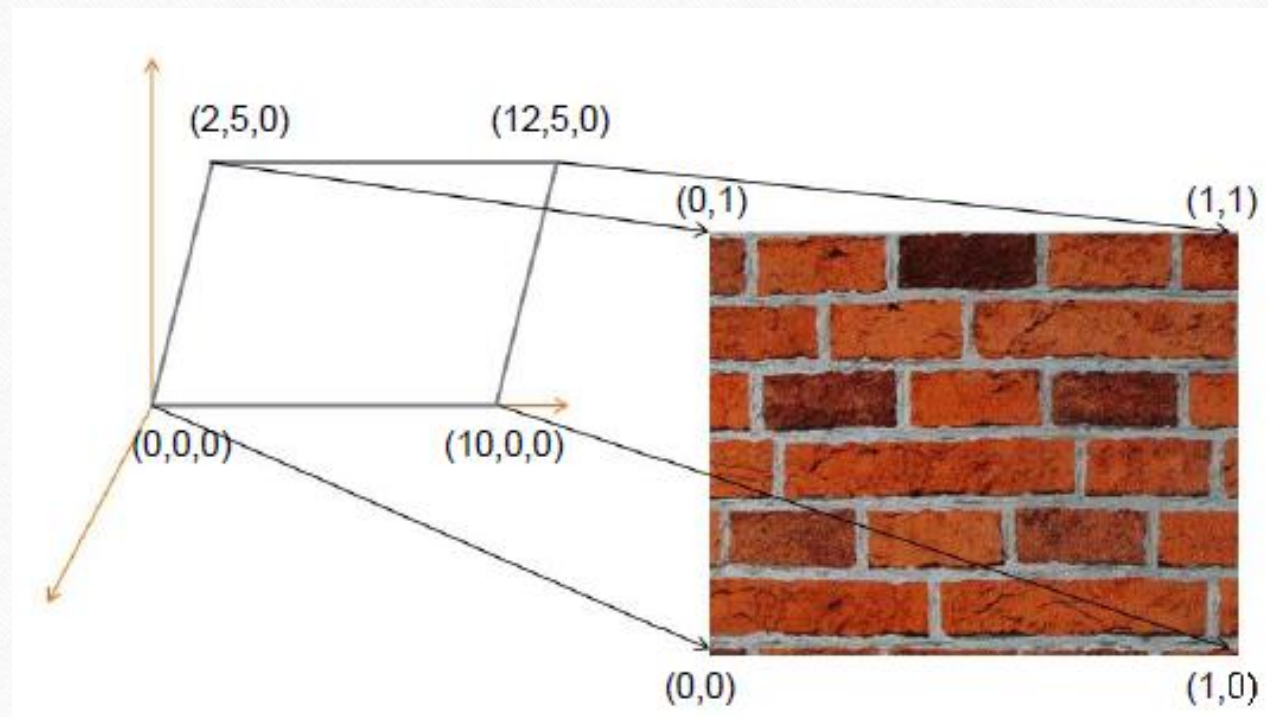
Texture Mapping



What is a Texture?

- A texture is just a bitmap image
- 2d array – `texture[height][width][4]`
- Pixels of the texture are called texels
- Texture coordinates are in 2D, in range $[0,1]$

Texture Mapping



Texture Mapping in OpenGL: Rendering

```
glEnable(GL_TEXTURE_2D);  
glBegin(GL_QUADS);  
    glTexCoord2f(0.0, 0.0); glVertex3f(0.0, 0.0, 0.0);  
    glTexCoord2f(1.0, 0.0); glVertex3f(10.0, 0.0, 0.0);  
    glTexCoord2f(1.0, 1.0); glVertex3f(12.0, 5.0, 0.0);  
    glTexCoord2f(0.0, 1.0); glVertex3f(2.0, 5.0, 0.0);  
glEnd();  
glDisable(GL_TEXTURE_2D);
```

Texture Mapping in OpenGL

- `void glTexImage2D` – defines the texture being used
- `glTexParameter{if} {v}` – specifies certain parameters
- `glGenTexture` – creates a Texture Object
- `glBindTexture` – binds a texture object

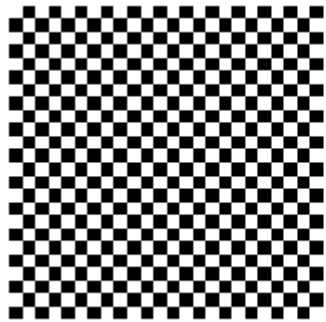
Color Blending

- Final pixel color : (texture color, object color) \rightarrow color
 - `GL_REPLACE` – use texture color
 - `GL_BLEND` – linear combination of both
 - Etc.
- `glTexEnv{if}{v}` – specifies method

Interpolating Color

- We lookup texel (s,t) for the color to use.
- What if (s,t) isn't a proper texel?
- Use `glTexParameter` with `GL_TEXTURE_MIN_FILTER`
 - `GL_NEAREST` – use nearest texel
 - `GL_LINEAR` – use linear combination

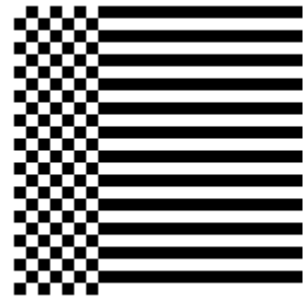
Extrapolating Color



Repeat on both



Clamp Both



Repeat and Clamp



Use `glTexParameter` – `GL_CLAMP`, `GL_REPEAT`

Useful Resources: Texture Mapping

- OpenGL Programming Guide, Version 1.1
- <http://www.glprogramming.com/red/chapter09.html>