

# Texture Mapping

Tom Kelliher, CS 320

Apr. 25, 2005

## 1 Administrivia

### Announcements

### Assignment

Hand-out final project.

### From Last Time

Exam.

### Outline

1. Introduction to texture mapping.
2. A few issues/problems.
3. Example program: `checker.c`

### Coming Up

Texture lab.

## 2 Introduction

1. What is a texture?
2. Why texture map? Complexity from simplicity.
3. Where can I get textures? Fixed patterns (polygon fills), texture generation functions, digitized images.
4. Do Web browsers texture map?
5. 1-D and 2-D textures.

## 3 A Little More Detail

1. Texture pattern:  $T(s, t)$ . Stored in texture memory as array of *texels*. (Texture memory and the rise of AGP.)
2. Texture mapping: mapping from  $T$  to object's geometric coordinates. (Must then map to screen coordinates.)
3. Possible problems: curved surfaces, closed surfaces, pixels not inverse mapping onto texels, aliasing.
4. How is a texture mapped to an object?
  - (a) texture and vertex coordinates.
  - (b) Range of texture coordinates.
  - (c) Wrapping modes: repeat, clamp.
5. How is it applied to an object?
  - (a) Modulation, decal.
6. Magnification and minification. Filters.

## 4 checker.c

Numbers in parentheses refer to line numbers in handouts.

1. Generation of a texture: `makeCheckImage()` (24).  
Interpretation?
2. Initializing: `init()` (39).
  - (a) Storage formats, texture handles and binding.
  - (b) Wrapping modes.
  - (c) Minification, magnification filters.
  - (d) `glTexImage2D()` — ugh.
3. Rendering: `display()` (73).
  - (a) Enabling textures and specifying mapping mode.
  - (b) Specifying which texture.
  - (c) Binding texture and vertex coordinates.
4. Comparison of code with rendered results.

Experiments:

1. Is the lower right result a fluke? Rotate the lower left polygon and see what happens.
2. Specify a color for the polygons. Did anything change? Change the mode from `GL_DECAL` to `GL_MODULATE` and try again.
3. Individually change the `GL_REPEATs` to `GL_CLAMPs` and see what happens.

Brief demos of other programs, time permitting.