

# CPSC 314

## Computer Graphics

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### Texture Mapping 1

Textbook Appendix A4, Chapter 15

**NOTICE:**

Recordings of the lecture are provided to students enrolled in the course for self-study only. Any other use, including reproduction and sharing of links to materials, is strictly prohibited.

## Preliminaries

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- Announcements and Reminders
  - Updated Notepack on Canvas with section on Projective Transformation
  - Assignment 2 F2F signup sheet available soon. Grading starts and should finish this week
  - Midterm on Friday: NOTE: it's closed book! See updated lecture 14 slides on Canvas
  - Review on Wednesday
  - Assignment 3 will be out on Friday
- Today
  - A1 Spotlights
  - Texture mapping introduction

## A1 spotlights

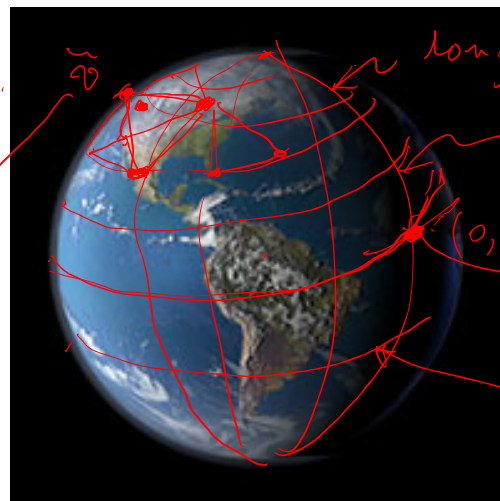
- For each assignment from now on, we will highlight a few creative efforts from students, to inspire us all
  - These are just meant to be examples... don't be discouraged if yours wasn't picked
- A1 spotlights (in reverse alphabetical order)
  - Andrew Forde
  - James Ross
  - Justin Bruss

## First example How to model the earth?

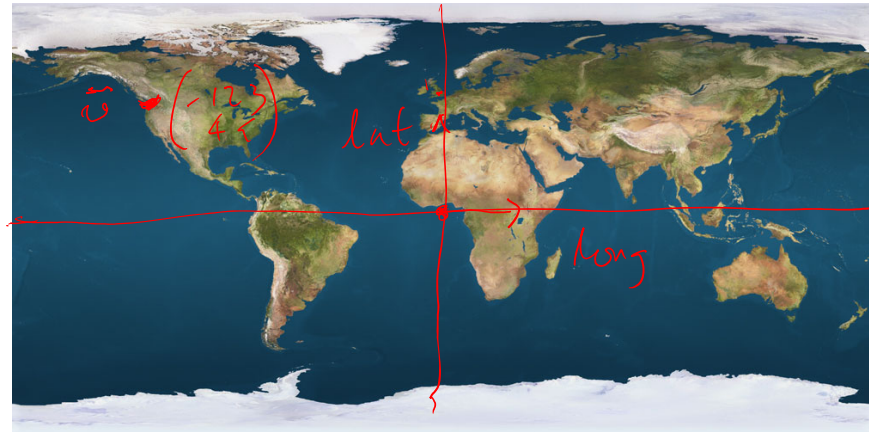
texture coordinate "uv" on "st"

$$\bar{u} = \begin{pmatrix} u \\ v \end{pmatrix} = \begin{pmatrix} 49 \\ -123 \end{pmatrix}$$

$$\bar{v} = \begin{pmatrix} 6123 \\ 6500 \\ 6200 \end{pmatrix}$$

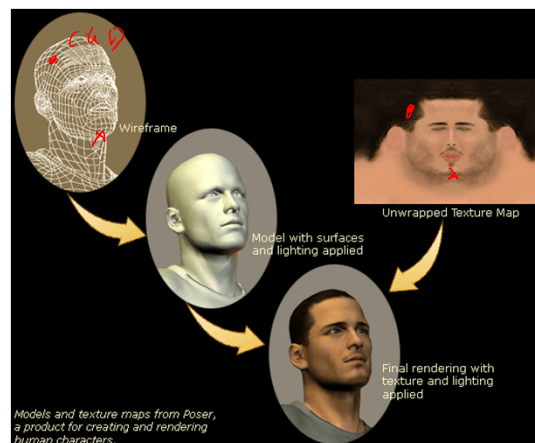


## Earth texture



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## Another Example



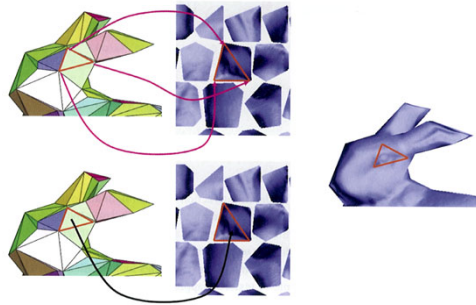
Source: (result of random web search)  
<http://blog.gamerdna.com/2007/03/27/anatomy-of-an-mmorpg/>

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## Texture mapping

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- In basic texturing, we simply 'glue' part of an image onto a triangle by specifying texture coordinates at the three vertices.

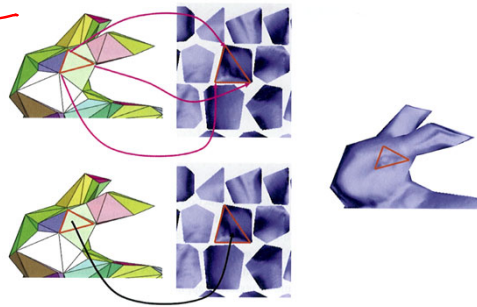


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## Texture mapping

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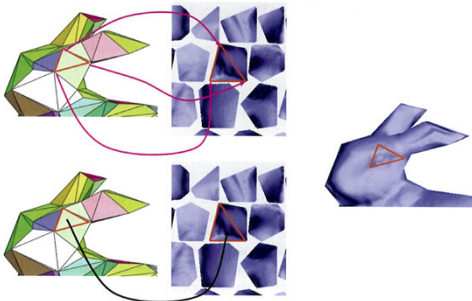
- Bunch of WebGL functions to load a texture and set various parameters (lin/const, mipmap, wrapping rules).
- A uniform variable is used to point to the desired texture unit



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## Texture mapping

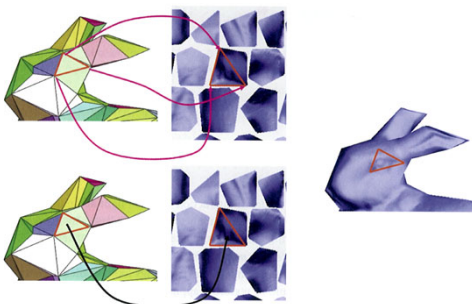
- Varying variables are used to store texture coordinates.
- In this simplest incarnation, we just fetch r,g,b values from the texture and send them directly to the frame buffer.



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## Texture mapping

- Alternatively, the texture data could be interpreted as, say, the diffuse material color of the surface point, which would then be followed by the diffuse material computation described earlier.



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## Steps for Texture Mapping

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1. Create a *texture object* and load texels into it
2. Include *texture coordinates* with your vertices
3. Associate a *texture sampler* with each texture map used in shader
4. Retrieve texel values

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## Texture mapping in Three.js

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- Interactive demo, Earth texture mapping

```

var earthGeometry = new THREE.SphereGeometry(5, 32, 32);

var earthColorTexture =
    new THREE.ImageUtils.loadTexture('images/earthmap1k.jpg');

var earthBumpTexture =
    new THREE.ImageUtils.loadTexture('images/earthbump1k.jpg');

var earthMaterial = new THREE.MeshPhongMaterial(
    {
        map: earthColorTexture,
        bumpMap: earthBumpTexture
    } );

var earth = new THREE.Mesh(earthGeometry, earthMaterial);

earth.position.set(0, 5, 0);
earth.parent = worldFrame;
scene.add(earth);

```

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