Ryan Louvien (Rva123)

Phelps Williams (pww36)

12-Feb-2008

CS569 Assignment 1 Written Part

1. Warm Up:

The projection of w onto the function o + td equals the following:

2. Tangent space:

i)

With two known points and texture coordinates, relative to P0 it is possible to solve matrix M. Where M is composed of the Tangent (T) and Binormal(B) vectors.

Relative to P0 we can write equations relating the relative positions of P1 and P2 to the relative positions of texture coordinates uv1 and uv2.

We now have a linear function which maps *uv* texture coordinates to points on the triangle relative to position P0.

ii) With the work from part i, we can now solve for equations of T and B, the Tangent and Binormal vectors respectively.

Or expanded as:

Similarly B in expanded form:

Because T, B and the Normal vector N should be a coordinate system base, we can calculate N by the cross product of T and B:

Using Gram-Schmidt Orthogonalization it is possible to ensure these vectors are orthogonal.

**References:**

http://jerome.jouvie.free.fr/OpenGl/Lessons/Lesson8.php

http://www.blacksmith-studios.dk/projects/downloads/tangent\_matrix\_derivation.php