



Specifying Projective Texture Mapping into X3D files

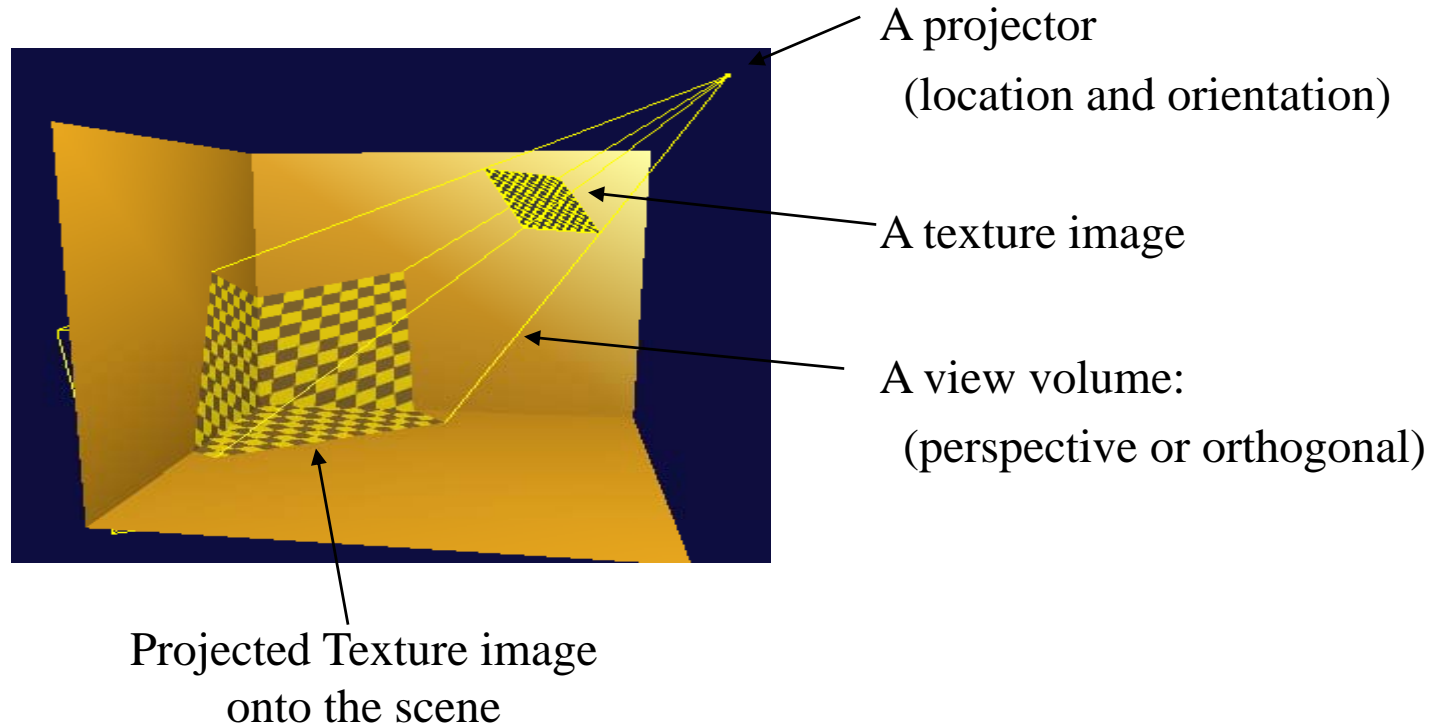
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Kwan-Hee Yoo

Chungbuk National University, Korea

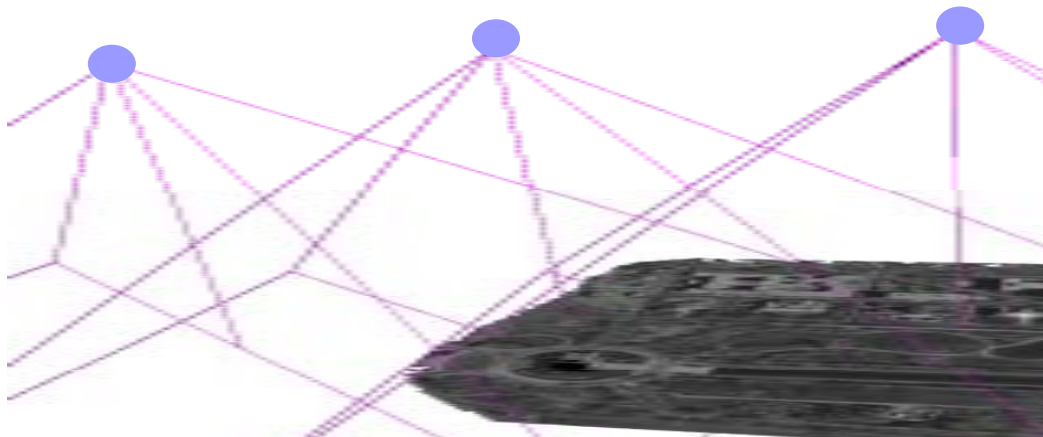
Projective Texture Mapping

- A method for texture mapping which allows the texture image to be projected onto the scene as if by a slide projector[Cass Everitt, 1999)



Multiple Projective Textures

- Obtain an image taken from each slide projector, i.e., each camera
- Display overlapping images obtained after applying several projective textures to the surface model.



Applications of Multiple Projective Textures

- Construction of a digital terrain surface from images captured by cameras
- Construction of 2D/3D endoscope images from massive inner intestine photos

Specifying the projective texture mapping into X3D

- Projective texture mapping: a method for specifying (multi-) texture image associated with a specific viewpoint and view volume for given scene objects
- With the specification, users can control projective texture mapping interactively or directly

Specifying Projective Texturing

- Shall specify the following items
 - a slider projector including a viewpoint and a view volume
 - A texture image or multi-texture images
 - Scene objects
- The following nodes related to projective texture mapping are required
- ProjectiveTextureNode
 - OrthoTexture
 - PerspectiveTexture
 - ProjectiveTextureGroup

Specifying Projective Texturing

■ X3DProjectiveTextureNode

```
{  
    SFString    [in, out] description ""  
    SFVec4f/d   [in, out] position 0 0 10 1  
    SFVec3f/d   [in, out] direction 0 0 1  
}
```

Specifying Projective Texturing

- OrthoTexture : X3DProjectiveTextureNode {
 - SFString [in, out] description ""
 - SFVec4f/d [in, out] position 0 0 1 0
 - SFVec3f/d [in, out] direction 0 0 1
 - MFFloat [in,out] -1 1 -1 1 -1 1 // (viewvolume)
 - SFNode [in,out] texture NULL [X3DTextureNode]
 - SFNode [in,out] textureTransform NULL [X3DTextureTransformNode]}

Specifying Projective Texturing

- PerspectiveTexture : X3DProjectiveTextureNode {
 - SFString [in, out] description ""
 - SFVec4f/d [in, out] position 0 0 10 1
 - SFVec3f/d [in, out] direction 0 0 1
 - SFFloat [in,out] fieldOfView n/4 (0, n) // field of view
 - SFFloat [in, out] aspectRatio 1 // aspect ratio
 - MFFloat [in, out] minmax 1 10 // min-max z value

 - SFNode [in,out] texture NULL [X3DTextureNode]
 - SFNode [in,out] textureTransform NULL [X3DTextureTransformNode]}

Specifying Projective Texturing

```
■ ProjectiveTextureGroup:X3DChildNode{  
  SFFloat [in,out] alpha 1 [0,1]  
  SFColor [in,out] color 1 1 1 [0,1]  
  MFString [in,out] function []  
  SFNode [in,out] metadata NULL [X3DMetadataObject]  
  MFString [in,out] mode []  
  MFString [in,out] source []  
  MFNode [in,out] projectiveTexture [] [X3DProjectiveTextureNode]  
}
```

Demo 1

```
<Scene><!-- Scene graph nodes are added here -->
```

```
<Transform>
```

```
<Shape>
```

```
<PerspectiveTexture description="sample1", position="8.0 8.0 -22.0",  
direction=" -6 -6 -8", fieldOfView="45.0", aspectRatio = "1" minmax = "7 30">
```

```
<PixelTexture url="sample1.rgb" />
```

```
</PerspectiveTexture>
```

```
<Appearance>
```

```
<Material diffuseColor="0 0 0" />
```

```
</Appearance>
```

```
<!--define walls by using IndexedFaceSet -->
```

[DEMO](#)

```
.....
```

```
</Shape>
```

```
</Transform>
```

```
</Scene>
```

Demo 2

```
<Scene><!-- Scene graph nodes are added here -->
```

```
<Transform>
```

```
<Shape>
```

```
<PerspectiveTexture description="sample1", position="8.0 8.0 -22.0",  
direction=" -6 -6 -8", fieldOfView="45.0", aspectRatio = "1" minmax = "7 30">
```

```
<PixelTexture url="sample2.rgb" />
```

```
</PerspectiveTexture>
```

```
<Appearance>
```

```
<Material diffuseColor="0 0 0" />
```

```
</Appearance>
```

```
<!--define cylinder -->
```

[DEMO](#)

.....

```
</Shape>
```

```
</Transform>
```

```
</Scene>
```

Demo 3

```
Scene><!-- Scene graph nodes are added here -->
```

```
<Transform>
```

```
<Shape>
```

```
<PerspectiveTexture description="sample1", position="8.0 8.0 -22.0",  
direction=" -6 -6 -8", fieldOfView="45.0", aspectRatio = "1" minmax = "7 30">
```

```
<PixelTexture url="sample2.rgba"/>
```

```
</PerspectiveTexture>
```

```
<Appearance>
```

```
<Material diffuseColor="0 0 0"/>
```

```
</Appearance>
```

```
<!--define wall -->
```

```
.....
```

```
<!--define model -->
```

```
.....
```

```
</Shape>
```

```
</Transform>
```

```
</Scene>
```

[DEMO](#)

Demo 4

```
<Scene><!-- Scene graph nodes are added here -->
```

```
<Transform>
```

```
<Shape>
```

```
<PerspectiveTexture description="sample1", position="8.0 8.0 -22.0",  
direction=" -6 -6 -8", fieldOfView="45.0", aspectRatio = "1" minmax = "7 30">
```

```
<PixelTexture url="spotlight.rgb" />
```

```
</PerspectiveTexture>
```

```
<Appearance>
```

```
<Material diffuseColor="0 0 0" />
```

```
</Appearance>
```

```
<!--define model1 -->
```

```
.....
```

```
<!--define model2 -->
```

```
.....
```

```
</Shape>
```

```
</Transform>
```

```
</Scene>
```

DEMO

Demo 5

```
<Scene><!-- Scene graph nodes are added here -->
```

```
<Transform>
```

```
<Shape>
```

```
<PerspectiveTexture description="sample1", position="8.0 8.0 -22.0",  
direction=" -6 -6 -8", fieldOfView="45.0", aspectRatio = "1" minmax = "7 30">
```

```
<PixelTexture url="spotlight.rgb" />
```

```
</PerspectiveTexture>
```

```
<Appearance>
```

```
<Material diffuseColor="0 0 0" />
```

```
</Appearance>
```

```
<!--define model1 -->
```

```
.....  
</Shape>
```

```
</Transform>
```

<Transform>

<Shape>

<PerspectiveTexture description="sample1", position="6.0 6.0 -20.0",
direction=" -6 -6 -8", fieldOfView="45.0", aspectRatio = "1" minmax = "7 30">

<PixelTexture url="spotlight.rgb" />

</PerspectiveTexture>

<Appearance>

<Material diffuseColor="0 0 0" />

</Appearance>

<!--define model2 - ->

DEMO

.....
</Shape>

</Transform>

</Scene>

Ongoing Work

- Update DTD and Schema for adopting our proposed projective texture nodes
- Have used a CyberX3D browser to visualizing the updated X3D files.

Thank you.