

Summary:

Texture mapping has been used to achieve realistic images without as little rendering time as possible. One of the major challenges, is how to take an image that may be of any shape, and map it onto a surface without taking away the realism aspect of the image. Different photogrammetry equations help solve the problem of distortion for all different types of image transformations.

One of the first texture mapped images was created by Catmull, and it was a brick wall. The geometry of texture mapping goes through two transformations: object space and texture space, and objects space and screen space. The object to texture transformation can be as complex or as simple as the image needs. These two transformations are often concatenated in order to save computations. The simpler the transformation sometimes produces a problem of antialiasing. Take a bilinear transformation, since it only preserves the straight lines, and triangle will not be transformed right for at least one edge. A solution for this is to sample multiple points on a texture -- super sampling.

Implementing a texture mapping approach can be easy if all that is needed is gouraud shading with associates it's shading model with vertices and vertex normals and the well phone Phong shading that interpolates this normal for each pixel. The simple approach will introduce distortion.

Issues implementing texture mapping:

1. Currently, the material does all the shading for the ray tracer, so if I just replaced the current material with a texture mapping material, i will lose all shadows.
2. Choosing what approach to use for a given object. Since objects can be different shapes, the texture mapping approach should vary. The ability to choose what approach needed will add multiple layers of code in order to achieve this.
3. Adding a procedural texture to a 3D object will be hard with anything that is not a generic geometric object. It may not be hard, but it will not look "right".