Post Processing Assignment

# Overview

Post Processing allows a programmer to add additional effects to the entire screen, sections, or objects within the scene. These effects allow us to change the way a texture is viewed depending on certain conditions ( For example, Refracting and Tinting a texture seen through stained glass). These techniques may be difficult, if not impossible to implement into the model directly and can be used to stylize or to provide a realistic touch to a scene.

# Techniques

## Variable Tint

The first technique used in this project is a variable tint.

This effect slightly tints the entire scene a specific colour, that changes slightly each frame.  
This is achieved by having a floating point “VariableTintHue” variable that is slightly increased with each frame. Storing a HSL hue value in the range 0 to 1. Each frame this is converted to an RGB colour value and passed to the shader. The Pixelshader samples the texture and multiplies the given colour by the tint value. This results in the scene being visible, and the contrast maintained, but the scene is tinted various shades of a given, constantly changing, colour.

## High Contrast

The goal of a high contrast effect is to make every attribute of a scene more extreme. Light colours become lighter, dark colours become darker, red areas become more red ect.

To this goal I sample the pixel as normal and then take each RGB value of the given pixel.

If the value is over half of the given range, the difference between the current value and the maximum range is found, and a percentage of this is added to the original value.

If the value is less than half of the range, the value is further divided to reduce it's effect.

This method however does have it's disadvantages, as in a bright area, a single colour can takeover a space, causing what was once a “Bright” area to become a “Red” area. I can instead take the 3 colours as a single value and change based on the colour as a whole, but this has the effect of reducing the amount of colour variance in the scene.

## Underwater

The Underwater effect attempts to give the feeling of being underwater by adding a distortion effect to the scene, overladen on the original scene. Added to this is a blue/green water tint.

This effect takes sample at a sin wave offset that's updated each frame, this causes a wiggling after-image of each object to be displayed faintly in-front of each object (this also applies to everything else in the scene, but is most visible on objects).

This is then combined with a simple blue/green tint (Similar to our variable tint shader) to complete the underwater effect.

This effect could be improved with a few rising distortions that break the sin-wave patten to simulate bubbles.

# Other Improvements

## Multiple Effects

Multiple post-processing effects can be enabled simultaneously via the use of alpha blending.

Each effect is only applied at an alpha of 0.7. This allows us to stack the different post-processing effects, although this could be improved by changing the alpha value based on the number of simultaneous effects.