CMPM 163 W2018
Game Graphics & Real-time Rendering

Homework 1 (100 pts) – Due Sunday, 1/28 at 12noon

All code will be uploaded to GitHub (or another repo), it should include a short "ReadMe" describing the project, along with one or more screenshots of the project. Assignments A, B, and C should run from a website, such as GitHub Pages (https://pages.github.com/). You are encouraged to help each other, but you must submit the homework individually to angus@ucsc.edu and lferreira@ucsc.edu with the subject: "CMPM 163 – Homework 1". This email will contain links to your Git repo and the websites for A, B, and C. The write-up for D can be included as a text file or PDF in the Git repo, and should be named "Homework1D.txt" or "Homework1D.pdf".

A. Design a 3D scene (30 pts)

Using Three.js, create a scene with at least 3 objects and 3 lights.

— Each object will use a different shader, e.g., a Phong shader, a shader that applies a texture, a vertex displacement shader, etc. At least one of the objects must both be textured and react to lighting.
— Each object and light in the scene will move or rotate.

(Lucas will show you how to create and load in more complex shapes using Blender in this week's Lab sections. You can also use .obj files, for example, taken from the Google Poly library.)

B. Image processing (20 pts)

Using GLSL, create an shader that takes an image and applies an image processing algorithm to it.

— Design an image processing shader of your choice using a filter kernel, such as one described on https://en.wikipedia.org/wiki/Kernel_(image_processing).
— Add simple mouse or keyboard interactivity to increase or decrease the effect in some way.

C. Game of life using shaders (40 pts)

In this exercise, you will create a multi-color game of life that extends the code I provided in class (ie, using the "ping-pong" strategy) to follow any of the rules described here: https://softologyblog.wordpress.com/2013/08/29/cyclic-cellular-automata/

— Choose your own colors, number of states, etc.
— You can use these (non-GLSL) examples as inspiration, or come up with your own ideas: http://jsfiddle.net/awilliams47/LJnue/, http://xpl.github.io/expression/.

Another option for this exercise is to instead use the game of life I showed in class and place it on an object of your choice (instead of a full screen plane).

D. Discuss a visual effect (10 pts)

Take a screenshot (or photo) of an interesting visual effect you noticed in a video game or computational artwork. In a few paragraphs, describe the effect. What do you like about it? How do you think it was created? Does the effect change depending on the camera view? The lights? Is it an effect that updates the geometry itself, or change the color of the pixels, or does it alter a texture?