Report

# Day 1

## Put a textured floor and teapot in a scene with per-pixel lighting

### One of the lights should pulsate on and off

I started from lab 19- the one with the better model importer.

Immediately removed the unnecessary 2% code for the lab (making the model walk) and changed the robot.x model for the teapot.x model.

Right near the bottom of Scene.cpp , in the UpdateScene function, I made a small snippet of code that changed the lights strength over time. It used a multiplier that switched between being negative and positive: the light would start off at a brightness of 40 and decrease. once the light strength hit 0, the negative would flip to be positive and the light would now get brighter over time until it hit 40 and then the multiplier would flip again, making the brightness decrease again and restarting the loop.  
this could have been done better with a sin wave, this would negate the need for a multiplier that flips between being negative and positive.

### Whilst the other light should gradually change colour

below that, with pretty much identical code, the other light will switch between two different colours, I did this by using the same flipping multiplier technique, but this time it changes the colours ‘.x’ value. Meaning that I am gradually turning the light’s amount of red light up and down.  
it does all the way down to 0, and up to 1 before flipping the negative, again, this could probably have been done better/quicker using a sin wave.

This would have definitely looked a lot nicer if I had used the HSL to RGB calculations we did in the first semester and made the light cycle through the Hue value. But in the instance of saving time, I elected not to explore that option any further.

### Include ambient light attenuation in the lighting equations

As far as I am aware, the base Lab19 already included attenuation by dividing the light’s strength by the distance, but it was barely noticeable, so I multiplied the distance float to smooth this attenuation more and make it more noticeable

## Add a sphere model to the scene, but using different shaders

This took some time, a little trial and error, but eventually I managed to get another vertex shader working called Wiggle\_vs.

### The vertex shader must constantly move the vertices in some way to produce some kind of pulsating effect

Once I decided I needed to add another float to the PerFrameConstants, I realised that the padding variables are essentially unused float variables, so instead of creating a new float in the struct and buffer, I decided to use padding1 as a Time variable. This time variable would increase by frametime each frame, though in order to stop the numbers from spiraling out of control after a certain amount of time, after a certain large number is passed, the time is set back to 0. Once I was able to pass this number over to the GPU, I used it in the wiggle\_vs vertex shader.  
at first I was attempting a wiggle effect, so I did the calculation sin(padding1) and added that to the models position just before the world position is calculated. This made the model scale infinitely and back. Assume this is because some of the numbers were approaching 0 or becoming negative, adding a +1 to the end of that equation made the sphere effectively scale up and down, but the scaling was done entirely in the shader, not by altering the models size.

### The pixel shader must constantly scroll the texture coordinates and tints the sphere texture to a fixed colour

Using the padding1 variable I modified earlier, I simply found the code in the vertex shader that dealt with UVs and I added padding1 to the UVs on both the x and y co-ordinates. This created a diagonal scrolling effect with the UVs

I later realised that I completely misread the brief and noticed that the UV scrolling is required to be done in a pixel shader.

So I made a pixel shader for the wiggle effect and I moved the code from the vertex shader to the newly created pixel shader