CS450/550 Project Proposal:

Implementing Disney's Principled Shader

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Proposed:

Create a working implementation of Walt Disney Animation Studios' Physically-Based Shading in OpenGL.

Intent:

Use this project as an opportunity to take all that we have learned in this course, combine it, and bring it in-line with OpenGL 3.3+ capabilities outside of the fixed-function structures to implement modern shader usage.

Background:

Physically-Based Shading was introduced at SIGGRAPH 2012 to describe the augments to RenderMan during the production of *Wreck-It Ralph*. Walt Disney Animation Studios identified deficiencies in the existing Physically-Based Rendering (referred further as "PBR") pipeline and implemented changes to remedy those deficiencies (see Burley 2012). Since the publication, this model for rendering realistic materials has been implemented as the Principled Shader in Blender, the Disney BRDF in Arnold, and numerous other commercially viable tools.

Roadmap:

- Learn and develop a basic PBR rendering engine.
  This has already been started. There are plenty of tutorials on how to implement PBR shaders in OpenGL, abet not using FREEGLUT thus requiring some trial & error to have one-to-one functionality.
- Find and configure suitable models to load.
  This has already been started. This is tricky as I converted loadobjfile.cpp to work with Vertex Attribute Objects, which is a necessary modification to the file for further work. I am now seeking a suitable model to showcase work completed.
- Modify all existing work to match the Principled Shader that has been implemented in Blender.
  This would require the most amount of work as Blender uses the Open Shading Language over GLSL or HLSL. OSL is closest to GLSL so it may not be insurmountable to implement in a short window of time.

Required Third Party Libraries (outside those that we have already used):

1. Stb_image.h: this is primarily to load *.hdr files for the environment cubemaps.