Assignment 4

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For the assignment 4, I am aiming for 100% grade, so my code, written using JavaScript in ReactJs framework and only the original WebGL2, implemented all following features:

- Properly setting up the surface normals for the objects being shown on the scene. (20%)
- Properly setting up different material properties for the objects being shown on the scene. (10%)
- Properly showing two different light sources at fixed locations that are used to illuminate the objects on the scene and can be turned on and off independently. (20%)
- Properly setting up the environment in your scene with an ambient light source component that is used to illustrate the objects on the scene and which can be turned from totally dark to intense brightness using a dial or a slider (from 0-total darkness to 100-total brightness, with a default of 30). Keys "," and "." can be used to increase or decrease these values. (10%)
- Properly showing one moving point light source that is used to illuminate some of the objects on the scene and illustrate the moving shadows projected on a ground plane. The moving point light is shown as a 3D sphere so that it is easy to see where the point light is located and move up and down the Y axis. (10%) . The space bar (or "space key") is used to pause/stop and continue moving as a toggle key.
- Have a light source attached to the viewer during navigation (like a head lamp), setting up a spot light that can be turned on and off and with a direction that can be controlled with the mouse. (10%)
- Show properly the three shading modes: flat, Gouraud, and Phong shading, using the keyboard mapping "f", "g", and "h", respectively. (10%)
- Provide a basic interface to make use of the different light sources mentioned above. Have buttons (5%) and keys (5%) to switch on and off each of the light sources (10% total).

The code is a one page application using ReactJS, submitted with a node_modules folder containing dependencies for the application. Prior to running the application, NodeJS must be installed. In case dependencies are missing, simply run: "npm install" in the code folder to update the node_modules folder. To start the web application, run: "npm start" in the code folder. The web will be available at port 3000.

The user interface includes a canvas for displaying the scene and an interface containing:

- a slider to adjust the intensity of the ambient light, default value is 30. The intensity can also be modify with keyboard "," and "."
- a toggle button group for selecting the shading mode, including Phong shading, flat shading, and Gouraud shading. The shading mode can also be selected using keyboard "h", "f", and "g", respectively. The default mode is Phong shading.
- A button to turn on or off the fixed left light (white light).
- A button to turn on or off the fixed right light (red light).
- A button to stop or move the light bulb (purple light bulb).

- A button to turn on or off the light bulb.
- A button to turn on or off the head lamp (green light).
- A button to turn on or off shadow rendering, default value is off.
- Use the mouse cursor movement on the canvas to move the green head lamp.

The application maintains a list of objects, including the virtual camera and 4 different 3D shapes, 3 objects on the plane and a lightbulb. The screen includes 2 fixed stage lights (white and red), ambient light, green light from the head lamp attached to the camera, and purple light from the light bulb. It also includes 3 objects, a green cube made of jade, a yellow shiny sphere, and a red pyramid. Shadow of objects are casted from the light bulb to the plane.

References & Sources

No external resources except those provided by the instructor were used to produce this assignment.