Final Project

The final project will be of your own design but it must be fully 3D and include the following:

- Animation that is at least semi-independent of user interaction (can be started due to user interaction but continue independently)
- Mouse and/or Keyboard Events
- Geometry, Transformations, and Projection (either perspective or orthographic)
- Lighting/Shading
- Textures

It must also include ***at least one*** of the following topics:

- Complex models loaded from OBJ/JSON files (not including a teapot)
- Reflection/Environment Maps
- Bump Maps
- Translucent Materials
- Off-Screen Rendering (for use with picking, reflection maps, …)

Based on the type of project you choose, it must also follow these requirements:

- Games: must have at least 3 levels or difficulties
- Models/Simulation: mouse/keyboard don't just change view but interact with the system
- Data Visualization: must be able to import data to be displayed

You may not cover a topic trivially (e.g. just doing exactly what was done in class).

Additionally, the project must make good use of buffers, drawing, and uniforms, not send large amounts of data to the GPU on a regular basis, or have any unnecessary code run during a render.

It is extra credit for incorporating features of JS/WebGL not discussed in class. Some ideas are:

- Playing/recording audio (e.g. AudioContext)
- Client-Server communication (e.g. WebSocket)
- Background processing threads (e.g. Web Workers)

You must submit an idea for your project by Friday April 14 via Canvas. I will reply by the following Monday if they are approved or need adjustments. Make sure the description of the project says how ***all*** of the above requirements will be covered.

Your project will be turned in via Gitkeeper by Tuesday May 2 1pm. You will present your work during the final exam period on Tuesday May 2 from 1-3pm. Your presentation will be 10 minutes. You must demo the program, explain how to interact with it, describe any special features you have added, and talk about at least 2 challenging programming aspects that you had to go through while making the program. You may choose to use slides in addition to your demo program but this is not required.

GRADING

There are 100 pts and they are broken down as follows:

- 10 pts each for use of animation, mouse/keyboard, geometry/transformations/projection, lighting/shading, and textures
- 10 pts for the advanced topic used
- 15 pts for appropriate GPU usage and good code quality
- 15 pts for polish including your page informing the user how to use the program/interact with it
- 10 pts for your presentation

Use of non-discussed features is eligible for up to 10 extra credit points.

PROJECT IDEAS

All of these ideas are just starting points and will need more details.

Simulations

- Water
- Fire
- Smoke/Steam
- Floating Soap Bubbles
- Cloth
- Solar System
- Sky (day/night, sun/stars/moon, phases of the moon, selectable items tell you what they are)
- Fish Tank

Games

- Rubik's Cube
- Flying program (with HUD, shadow, constantly moving forward, larger/infinite range of terrain)
- Billiards
- Car Racing
- Maze/Puzzle (with POV of being in the maze, has challenges in parts of the maze to get through)
- Board Game Pack (checkers, chess, … - make sure fully 3D)
- 3D Snake (unlike ones online the direction could be in X, Y, or Z; view from the snake's perspective)