Alex Chen

Seong Kim

Giving Spheres "Anime Eyes": Ray Tracing with Just Cause and Purpose

Panopto Link

https://northwestern.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=22c3b4aa-d3a4-4efa-a1bf-ae5a0042e123

Ray Tracer: Press 't' to Trace! (left: WebGL Scene Preview. Right: Ray-Traced Result.)
[Super-Sampling] [Jitter] 1 sample/pixel. No jitter.
[Change Scene] Show Scene Number 0

Try using the sliders below to adjust the light positions or turn them on/off.
Remember to press 't' once you've set your slider positions to redraw the ray-traced image.

Adjust Light 1 (Press 't' once set to redraw ray-traced image.)
Light X Position   Light Y Position   Light Z Position
[Click to disable]

Adjust Light 2 (Press 't' once set to redraw ray-traced image.)
Light X Position   Light Y Position   Light Z Position
[Click to disable]

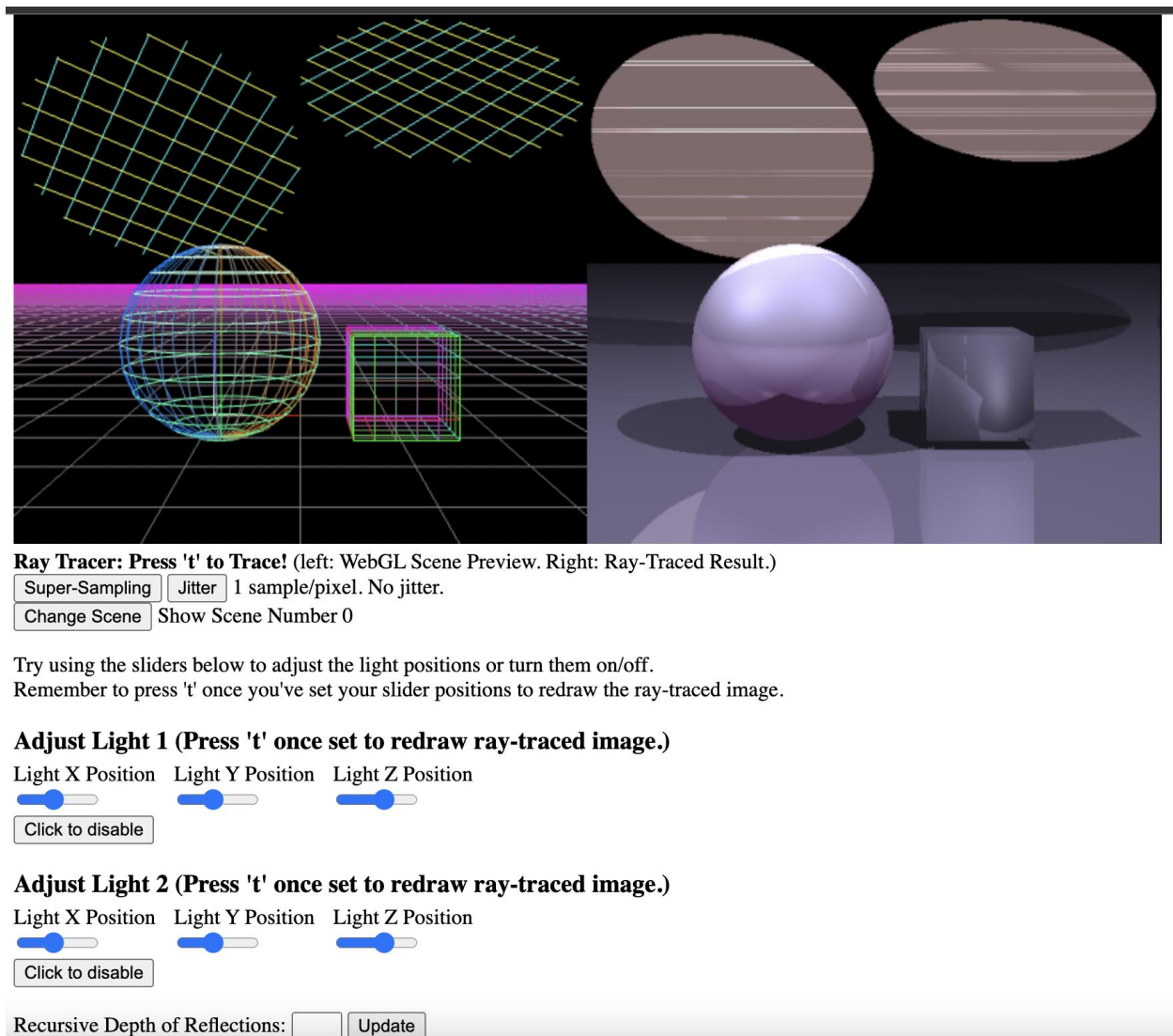Recursive Depth of Reflections: [   ] [Update]

Figure 1: Startup screen with instructions. Other figures will concentrate on the ray traced view only. The disks are functional, but do not reflect much light at their current angle with the camera. Below figures will exemplify what disks look like from clearer angles.

Essential Instructions:

Camera Control + Movement:
WASD: Move Forwards, Left, Back, and Right respectively
Mouse drag: angle camera position
E and Q key: move up and down, respectively
Buttons and inputs: See text next to button for function

Goals: To simulate light within a system as closely as possible, via raytracing. Recursive reflection depth and light sources are also adjustable, along with supersampling and jitter anti-aliasing. From certain angles within the first scene, the sphere will look like it is blushing, which is a hilarious, though unintended, side effect.

Grading Stuff:

- Panopto videos as indicated
- File Naming, Report, etc: Hopefully yes
- Side-by-side viewports: yes
- Camera Navigation: camera functionality outlined in Instructions
- Adjustable antialiasing and Supersampling done, with 2x2 and 3x3 options. Should fulfill the requirement for +2%
- Scenes: there are 4 of them, and the individual requirements of them are fulfilled with…
- 3 Spheres: The second scene has multiple spheres demonstrating this requirement
- 3 of another object: The third scene has a snowman, made of multiple boxes and spheres
- Point Light Sources: There are indeed 2 light sources, with adjustments possible as indicated
- Adjustability of light source position: see above
- Mirror like reflections: clear in first and second scene
- User Adjustable recursion depth: instructions on page
- OPTIONALS
  - Distortion: the third scene has distorted boxes, and the fourth scene has distorted spheres
  - New geometric shape: cubes
  - No additional optionals

Code Guide

the Seong_Alex_RayTrace folder, the following .js files can be found. A brief description

KimSeong_ChenAlex_ProjB: html file to open

JT_GUIbox-Lib: Camera movement handling

JT_tracer0-Scene: setup for each scene and calculations for r

JT_tracer1-RayCamera: setup for raytracing camera on right viewport

JT_tracer2-Geom: setup and code for defining geometric figures within scenes

JT_tracer3-ImgBuf: holds ray traced image to be displayed in the viewport

JT_VBObox-Lib: setup for left scenes

Lights-JT: definition of a light and its attributes in scene

Styles: stylistics for html. Safe to ignore

Week03_Main: main function that handles operations for the html file
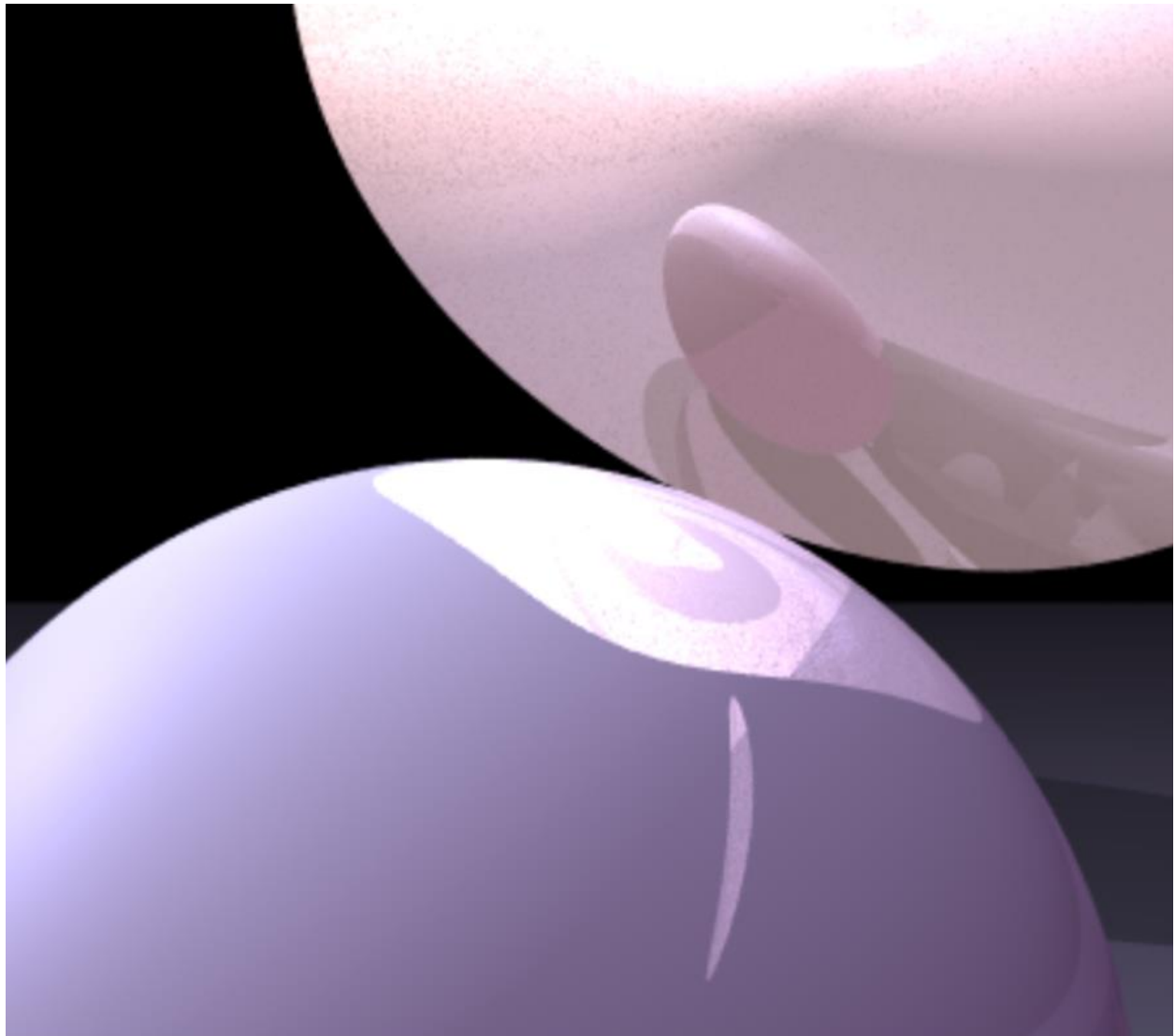
Results

Figure 2: Sphere with reflectance turned to 8, 4x4 supersampling, and jitter anti-aliasing, for maximum image clarity and brightness. The second spot on the sphere is due to a second disk, out of view. The sphere's reflection of the disk on the sphere gives the project its namesake.
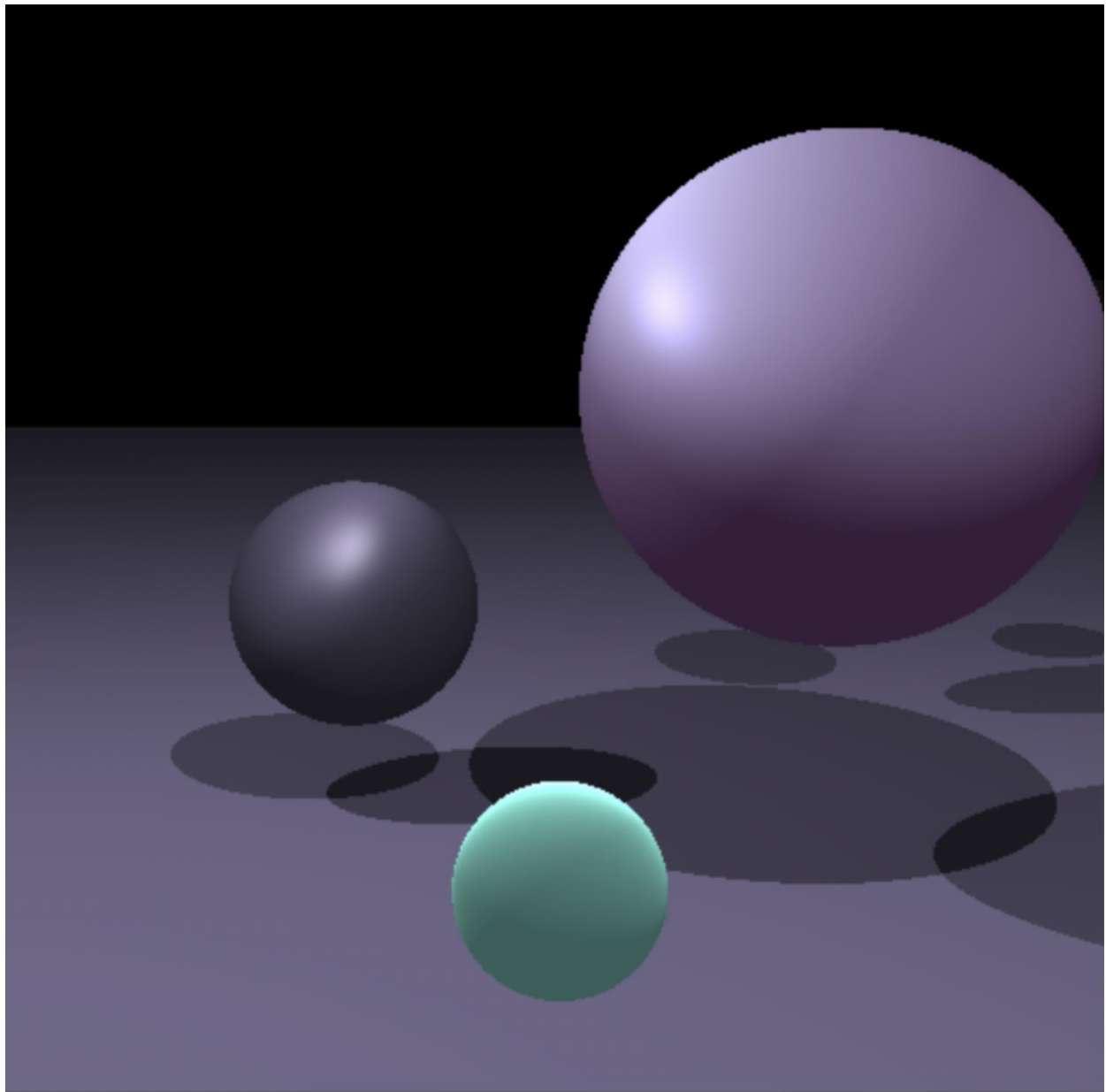
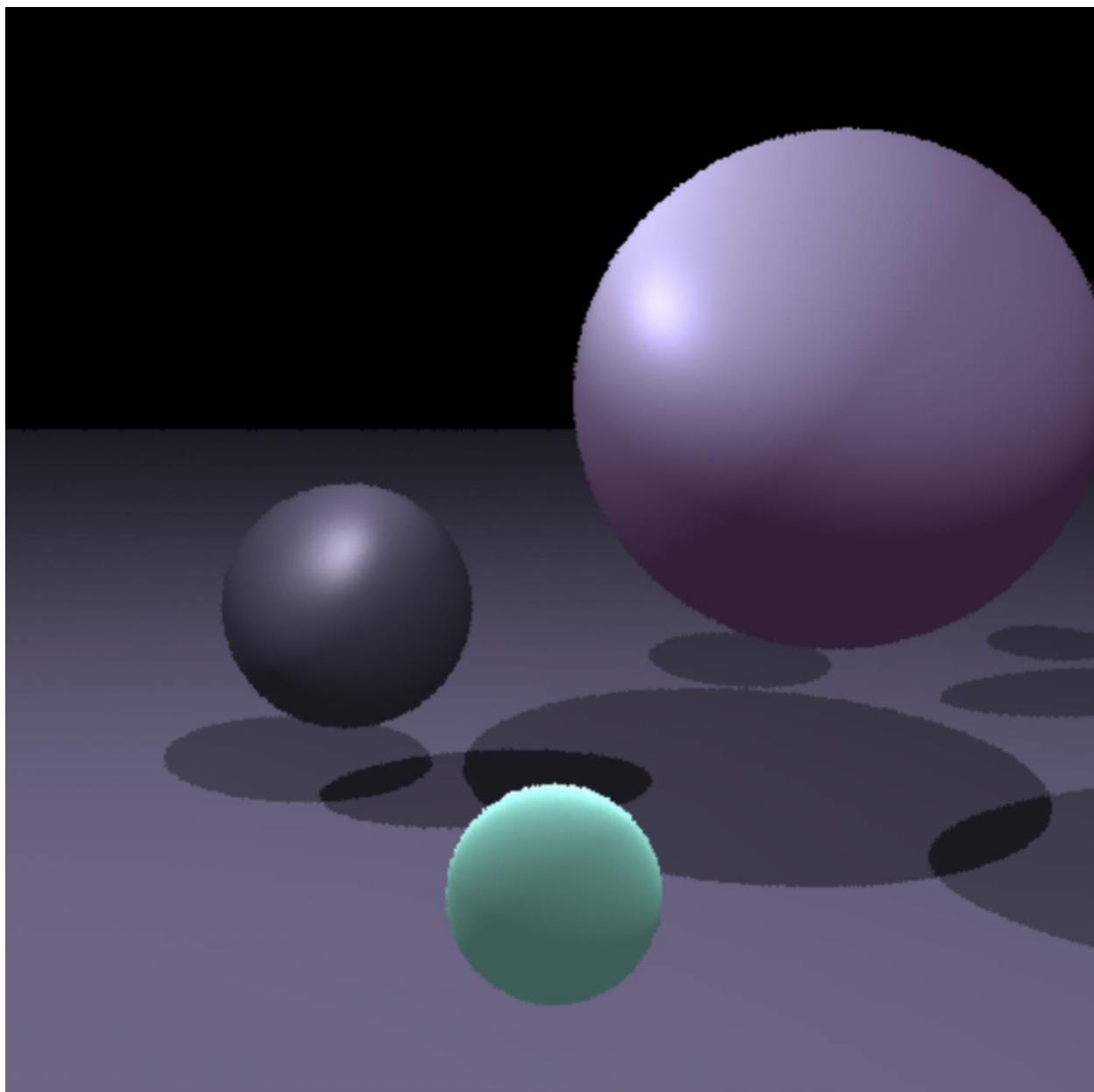Figure 2: the second scene, with 1x1 sampling, no antialiasing, and no reflection depth.

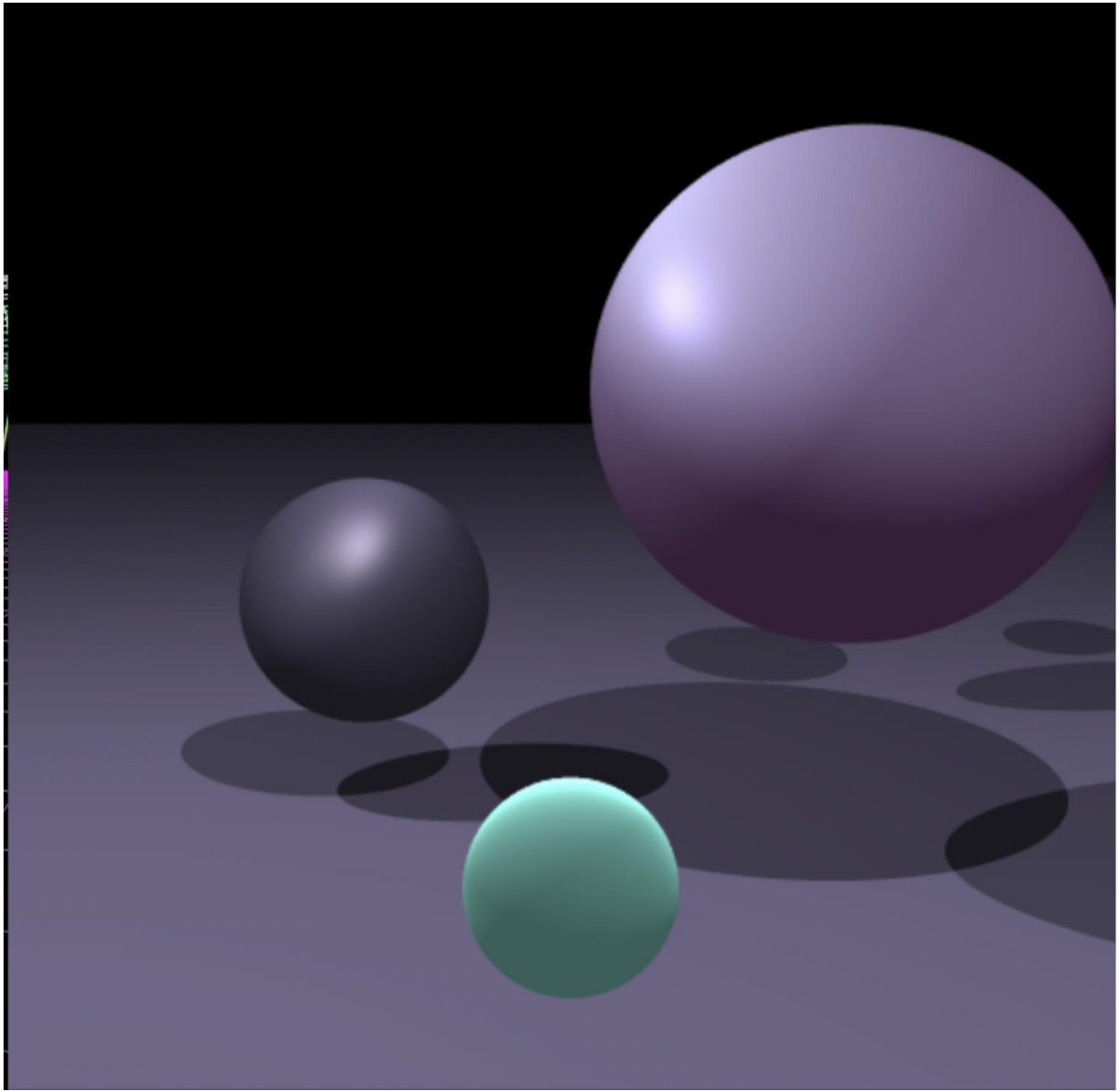Figure 3: the same scene, but now jittered, showcasing that jittering works

Figure 4: the same scene, still anti-aliased, but now with 4x4 supersampling, showcasing supersampling works
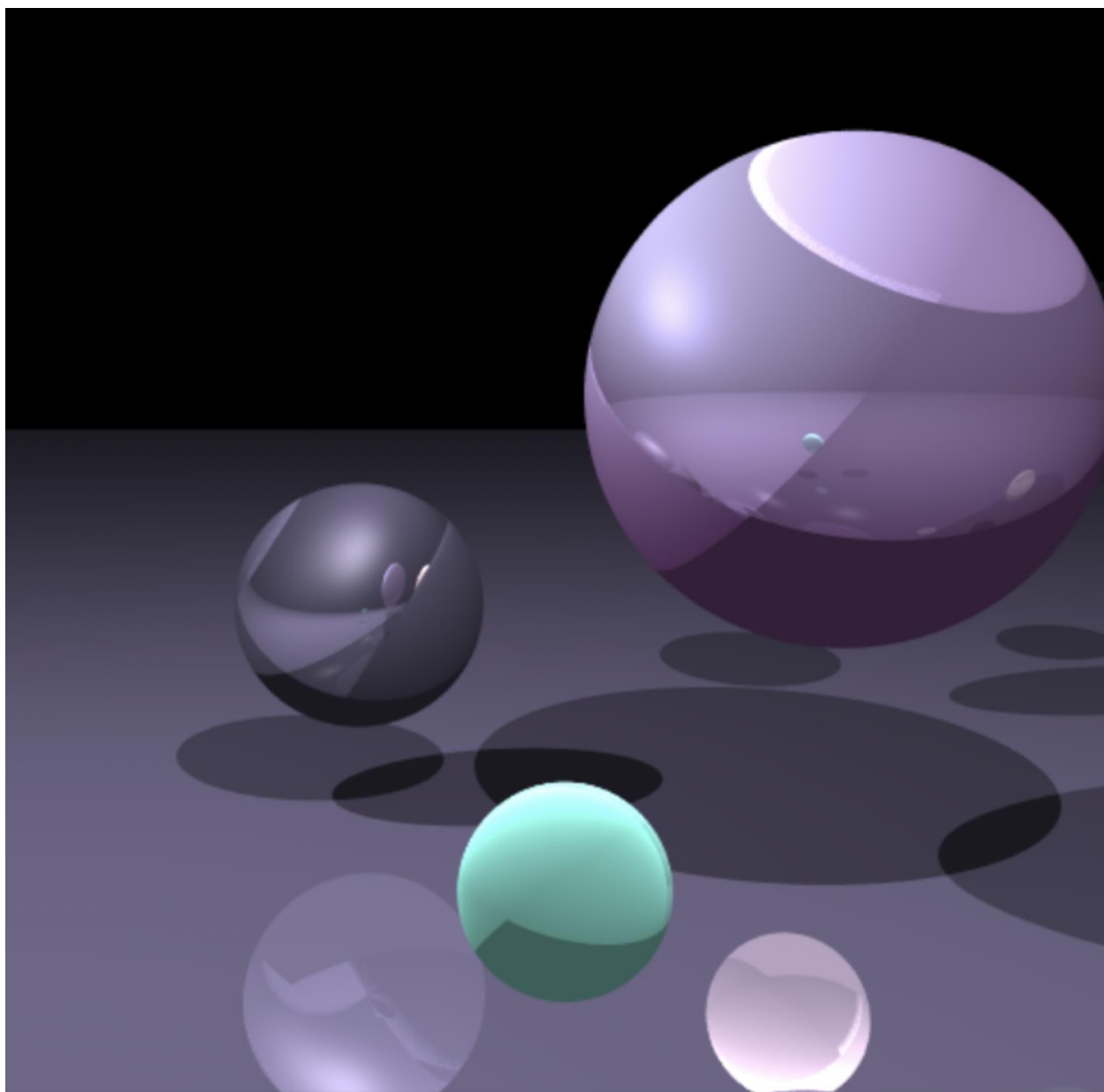
Figure 5: the same scene, 4x4 sampled and anti-aliased, now with maximum reflection depth. Note the reflections off of the shiny spheres, along with the increased overall brightness.
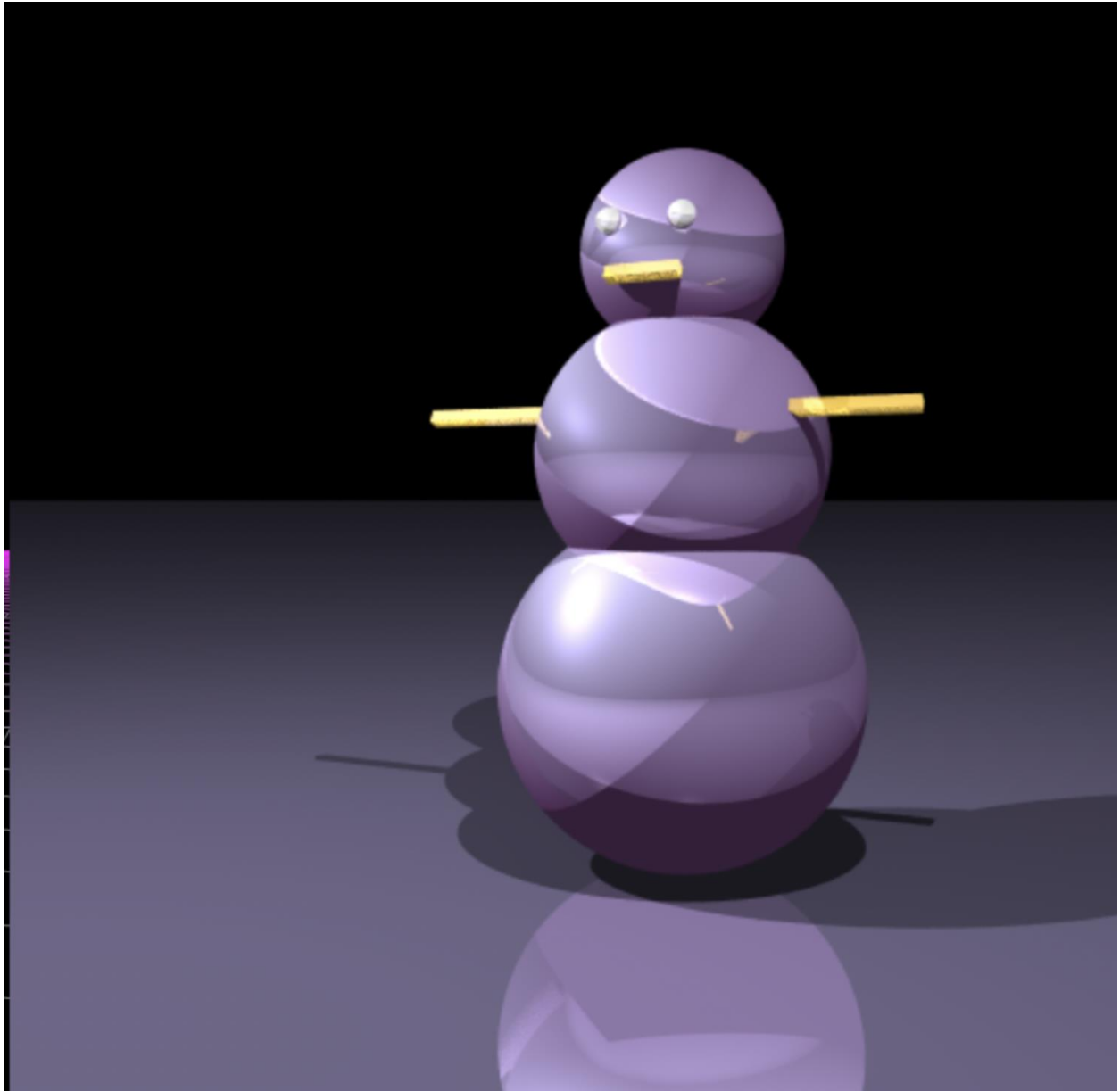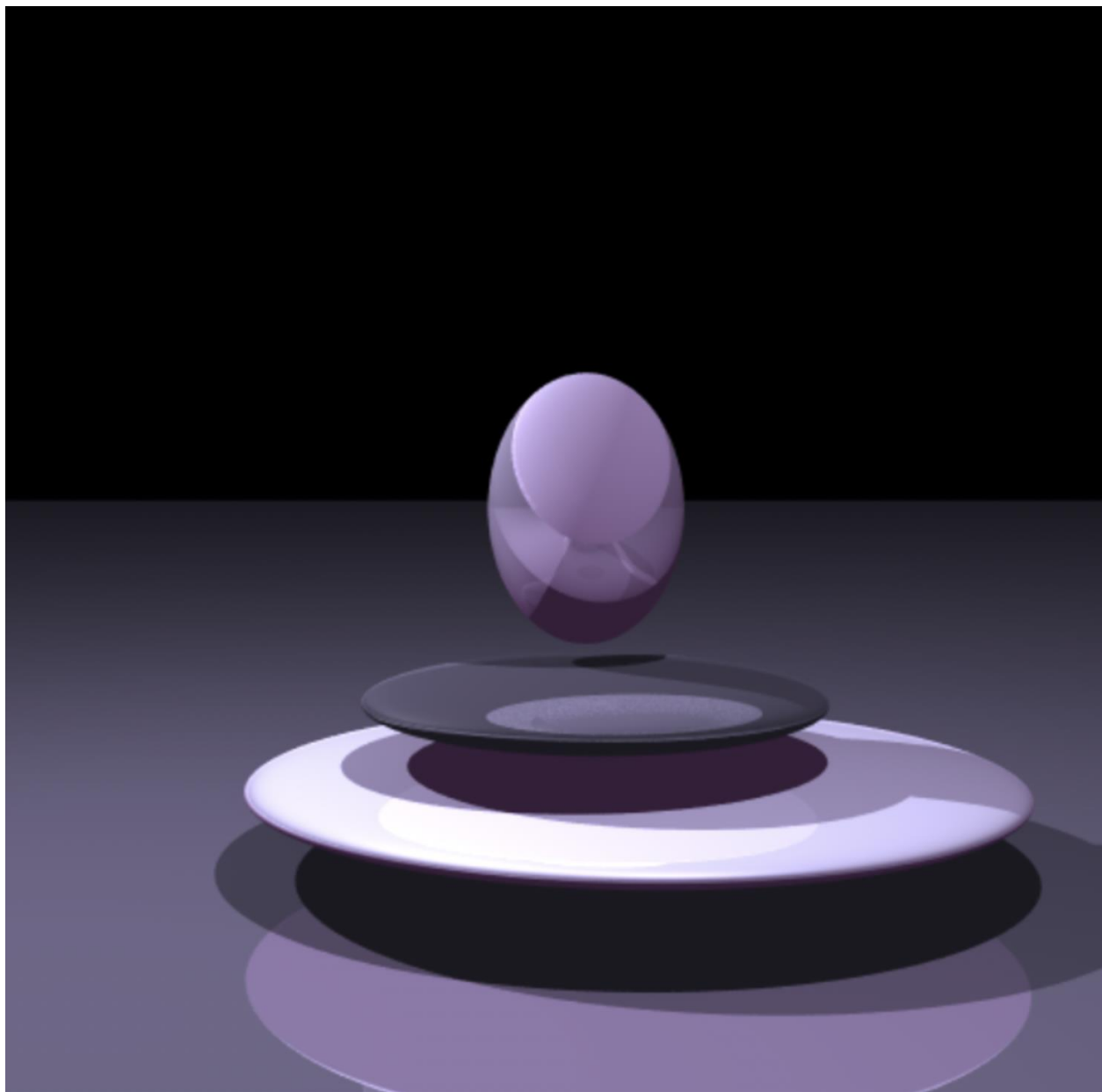
Figure 6: the snowman. Seong and I have made a monster.

Figure 7: three stretched spheres