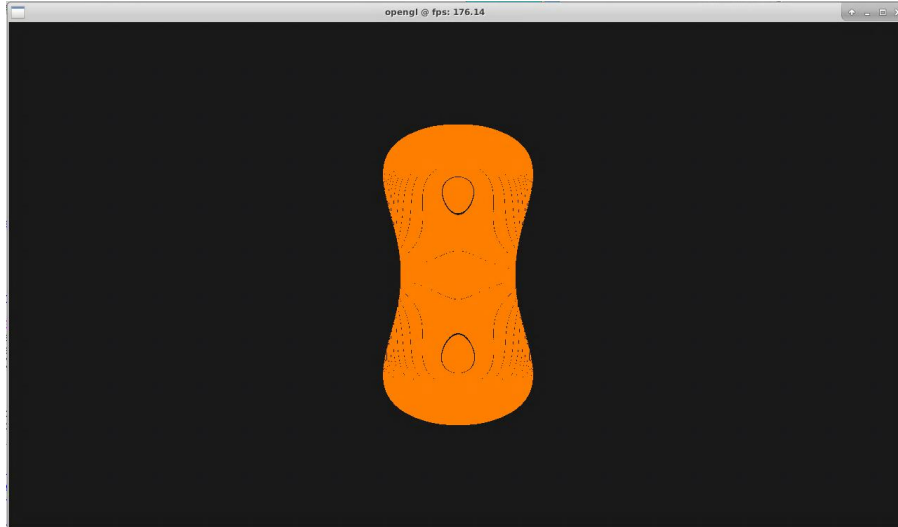


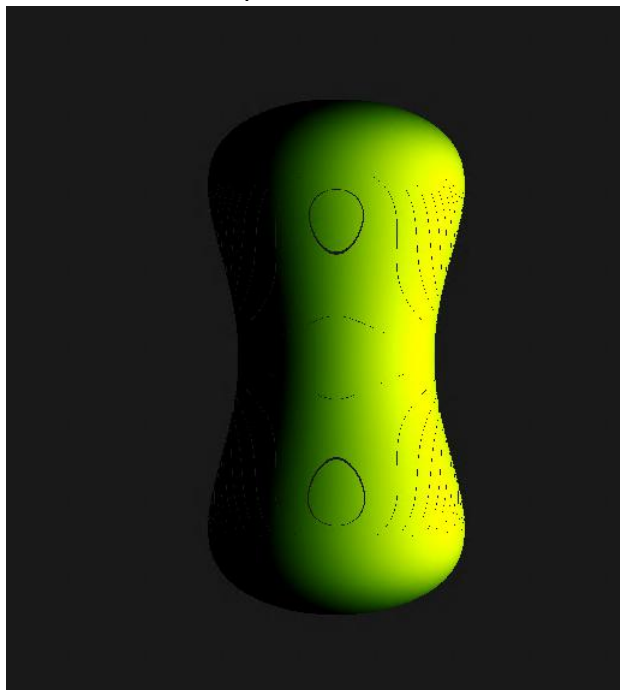
Package Structure:

Please directly go to main folder and use command “make -f Makefile” to compile. Run ‘./cg vs.glsl frag.glsl atlas.jpg checkers.png’ to start the program.

Part-A: VAO & VBO usage



Part-B: normal map



Part-C: texture map



Part-D: keyboard interactivity

Please refer to the Appendix for special key usages. Here I only post the images of disabling diffuse effect, specular effect and texture map effect, respectively.

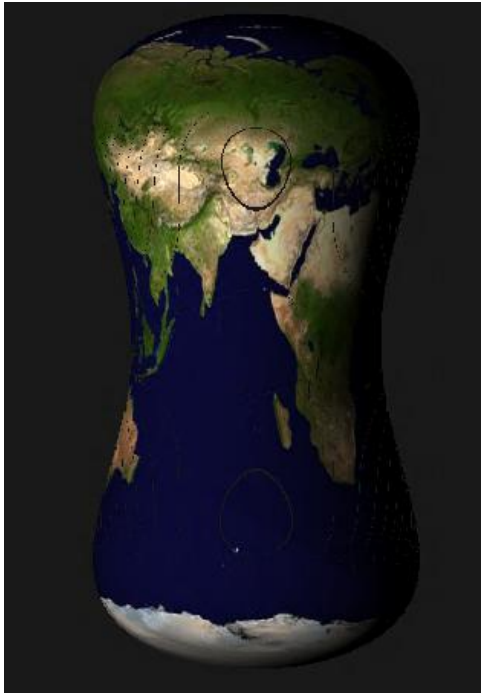
1) diffuse shading effect off

Here I add diffuse color in the ambient color so we could still see some shallow texture. I deliberately leave it there. Of course we could remove this easily.

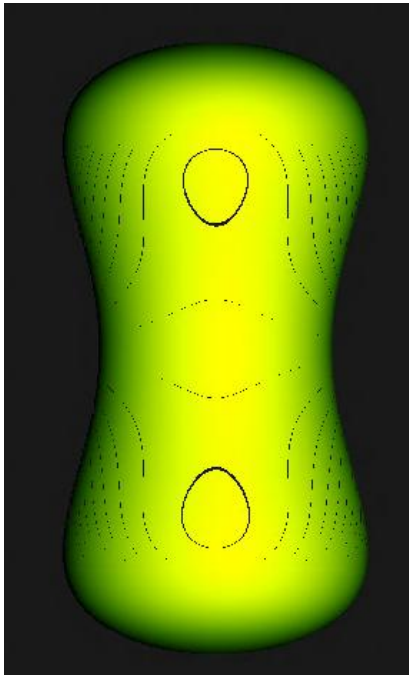


2) specular lighting effect off

The light source color is red, so without specular effect, the color goes back to normal texture color.



3) usage of texture off



Bonus E: 2nd texture map as normal map

Please use command `./cg vs.glsl frag.glsl atlas.jpg checkers.png` to use 2nd texture map.

The toggling key for the 2nd texture map is the key “H”.



Appendix: Tabulation for ‘key’ associations with tasks

#	Operation	Detail	Shortcut-key/key Combination
1	Reset Display	Reset all parameters	r
2	Move light source left	Decrease light source x value	a
3	Move light source up	Increase light source y value	w
4	Move light source down	Decrease light source y value	s
5	Move light source right	Increase light source x value	d
6	Move light source closer to origin	Decrease light source z value	q
7	Move light source farther to origin	Increase light source z	e

8	Decrease specular exponent	Decrease specular exponent	u
9	Increase specular exponent	Increase specular exponent	i
10	Toggling diffuse shading effect	Enable/disable diffuse shading effect	j
11	Toggling specular lighting effect	Enable/disable specular lighting effect	k
12	Toggling 1st texture effect	Enable/disable 1st texture effect	l
13	Toggling 2st texture as normal map effect	Enable/disable 2st texture as normal map effect	h