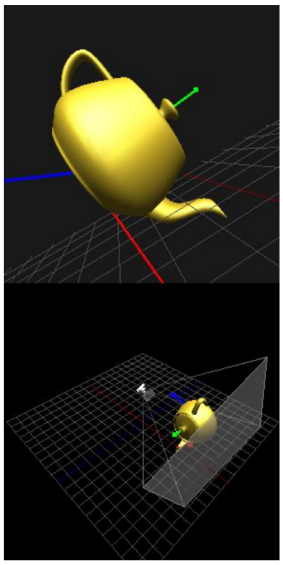
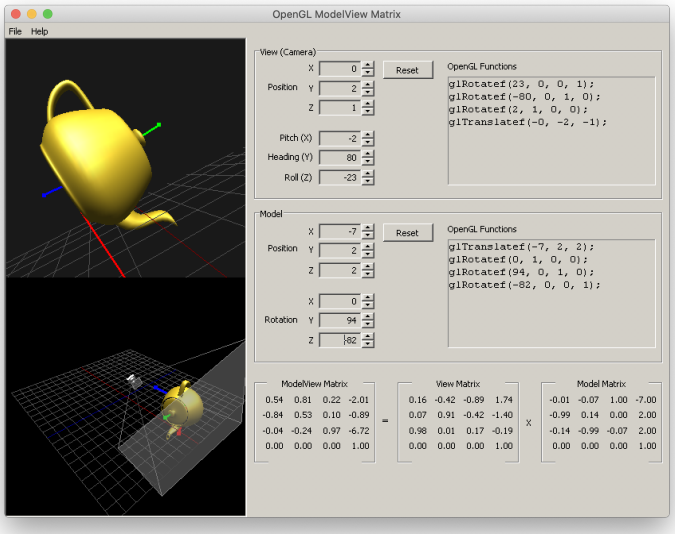
Realtime Graphics and Physics - HW 2

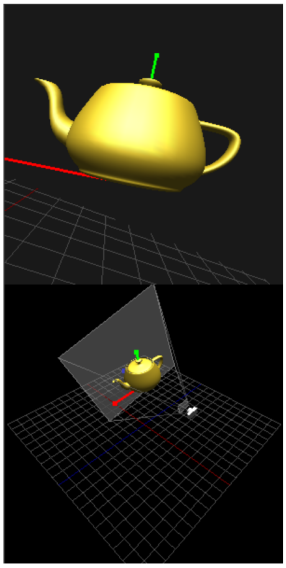
Krist Pornpairin 6031301721

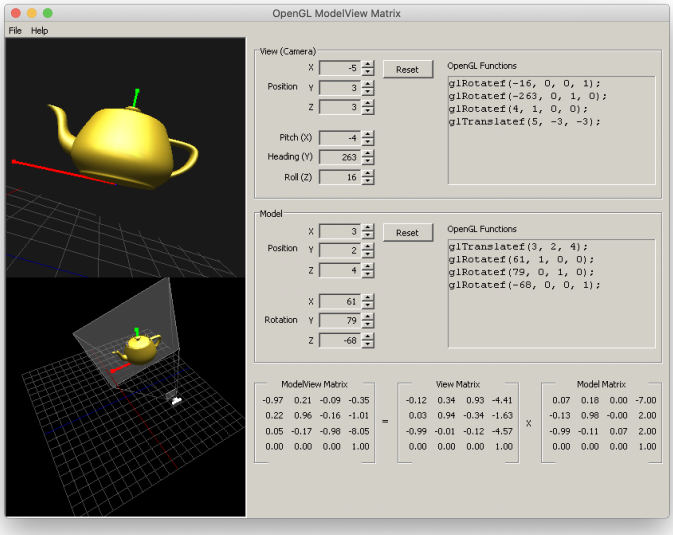
github: https://github.com/krist7599555/opengl-realtimecg-hw2

1. MatrixModelView.exe

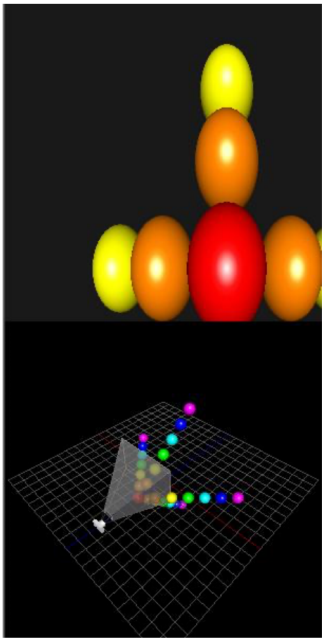


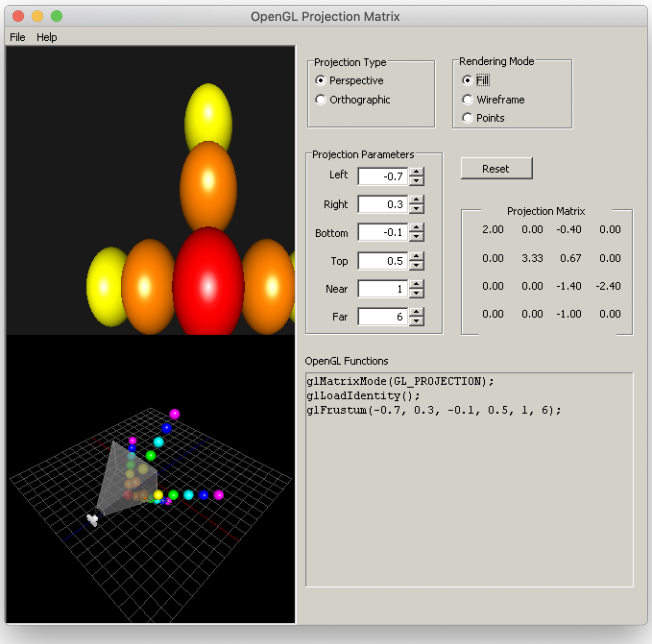


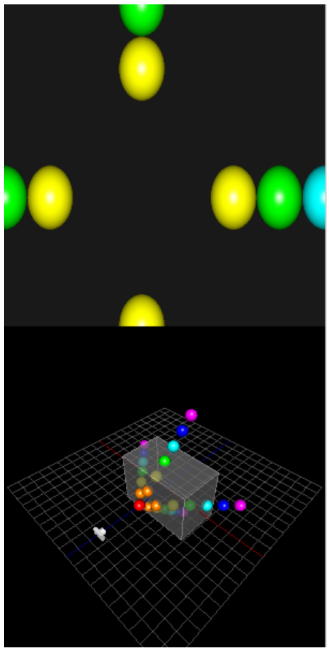


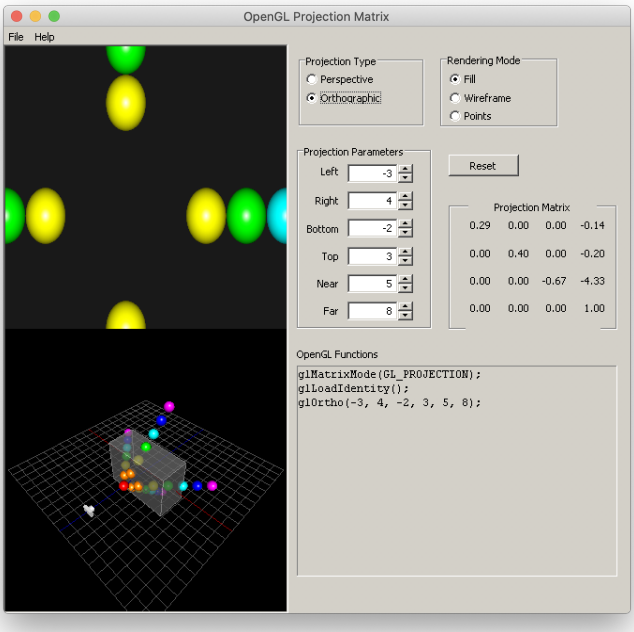


2. MatrixProjection.exe









3. glut_example_view_light_texture.cpp

Create vector class

```
24
25  template<typename T>
26  struct Vec3 {
27      T x, y, z;
28      Vec3(T _x, T _y, T _z): x(_x), y(_y), z(_z) {}
29  };
30
```

Global state

```
57
58  // INSERT - DO GLOBAL VARS
59  int is_look_teapot = false;
60  Vec3<GLfloat> teapot_translate(2, 0, 0);
61  Vec3<GLfloat> teapot_rotate(2, 0, 0);
62
63  Vec3<GLfloat> shift(2, 1, g_fViewDistance);
64  Vec3<GLfloat> cam_position = shift;
65  Vec3<GLfloat> cam_lookat(0, 0, 0);
66  Vec3<GLfloat> cam_up(0, 1, 0);
67
68  GLfloat fov = 65.0;
69
70  float TRANSLATEION_FACTOR = 0.7;
71  float ROTATION_FACTOR = 1507.0;
72
```

Transform teapot

```
136
137   // Child object (teapot) ... relative transform, and render
138   glPushMatrix();
139   glTranslatef(
140     teapot_translate.x,
141     teapot_translate.y,
142     teapot_translate.z
143   );
144   glRotatef(teapot_rotate.x, 1, 0, 0);
145   glRotatef(teapot_rotate.y, 0, 1, 0);
146   glRotatef(teapot_rotate.z, 0, 0, 1);
147
```

Set new camera

```
167   // Modify here
168   gluLookAt(
169     cam_position.x, cam_position.y, cam_position.x,
170     cam_lookat.x, cam_lookat.y, cam_lookat.z,
171     cam_up.x, cam_up.y, cam_up.z
172   );
173
```

Keypress Helper

```
334
335   template<typename T>
336   GLfloat direction(T pred, T neg, T pos) {
337     if (pred == neg) return -1.0;
338     if (pred == pos) return 1.0;
339     return 0.0;
340   }
341
```

Keypress Handler

```
353
354     // 3a
355     cam_position.y += TRANSLATEION_FACTOR * direction(k, 's', 'w');
356     cam_lookat.y   += TRANSLATEION_FACTOR * direction(k, 's', 'w');
357     cam_position.x += TRANSLATEION_FACTOR * direction(k, 'a', 'd');
358     cam_lookat.x   += TRANSLATEION_FACTOR * direction(k, 'a', 'd');
359     cam_position.z += TRANSLATEION_FACTOR * direction(k, 'q', 'e');
360     cam_lookat.z   += TRANSLATEION_FACTOR * direction(k, 'q', 'e');
361
362     // 3b
363     teapot_translate.x += TRANSLATEION_FACTOR * direction(k, 'j', 'u');
364     teapot_translate.y += TRANSLATEION_FACTOR * direction(k, 'h', 'k');
365     teapot_translate.z += TRANSLATEION_FACTOR * direction(k, 'y', 'i');
366
367     // 3c
368     teapot_rotate.x = ROTATION_FACTOR * direction(k, '3', '4');
369     teapot_rotate.y = ROTATION_FACTOR * direction(k, '5', '6');
370     teapot_rotate.z = ROTATION_FACTOR * direction(k, '7', '8');
371
372     // 3d
373     if (k == '1') {
374       cam_lookat = is_look_teapot ? Vec3<GLfloat>(0, 0, 0) : teapot_translate;
375       is_look_teapot = !is_look_teapot;
376     }
377
378     // 3e
379     fov += 10 * direction(k, '-', '+');
380   }
381
```

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