Craig Harris
harricra@oregonstate.edu
Project 4: Keytime Animation
Video Link

Description: Using Blender, I modeled a ping pong paddle and a ping pong table. I brought those into OpenGL and set a starting position such that it looked as though the two paddles were ready to swing at a ping pong ball on opposite sides of the table. I set the colors within OpenGL. Each object has just one color as I haven't played with textures yet. A light is set to be above the ping pong ball.

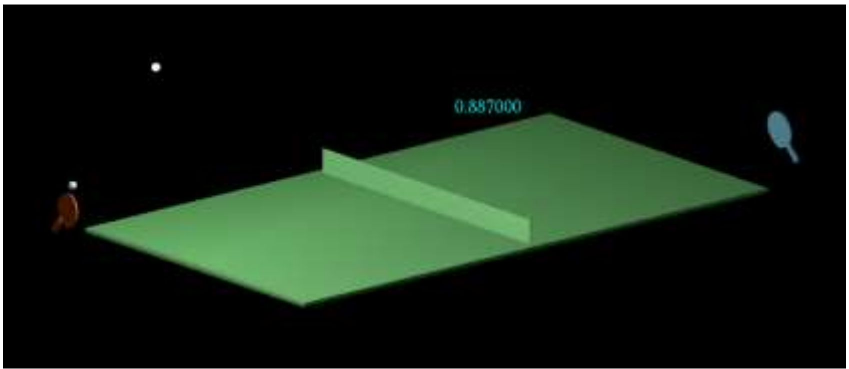
Using the Keytimes class, I set up Keytime objects for each attribute, initialized them, and added keytimes such that the animation looks like the ping pong paddles volley the ball a couple time until one paddle pulls a sneak shot, the other paddle attempts to throw its paddle for a saving shot but misses. The light is using keytimes to follow the z coordinate of the ball along the table. The gluLookAt eye position rotates based on keytimes so that we are always looking from the side of the paddle currently hitting the ball. When the ball is hit, it briefly turns red and transitions back to white. When a paddle hits the ball, that paddle's red or blue saturation maxes out (depending which paddle it is). When the paddle is not in its hitting animation, it is wavering along the x, y, z axis.

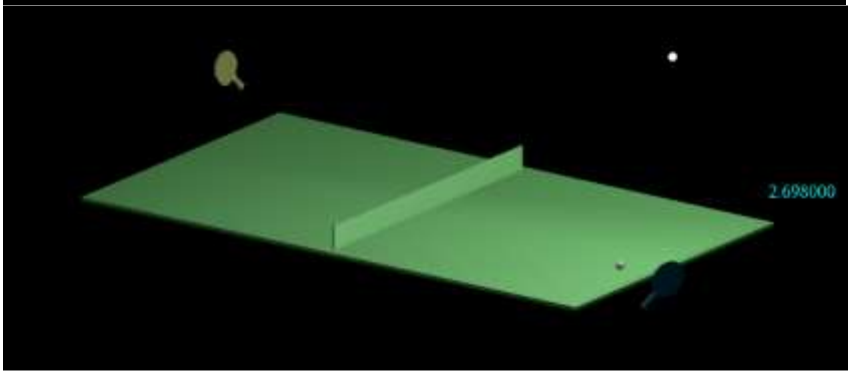
Note that I modified the keytimes class so that I could add a parameter "linear" so that no slope would be added to the generated keytimes if desired. This is used on the ball movement as I thought it was more realistic.

Animated Quantities: Noted here are all the quantities fulfilling the requirements along with 8 additional quantities to fulfill the extra credit criteria. Each of these quantities have at least 6 keytimes.

- Light position Z (**required lighting**)
- gluLookAt Eye Position Z (**required viewing**)
- Ping Pong Ball X (**required positioning**)
- Ping Pong Ball Color (one quantity affecting the G and B fields) (**required color**)
- Ping Pong Ball, Y, Z, Ping Pong Paddle (#1) X, Y (**4 more quantities of choice**)
- Ping Pong Paddle (#1) Z, Rotation, Color, Ping Pong Paddle (#2) X, Y, Z, Rotation, Color (**E.C. Fulfillment**)

Screen Shots:

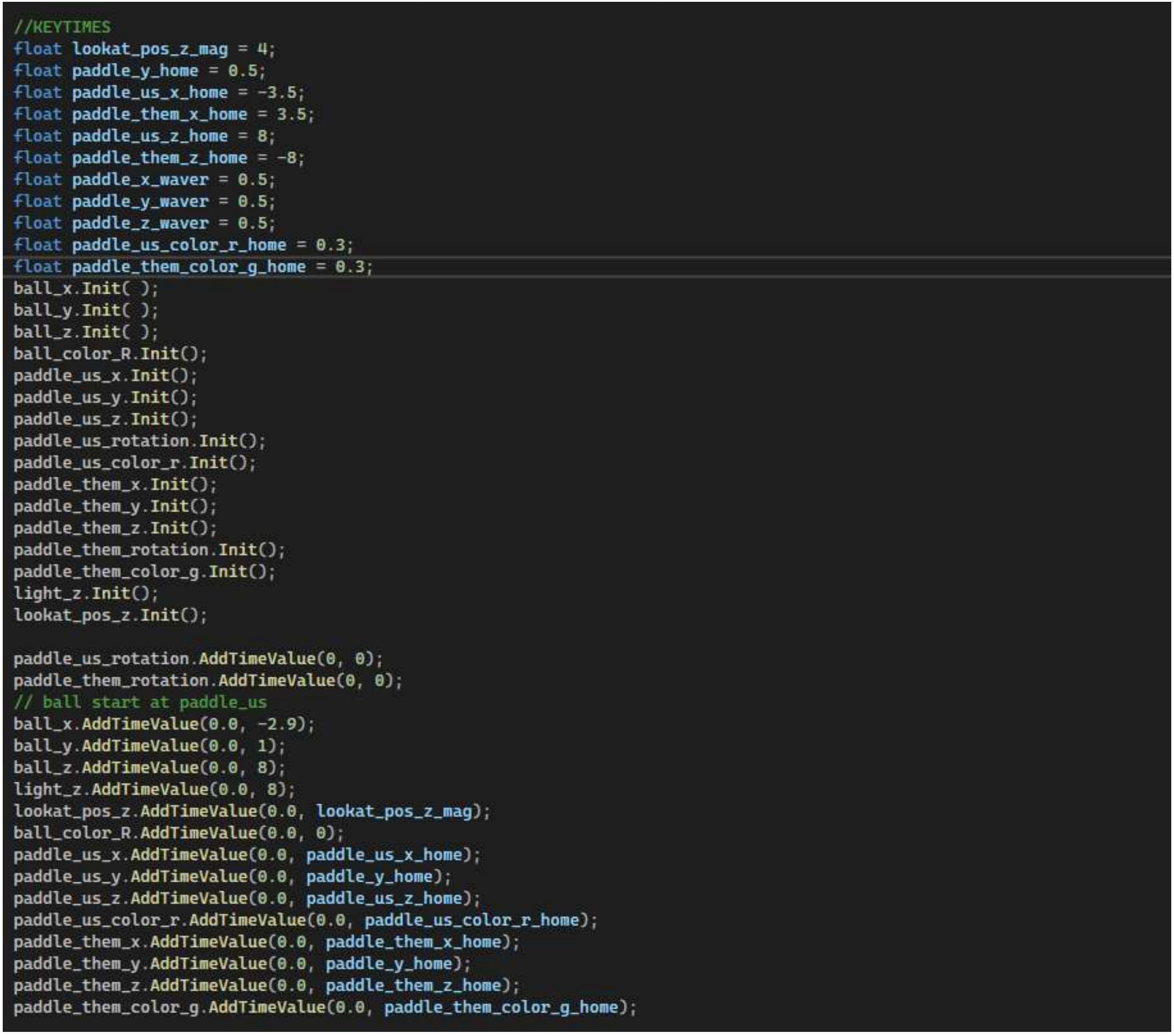




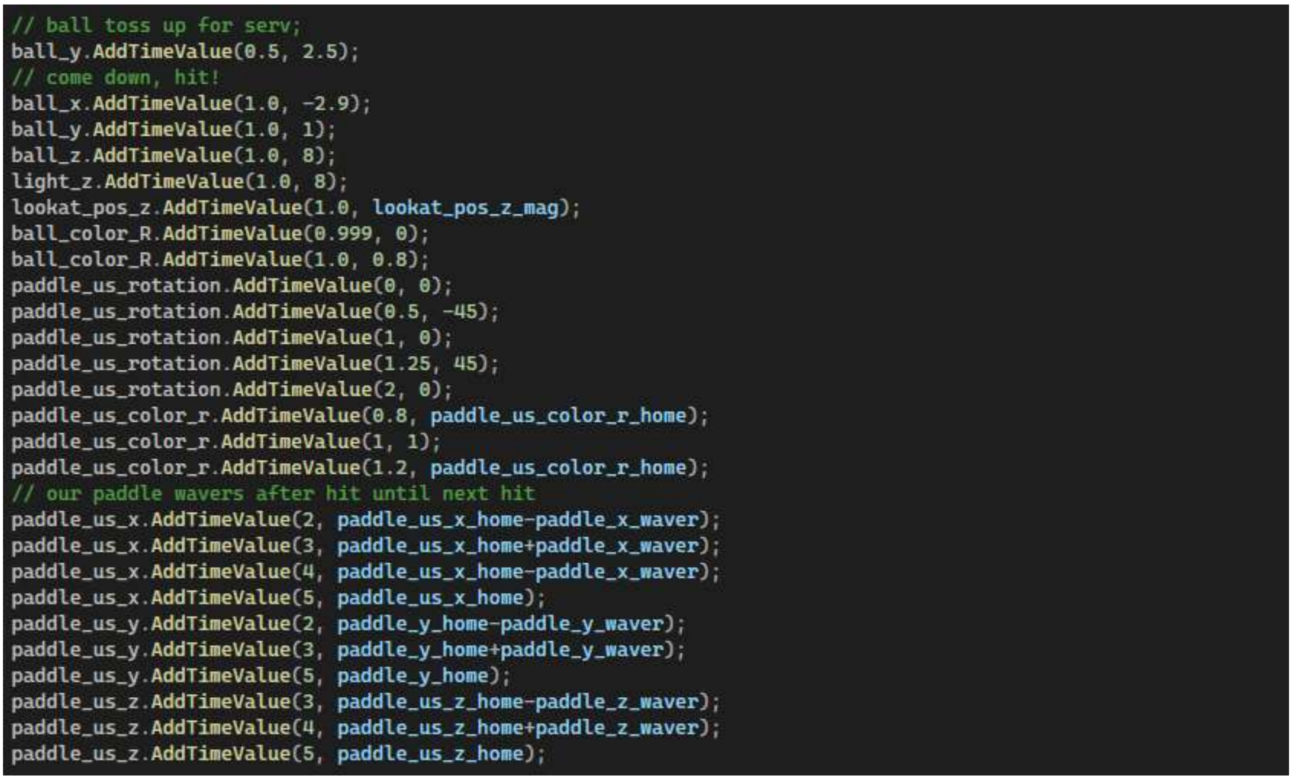
Tell us what convinces you that your animation is indeed doing what you set it up to do.

- The goal of each set of keytime animations can be clearly seen in the video: The eye and light position changes, the ball positions, the paddle positions when swinging or when waiting for the return, the color shifts, the throwing of the paddle at the end.

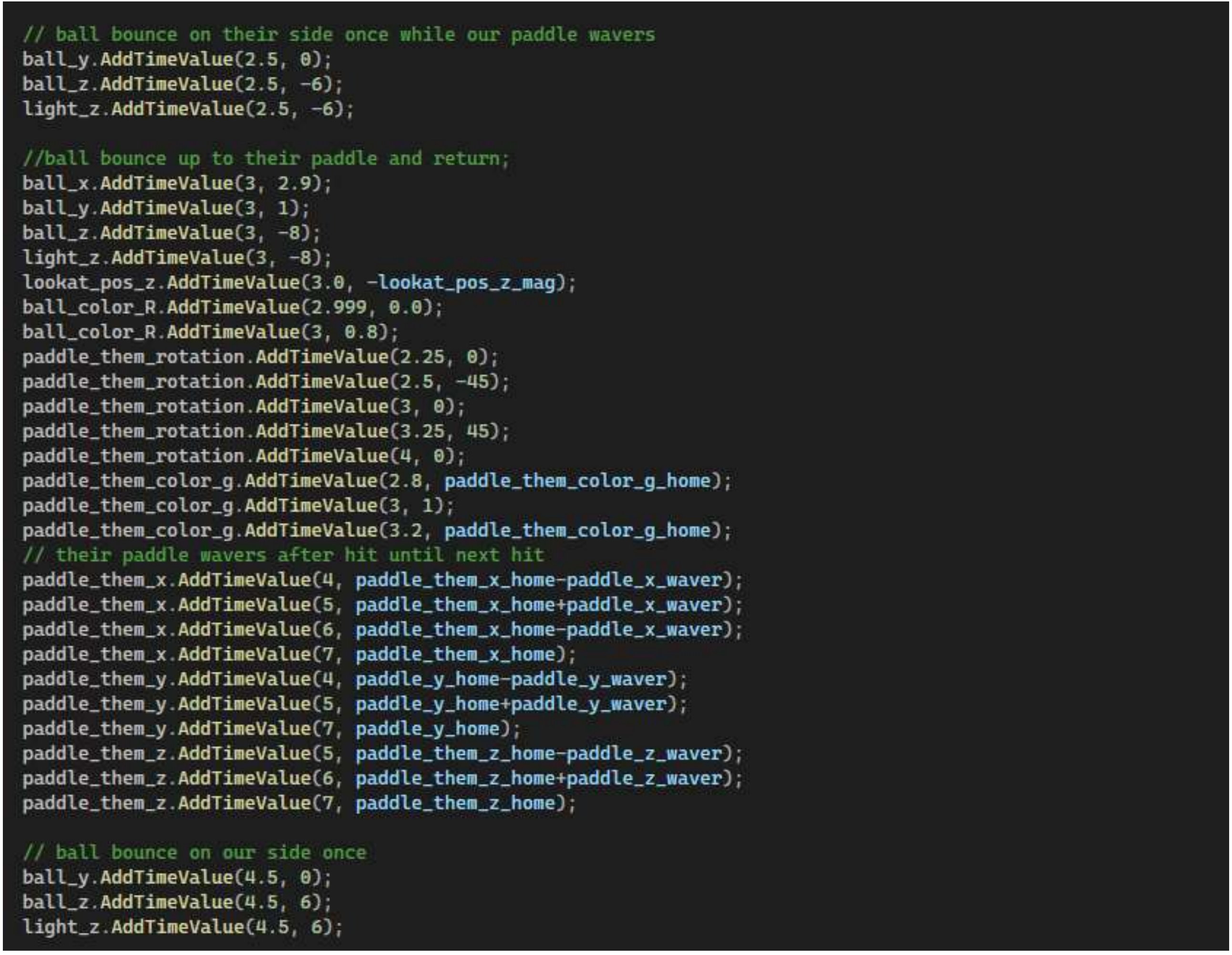
Keytime values for each quantity: *It is OK just to include the lines of code that set them*



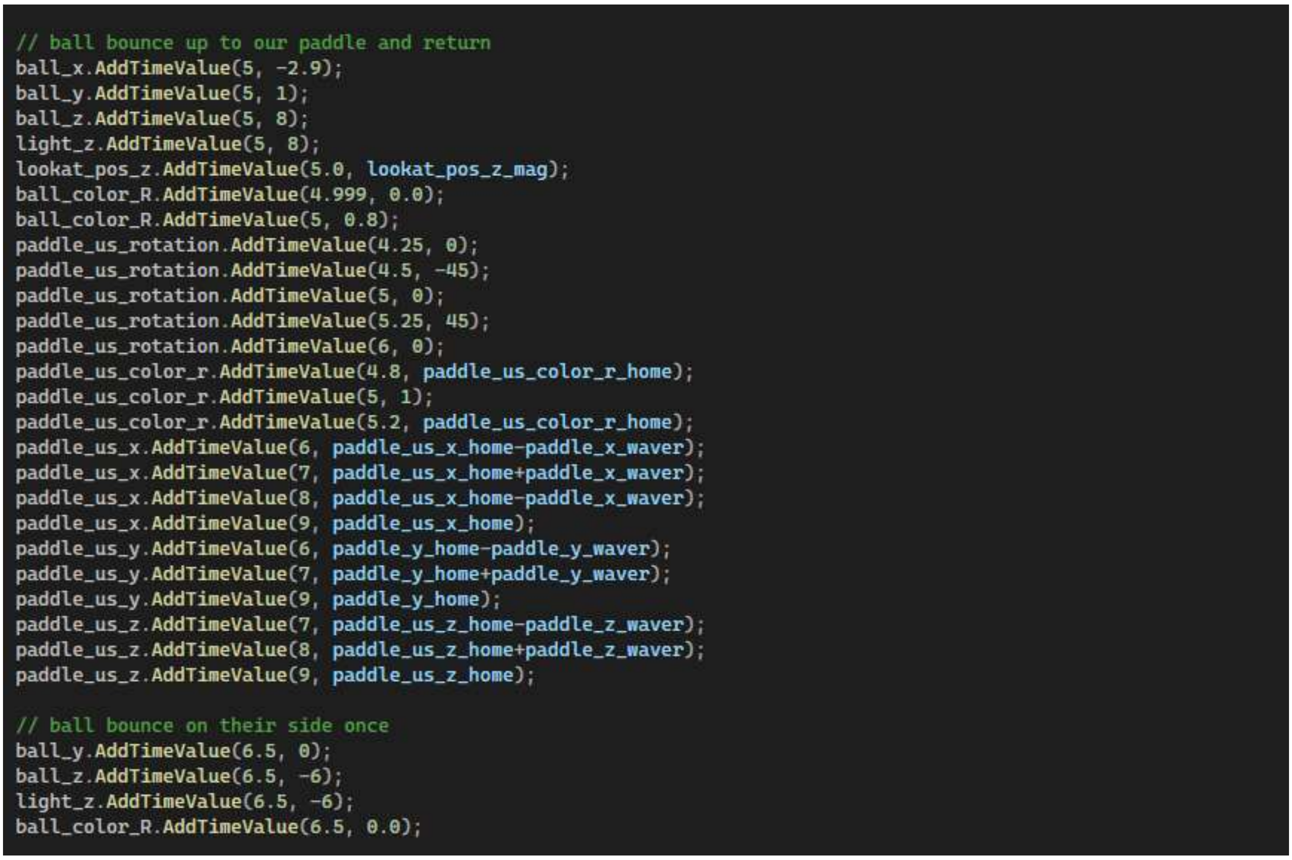
```
//KEYTIMES
float lookat_pos_z_mag = 4;
float paddle_y_home = 0.5;
float paddle_us_x_home = -3.5;
float paddle_them_x_home = 3.5;
float paddle_us_z_home = 8;
float paddle_them_z_home = -8;
float paddle_x_waver = 0.5;
float paddle_y_waver = 0.5;
float paddle_z_waver = 0.5;
float paddle_us_color_r_home = 0.3;
float paddle_them_color_g_home = 0.3;
ball_x.Init( );
ball_y.Init( );
ball_z.Init( );
ball_color_R.Init();
paddle_us_x.Init();
paddle_us_y.Init();
paddle_us_z.Init();
paddle_us_rotation.Init();
paddle_us_color_r.Init();
paddle_them_x.Init();
paddle_them_y.Init();
paddle_them_z.Init();
paddle_them_rotation.Init();
paddle_them_color_g.Init();
light_z.Init();
lookat_pos_z.Init();

paddle_us_rotation.AddTimeValue(0, 0);
paddle_them_rotation.AddTimeValue(0, 0);
// ball start at paddle_us
ball_x.AddTimeValue(0.0, -2.9);
ball_y.AddTimeValue(0.0, 1);
ball_z.AddTimeValue(0.0, 8);
light_z.AddTimeValue(0.0, 8);
lookat_pos_z.AddTimeValue(0.0, lookat_pos_z_mag);
ball_color_R.AddTimeValue(0.0, 0);
paddle_us_x.AddTimeValue(0.0, paddle_us_x_home);
paddle_us_y.AddTimeValue(0.0, paddle_y_home);
paddle_us_z.AddTimeValue(0.0, paddle_us_z_home);
paddle_us_color_r.AddTimeValue(0.0, paddle_us_color_r_home);
paddle_them_x.AddTimeValue(0.0, paddle_them_x_home);
paddle_them_y.AddTimeValue(0.0, paddle_y_home);
paddle_them_z.AddTimeValue(0.0, paddle_them_z_home);
paddle_them_color_g.AddTimeValue(0.0, paddle_them_color_g_home);
```



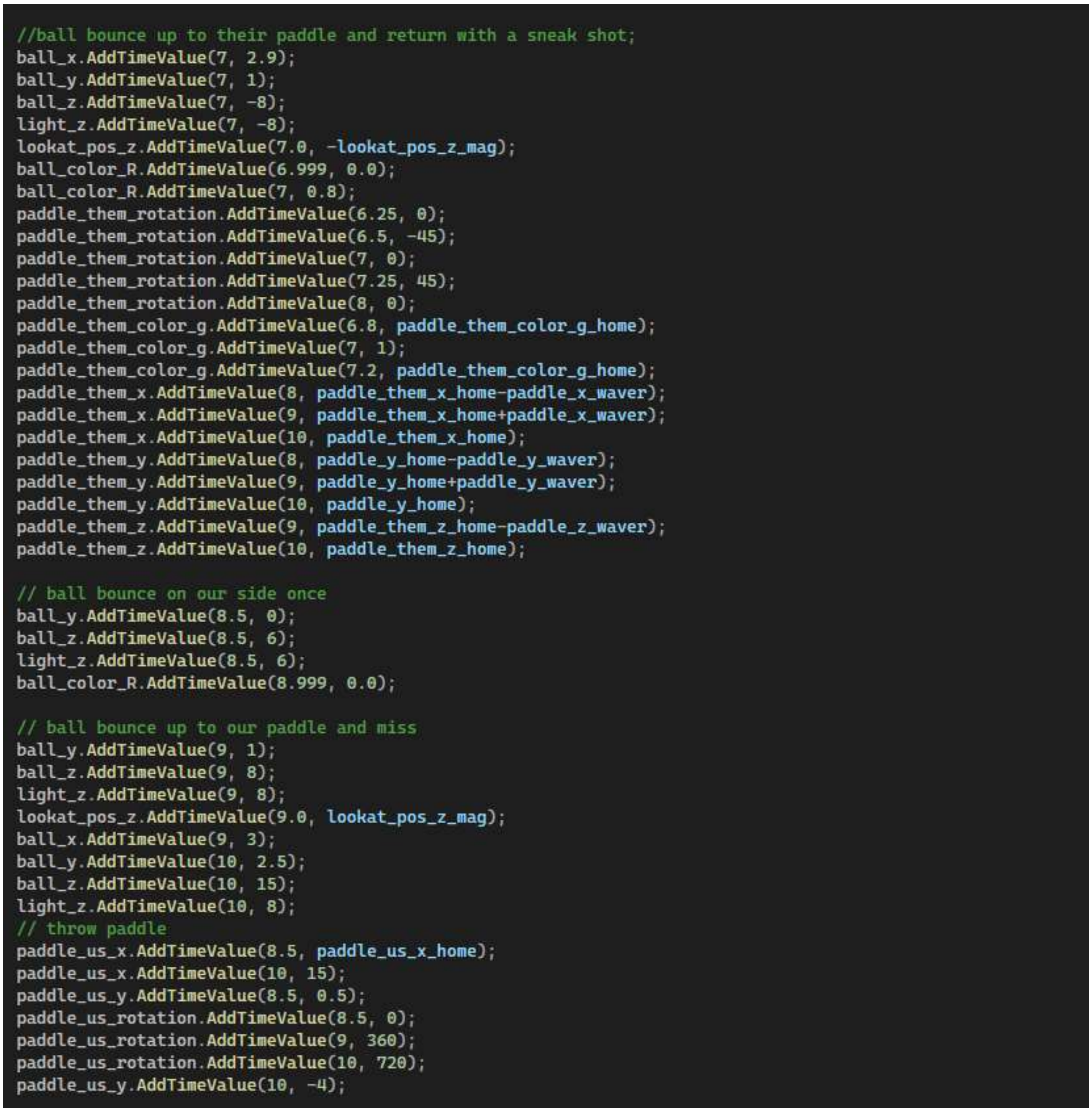
```
// ball toss up for serv;
ball_y.AddTimeValue(0.5, 2.5);
// come down, hit!
ball_x.AddTimeValue(1.0, -2.9);
ball_y.AddTimeValue(1.0, 1);
ball_z.AddTimeValue(1.0, 8);
light_z.AddTimeValue(1.0, 8);
lookat_pos_z.AddTimeValue(1.0, lookat_pos_z_mag);
ball_color_R.AddTimeValue(0.999, 0);
ball_color_R.AddTimeValue(1.0, 0.8);
paddle_us_rotation.AddTimeValue(0, 0);
paddle_us_rotation.AddTimeValue(0.5, -45);
paddle_us_rotation.AddTimeValue(1, 0);
paddle_us_rotation.AddTimeValue(1.25, 45);
paddle_us_rotation.AddTimeValue(2, 0);
paddle_us_color_r.AddTimeValue(0.8, paddle_us_color_r_home);
paddle_us_color_r.AddTimeValue(1, 1);
paddle_us_color_r.AddTimeValue(1.2, paddle_us_color_r_home);
// our paddle wavers after hit until next hit
paddle_us_x.AddTimeValue(2, paddle_us_x_home-paddle_x_waver);
paddle_us_x.AddTimeValue(3, paddle_us_x_home+paddle_x_waver);
paddle_us_x.AddTimeValue(4, paddle_us_x_home-paddle_x_waver);
paddle_us_x.AddTimeValue(5, paddle_us_x_home);
paddle_us_y.AddTimeValue(2, paddle_y_home-paddle_y_waver);
paddle_us_y.AddTimeValue(3, paddle_y_home+paddle_y_waver);
paddle_us_y.AddTimeValue(5, paddle_y_home);
paddle_us_z.AddTimeValue(3, paddle_us_z_home-paddle_z_waver);
paddle_us_z.AddTimeValue(4, paddle_us_z_home+paddle_z_waver);
paddle_us_z.AddTimeValue(5, paddle_us_z_home);
```



```
 // ball bounce on their side once while our paddle wavers
 ball_y.AddTimeValue(2.5, 0);
 ball_z.AddTimeValue(2.5, -6);
 light_z.AddTimeValue(2.5, -6);

 //ball bounce up to their paddle and return;
 ball_x.AddTimeValue(3, 2.9);
 ball_y.AddTimeValue(3, 1);
 ball_z.AddTimeValue(3, -8);
 light_z.AddTimeValue(3, -8);
 lookat_pos_z.AddTimeValue(3.0, -lookat_pos_z_mag);
 ball_color_R.AddTimeValue(2.999, 0.0);
 ball_color_R.AddTimeValue(3, 0.8);
 paddle_them_rotation.AddTimeValue(2.25, 0);
 paddle_them_rotation.AddTimeValue(2.5, -45);
 paddle_them_rotation.AddTimeValue(3, 0);
 paddle_them_rotation.AddTimeValue(3.25, 45);
 paddle_them_rotation.AddTimeValue(4, 0);
 paddle_them_color_g.AddTimeValue(2.8, paddle_them_color_g_home);
 paddle_them_color_g.AddTimeValue(3, 1);
 paddle_them_color_g.AddTimeValue(3.2, paddle_them_color_g_home);
 // their paddle wavers after hit until next hit
 paddle_them_x.AddTimeValue(4, paddle_them_x_home-paddle_x_waver);
 paddle_them_x.AddTimeValue(5, paddle_them_x_home+paddle_x_waver);
 paddle_them_x.AddTimeValue(6, paddle_them_x_home-paddle_x_waver);
 paddle_them_x.AddTimeValue(7, paddle_them_x_home);
 paddle_them_y.AddTimeValue(4, paddle_y_home-paddle_y_waver);
 paddle_them_y.AddTimeValue(5, paddle_y_home+paddle_y_waver);
 paddle_them_y.AddTimeValue(7, paddle_y_home);
 paddle_them_z.AddTimeValue(5, paddle_them_z_home-paddle_z_waver);
 paddle_them_z.AddTimeValue(6, paddle_them_z_home+paddle_z_waver);
 paddle_them_z.AddTimeValue(7, paddle_them_z_home);

 // ball bounce on our side once
 ball_y.AddTimeValue(4.5, 0);
 ball_z.AddTimeValue(4.5, 6);
 light_z.AddTimeValue(4.5, 6);
```



```
// ball bounce up to our paddle and return
ball_x.AddTimeValue(5, -2.9);
ball_y.AddTimeValue(5, 1);
ball_z.AddTimeValue(5, 8);
light_z.AddTimeValue(5, 8);
lookat_pos_z.AddTimeValue(5.0, lookat_pos_z_mag);
ball_color_R.AddTimeValue(4.999, 0.0);
ball_color_R.AddTimeValue(5, 0.8);
paddle_us_rotation.AddTimeValue(4.25, 0);
paddle_us_rotation.AddTimeValue(4.5, -45);
paddle_us_rotation.AddTimeValue(5, 0);
paddle_us_rotation.AddTimeValue(5.25, 45);
paddle_us_rotation.AddTimeValue(6, 0);
paddle_us_color_r.AddTimeValue(4.8, paddle_us_color_r_home);
paddle_us_color_r.AddTimeValue(5, 1);
paddle_us_color_r.AddTimeValue(5.2, paddle_us_color_r_home);
paddle_us_x.AddTimeValue(6, paddle_us_x_home-paddle_x_waver);
paddle_us_x.AddTimeValue(7, paddle_us_x_home+paddle_x_waver);
paddle_us_x.AddTimeValue(8, paddle_us_x_home-paddle_x_waver);
paddle_us_x.AddTimeValue(9, paddle_us_x_home);
paddle_us_y.AddTimeValue(6, paddle_y_home-paddle_y_waver);
paddle_us_y.AddTimeValue(7, paddle_y_home+paddle_y_waver);
paddle_us_y.AddTimeValue(9, paddle_y_home);
paddle_us_z.AddTimeValue(7, paddle_us_z_home-paddle_z_waver);
paddle_us_z.AddTimeValue(8, paddle_us_z_home+paddle_z_waver);
paddle_us_z.AddTimeValue(9, paddle_us_z_home);

// ball bounce on their side once
ball_y.AddTimeValue(6.5, 0);
ball_z.AddTimeValue(6.5, -6);
light_z.AddTimeValue(6.5, -6);
ball_color_R.AddTimeValue(6.5, 0.0);
```



```
//ball bounce up to their paddle and return with a sneak shot;
ball_x.AddTimeValue(7, 2.9);
ball_y.AddTimeValue(7, 1);
ball_z.AddTimeValue(7, -8);
light_z.AddTimeValue(7, -8);
lookat_pos_z.AddTimeValue(7.0, -lookat_pos_z_mag);
ball_color_R.AddTimeValue(6.999, 0.0);
ball_color_R.AddTimeValue(7, 0.8);
paddle_them_rotation.AddTimeValue(6.25, 0);
paddle_them_rotation.AddTimeValue(6.5, -45);
paddle_them_rotation.AddTimeValue(7, 0);
paddle_them_rotation.AddTimeValue(7.25, 45);
paddle_them_rotation.AddTimeValue(8, 0);
paddle_them_color_g.AddTimeValue(6.8, paddle_them_color_g_home);
paddle_them_color_g.AddTimeValue(7, 1);
paddle_them_color_g.AddTimeValue(7.2, paddle_them_color_g_home);
paddle_them_x.AddTimeValue(8, paddle_them_x_home-paddle_x_waver);
paddle_them_x.AddTimeValue(9, paddle_them_x_home+paddle_x_waver);
paddle_them_x.AddTimeValue(10, paddle_them_x_home);
paddle_them_y.AddTimeValue(8, paddle_y_home-paddle_y_waver);
paddle_them_y.AddTimeValue(9, paddle_y_home+paddle_y_waver);
paddle_them_y.AddTimeValue(10, paddle_y_home);
paddle_them_z.AddTimeValue(9, paddle_them_z_home-paddle_z_waver);
paddle_them_z.AddTimeValue(10, paddle_them_z_home);

// ball bounce on our side once
ball_y.AddTimeValue(8.5, 0);
ball_z.AddTimeValue(8.5, 6);
light_z.AddTimeValue(8.5, 6);
ball_color_R.AddTimeValue(8.999, 0.0);

// ball bounce up to our paddle and miss
ball_y.AddTimeValue(9, 1);
ball_z.AddTimeValue(9, 8);
light_z.AddTimeValue(9, 8);
lookat_pos_z.AddTimeValue(9.0, lookat_pos_z_mag);
ball_x.AddTimeValue(9, 3);
ball_y.AddTimeValue(10, 2.5);
ball_z.AddTimeValue(10, 15);
light_z.AddTimeValue(10, 8);
// throw paddle
paddle_us_x.AddTimeValue(8.5, paddle_us_x_home);
paddle_us_x.AddTimeValue(10, 15);
paddle_us_y.AddTimeValue(8.5, 0.5);
paddle_us_rotation.AddTimeValue(8.5, 0);
paddle_us_rotation.AddTimeValue(9, 360);
paddle_us_rotation.AddTimeValue(10, 720);
paddle_us_y.AddTimeValue(10, -4);
```