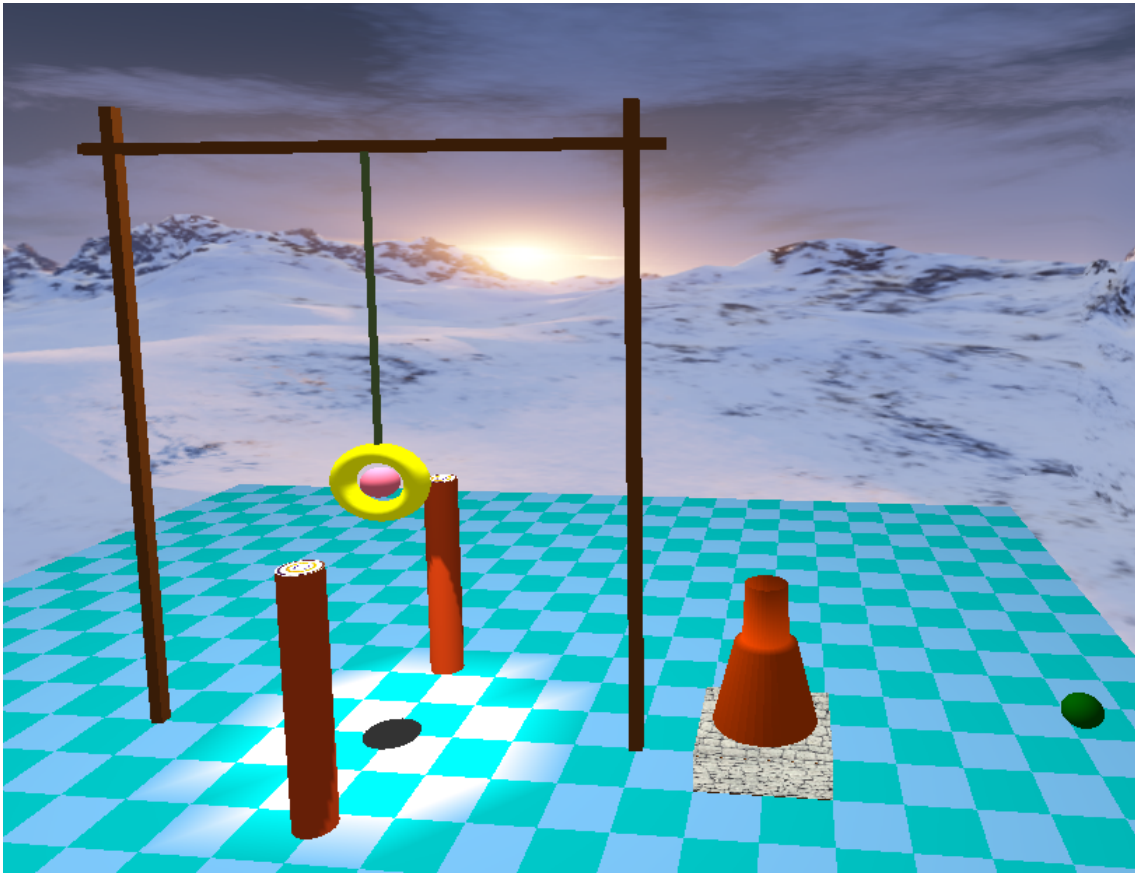
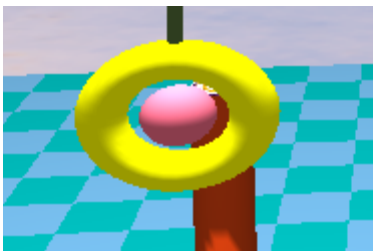


Minfang Yu  
75219495

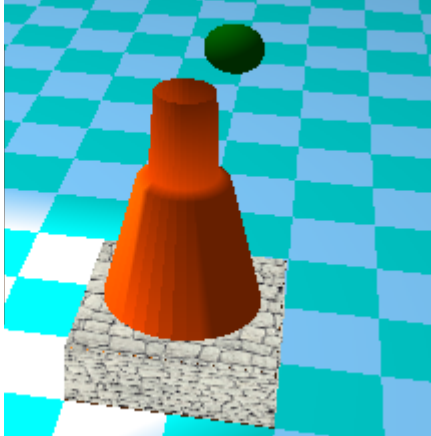


1. This is the whole sense. It is built in the snow mountain and has two synchronized animations. The torus swings left and right, while the sphere will swing back and forth. When the torus reaches its lowest point and the sphere reaches its highest point, the sphere can pass through the middle of the torus. The sphere is bounced back and forth by two spring pillars in a circular motion, and the torus is pulled in a circular motion by an inelastic rope hung on the shelf. There is a base next to the shelf with a barrel built on it. It detects collisions and automatically launches a bullet every time the sphere hits the spring pillar in front. The bullet will make a parabolic motion after firing. The green sphere in the lower right corner of the photo is a bullet moving along the parabola.



2. First, the most important thing is that the torus and sphere will never collide. The sphere can pass through the middle of the torus. They will reach the point shown in

previous two photos at the same time, which is the only point where their respective circular motions intersect.



Next is the sweep surface I generated. It is a barrel and the green bullet will be launched from its muzzle.

### 3. Extra Features:

I generate a planar shadow of the pink sphere.

I generate a spot light, it is obvious and it will move with the movement of the yellow torus.

I make a parabolic calculation, the bullet will make a parabolic motion after firing.

I also make two circular motion calculations of the sphere and torus.

I make a collision detection that the barrel will automatically launch a bullet every time the sphere hits the spring pillar in front.

I generate a sky box which is shown as snow mountains.

I make a CmakeLists.txt file.

### 4.

Page Up	Increase camera height 1.0 in initial camera mode
Page Down	Decrease camera height 1.0 in initial camera mode
Up Arrow Key	Move camera forward
Down Arrow Key	Move camera backward
Right Arrow Key	Turn right some angle
Left Arrow Key	Turn left some angle

### 5.

1) open terminal

2) `g++ -o program Assignment.cpp -IGL -IGLU -lglut`

change the output name to 'program' using the -o option

3) `./program`

1) start up a editor, eg Geany

2) change the build command to `g++ -Wall -o "%e" "%f" -lm -IGL -IGLU -lglut`

3) Compile

6.Resources: Lecture, Lab

How to find point on circle. <https://www.jianshu.com/p/fb6bc53e4ff3>

Parabola. <https://en.wikipedia.org/wiki/Parabola>