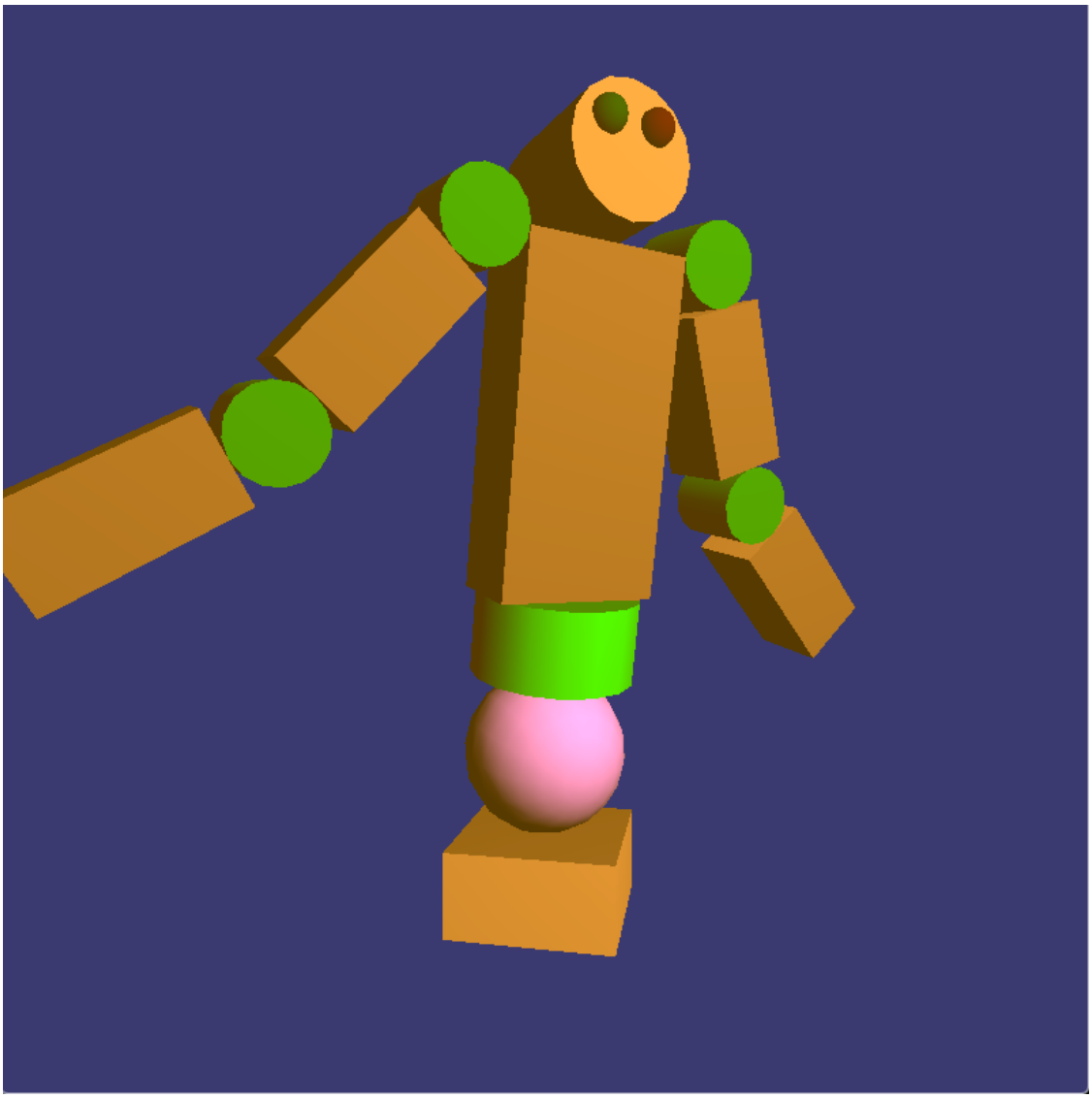
CS 770/870 Assignment 4

- Due: Tuesday, Oct. 4th.
- Late penalty: Wed: -5, Thu: -10, Fri: -20 Sat/Sun/Mon: -50 Tue: -100

Write a program to draw and control this robot:



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Specifications

The robot has the following body parts:

PART	COLOR	SHAPE

base	beige	box, 2x2x1
ball	purple	sphere,r=1
roller	green	cylinder, r=1,h=1
torso	beige	box, 2x1x4
head	beige	cylinder, r=0.75,h=1
eyes	red,green	sphere, r=0.2
shoulder & elbow joints	green	cylinder, r=0.5,h=1
arm bones	beige	box, 1x1x2

The base of the robot should positioned with its center at (0 0 0).

Controls

I am providing code, including a primitive keyboard-driven interface for adjusting the figure's angles. It uses these keys:

LEFT / RIGHT : choose next / previous parameter

UP / DOWN : increase / decrease parameter's value

SPACE : show all parameters

Finally, there are two Reset actions, which are triggered by any UP/DOWN action. One resets the Camera's parameters, and the other resets the angles.

Your Tasks

1. [45 points] Implement the `Shapes::cylinder(float n_slats)` method, in the file `shapes.cpp`. This should return a `std::vector` with three `Mesh3d` objects: the base, the top, and the round sides of a cylinder.

   The cylinder has radius 1, has its axis along the z axis, and extends from z=-1 to z=+1. The round sides should be approximated by `n_slats` vertical rectangles, stored in a `GL_TRIANGLE_STRIP`. The top and bottom are each a corresponding polygon with `n_slats` sides, stored in a `GL_TRIANGLE_FAN`.

2. [55 points] The `draw_scene()` function in `robot.cpp` currently draws the torso and left upper arm of the figure. Extend it to draw all the parts.

Turn in Your Work

When you are done, go to `mycourses.unh.edu`, find CS770/870 assignment 4, click the "Submit" button, and upload `robot.cpp` and `shapes.cpp`.

Important Note

As with all assignments, your program should, at least, compile and link successfully on `agate.cs.unh.edu`. Submissions that do not compile will score zero points.