CS6323 Computer Animation and Gaming

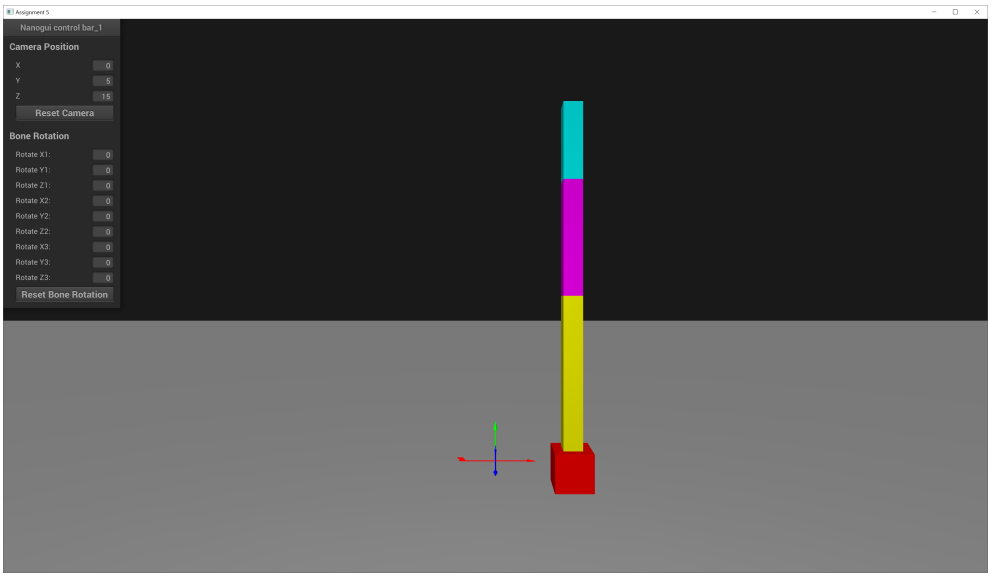
Assignment 5 (Grade: 10 Points)

Implement Forward Kinematics

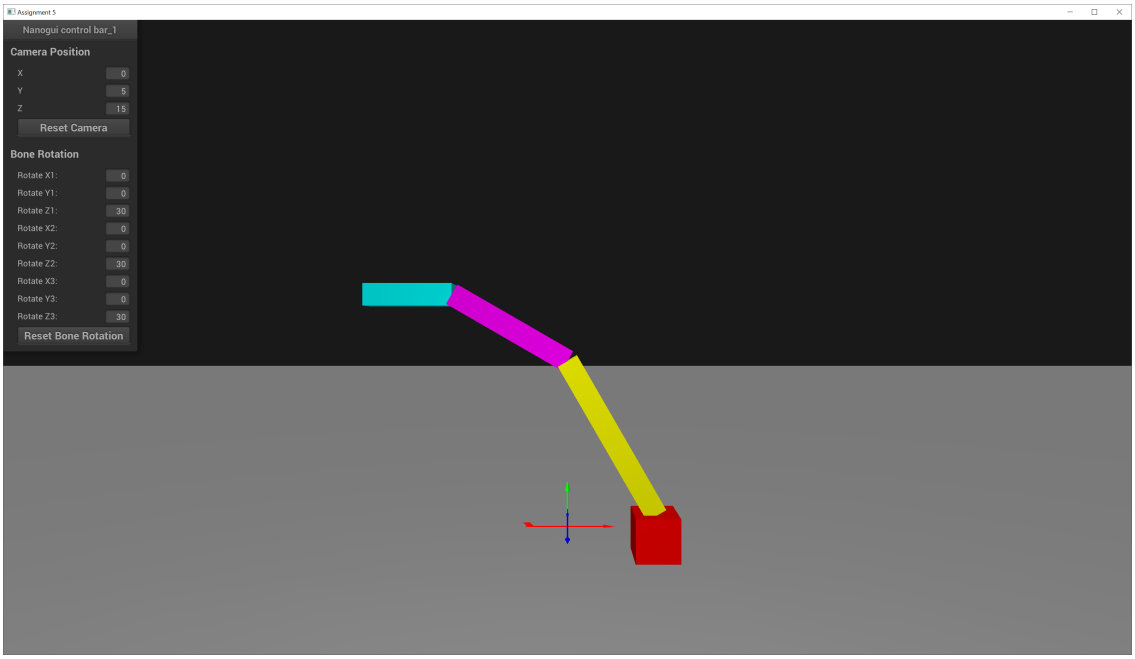
Write a program to animate a linkage with 3 joints and 9 degree of freedoms. Each joint is associated with 3 DOF, i.e. the rotation angles along y, z, x axis, respectively.

- For any 3 DOF joint, use the rotations in the following order: y-axis, z-axis, x-axis. The initial pose vector for each bone is $(\theta^y, \theta^z, \theta^x) = (0,0,0)$, with all the numbers in degrees.
- The red root cube has its position at: {2.0f, 0.0f, 2.0f}
- Each bone is model as a stretched cube. The scaling factor (in x, y, z directions) for each cube is:
    - Red: {1.0f, 1.0f, 1.0f}
    - Yellow: {0.5f, 4.0f, 0.5f},
    - Pink: {0.5f, 3.0f, 0.5f},
    - Blue: {0.5f, 2.0f, 0.5f}

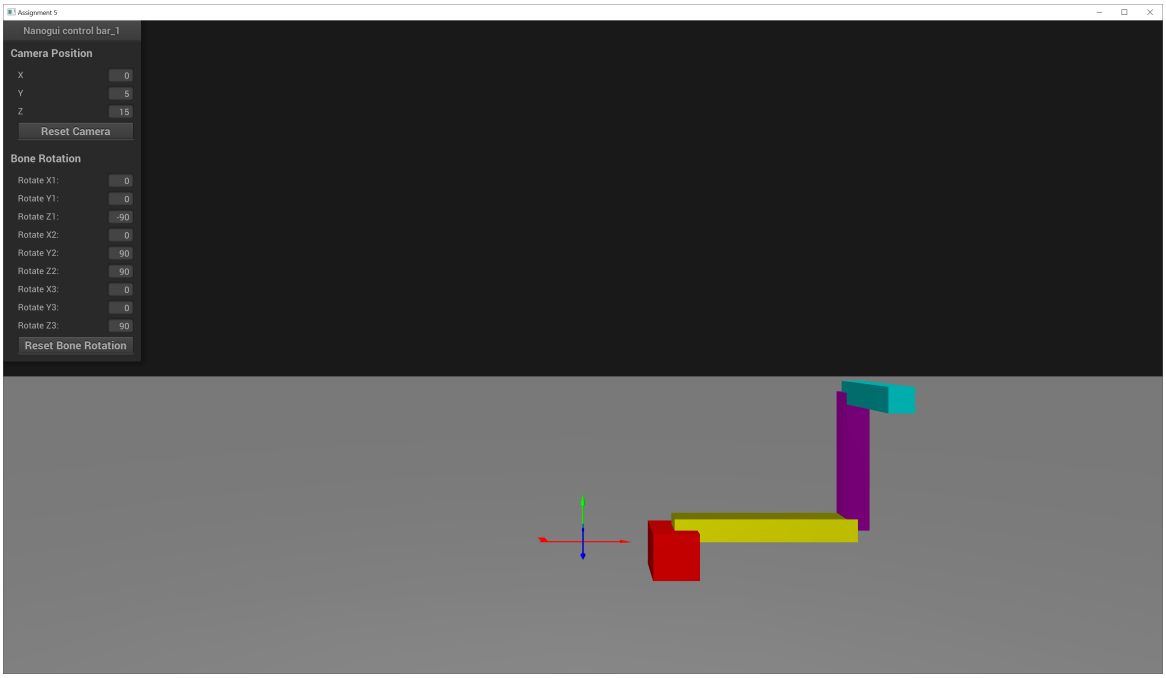
  In the starting code, the red cube is already defined in the model class. Use the corresponding colors to render these four bones. The linkage should be straight up initially as shown in the following figure: (Grade: 3 points)



- Support interactive control of the 9 DOFs. Here are two example poses to check your result: (Grade: 6 points)
    - If we set the pose vector $(\theta^y_{Yellow}, \theta^z_{Yellow}, \theta^x_{Yellow}, \theta^y_{Pink}, \theta^z_{Pink}, \theta^x_{Pink}, \theta^y_{Blue}, \theta^z_{Blue}, \theta^x_{Blue})$ to be (0, 30, 0, 0, 30, 0, 0, 30, 0), with all the numbers in degrees, we get the following result:



- If we set the pose vector $(\theta^{y}_{Yellow}, \theta^{z}_{Yellow}, \theta^{x}_{Yellow}, \theta^{y}_{Pink}, \theta^{z}_{Pink}, \theta^{x}_{Pink}, \theta^{y}_{Blue}, \theta^{z}_{Blue}, \theta^{x}_{Blue})$ to be (0, -90, 0, 90, 90, 0, 0, 90, 0), with all the numbers in degrees, we get the following result:



- Have a reset button to reset the linkage to the initial state. (Grade: 1 point)