HOMEWORK ASSIGNMENT 2 (PRACTICE)

CO19-320322: COMPUTER GRAPHICS
320322: GRAPHICS AND VISUALIZATION

Fall 2016

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Due: Friday, September 30, 2016, at 8pm.

Problem 2: Geometric Background & Object Representation   *(7+3+9+4+2=25 points)*
Write an OpenGL program that implements a simplified model of the Jacobs duck swimming in the Jacobs pond.

(a) Construct a model of the Jacobs duck. It should consist (at least) of a main body, a head, a beak, and a tail. For the body parts, you can use transformed GLUT objects such as *glutSolidSphere*, *glutSolidCube*, *glutSolidCone*, etc. The body parts shall be attached to each other in a realistic way.

(b) Place the duck in a pond. For the pond you can simply use a quadrilateral to model the water level. The duck should be placed such that its main body slightly enters the water. Use different colors for duck and water.

(c) Implement interactions that allow the user to

- smoothly translate the duck forward, i.e., in the direction the duck is looking,
- smoothly rotate the duck around an upward pointing rotation axis that goes through the barycenter of the duck's main body, and
- smoothly rotate the duck around a sideward pointing rotation axis that goes through the barycenter of the duck's main body, i.e., simulating the dunking of the duck's head.

(d) Use perspective projection to view the entire scene.
Note: Use *glutInitDisplayMode(GLUT_RGBA | GLUT_DOUBLE | GLUT_DEPTH)* and *glEnable(GL_DEPTH_TEST)* in your OpenGL initialization and *glClear (GL_COLOR_BUFFER_BIT | GL_DEPTH_BUFFER_BIT)* at the beginning of your *display* function for a correct rendering. In the tutorial, there may be some other commands introduced that you can use to make the rendering prettier. The meaning of these functions will be explained later on during the lecture. No need to wait for the tutorial though to start the assignment.

(e) Allow for user interaction to view the scene from all directions and to zoom in and out of the scene.

Bonus: Up to five bonus points may be assigned for particularly pretty solutions.

Remarks: Solutions for the practical part have to be handed in via jGrader (https://cantaloupe.eecs.jacobs-university.de/login.php) by the due date. For late submissions you need to get in contact with the TA directly. You need to upload one zip-file that contains all source files (no executables or object files) for the programming assignments.