

Interactive 3D Graphics and Animation
COSC1186/1187
Assignment
Title: Human Virtual Body Animation
Due Date : 31/5/2002
Assessment : 50%

Overview

Animation of synthetic faces and bodies is increasingly important in a range of applications. As research has progressed greater understanding has been gained and the area is now matured to the extent that we are seeing attempts at standard approaches. for facial MPEG-4 includes an approach for face and body animation.

The assignment is to implement an OpenGL program which does virtual body, or *humanoid*, animation using an approach based on the MPEG-4 virtual *body model*. The MPEG-4 body model is quite detailed, and has specific names for most *joints* and *segments* in the human body. In the assignment your minimal body model is to consist of a subset of the MPEG-4 joints and segments, as given below. The theme for the animation must be either a trampolinist doing acrobatics on a trampoline or a diver diving from a board into a diving pool.

In the simplest case (for a pass level assignment):

1. The minimum body model must consist of the following joints and segments:

```
HumanoidRoot : sacrum
  sacroiliac : pelvis
  | l_hip : l_thigh
  |   l_knee : l_calf
  |     l_ankle : l_hindfoot
  | r_hip : r_thigh
  |   r_knee : r_calf
  |     r_ankle : r_hindfoot
v15 : 15
  vc7 : c7
  | skullbase : skull
  l_sternoclavicular : l_clavicle
  | l_shoulder : l_upperarm
  |   l_elbow : l_forearm
  |     l_wrist : l_hand
  r_sternoclavicular : r_clavicle
  | r_shoulder : r_upperarm
  |   r_elbow : r_forearm
  |     r_wrist : r_hand
```

2. Your humanoid must be capable of the gesture of giving a bow whilst on either the diving board or the trampoline by interactively controlling appropriate joints.
3. Your humanoid must also be capable of then either diving into the pool or jumping into the air from the trampoline - and performing a somersault in the process.
4. You should allow the user to change the rendering from wireframe through to lit and fully shaded.
5. Options for controlling rendering parameters, animations and interactive control of joints may be from the keyboard or from glut menus.

The robot arm and solar system example programs from *The OpenGL Programming Guide* are a good place to start on the assignment.

Optional Extensions

There are many extensions possible, for higher marks. Some are:

- Reading in *parameter curves* to control the animations.
- Reading in your humanoid model in from a file.
- Animating the trampoline or diving board.
- Using a hierarchical data structure for your humanoid model.
- Adding rendering effect such as texturing, transparency and fog.
- Allowing other moves such as triple somersaults.
- Allowing other gestures such as “waving”.
- Using polygon meshes for the humanoid model.
- Add other objects such as a ball which the humanoid interacts with.
- Add other humanoids which interact.

Not all of these extensions are of equal difficulty. For instance, reading the model from a file and using a hierarchical data structure is much more difficult than embedding the model in the program. Building a great detailed model by hand is *not* the main aim of the assignment, you should aim for interesting animation or gestures of a relatively simple model.

Assessment

Assessment will be based on:

- The demonstration of your work where you point out just what you have done.
- The quality of your work (including your program).
- The difficulty of your work.
- The functionality your work.
- The creativity of your work including animation.
- Your report discussing what you have done.

Your program must be demonstrated on the machines in the Sutherland Laboratory. Demonstrations will take place in the final week of semester. There will be an opportunity in the laboratories in the weeks before the final demonstration to preview your work and gain some provisional feedback before you submit. More guidance on the marking scheme will be provided later in the semester.

Implementation

You must use OpenGL as the 3D graphics library, GLUT as the windowing system and C or C++ as the programming language.

Submission

Your assignment submission must include:

- A tar file containing your source code submitted using turnin.
- A makefile which works.
- A report of what you have done. Your report must be in XHTML format and also be available from your student subject web page.