CS480/580 Introduction to Computer Graphics

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Office Hours: Tuesday/Thursday: 7:15-8:15p.m.;
Wednesday: 11am-12noon

Project 3 (Due Date May 3rd, 2007, Demos: May 1st - May 7th, 2007) (15% of the total grade for CS480 students)

This project deals with using a series of poses (keyframes) for moving the table. We will make additions to project 2 by specifying another file (The Action_File) as shown in Figure 3. We want to apply the same transformations repeatedly to the table so that the table would be physically moving. The Action_File allows the poses to be changed without recompiling the program.

In the Action_File M indicates how many times sequence of poses are to be repeated. In the Action_File N is the number of frames between two keyframes and indicates how many frames there are between two key-frames. Linear interpolation should be used so that angles are changed gradually between these two frames. For example, if angle = 25, and N is 5, then between pose 1 (keyframe 1) and pose 2 (keyframe 2), there would be five angles for the upper-leg as 5, 10, 15, 20, 25.

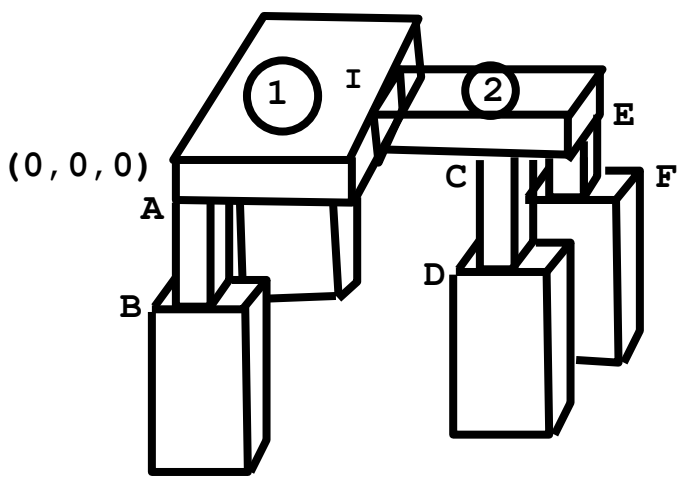
The Action_File also contains key angle descriptions as shown in Figure 3. All the four legs will use the same script. Let us consider the leg with joint A and B. Each keyframe specifies a rotation about the x-axis (See Figure 2) for joints A and B. The keyframe 1 indicates that both of these angles are zero, and we have a straight leg. As the leg moves forward, the angles of rotations would be a and -a respectively. The keyframe 4 indicates that both the angles are returning to zero, and a translation has been added. Please

note that the translation should be applied to the center of the table top so that all the legs move along with the table-top. The approximate poses are also shown in Figure 3. Translation is specified by x, y, and z values. Please note that a variety of walks are possible by specifying different values of a and x, y and z.

As in project 2, *pick* should still be working for project 3 as well. We should also be able to change the shape (shape_file) of the table and the minimum and maximum angle limits (joint_file) for the table as in project 2. In addition, add double-buffering and swapbuffers (if you have not added them already) to provide a smoother transformation.

Once the assignment is done, please arrange a time during office hours for a demonstration of the project. I will post the sign up sheet at my office door (EN 180) for project demonstrations.

Good luck. If you have any questions, please let me know.




```
shape_file:

10
1     1.5   .2   0 0 0   0 0   0
1.2    .5   .2   0 0 0   1 .3  0
●●●
```

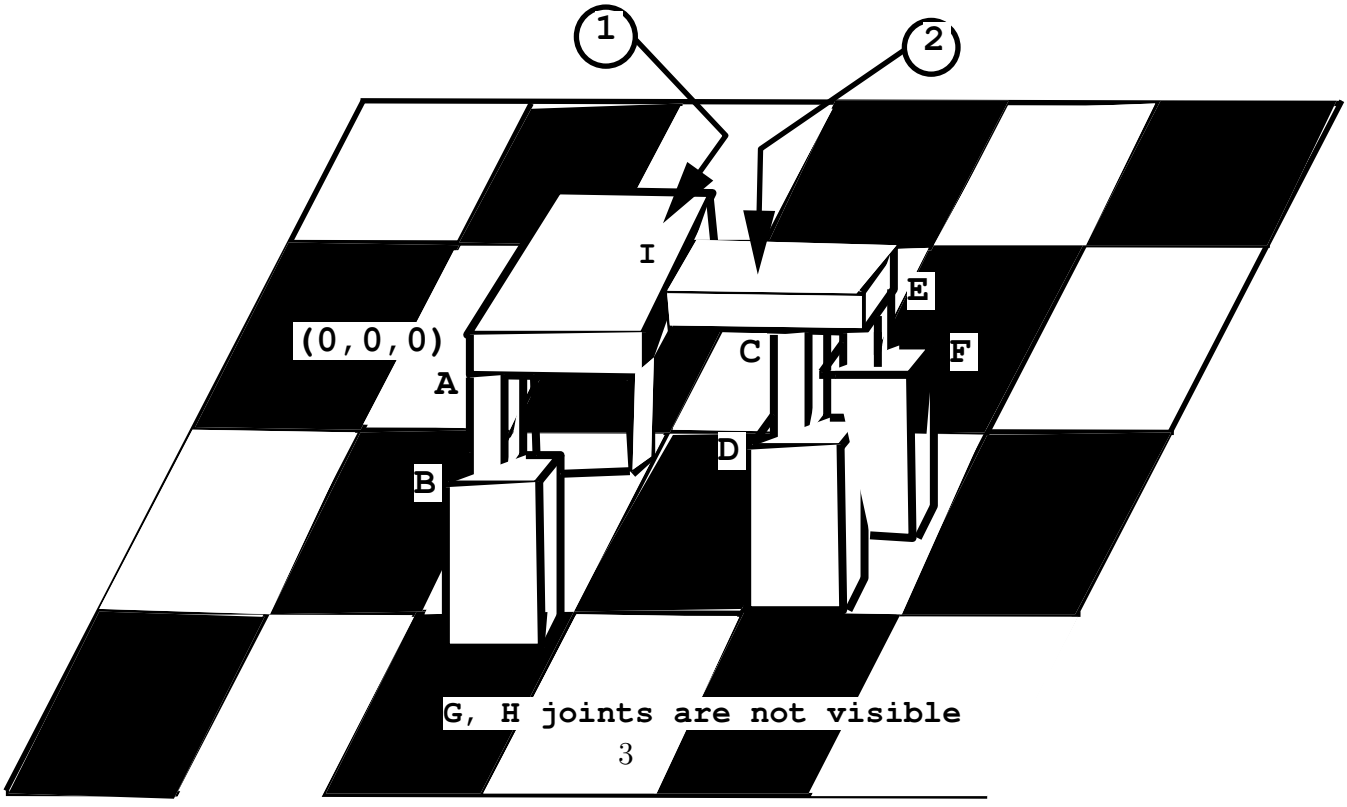


Figure 1: Table with shape file and floor. Joints are also shown.

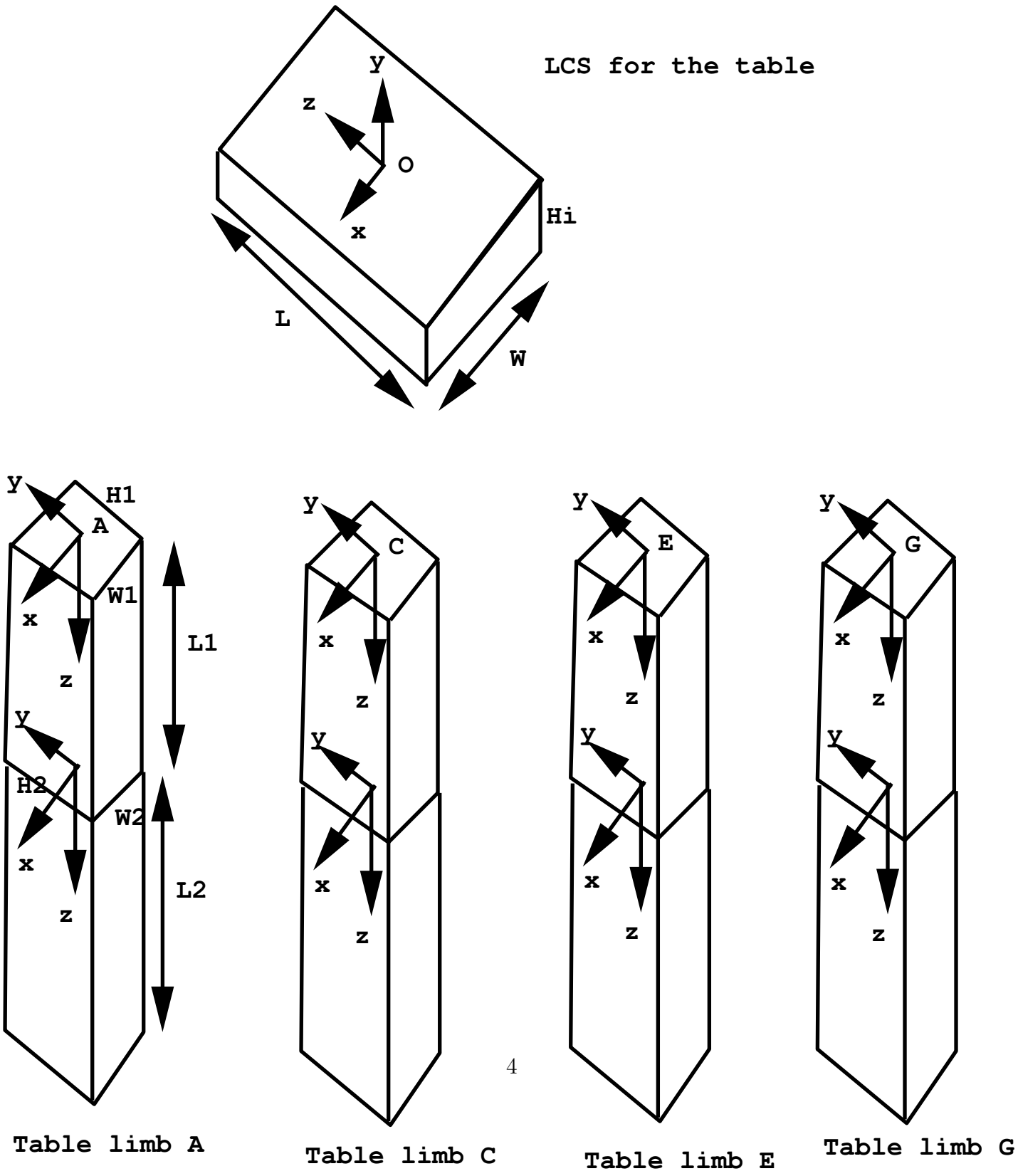
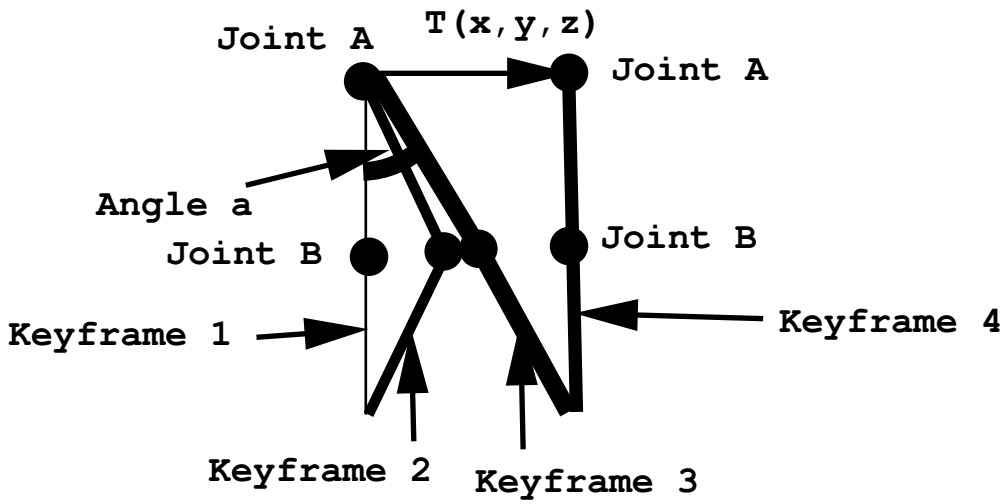


Figure 2: Local coordinate systems for each of the limb are shown



Action_File will have series of positions:

```
No_of_times_to_repeat = M

No_of_frames_between_keyframes = N
Keyframe 1: 0    0     0 0 0
Keyframe 2: a    -a    0 0 0
Keyframe 3: a    0     0 0 0
Keyframe 4: 0    0     x y z
```

Keyframe 1: specifies starting position of all the legs of the table. Angle a is the rotation angle about the x-axis (See Figure 2) for the upper leg, and -a is the angle for the lower leg.

Keyframe 4: defines a position where the leg is back to its original position, but the whole table moves with a translation T(x,y,z).

The animation should repeat M times, and there are N frames of animation between two keyframes specified in the Action_File.

Figure 3: Four poses, and Action-File description.