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6.387 Project Proposal

We want to expand upon the skinning techniques from class. In particular, the problem we are solving is making the animation of moving characters more realistic, by modeling the deformation of skin and flesh that follows the movement of a skeleton.

This problem is interesting, because the problem set that we did with skinning was not animated, and did not take into account this kind of movement. Successfully implementing this would make our character models look a lot more realistic when animated.

This problem has been tackled (probably many times) before, in video gaming/CG animations in movies. Because we do not have too much experience working with these technologies, we expect to fall more on the video gaming side, where the algorithms/techniques to create these models are more simplistic and faster to compute.

The papers that we will be implementing/referencing are:

Dynamic Skinning : Adding Real-Time Dynamic Effects to an Existing Character Animation - Larboulette, Cani, Arnaldi (2005)

Fast simulation of skeleton-driven deformable body characters - Kim, Pollard (2011)

The first paper (Larboulette, Cani, Arnaldi) tackles this problem for several different kinds of objects, i.e. humans, animals, mushrooms, and attempts to add dynamic effects quickly, with little extra computation beyond the original animation sequence. Their skinning solution uses a second frame with the flesh volume, and computes the movement of the local tissues in relation to the movement of the skeleton.

In the second paper (Kim, Pollard), the authors created realistic motions by considering interactions between the skeleton, the deformable body, and the environment. They used a physically based simulation system with a body model that allowed for deformation in order to represent the animated flesh. The bodies are attached to the skeletons, similarly to our previous skinning technique, but also takes into account external forces deforming the mesh, allowing for more realistic animations. We don't plan on animating contact forces like they do in the paper (e.g. they animated a moving starfish interacting with the ground), but we can look to their body mesh as an example.

The substantial programming component of this project is coding the techniques to model the deformation of flesh. To demonstrate our work, we will find several character meshes, and then use the techniques in these papers to animate them under different forces (i.e. gravity, drag, or "a gentle wind"), and we will submit several clips of these animations for our final project.

I will be working with Helen Ho on this project.