# CSC 2521 Computer Graphics, Fall 2006, Assignment 2: Project

For this project, you will design and implement a physical animation system. The project should be one of the following, or the rough equivalent:

1. Full-body "ragdoll simulation:" implement simulated articulated rigid body dynamics.
2. Spacetime character animation: Create full-body character motion based on sparse animation constraints.
3. Learn spacetime animation of multiple individuals or of animals from examples.
4. Implement an existing research paper.

Your implementation may be on any platform and language, but you should implement a signficant portion of the dynamics computations yourself. OpenGL/interactive results are much preferred (and will give you more satisfying results) than MATLAB implementations.

The milestones for this project are as follows:

1. **Discuss the idea with me informally.** I can provide pointers to the literature and suggestions, and let you know if I think the proposal is too difficult or too easy. No deadline, but I recommend you do this before getting too deep in the proposal.
2. **Detailed project proposal,** due: November 7. This is a written proposal, and should include the following components:
   (a) A brief abstract, outlining the overall goals of the project, and the methods used.
   (b) A detailed description of the components of the system to be implemented.
   (c) A complete mathematical description of the project. For example, for a rag-doll simulation, this would include the body parameterization, and the derivation of the equations of motion in terms of the body parameterization. I can point out some references that may assist you with the derivation. *Note:* You don't need to fully substitute everything through; that would get too complicated. For example, if $h(x) = f(g(x))$, and you need to evaluate $dh/dx$, then it's sufficient to write out the chain rule for $h$, followed by the derivatives of $f$ and $g$. You can also make use of recursive definitions: instead of writing one equation for every body part, write the general equation for body part $i$ as a function of its parents and children in the kinematic hierarchy.
   (d) An outline of the stages of the project and the expected amount of time required for each stage. Make sure that the stages are incremental, i.e., implement a basic version before adding bells and whistles. This will ensure that you have something to show even if you don't meet all your goals by the deadline.
   (e) A list of references that you consulted for this project, both for inspiration and mathematical details.
   (f) Outside code, libraries, and/or data that you plan to use, if any.
3. **Final implementation,** due: Dec 8, but I will be very flexible with extensions. Your final deliverable for the project is a live demo of the system with me, explaining the system, what you learned from the project, what was unexpected, etc. If you prefer, you may submit a written report and accompanying video/demo instead.

The final mark for this assignment will be split evenly between the project proposal and the final demonstration.