15-464/15-664 Reference List 4/7/15

Before we get started with the list, let me mention that this reference is very thorough, and contains a great deal of background material up to 2011:

Geijtenbeek, Thomas, Nicolas Pronost, Arjan Egges, and Mark H. Overmars. "Interactive character animation using simulated physics." *Eurographics-state of the art reports* 2 (2011). http://www.cs.uu.nl/docs/vakken/mgp/literature/Interactive%20Character%20Animation%20Using%20Simulated%20Physics%20-%20A%20State-of-the-Art%20Review.pdf

The following paper mixes simulation and interactive control in an interesting way:

Laszlo, Joseph, Michiel van de Panne, and Eugene Fiume. "**Interactive control for physically-based animation**." In Proceedings of the 27th annual conference on Computer graphics and interactive techniques, pp. 201-208. ACM Press/Addison-Wesley Publishing Co., 2000. http://www.dgp.toronto.edu/~jflaszlo/interactive-control.html

My handout "spatial.pdf" walks through how to create a forward dynamic simulation of the Luxo lamp character using Featherstone dynamics and associated Spatial Vector notation. http://graphics.cs.cmu.edu/nsp/course/15-869/slides/spatial.pdf

Extremely useful background on physics simulation for computer graphics in general can be found in the 1997 SIGGRAPH course notes for the course "**Physically Based Modeling: Principles and Practice**," by David Baraff and Andrew Witkin. However, this course does not cover simulation of animated characters. http://www.cs.cmu.edu/~baraff/sigcourse/

For me, the easiest way to implement and understand forward dynamics was by implementing and using Featherstone inverse dynamics. However, there is an efficient recursive forward dynamics algorithm courtesy of Roy Featherstone. The go-to reference for learning this algorithm from the ground up is Brian Mirtich's 1996 dissertation (Chapter 4). Note that the Appendix in Mirtich's thesis also contains some very useful mathematical information and derivations.

Mirtich, Brian Vincent. "**Impulse-based dynamic simulation of rigid body systems**." PhD diss., University of California, 1996. http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.108.783

The following paper is a practical overview of using the Featherstone forward dynamics algorithm from a game development perspective:

Kokkevis, Evangelos. "**Practical physics for articulated characters**." In Game Developers Conference, vol. 2004.
http://www.computerscience.nl/docs/vakken/mgp/literature/Practical%20Physics%20for%20Articulated%20Characters.pdf

If you want another view on recursive inverse dynamics, see the following tutorial from Karen Liu (Chapter 7). This tutorial also includes a derivation of Lagrangian dynamics, from which the familiar equations of motion can be obtained. This tutorial was written in the context of introducing Karen Liu's simulator RTQL8. http://www.cc.gatech.edu/~karenliu/RTQL8_files/dynamics-tutorial.pdf
http://www.cc.gatech.edu/~karenliu/RTQL8.html

We talked about some early control papers:

Raibert, Marc H., and Jessica K. Hodgins. "Animation of dynamic legged locomotion." In *ACM SIGGRAPH Computer Graphics*, vol. 25, no. 4, pp. 349-358. ACM, 1991.
http://dl.acm.org/citation.cfm?id=122755&dl=ACM&coll=DL&CFID=657285216&CFTOKEN=27654732

Jessica K. Hodgins, Wayne L. Wooten, David C. Brogan, and James F. O'Brien. 1995. Animating human athletics. In *Proceedings of the 22nd annual conference on Computer graphics and interactive techniques* (SIGGRAPH '95), Susan G. Mair and Robert Cook (Eds.). ACM, New York, NY, USA, 71-78. DOI=10.1145/218380.218414 http://doi.acm.org/10.1145/218380.218414

Yin, KangKang, Kevin Loken, and Michiel van de Panne. "Simbicon: Simple biped locomotion control." In *ACM Transactions on Graphics (TOG)*, vol. 26, no. 3, p. 105. ACM, 2007.
http://www.cs.ubc.ca/~van/papers/Simbicon.htm

Creating softness in the motion is a major problem. Here are two papers which address that problem:

Jain, Sumit, and C. Karen Liu. "Controlling physics-based characters using soft contacts." In *ACM Transactions on Graphics (TOG)*, vol. 30, no. 6, p. 163. ACM, 2011.
http://www.cc.gatech.edu/graphics/projects/Sumit/homepage/projects/softcontacts/

Geijtenbeek, Thomas, Michiel van de Panne, and A. Frank van der Stappen. "Flexible muscle-based locomotion for bipedal creatures." *ACM Transactions on Graphics (TOG)* 32, no. 6 (2013): 206.
http://www.cs.ubc.ca/~van/papers/2013-TOG-MuscleBasedBipeds/index.html