15-464/15-664 Reference List for April 26, 2021

We started by talking about the research of Jernej Barbic and his students on detailed simulation models for the human hand.

Wang, Bohan, George Matcuk, and Jernej Barbič. "Hand modeling and simulation using stabilized magnetic resonance imaging." *ACM Transactions on Graphics (TOG)* 38, no. 4 (2019): 1-14.
http://barbic.usc.edu/hand-mri/

We then moved on to talk about modeling the shape of the human body. I started by mentioning the SCAPE project from 2005:

Anguelov, Dragomir, Praveen Srinivasan, Daphne Koller, Sebastian Thrun, Jim Rodgers, and James Davis. "SCAPE: shape completion and animation of people." In *ACM SIGGRAPH 2005 Papers*, pp. 408-416. 2005.
http://robotics.stanford.edu/~drago/Projects/scape/scape.html

This was followed by the SMPL project at Max Planck, which attempted to make such tools more accessible and useful to animators by making all deformations in the same style as Linear Blend Skinning.

Loper, Matthew, Naureen Mahmood, Javier Romero, Gerard Pons-Moll, and Michael J. Black. "SMPL: A skinned multi-person linear model." *ACM transactions on graphics (TOG)* 34, no. 6 (2015): 1-16.
https://smpl.is.tue.mpg.de/

Subsequent research by the same group added dynamics with a finite element outer layer of skin:

Kim, Meekyoung, Gerard Pons-Moll, Sergi Pujades, Seungbae Bang, Jinwook Kim, Michael J. Black, and Sung-Hee Lee. "Data-driven physics for human soft tissue animation." *ACM Transactions on Graphics (TOG)* 36, no. 4 (2017): 54.
https://ps.is.tuebingen.mpg.de/publications/meekyoung-siggraph

.. and addressed the problem of capturing clothing.

S. Saito, J. Yang, Q. Ma, M. J. Black. "SCANimate: Weakly Supervised Learning of Skinned Clothed Avatar Networks," *CVPR* 2021. https://scanimate.is.tue.mpg.de/

The group's research web pages are interesting to browse:
https://ps.is.tuebingen.mpg.de/research_fields/virtual-humans

We concluded with a very quick look at the following paper, which uses an inner volumetric muscle model to facilitate growing a range of body types, all of which can be physically simulated.

Saito, Shunsuke, Zi-Ye Zhou, and Ladislav Kavan. "Computational bodybuilding: Anatomically-based modeling of human bodies." *ACM Transactions on Graphics (TOG)* 34, no. 4 (2015): 41.
https://www.cs.utah.edu/~ladislav/saito15computational/saito15computational.html