Reference List 15-464 / 15-664 Feb 12, 2020

Today we had a look at a number of final project examples from earlier classes. I thought it might be useful to list the major references that were inspiration for each project. If you have any questions about specific details or how a project was carried out, please let me know.

We started by looking at a contact modeling project. (Remember the bouncing and inverting mesh dragon?) This project was built on Vega FEM
http://barbic.usc.edu/vega/

The paper that inspired the contact modeling technique was this one:

Perez, Alvaro G., Gabriel Cirio, Fernando Hernandez, Carlos Garre, and Miguel A. Otaduy. "Strain limiting for soft finger contact simulation." In 2013 World Haptics Conference (WHC), pp. 79-84. IEEE, 2013.
https://ieeexplore.ieee.org/abstract/document/6548388

Next, we looked at a PIC/FLIP fluid simulator, which was constructed bit by bit by rewriting and replacing modules in a Houdini implementation. The PIC/FLIP solver was introduced to computer graphics by this paper. However, by now, there are many tutorials and implementations available online.

Zhu, Yongning, and Robert Bridson. "Animating sand as a fluid." ACM Transactions on Graphics (TOG) 24, no. 3 (2005): 965-972.
https://dl.acm.org/doi/10.1145/1073204.1073298

We then looked at an exploration of height fields. If you are interested in exploring height fields, here are some resources, including one that covers breaking waves:

Müller-Fischer, Matthias. "Fast water simulation for games using height fields." In Proceedings of the Game Developer's Conference. 2008.
http://twvideo01.ubm-us.net/o1/vault/gdc08/slides/S6509i1.pdf

Miklós, Bálint, and M. Müller. "Real time fluid simulation using height fields." Semester thesis (2004).
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.138.5153&rep=rep1&type=pdf

Thurey, Nils, Matthias Muller-Fischer, Simon Schirm, and Markus Gross. "Real-time breaking waves for shallow water simulations." In 15th Pacific Conference on Computer Graphics and Applications (PG'07), pp. 39-46. IEEE, 2007.
https://ieeexplore.ieee.org/abstract/document/4392714

Implicit skinning was the topic of the next project, and is covered in the following paper:

Vaillant, Rodolphe, Loïc Barthe, Gaël Guennebaud, Marie-Paule Cani, Damien Rohmer, Brian Wyvill, Olivier Gourmel, and Mathias Paulin. "Implicit skinning: real-time skin deformation with contact modeling." ACM Transactions on Graphics (TOG) 32, no. 4 (2013): 1-12.
http://rodolphe-vaillant.fr/permalinks/implicit_skinning_project.php

We saw a pure motion capture project, where the technical component was to work with the full motion capture pipeline from start to finish, incorporating some straightforward physics.

We saw an example of a snow implementation using the Material Point Method from this paper, which was quite successful in 2D. One feature of this paper was its comparisons of different parameter settings used to explore performance of the algorithm. The paper is this one:

Stomakhin, Alexey, Craig Schroeder, Lawrence Chai, Joseph Teran, and Andrew Selle. "A material point method for snow simulation." ACM Transactions on Graphics (TOG) 32, no. 4 (2013): 1-10.
http://www.andyselle.com/papers/21/

We then saw a second skinning paper which used the idea that we could use different joint centers of rotation for each vertex of the skin mesh. Here is the reference:

Le, Binh Huy, and Jessica K. Hodgins. "Real-time skeletal skinning with optimized centers of rotation." ACM Transactions on Graphics (TOG) 35, no. 4 (2016): 1-10.
https://dl.acm.org/doi/abs/10.1145/2897824.2925959

The next project attempted to duplicate performance of the phase-function neural network developed by Komura's group. Here is the paper:

Holden, Daniel, Taku Komura, and Jun Saito. "Phase-functioned neural networks for character control." ACM Transactions on Graphics (TOG) 36, no. 4 (2017): 1-13.
https://dl.acm.org/doi/10.1145/3072959.3073663

We saw a paper on smoke control. The smoke control project was based on a sophisticated approach described in the following paper, but there are other approaches which are more straightforward. Contact me if you would like to find those references.

McNamara, Antoine, Adrien Treuille, Zoran Popović, and Jos Stam. "Fluid control using the adjoint method." ACM Transactions On Graphics (TOG) 23, no. 3 (2004): 449-456. https://dl.acm.org/doi/10.1145/1015706.1015744

The last project we saw was on spatial keyframing (the dancing bear). Here is the paper:

Igarashi, T., T. Moscovich, and J. F. Hughes. "Spatial keyframing for performance-driven animation." In Proceedings of the 2005 ACM SIGGRAPH/Eurographics symposium on Computer animation, pp. 107-115. 2005.
https://www-ui.is.s.u-tokyo.ac.jp/~takeo/research/squirrel/index.html