16-848: Reference List for March 5, 2018

Today we took a look at some research on mechanism optimization by Bernhard Thomaszewski http://www-labs.iro.umontreal.ca/~bernhard/

We began with linkage mechanisms, which were partially inspired by the fantastic Theo Jansen walkers: https://www.youtube.com/watch?v=HSKyHmjyrkA

Thomaszewski, Bernhard, Stelian Coros, Damien Gauge, Vittorio Megaro, Eitan Grinspun, and Markus Gross. "Computational design of linkage-based characters." *ACM Transactions on Graphics (TOG)* 33, no. 4 (2014): 64. https://www.disneyresearch.com/publication/computational-design-of-linkage-based-characters/

This idea has been used not only for graphically interesting linkages, but also to make characters that are capable of walking in the real world:

Bharaj, Gaurav, Stelian Coros, Bernhard Thomaszewski, James Tompkin, Bernd Bickel, and Hanspeter Pfister. "Computational design of walking automata." In *Proceedings of the 14th ACM SIGGRAPH/Eurographics Symposium on Computer Animation*, pp. 93-100. ACM, 2015. http://people.seas.harvard.edu/~gaurav/papers/cdwa_sca_2015/

The most recent iteration of this research automatically replaces traditional linkages with flexure joints, creating compliance and allowing a character to be printed as a single piece. One of the characters tested was a five fingered hand.

Megaro, Vittorio, Jonas Zehnder, Moritz Bazcher, Stelian Coros, Markus Gross, and Bernhard Thomaszewski. "A computational design tool for compliant mechanisms." *ACM Transactions on Graphics (TOG)* 36, no. 4 (2017): 82. https://www.disneyresearch.com/publication/a-computational-design-tool-for-compliant-mechanisms/

The next line of research features characters with soft bodies. These characters have optimized stiffness distribution as well as optimized points and directions for actuation.

Skouras, Mélina, Bernhard Thomaszewski, Stelian Coros, Bernd Bickel, and Markus Gross. "Computational design of actuated deformable characters." *ACM Transactions on Graphics (TOG)* 32, no. 4 (2013): 82. https://www.disneyresearch.com/publication/computational-design-of-actuated-deformable-characters/

Zehnder, Jonas, Espen Knoop, Moritz Bächer, and Bernhard Thomaszewski. "Metasilicone: design and fabrication of composite silicone with desired mechanical properties." *ACM Transactions on Graphics (TOG)* 36, no. 6 (2017): 240.
https://www.disneyresearch.com/publication/metasilicone/

The following paper discusses embedding stretch sensors to measure deformation:

Bächer, Moritz, Benjamin Hepp, Fabrizio Pece, Paul G. Kry, Bernd Bickel, Bernhard Thomaszewski, and Otmar Hilliges. "Defsense: Computational design of customized deformable input devices." In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, pp. 3806-3816. ACM, 2016.
https://www.disneyresearch.com/publication/defsense/
http://www.imagesco.com/sensors/stretch-sensor.html

We did not discuss the following two references, but you may be interested to take a look at these publications as well.

Slyper, Ronit, Ivan Poupyrev, and Jessica Hodgins. "Sensing through structure: designing soft silicone sensors." In *Proceedings of the fifth international conference on Tangible, embedded, and embodied interaction*, pp. 213-220. ACM, 2011.
http://www.cs.cmu.edu/~rys/researchprojects/sensing_through_structure/

Schumacher, Christian, Bernd Bickel, Jan Rys, Steve Marschner, Chiara Daraio, and Markus Gross. "Microstructures to control elasticity in 3D printing." *ACM Transactions on Graphics (TOG)* 34, no. 4 (2015): 136.
https://dl.acm.org/citation.cfm?id=2766926
https://www.youtube.com/watch?v=T_ibOR2owQc