16-848 Spring 2018: Reference List for April 16

Today I started by briefly showing two papers on sensors. The first uses the hall effect to create an inexpensive and compact force sensing fingertip.

Jamone, Lorenzo, Lorenzo Natale, Giorgio Metta, and Giulio Sandini. "Highly sensitive soft tactile sensors for an anthropomorphic robotic hand." *IEEE sensors Journal* 15, no. 8 (2015): 4226-4233.
https://ieeexplore.ieee.org/abstract/document/7070742/
http://limoman-project.blogspot.pt/p/videos.html

The second is an air bladder force sensor, where the air bladder does not inflate or deflate, but instead, pressure is measured to obtain an indication of force.

Gong, Daoxiong, Rui He, Jianjun Yu, and Guoyu Zuo. "A Pneumatic Tactile Sensor for Co-Operative Robots." *Sensors* 17, no. 11 (2017): 2592.
http://www.mdpi.com/1424-8220/17/11/2592/htm

I also showed this paper, introducing an alternative toolkit for soft robot design and prototyping that focuses on elastic actuators that are DIY along with multi-link structures having flexible joints.

Della Santina, Cosimo, Cristina Piazza, Gian Maria Gasparri, Manuel Bonilla, Manuel Giuseppe Catalano, Giorgio Grioli, Manolo Garabini, and Antonio Bicchi. "The quest for natural machine motion: An open platform to fast-prototyping articulated soft robots." *IEEE Robotics & Automation Magazine* 24, no. 1 (2017): 48-56.
https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7857692

We viewed some of this video – a talk given by Antonio Bicchi. Starting at about 11 minutes in, he talks about this initiative and then shows quite interesting examples of his one degree of freedom hand being used through human control to create grasps, manipulations, and dexterous motions.
https://www.youtube.com/watch?v=1Umyv8-KGFw

The two main papers for today were this one, which shows a straightforward example of designing the form of the manipulator together with its control for a soft robot hand grasping a set of objects.

R. Deimel, P. Irmisch, V. Wall and O. Brock, "Automated co-design of soft hand morphology and control strategy for grasping," *2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, BC, 2017, pp. 1213-1218.
https://ieeexplore.ieee.org/document/8202294/
https://www.youtube.com/watch?v=wvUGK0U2oQU

The second is a “robogami” gripper which uses thermoplastics to create joints having multiple levels of stiffness. High and low stiffness joints can be chosen to create a desired grasping behavior.

Firouzeh, Amir, and Jamie Paik. "Grasp Mode and Compliance Control of an Underactuated Origami Gripper Using Adjustable Stiffness Joints." *Ieee/asme Transactions on Mechatronics* 22, no. 5 (2017): 2165-2173.
https://ieeexplore.ieee.org/abstract/document/7994658/
https://www.youtube.com/watch?v=qxoytEqzZsc