

## 16-848 Reference List for Jan 22

The paper that we covered in class is this one:

Stuart, Hannah, Shiquan Wang, Oussama Khatib, and Mark R. Cutkosky. "The Ocean One hands: An adaptive design for robust marine manipulation." *The International Journal of Robotics Research* 36, no. 2 (2017): 150-166.

<http://journals.sagepub.com/doi/abs/10.1177/0278364917694723>

This paper as a case study brings up many of the issues that we have to think about in design of a robot hand – how many fingers / degrees-of-freedom (DoF) / actuators? How will torque be distributed from actuators to DoF? What sensing will be incorporated? How do we characterize what the hand must do? How can we test that this is a good hand? Etc...

We began by taking a quick look at some of the people and projects at Stanford:

<http://bdml.stanford.edu/Profiles/HannahStuart>

<http://bdml.stanford.edu/Profiles/ShiquanWang>

<https://cs.stanford.edu/groups/manips/ok.html>

<http://www-cdr.stanford.edu/~cutkosky/home.html>

.. with a short detour into looking at grippers using adhesion or microspines:

<http://bdml.stanford.edu/Main/ClimbingAdhesionHome>

.. and the idea of a climbing RoboSimian:

<http://bdml.stanford.edu/Main/MultiLimbedClimbing>

One area worth further discussion is the use of simulators for exploring grasping and manipulation and iterating on hardware or control designs. The paper today made use of SimGrasp:

<https://web.stanford.edu/~shiquan/SimGrasp/sim-grasp-manual/about.html>

..which is built on Klamp't

<http://motion.pratt.duke.edu/klampt/index.html>

..by Kris Hauser

<http://people.duke.edu/~kh269/>

If you are interested in simulation in situations with a great deal of contact, you may want to try out one of these simulators as part of your class project. You can also take a look at some of Kris's papers, such as this one:

<http://motion.pratt.duke.edu/papers/ICRA2016-Rocchi-stablesimulation.pdf>

If you are interested in following up on underactuated grippers, there are good references in today's paper, or you can get in touch with me.

We also touched on benchmarking, grasp quality, and taxonomies. Here are some references to get you started on any of those topics:

Benchmarking:

Calli, Berk, Arjun Singh, James Bruce, Aaron Walsman, Kurt Konolige, Siddhartha Srinivasa, Pieter Abbeel, and Aaron M. Dollar. "Yale-CMU-Berkeley dataset for robotic manipulation research." *The International Journal of Robotics Research* 36, no. 3 (2017): 261-268.

<http://journals.sagepub.com/doi/abs/10.1177/0278364917700714>

Grasp quality:

Rubert, Carlos, Beatriz León, Antonio Morales, and Joaquín Sancho-Bru. "Characterisation of Grasp Quality Metrics." *Journal of Intelligent & Robotic Systems* (2017): 1-24.

<https://link.springer.com/article/10.1007/s10846-017-0562-1>

Information on the Feix et al. taxonomy:

Feix, Thomas, Javier Romero, Heinz-Bodo Schmiedmayer, Aaron M. Dollar, and Danica Kragic. "The grasp taxonomy of human grasp types." *IEEE Transactions on Human-Machine Systems* 46, no. 1 (2016): 66-77.

<http://grasp.xief.net/>

Again, if you saw something you'd like to follow up on for a paper presentation or class project, let me know, and I can help you identify more literature or background on the topic.