

## 16-848 Reference List for February 5, 2018

We began with some background on grasp quality metrics, including the Ferrari and Canny metric. If you are interested to follow up on other quality metrics that are available, I've included a couple of additional references here.

Ferrari, Carlo, and John Canny. "Planning optimal grasps." In *Robotics and Automation, 1992. Proceedings., 1992 IEEE International Conference on*, pp. 2290-2295. IEEE, 1992.  
<https://people.eecs.berkeley.edu/~jfc/papers/92/FCicra92.pdf>

Kim, Junggon, Kunihiro Iwamoto, James J. Kuffner, Yasuhiro Ota, and Nancy S. Pollard. "Physically based grasp quality evaluation under pose uncertainty." *IEEE Transactions on Robotics* 29, no. 6 (2013): 1424-1439.  
[http://www.cs.cmu.edu/afs/cs/Web/People/junggon/publications/2013\\_IEEE\\_TRO\\_evalgrasp.pdf](http://www.cs.cmu.edu/afs/cs/Web/People/junggon/publications/2013_IEEE_TRO_evalgrasp.pdf)

Roa, Máximo A., and Raúl Suárez. "Grasp quality measures: review and performance." *Autonomous robots* 38, no. 1 (2015): 65-88.  
<https://link.springer.com/article/10.1007/s10514-014-9402-3>

I used the following paper as a supporting reference for explaining the Ferrari and Canny grasp quality metric:

Pollard, Nancy S. "Synthesizing grasps from generalized prototypes." In *Robotics and Automation, 1996. Proceedings., 1996 IEEE International Conference on*, vol. 3, pp. 2124-2130. IEEE, 1996.  
<http://graphics.cs.cmu.edu/nsp/papers/icra96.pdf>

I also went through a stiffness formulation for quality metrics for the microspine gripper. This has not been published yet, but if you are interested, I can share it with you individually. Let me know.

We looked most closely at the following paper, which uses a weighted A\* algorithm for grasp planning / grasp optimization:

Hang, Kaiyu, Johannes A. Stork, Nancy S. Pollard, and Danica Kragic. "A Framework for Optimal Grasp Contact Planning." *IEEE Robotics and Automation Letters* 2, no. 2 (2017): 704-711.  
<http://www.csc.kth.se/~kaiyuh/pdfs/hang2017a.pdf>

In contrast, we took a look at the following paper, which attempts to choose grasps based on image data alone (based on large amounts of collected data):

Pinto, Llerrel, and Abhinav Gupta. "Supersizing self-supervision: Learning to grasp from 50k tries and 700 robot hours." In *Robotics and Automation (ICRA), 2016 IEEE International Conference on*, pp. 3406-3413. IEEE, 2016.

<https://arxiv.org/pdf/1509.06825.pdf>

[https://www.youtube.com/watch?time\\_continue=6&v=oSqHc0nLkm8](https://www.youtube.com/watch?time_continue=6&v=oSqHc0nLkm8)

We also took a quick look at this similar project done at Google:

<https://spectrum.ieee.org/automaton/robotics/artificial-intelligence/google-large-scale-robotic-grasping-project>