

## 16-848 Spring 2018: Reference List for March 26

Today we looked at a collection of papers / websites related to robotic tactile sensing. Following our discussion of how to incorporate the GelSight sensor into a dexterous robot hand, we looked at this paper, which shows one way in which the sensor can be made to have a smaller form factor:

Donlon, Elliott, Siyuan Dong, Melody Liu, Jianhua Li, Edward Adelson, and Alberto Rodriguez. "GelSlim: A High-Resolution, Compact, Robust, and Calibrated Tactile-sensing Finger." *arXiv preprint arXiv:1803.00628* (2018).

<https://arxiv.org/pdf/1803.00628.pdf>

We looked in some detail at barometric tactile sensors, which use an off the shelf MEMS barometer encased in rubber for force sensing:

Tenzer, Yaroslav, Leif P. Jentoft, and Robert D. Howe. "The feel of MEMS barometers: Inexpensive and easily customized tactile array sensors." *IEEE Robotics & Automation Magazine* 21, no. 3 (2014): 89-95.

[https://dash.harvard.edu/bitstream/handle/1/22088984/2012\\_YTenzer\\_BarometricSensors.pdf?sequence=1](https://dash.harvard.edu/bitstream/handle/1/22088984/2012_YTenzer_BarometricSensors.pdf?sequence=1)

Guggenheim, Jacob W., Leif P. Jentoft, Yaroslav Tenzer, and Robert D. Howe. "Robust and Inexpensive Six-Axis Force-Torque Sensors Using MEMS Barometers." *IEEE/ASME Transactions on Mechatronics* 22, no. 2 (2017): 838-844.

[http://biorobotics.harvard.edu/pubs/2017/journal/JGuggenheim\\_TMech\\_2017.pdf](http://biorobotics.harvard.edu/pubs/2017/journal/JGuggenheim_TMech_2017.pdf)

We also looked at these combination sensors designed for all-body robot skin:

Bergner, Florian, Emmanuel Dean-Leon, and Gordon Cheng. "Efficient event-driven reactive control for large scale robot skin." In *Robotics and Automation (ICRA), 2017 IEEE International Conference on*, pp. 394-400. IEEE, 2017.

<https://mediatum.ub.tum.de/doc/1366849/file.pdf>

Kaboli, Mohsen, Di Feng, and Gordon Cheng. "Active tactile transfer learning for object discrimination in an unstructured environment using multimodal robotic skin." *International Journal of Humanoid Robotics* 15, no. 01 (2018): 1850001.

[https://www.researchgate.net/profile/Mohsen\\_Kaboli/publication/320961857\\_Active\\_Tactile\\_Transfer\\_Learning\\_for\\_Object\\_Discrimination\\_in\\_an\\_Unstructured\\_Environment\\_using\\_Multimodal\\_Robotic\\_Skin/data/5a04bd46458515eddb808bef/ijhr.pdf](https://www.researchgate.net/profile/Mohsen_Kaboli/publication/320961857_Active_Tactile_Transfer_Learning_for_Object_Discrimination_in_an_Unstructured_Environment_using_Multimodal_Robotic_Skin/data/5a04bd46458515eddb808bef/ijhr.pdf)

Finally, we took a look at the e-skin shirt marketed by Xenoma:

<https://xenoma.com/eskin-dk>

.. and experimented with some inexpensive bend sensors which can be used to make a homemade cyberglove or used more generally to capture deformation.

<https://www.robotshop.com/en/flexpoint-sensor-systems.html>

