Quantifying the Behavioral Touch Response

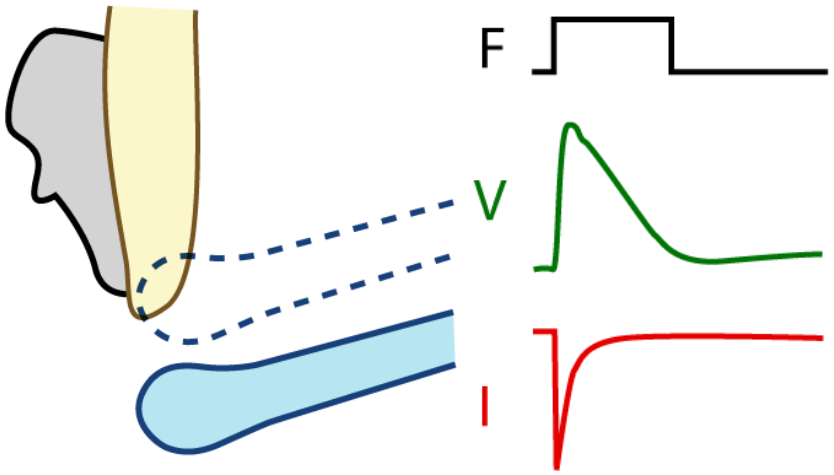
Joey Doll

October 2007

Two Types of Experiments

Behavioral
(Passive)

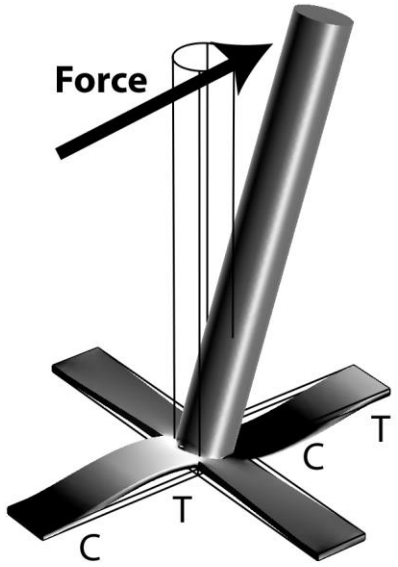
Physiological
(Active)

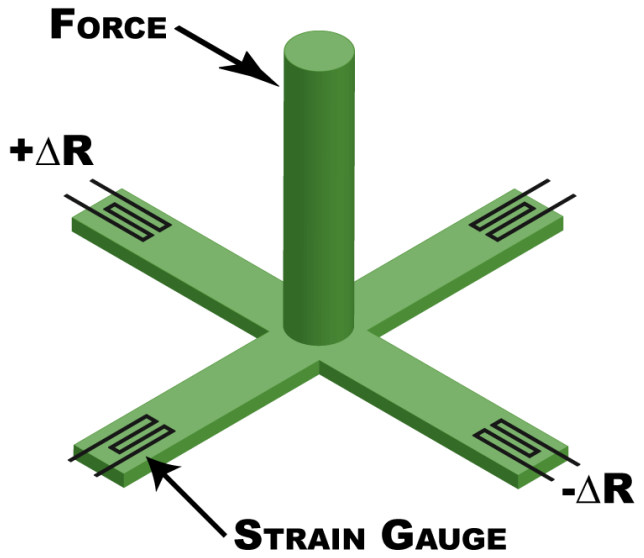


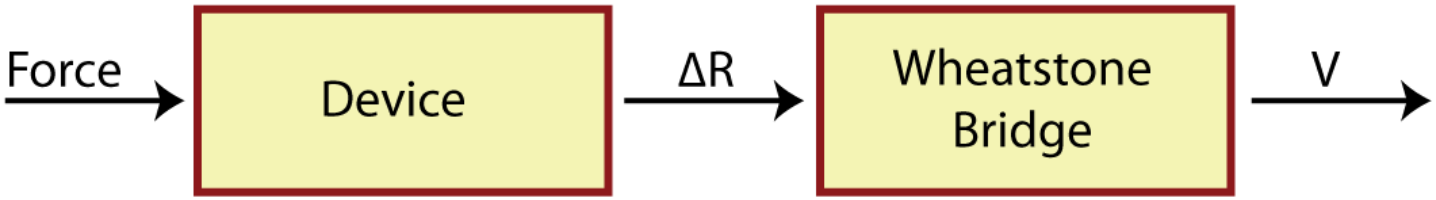
Questions to Answer

1. What size of force elicits a behavioral response?
2. Does this value agree with physiological experiments?

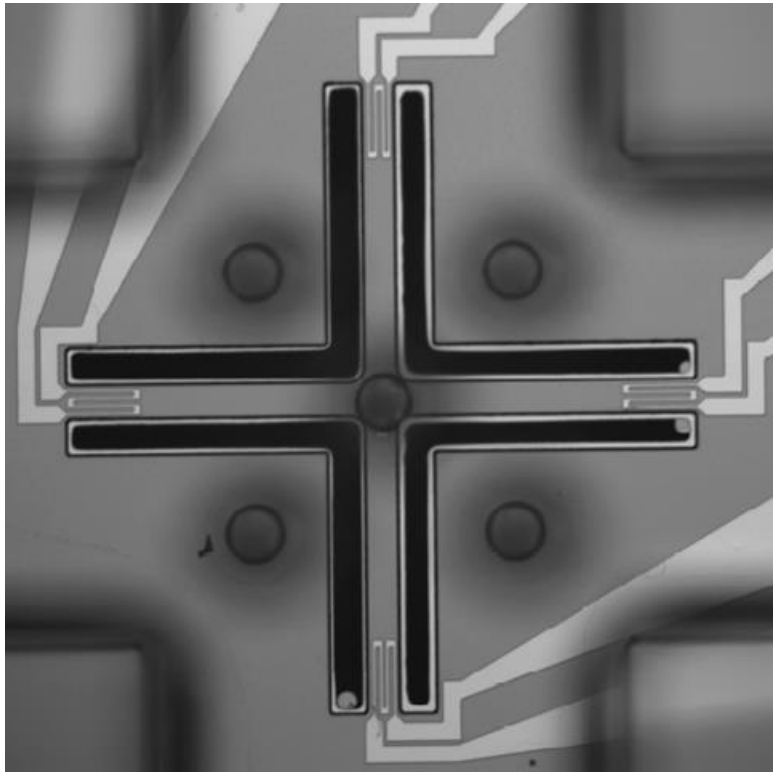
Device Design

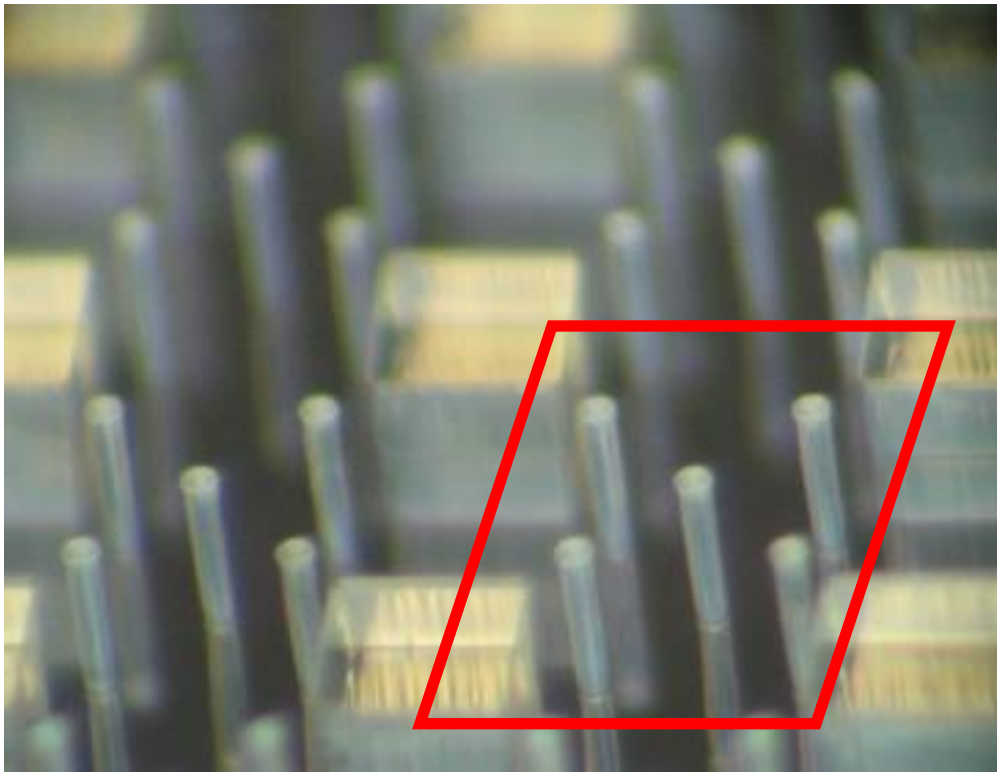






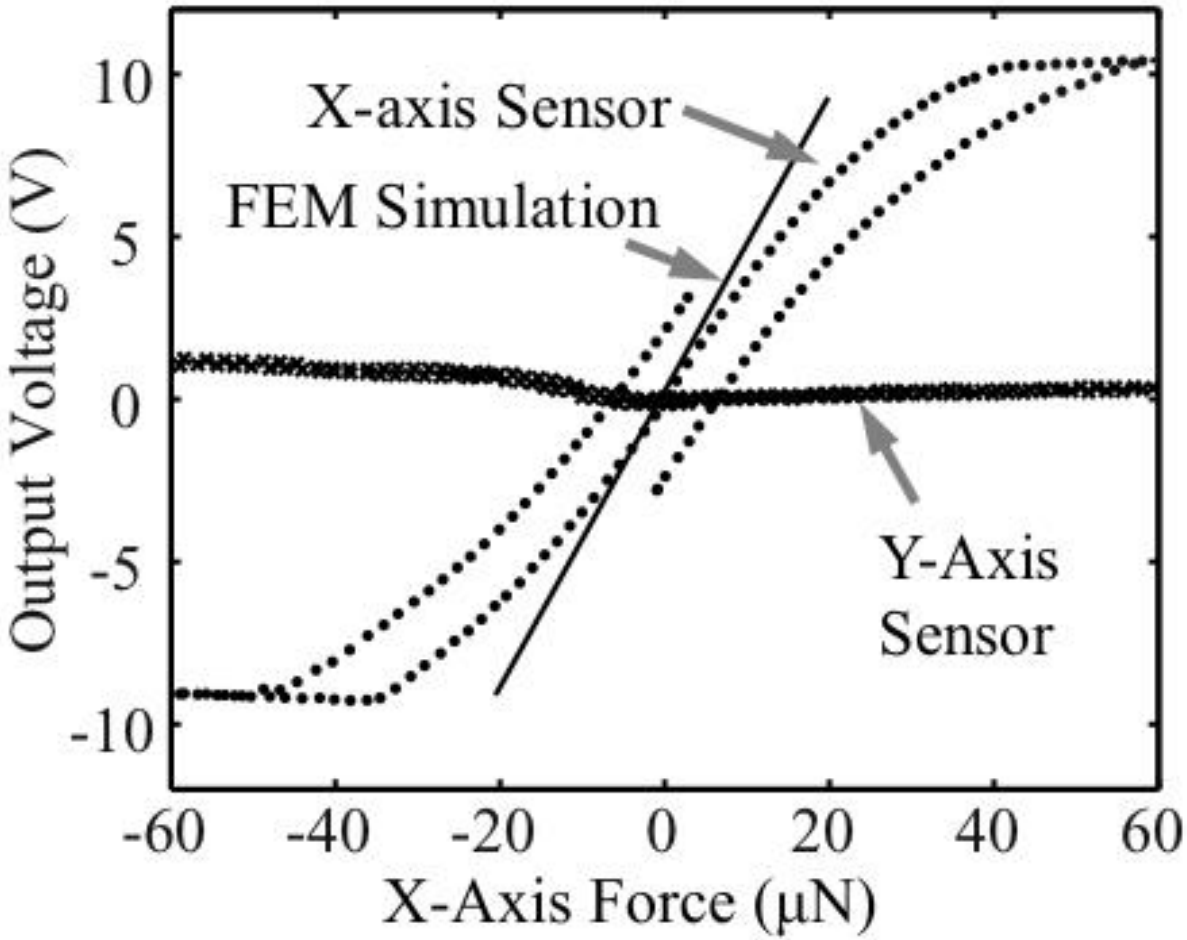
Finished Device



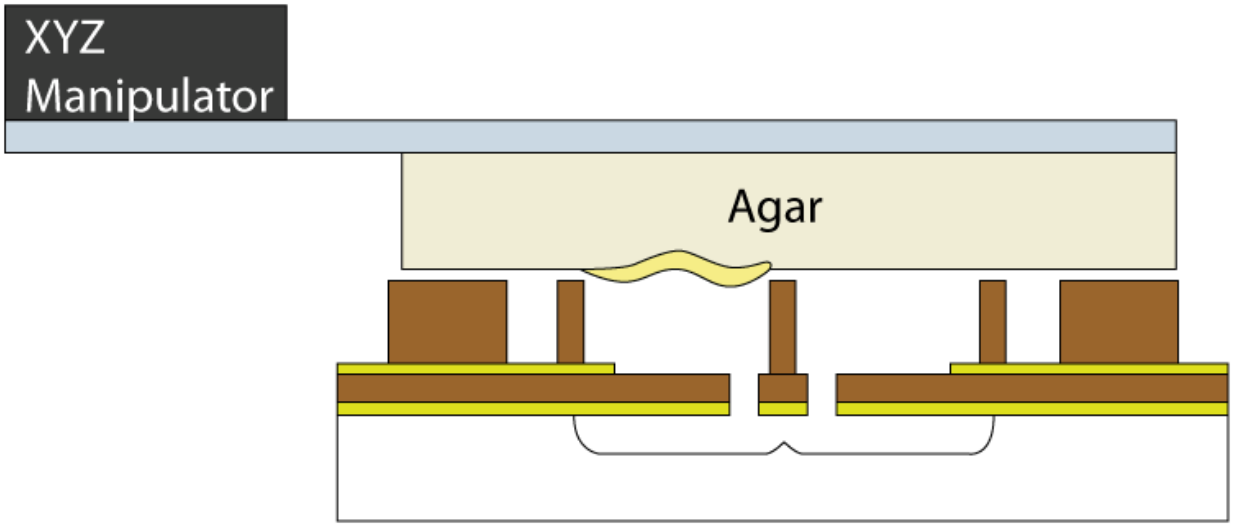


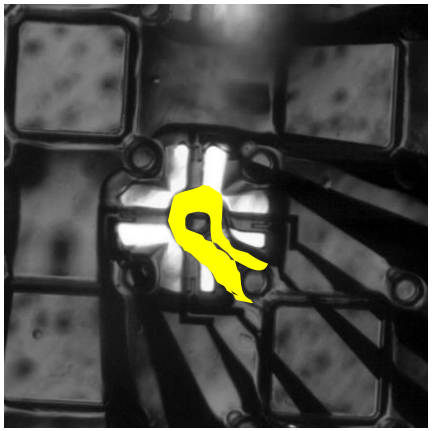
Design, 1st fab cycle and characterization by Sarah Coulthard, Nahid Harjee, Nathan Klejwa, and Ron Kwon in ME342 (MEMS Laboratory) ‘06

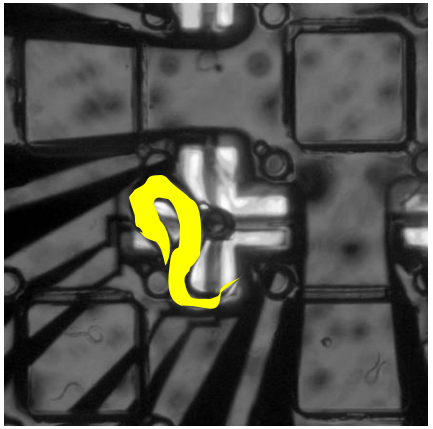
Device Characterization



Worm Measurement Setup

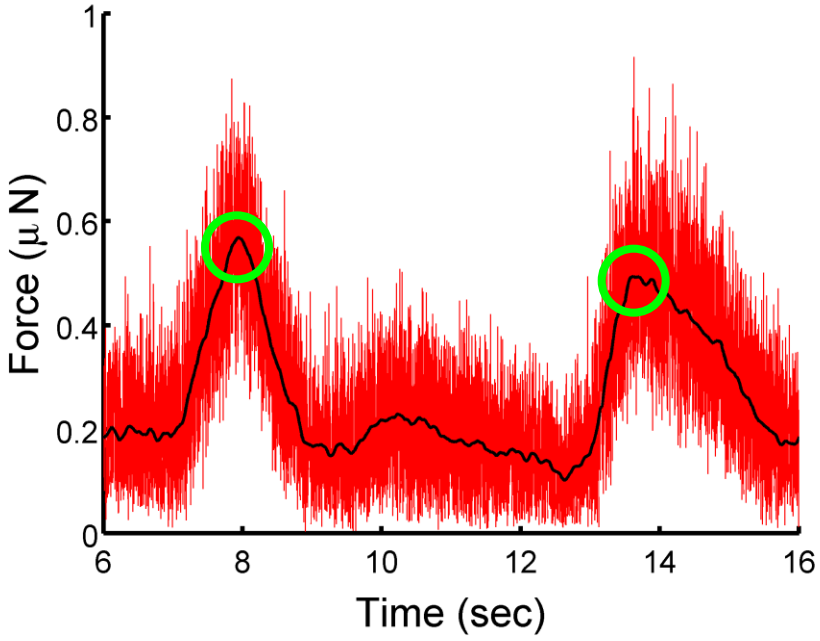


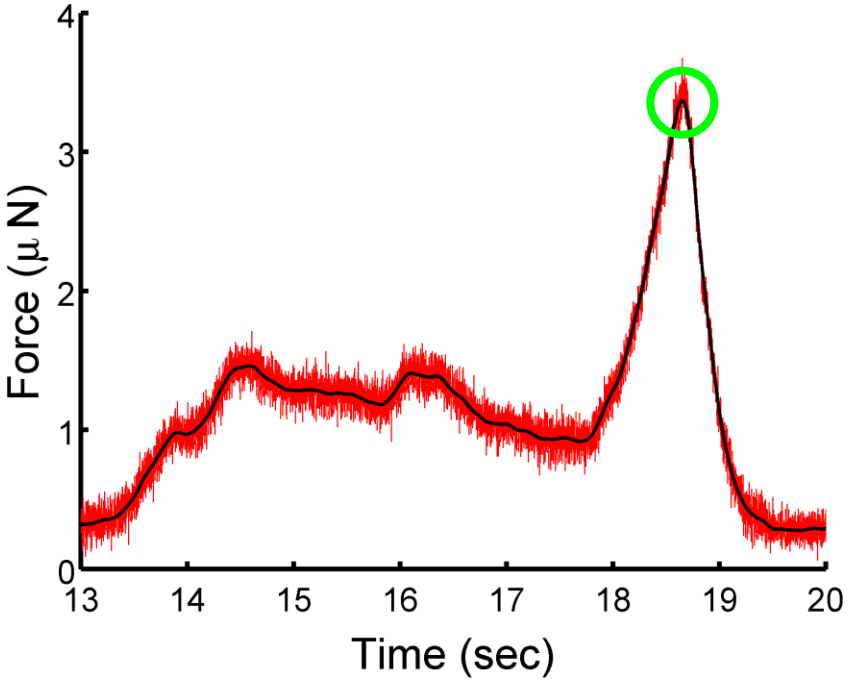




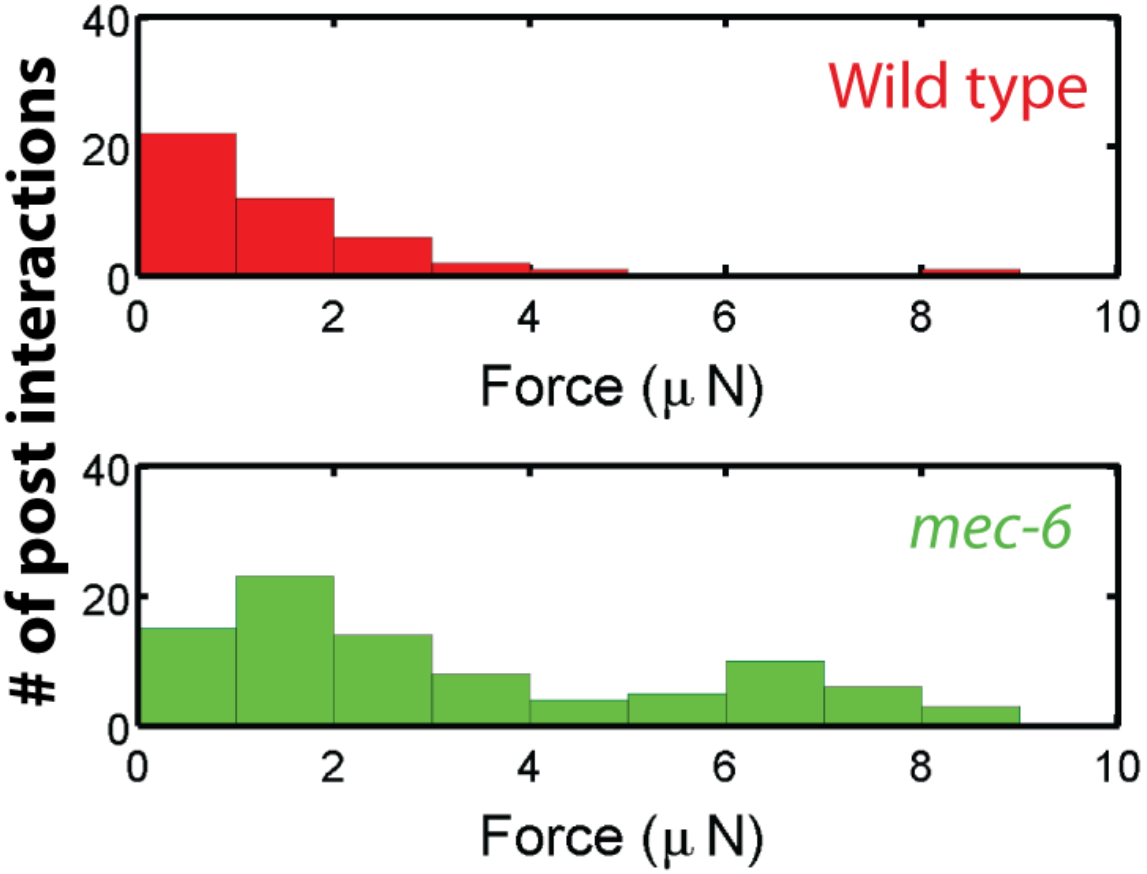
Worm Measurement Setup

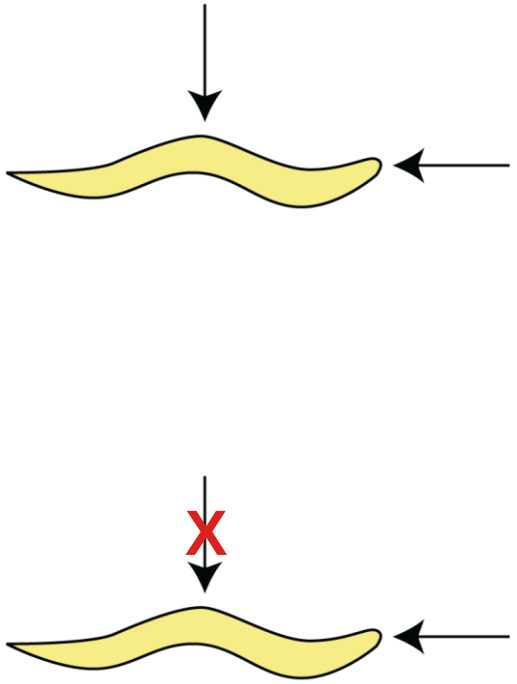
Experimental Results





Experimental Results





98 WT touches

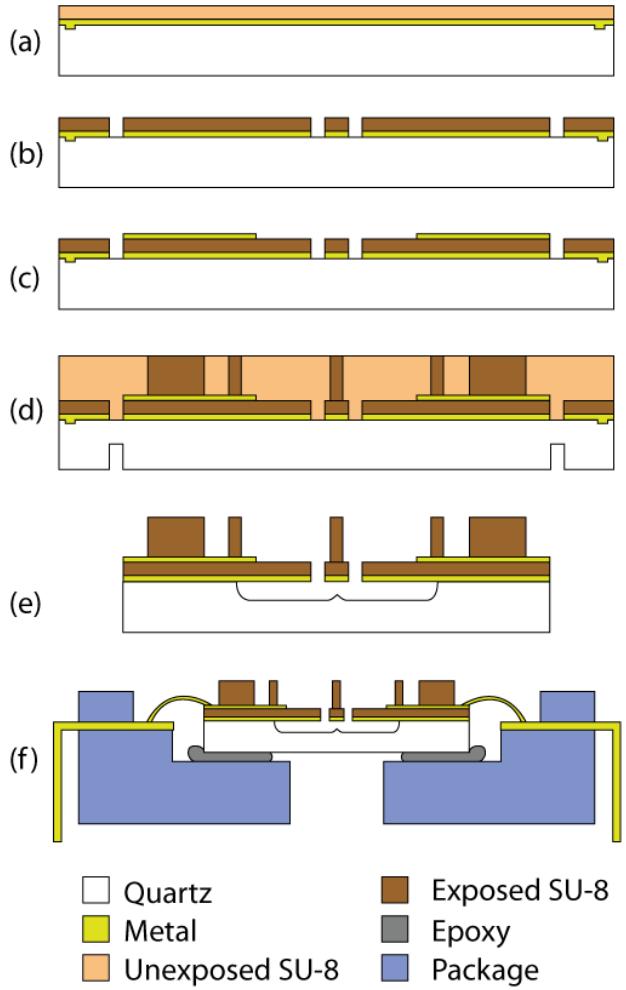
44 *mec-6* touches

Conclusion and Future Work

- Two-axis electronic force sensing
  - 1μN - 100μN force range
  - <1ms time resolution
- Currently using to quantify behavioral response in C. elegans

Thank You

Fab Process



(a) Sputter Cr/Au adhesion layer and spin 5μm SU-8 on quartz.
(b) Pattern cantilever arms and metal.
(c) Deposit and pattern strain gauges.
(d) Deposit and expose SU-8 pillar layer. Wafer saw from the backside.
(e) Develop SU-8 and release in HF.
(f) Glue device to package and wire bond.