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#### A Nanoscale Electromechanical Configuring Switch

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# Mechanical approaches to electronics?

Limitations at nanoscale in electronics

- Increasing strength of tunnel effect
  - Useful in injection of charge (such as non-volatile memories) but also causes increasing leakage current/power
- Reduced statistics and increase in random variations
  - Limits the integration density because of increasing variance

Mechanical approaches where length scales are change, used at nanoscale, have the potential for overcoming all of these limitations

### Schematic of electro-mechanical swtiching





#### State of the art Structures



## **Observation of Movement by EM**



- Successfully fabricated silicon pillars with sub 100nm diameters and aspect ratios greater than 50:1.
- Demonstrated electrostatic actuation of mechanical switches.
- We will explore the limits of device scaling using analytical models and simulations.

We will use self-limiting oxidation to substantially reduce critical dimensions and actuation voltage.

Pull-in voltage: 13 V at below 200 nm gap

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