EE C245 – ME C218
Introduction to MEMS Design
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Lecture Module 2: Benefits of Scaling

Lecture Outline

- Reading: Senturia, Chapter 1
- Lecture Topics:
  - Benefits of Miniaturization
  - Examples
    - GHz micromechanical resonators
    - Chip-scale atomic clock
    - Micro gas chromatograph

Benefits of Size Reduction: MEMS

- Benefits of size reduction clear for IC's in elect. domain
  - size reduction ⇨ speed, low power, complexity, economy
- MEMS: enables a similar concept, but …

MEMS extends the benefits of size reduction *beyond* the electrical domain

Performance enhancements for application domains beyond those satisfied by electronics in the same general categories

Speed	Frequency ↑ , Thermal Time Const. ↓
Power Consumption	Actuation Energy ↓ , Heating Power ↓
Complexity	Integration Density ↑ , Functionality ↑
Economy	Batch Fab. Pot. ↑ (esp. for packaging)
Robustness	g-Force Resilience ↑

Vibrating RF MEMS