

EE C245 - ME C218

Introduction to MEMS Design

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Lecture Module 2: Benefits of Scaling


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Lecture Outline

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


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Benefits of Size Reduction: MEMS

- Benefits of size reduction clear for IC's in elect. domain
 - ↳ size reduction \Rightarrow 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 \Rightarrow Frequency \uparrow , Thermal Time Const. \downarrow
- Power Consumption \Rightarrow Actuation Energy \downarrow , Heating Power \downarrow
- Complexity \Rightarrow Integration Density \uparrow , Functionality \uparrow
- Economy \Rightarrow Batch Fab. Pot. \uparrow (esp. for packaging)
- Robustness \Rightarrow g-Force Resilience \uparrow

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Vibrating RF MEMS

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