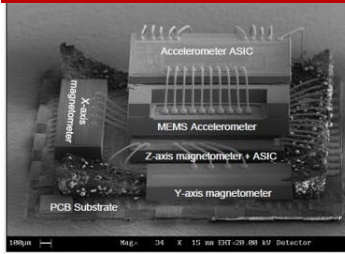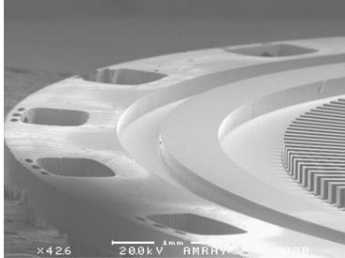# ECE 6030: Micro-Electro-Mechanical Systems (MEMS) Design
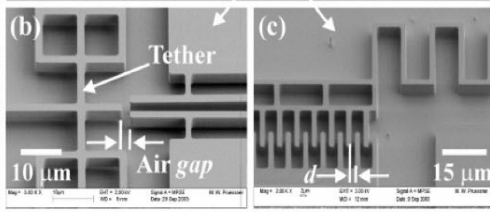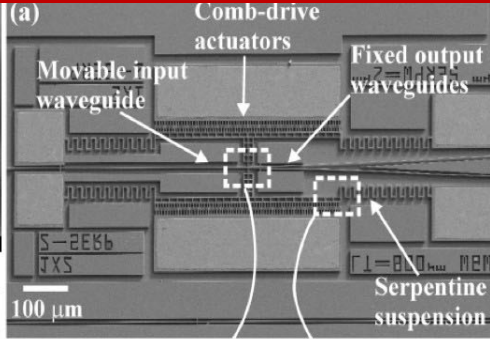
Want to learn how to design accelerometers, gyroscopes, pressure sensors, resonators, cantilever-based sensors, RF switches, micro-mirrors? New project-driven graduate course.

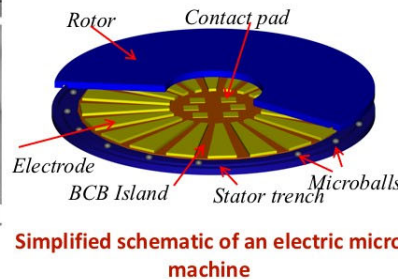6-Axis inertial sensor from Bosch

Rotor of a micro motor

1x2 optical switch with electrostatic actuation fabricated in InP (M. Prussner)

MEMS implantable pressure sensor (Sensimed)

Simplified schematic of an electric micro machine

MEMS microphone (Analog Devices)

COURSE TOPICS

- History of MEMS and commercial examples
- Miniaturization: law of scaling
- Structural mechanics, elasticity, mechanical properties of silicon, and dynamic response
- Beam theory, cantilevers, doubly clamped beams, comb-drive actuators
- Lumped modeling
- MEMS fabrication techniques
- Multiphysics modeling using COMSOL
- Case studies: Inertial, optical, RF, and power devices
- Project presentations

Description:

The field of micro-electro-mechanical systems (MEMS) is an interdisciplinary area that includes design and fabrication of sensors and actuators (transducers) that are capable of micron-size mechanical movements. Lectures cover a wide range of topics in design & fabrication. Projects include FE simulation of an inertial, optical, RF, or power MEMS devices as an integral part of this course.

Grading:

- Homework assignments - 25%
- Midterm - 30%
- Design project, report, and presentation - 45%

Prerequisites: Graduate standing in engineering or physics

Questions? Contact:

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go.osu.edu/MEMS