Microelectromechanical systems (MEMS): is a process technology used to create tiny integrated devices or systems that combine mechanical and electrical components.

This is a physical gear and chain. The links in the chain are about 50 µm long—i.e., less than the diameter of a human hair. Image courtesy of Sandia National Laboratories.
The idea of creating MEMS started in the 1980’s; however, the means to produce MEMS (the designing and manufacturing infrastructure) was not available enough until the 1990’s. One of the first few types of MEMS produced were for air-bag controllers and inkjet printheads.
MATERIALS

- **Silicon**
  - Most common
  - Long life cycle

- **Polymers**
  - Easily Produced
  - Wide range of material characteristics

- **Metals**
  - Very reliable

- **Ceramics**
  - High elastic modulus (TiN)
BASIC PROCESSES

• Deposition
• Patterning
• Lithography
• Remove Photoresist
MANUFACTURING TECHNOLOGIES

- Bulk micromachining
- Surface micromachining
- Thermal oxidation
- High aspect ratio (HAR) silicon micromachining
APPLICATIONS

- Inkjet printer – Piezoelectric to deposit ink
- Accelerometers – Airbag deployment, electronic stability control, and personal devices
- Silicon pressure sensor – TPMS and blood pressure
- Microphones – personal devices
REFERENCES

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QUESTIONS?

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