

Microelectronics Packaging

IME 156



Microsystems Packaging

- Micro – In reference to Integrated Circuits (ICs).
- Systems – Electronic products.
- Packaging – Electrical connections, mechanical integrity & thermal cooling of ICs and other components onto PCBs (printed circuit boards).

Mobile Phone Evolution



1980s



1990s



2000s

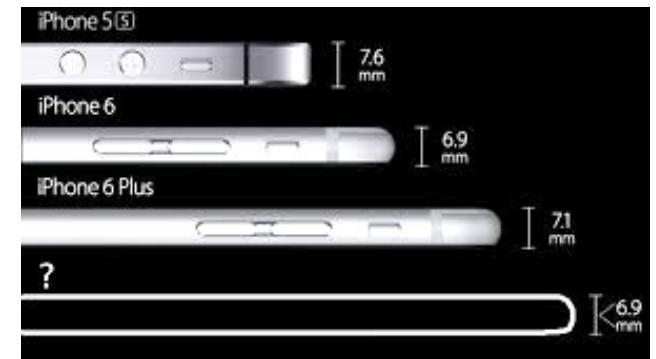


2007

Galaxy
S1-S9



Larger Displays



Thinner Profiles

Autonomous Vehicles & Drones

General Motors said that by the end of 2019 it will be mass-producing fully autonomous electric cars.



Wearable Electronics for Healthcare



Electronic sensor

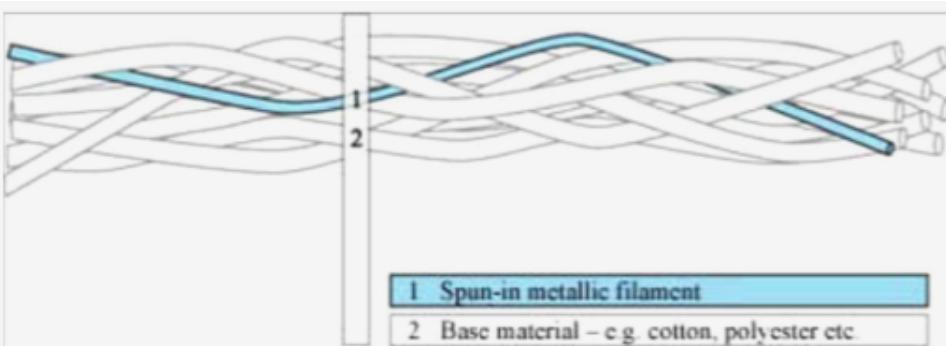


Under-skin, biosensors

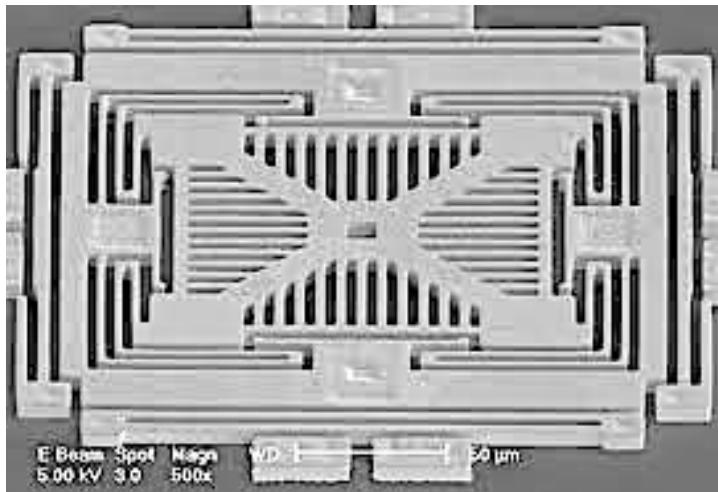


Accelerometer/gyroscope

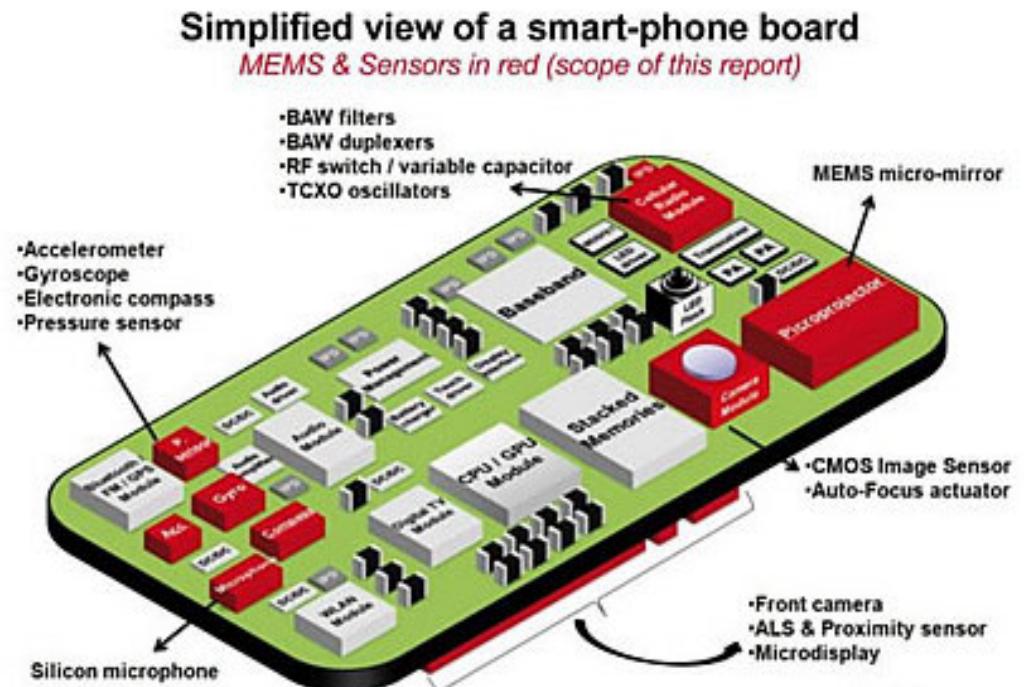
Conductive fabric



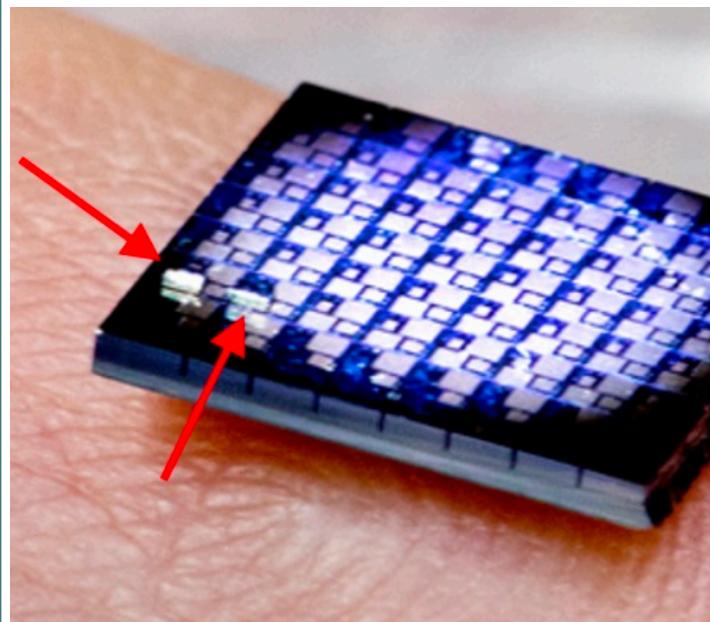
MEMS - MicroElectroMechanical Systems



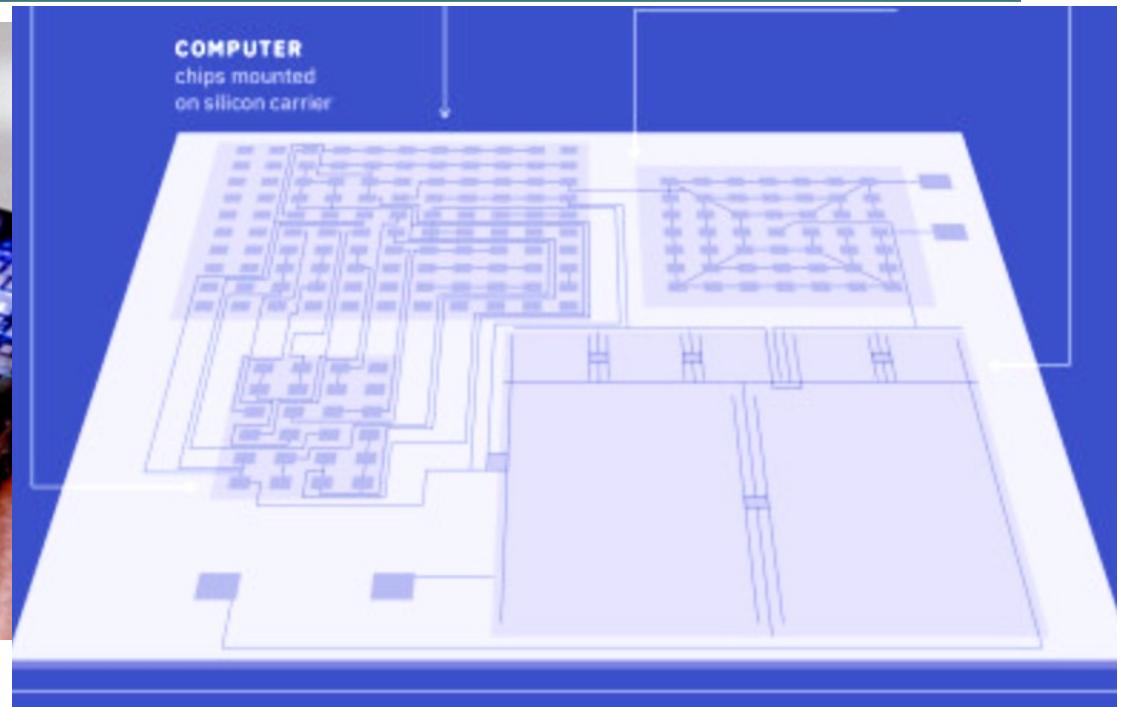
Silicon MEMS Accelerometer



World's Smallest Chip? 1mm x 1mm



Wafer containing many chips

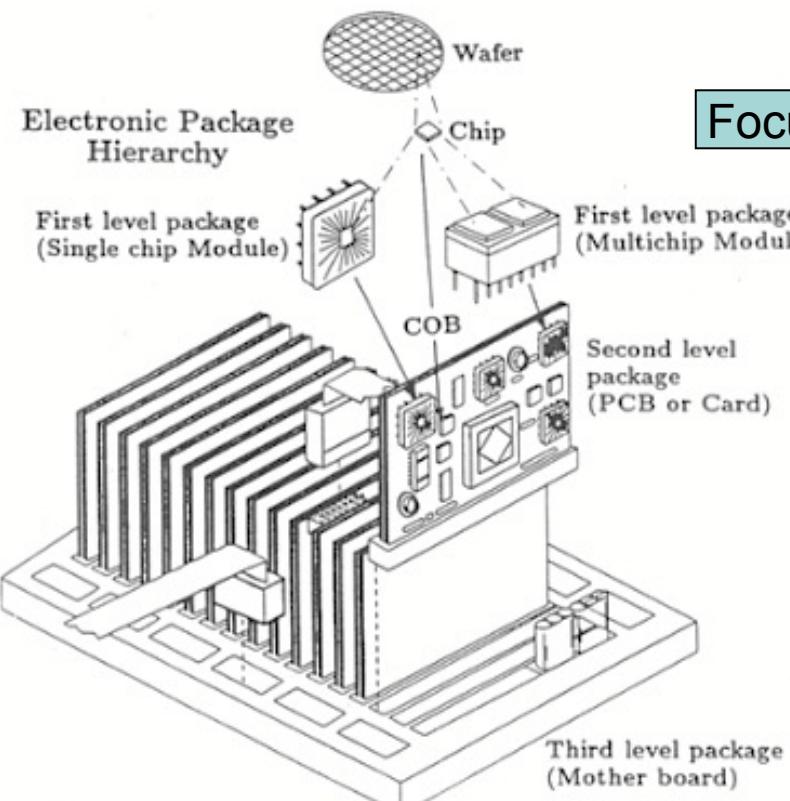


Chip Layout includes Processor,
Memory, Photovoltaic Power,
Communications

Topics by Week

- 1: Introduction, Microsystems Packaging, Select Teams
- 2: PCB Fabrication
- 3: PCB Assembly
- 4: Integrated Circuit Fabrication
- 5: Review for Midterm
- 6: **Group Midterm I** (Lectures, Videos, Quizzes)
- 7: IC Assembly & Electrical Testing
- 8: Advanced Packaging
- 9: Review for Final
- 10:**Group Midterm II** (Lectures, Videos, Quizzes)

Hierarchy of Interconnection Levels



- **Level 0**
 - Gate-to-gate interconnections on the silicon die
- **Level 1**
 - Connections from the chip to its package
- **Level 2**
 - PCB, from component to component or to external connector
- **Level 3**
 - Connections between PCBs, including backplanes or motherboards
- **Level 4**
 - Connections between subassemblies, for example a rack
- **Level 5**
 - Connections between physically separate systems, using for example an Ethernet LAN

Microsystems Packaging Importance

- Often control the system's:
 - **Cost \$**
 - **Size** – Number of components and their physical size affects overall product size.
 - **Reliability** – IC Failure tends to be attributed to packaging rather than electrical circuit defects.
 - **Performance** – Number of ICs & connections affects computer processing speed.

Prism Project Overview

