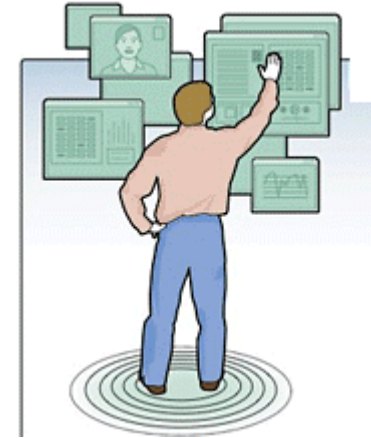


An Era of Embedded Systems



Computing system type	Mainframe	Mini computer	Personal computer	Embedded system
Era	1950s on	1970s on	1980s on	2000s on
Form factor	Multi-cabinet	Multi-board	Single board	Single chip
Owner	Corporate	Department	Person	Anything
Users/system	1000s ~ 100s	100s ~ 10s	10s ~ 1s	1s ~ 1/10s
Cost	\$1 Ms +	\$100 Ks +	\$10Ks – \$1Ks +	\$100s – \$1s +
Total units	10Ks +	100Ks +	1 billions +	1 Trillions +

*The table is adapted from J. A. Fisher, P. Faraboschi & C. Young with extensions and modifications

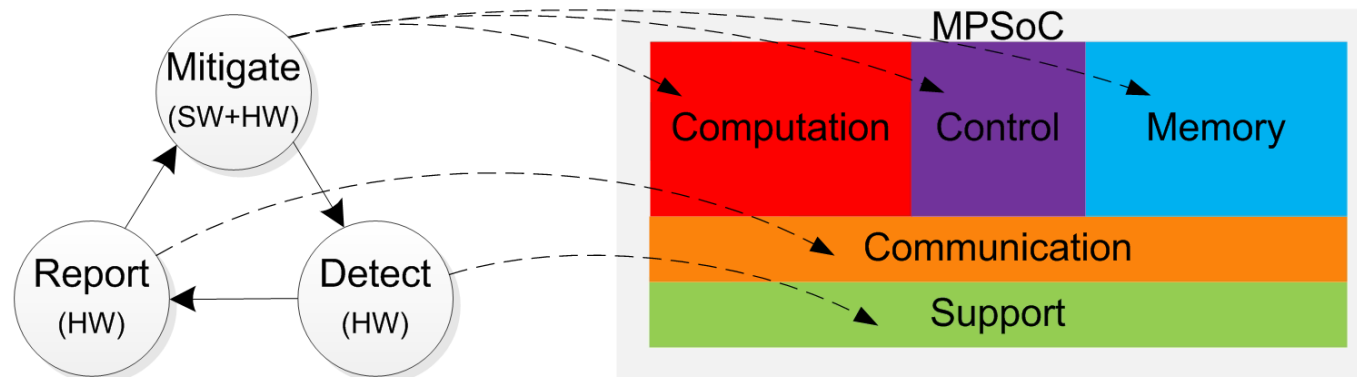
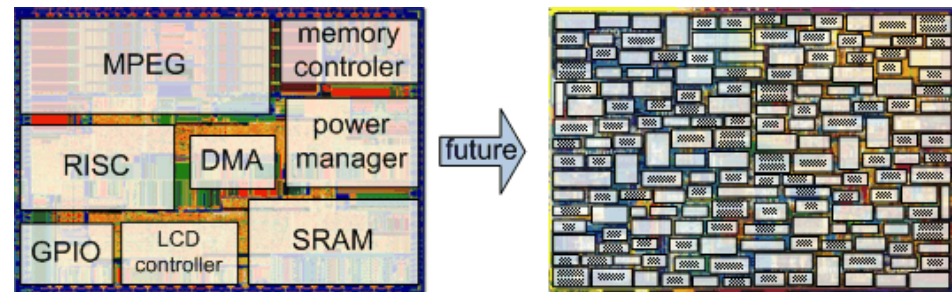
Embedded Systems are Ubiquitous

- Consumer electronics
 - Digital camera and camcorder
 - Cell phone
 - MP3 player
 - Wireless router
 - ...
- In robots
 - Vision system
 - Arm and leg control system
 - ...
- In telecommunications
 - Internet switch and router
 - Mobile phone base station
 - ...
- In automobile
 - Engine control system
 - Anti-lock braking system
 - Navigation system
 - ...
- In aircraft
 - Auto pilot system
 - ...
- In watercraft
 - Radar system
 - ...
- In satellite
- ...



Multiprocessor System-on-Chip

- Put all or most part of a complex system on a single chip
 - Enabled by shrinking feature sizes
 - Better performance, lower power consumption, and more compact and “reliable”
- Hybrid integration
 - Digital, RF, and mixed signal
 - SIP, 3D, *etc.*
- Network-on-chip





Thanks!

