

C Programming and Embedded Systems

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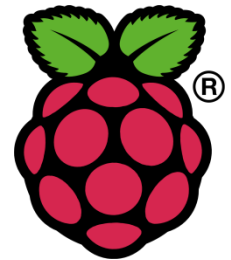
What is an Embedded System?

- Loose Definition:
 - A system which is part of a larger system
- What does that actually mean
 - Hardware/Software co-design
 - Usually with specific purpose
 - Usually special set of constraints (size/power/time)
- Can be based on microcontroller, DSP, ASICs, even standard Microprocessor(MPU)

Examples

 fitbit

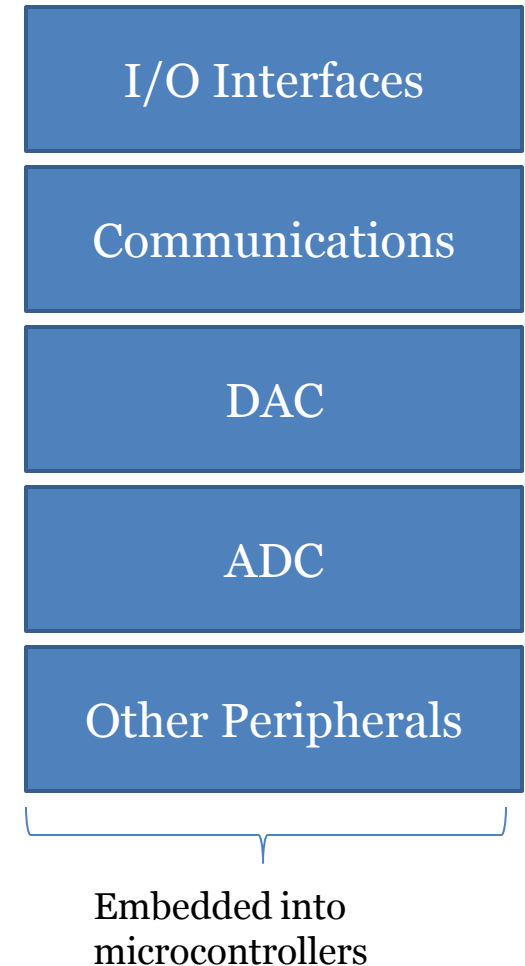
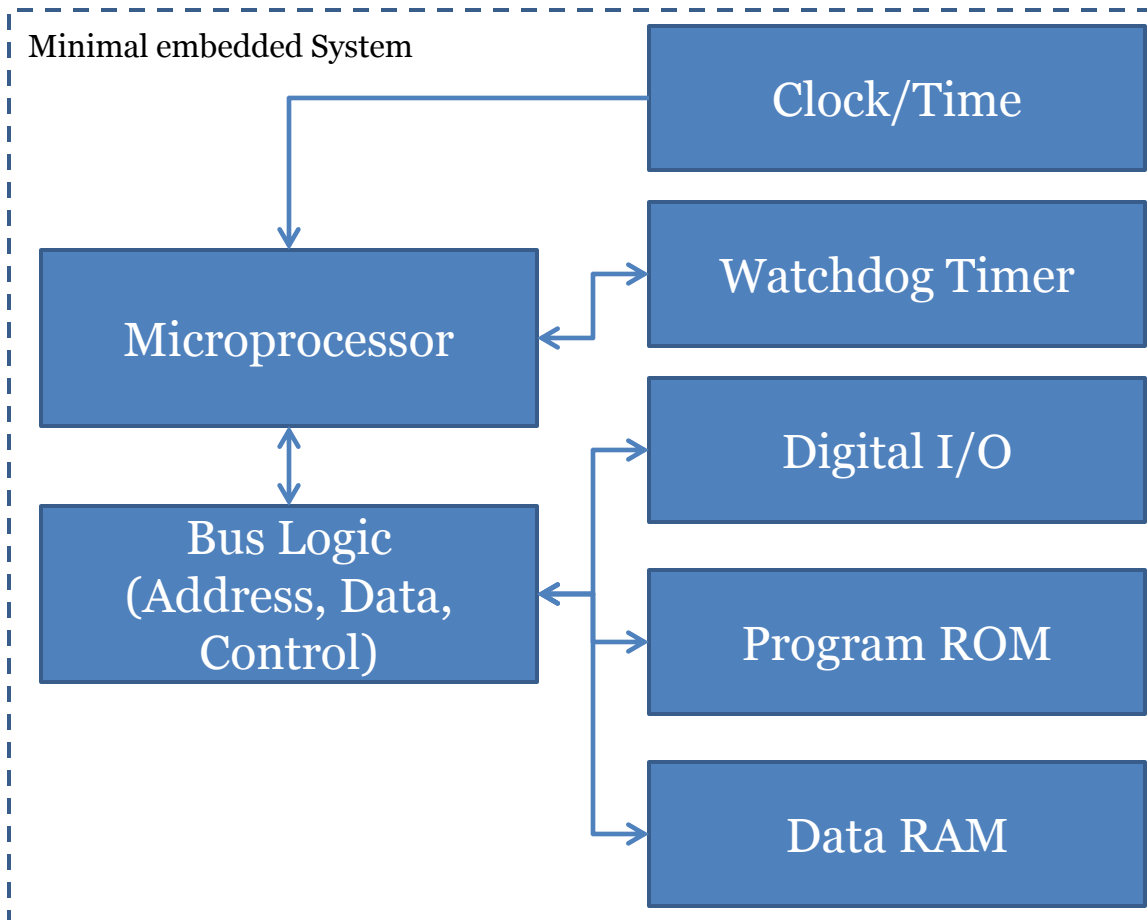
GLASS



Market Share

- Embedded industry represents about \$17 billion in revenue per year
 - Compare to \$19 B for cellphone processors
 - Compare to ~\$25 B for non-mobile, non-embedded MPUs
- Embedded Systems outnumber other MPUs by over 100:1

Microprocessor Based Embedded Systems



Why Microcontrollers?

- Peripheral loaded
 - ADC, DAC, GPIOs, Serial Interfaces
- Cheap
 - ~\$1 for 8-bit processor
- Low Power
 - ~300 μ A operation (1 AA battery for 275 days)
 - <1 μ A sleep (1 AA battery for 225 years)
- Programmable
 - Assembly or C

Our Microcontroller

- AVR Butterfly
 - ATMEGA 169PV chip
 - Built-in peripherals
 - 120 segment LCD Screen
 - Joystick
 - Piezo element – sounds
- Programmer
 - AVR Dragon
- These boards will be used for projects and discussions

