

Embedded Software

Networks and Embedded Systems

Second Grade Level

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Embedded Systems (1)

- What are embedded systems?



Personal Computer
General-purpose



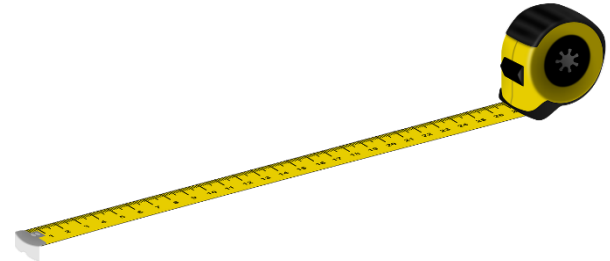
Embedded System
Specific control functions

Embedded Systems (2)

- How are they characterized?
 - Not seen as being computers
 - I am using a MP3 player, not a computer
 - Embedded into another system
 - Is part of the MP3 player
 - Perform process control
 - Display track list
 - Handle track selection
 - Control volume

Embedded Systems (3)

- How are they characterized? (continued)
 - Environment imposes constraints
 - Size
 - Must fit into device
 - User Interaction
 - Buttons or touch screen instead of keyboard and mouse
 - Power consumption
 - Device must work with batteries
 - Costs
 - Low cost high quantity products



Embedded Systems (4)

- Examples

- Automotive

- Engine Control
 - Antilock Breaking Control



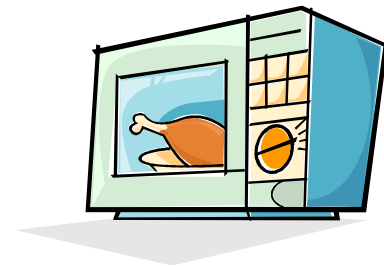
- Communication

- Switch



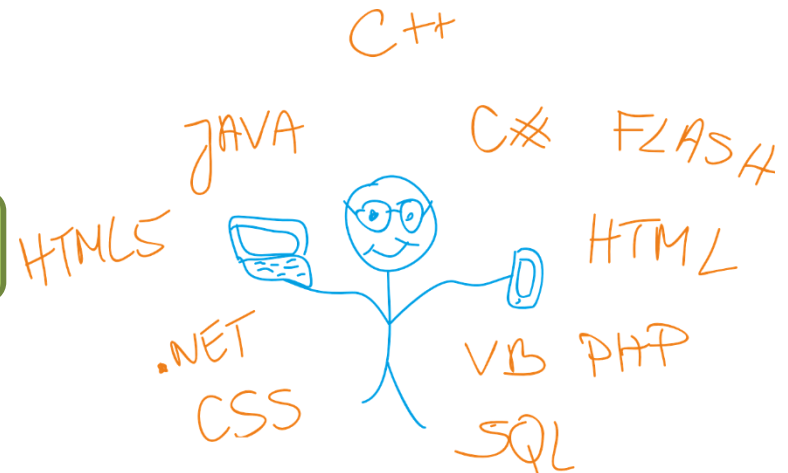
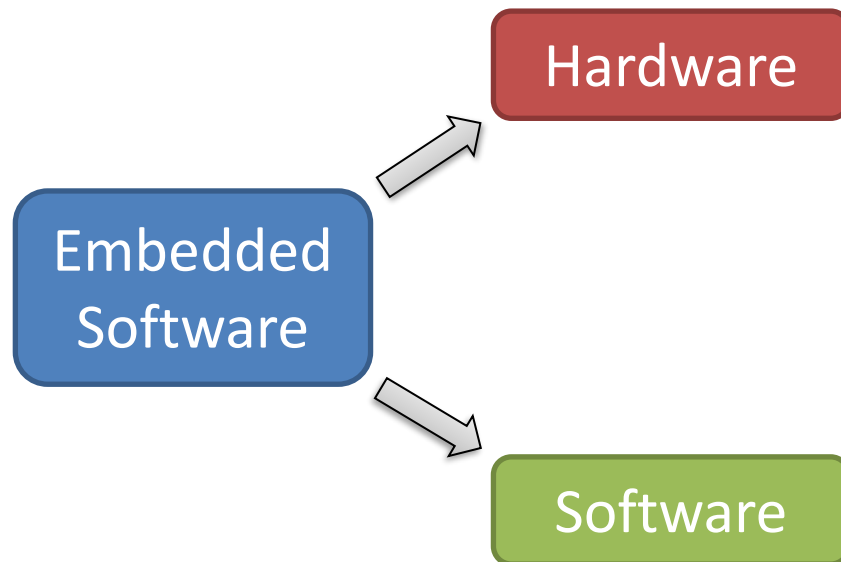
- Domestic

- Microwave oven
 - Washing machine



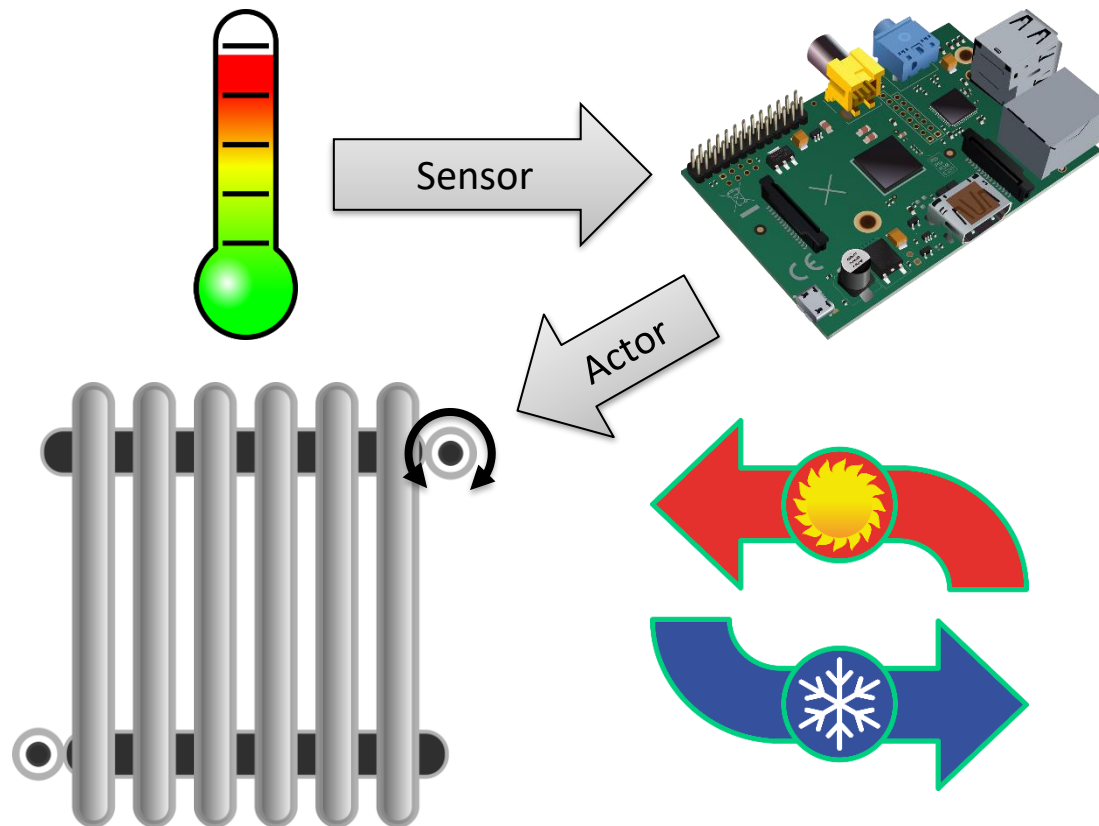
Embedded Software (1)

- What is embedded software?



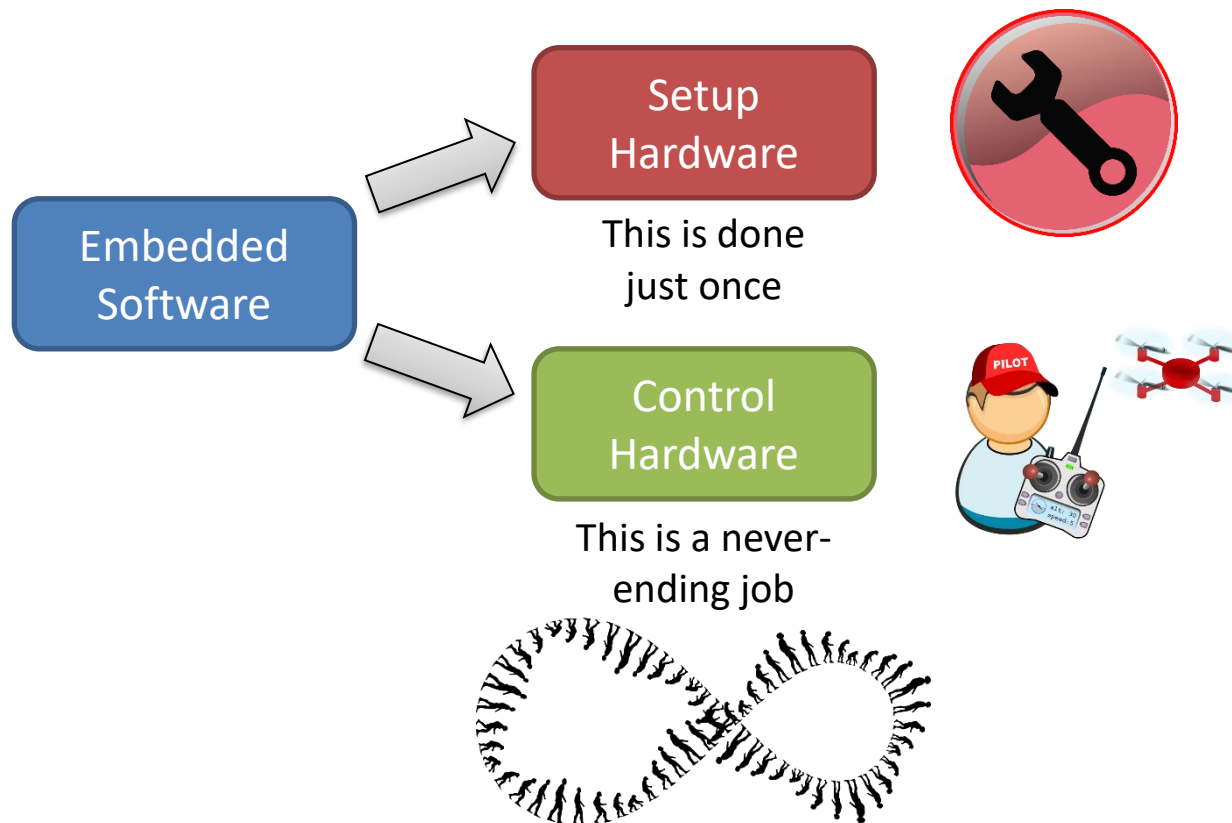
Embedded Software (2)

- Example: heating control



Embedded Software (3)

- What does embedded software do?



Embedded Software (4)

- Arduino's point of view



```
// The setup function runs once
void setup() {
    // Setup hardware
}

// The loop function runs forever
void loop() {
    // Do the control job
}
```

Embedded Software (5)

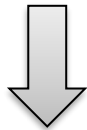
- C's point of view



```
int main(void)
{
    // Setup hardware
    for (;;) {
        // This is an infinite loop
        // Do the control job
    }
}
```

Embedded Software (6)

- Arduino's way with C



```
void setup() {  
}  
void loop() {  
}  
int main(void)  
{  
    // Setup hardware  
    setup();  
    for (;;) {  
        // Do the control job  
        loop();  
    }  
}
```