Real-Time and Embedded Systems

Prof. Li-Pin Chang

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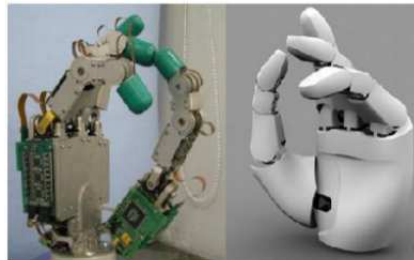
- 因實驗器材數量限制，課程暫時不接受加簽，請透過選課系統遞補

Course Information

- 嵌入式即時系統
  - Real-Time & Embedded Systems
- Instructor
  - 張立平
  - lpchang@gmail.com
 - 請直接寄信，不要透過 E3 寄（掉進 SPAM）
  - 晤談請寄信預約

Embedded Systems

- Mission oriented

- Highly resource-constrained
  - Time (CPU) and space (RAM) begets are limited

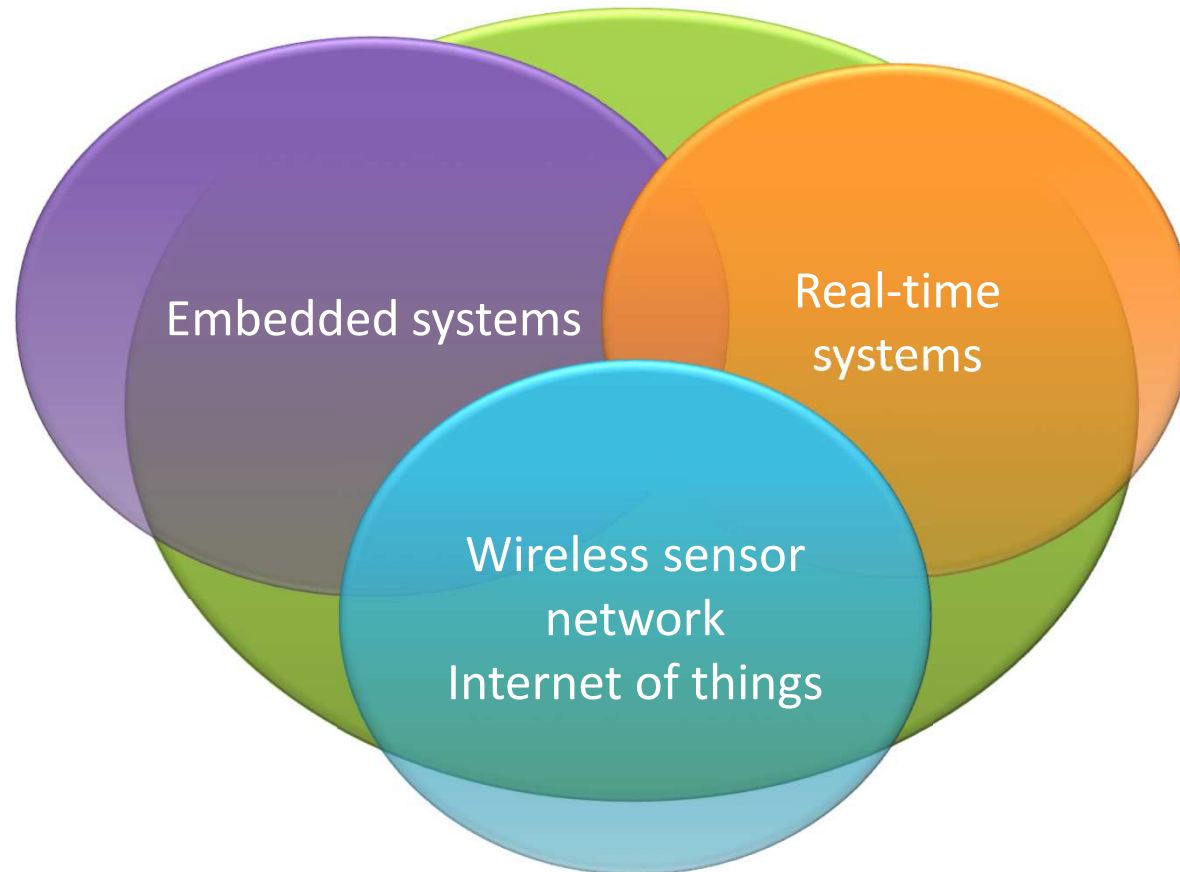- Subject to timing constraints

Real-Time Systems

- *"A real-time system is a system whose correctness includes its response time as well as its functional correctness"*
  - IEEE Definition on Real-Time Systems

Cyber-physical systems

Embedded systems

Real-time systems

Wireless sensor network
Internet of things
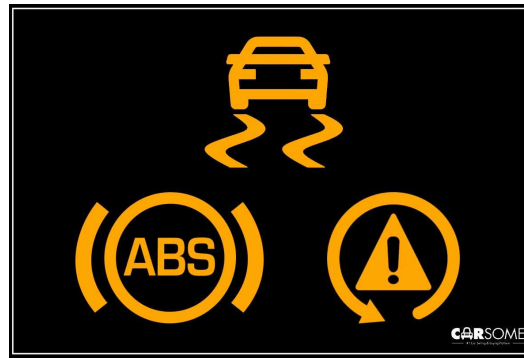
Cyber-Physical Systems

- *"Cyber-Physical Systems (CPS) are integrations of computation and physical processes."*

E. A. Lee, "Computing Foundations and Practice for Cyber-Physical Systems: A Preliminary Report", Technical Report UCB/EECS-2007-72, EECS Department, University of California, Berkeley, May 2007.

Course Organization

- Real-time scheduling theory
- Real-time operating system design

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While(1){
    Theory;
    Implementation;
}
```

- "Dual kernel" approach…
  - uC/OS (basic part) + FreeRTOS (extension part)

uC/OS-2 Projects

- 3 Lab weeks for uC/OS-2 projects
  - Periodic task modeling
  - Earliest-deadline first scheduling
  - Ceiling-priority protocol
- The same time as the class
- @EC 221+222

FreeRTOS Project

- Bonus project
- Based on your experience, implement EDF on FreeRTOS

Grading Policy

- First written test: 40%
- Second written test: 20%
- 3 uC/OS-2 Labs: (10% each)   30%
- Quizzes and attendance   10%

- Bonus FreeRTOS project   10%