Embedded Systems

2016/2017

Overview

Embedded Systems

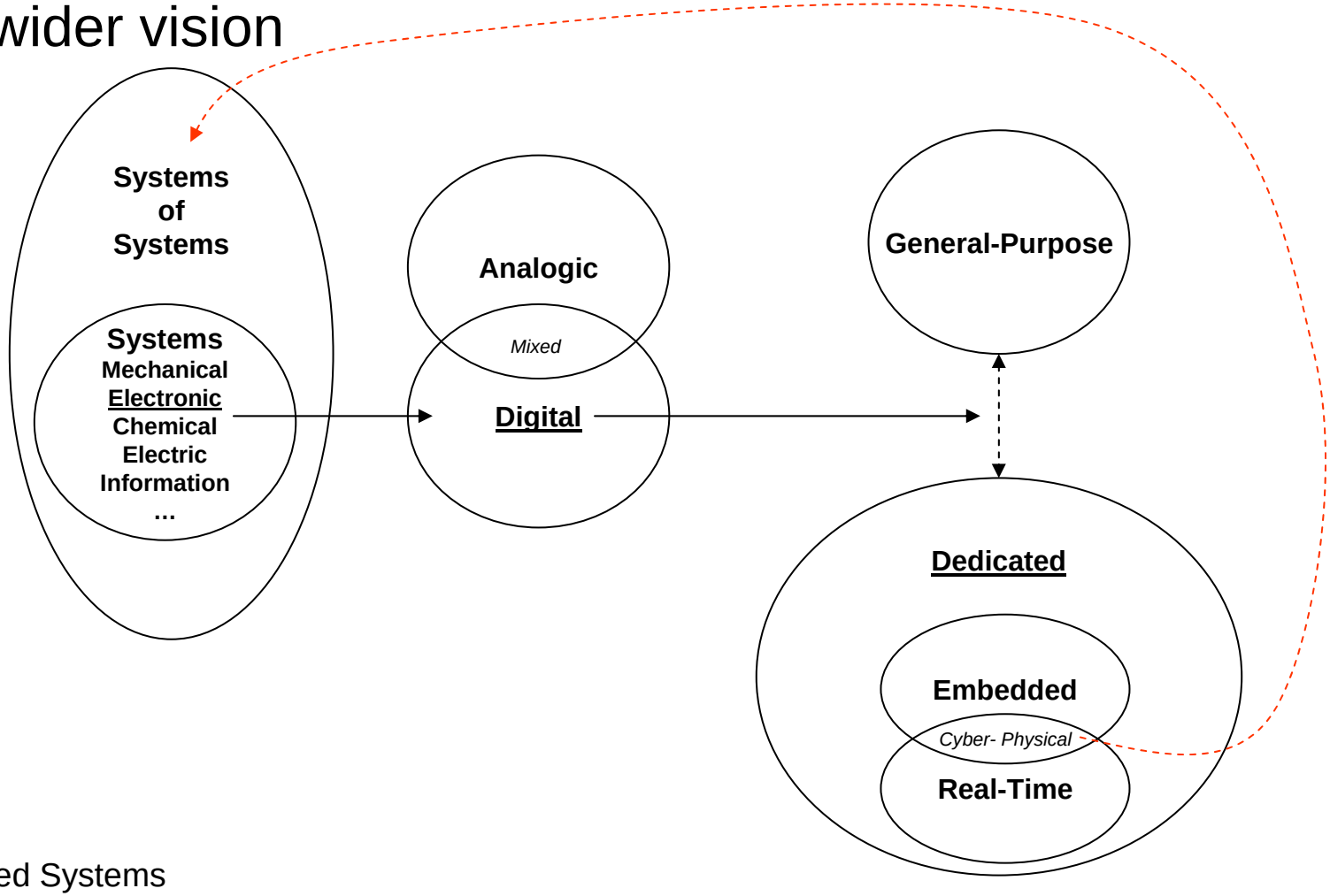
- Excuse me, please. But…

…what is an embedded system?!?!

From: ***http://en.wikipedia.org/***

Embedded Systems

- A wider vision



Cyber- Physical Systems: see 01_Extra

Embedded Systems

- General structure of the course
  - 9 CFU ING-INF/05
    - Near 90 hours of lessons
      - Basic “theoretical” concepts about the development of HW/SW dedicated/embedded systems
      - Techical/practical seminars and case studies
  - 6 CFU INF/01
    - Only a subset of the full program will be requested for examination

Embedded Systems

- General structure of the course
  - Scheduling
    - Tuesday: 14.30-17.00 (one 15 min break)
    - Thursday: 11.30-13.00
    - Friday: 09.00-11.30 (one 15 min break)

Embedded Systems

- Lecturer
  - Luigi Pomante, PhD
    - Researcher (Assistant Professor) – DISIM/DEWS
      - Contacts
        - » email: luigi.pomante@univaq.it
        - » skype: luigi.pomante
        - » web site : www.pomante.net (**course website**)
        - » **Course mailing list**: send e-mail to luigi.pomante@univaq.it
        - » Office hours by appointment (e-mail)

- Main collaborators
  - Marco Santic, Post-Doc
  - Giacomo Valente, PhD student
  - Vittoriano Muttillo, PhD student
  - Walter Tiberti, PhD student

Embedded Systems

- Goals
  - To provide a structured and homogeneous vision about technologies, methodologies and tools for HW/SW developments
  - To provide awareness about implementation issues during the analysis of theoretical concepts that needs a practical follow-up
  - To provide some (practical) knowledge about HW/SW development tools currently used in the academic and industrial worlds

    - Useful basic backgrounds
      - Computer Science, Algorithms, Structured/OOP Programming
      - Digital Electronics, Computer Architecture, Operating Systems
      - Electrical/Wireless Communications
      - Model driven/based development/engineering

Embedded Systems

- Why?
  - The course is designed for all the professional figures related to the ICT domain
    - Modern/Innovative Electronic Engineer
    - “Not only web-gis” Computer Science Engineer/Graduate
    - Concrete Telecommunications/Automation Engineer
    - Concrete (i.e. HW/SW technologies aware) Computer Science Graduate

Embedded Systems

- Why?
  - It is preparatory for the following ICT professional figures
    - Dedicated/Embedded HW/SW Systems Designer
      - A figure that knows, is able to select and use HW/SW technologies and related development tools
    - Embedded SW Developer
      - A figure that knows HW/SW technologies, is able to select and use SW technologies and related development tools
    - EDA (*Electronic Design Automation*) SW Developer
      - A figure that knows HW/SW technologies and (how work) related development tools, and is able to develop SW tools useful to support HW/SW designers
    - Project manager
      - A figure that knows and is able to select HW/SW technologies and related development tools in order to manage complex ICT projects (related in some way to the embedded domain)

Embedded Systems

- Syllabus
  - Introduction
  - Technologies
    - Processing
      - HW Technologies
      - Processors
      - System SW
    - Storage
    - Interfacing
    - Communications
  - Design Methodologies
    - Reference Architectures and Design Issues
    - Models, Metrics and Design Flows

Tools

Embedded Systems

- (Official) Educational Material
  - Main book (English)
    - Embedded System Design: A Unified HW/SW Introduction (ESD)
      - F. Vahid,T. Givargis - John Wiley & Sons 2001 (http://esd.cs.ucr.edu/)
        - » How much is it?
        - » http://www.addall.com/
        - » http://www.abebooks.com/
        - » http://www.abebooks.it/
  - Slides and other electronic documents

Embedded Systems

- (Supplementary) Educational Material
  - Books
    - **Sistemi Embedded: Sviluppo HW e SW per sistemi dedicati**
      - **W. Fornaciari, C. Brandolese - Pearson – Prentice Hall 2007**
    - **Real-Time Concepts for Embedded Systems**
      - **Qing Li & Caroline Yao - CMP Books 2003**
    - Introduction to Embedded Systems
      - A Cyber-Physical Systems Approach
        - » E. A. Lee and S. A. Seshia, LeeSeshia.org, 2011
  - Other electronic documents: EXTRA folders

Embedded Systems

- Examination (WIP)
  - HomeLabs: 0 points
    - 5 fixed single/group basic activities with specific HW/SW development kits
      - » Output: brief reports to summarize the work done and the main problems
  - Project: up to 11 points
    - Single/group activity to be selected from a list (WIP) or related to projects from other courses (it could be also a starting point for a Master Thesis)
      - » Intermediate revision and final presentation/discussion
  - 1 written test: up to 22 points
    - A mix of true/false, open questions, and programming exercises related to the **(Official) Educational Material** and the **HomeLabs**
      - » The program will be properly reduced for 6 CFU course (INF/01)

  - >30 points == 30L

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Any question?