« Embedded Systems »

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LAP/I&C/EPFL

Chargé de cours

LSN/hepia

Prof. HES

Main topics

- This course is oriented **hardware** and **interfaces**.
- It presents in details the different parts of an embedded system based on **microcontrollers** and/or **FPGA**.
- It is organized in 5 sections each associated with a group of laboratories sessions.

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Sections of the course

- **The first section** explain the different part of this kind of system, with standards parallel and serial bus, processor bus (asynchronous, synchronous) common and divergent characteristics.

- The main goal for this part is the **comprehension of programmable interfaces** and the access model. A simple Microcontroller is studied and its use is emphasized in the course with the help of laboratories.

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- **The 2nd section** present the design of an embedded system on FPGA. FPGA hardcore and softcore embedded processors are described and used in laboratories. **Conception methodology of some programmable interfaces architecture** is put in application with practical works in VHDL on FPGA.

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Sections of the course

- **The 3rd section** allows the students **to be able to design a master programmable interface on FPGA**.

- A LCD display is interfaced by a DMA controller on the FPGA.

- A camera is interfaced by a FPGA to make the picture acquisition

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- The **4th section** introduces an **FPGA-SOC system**. This system will be used for the last Mini-Project session.

- The **5th section** is a mini-project.
- This mini-project is done by groupes. It will be evaluated by:
  - ➢A report
  - ➢A demonstration
  - ➢An oral presentation

- **Grade evaluation:**

  ➢ 4 laboratories are to be provided during the semester as reports.

    ➢ 3 first laboratories will count as **10%** each.

    ➢ The mini-project will count for **20%**.
      It will include a final demonstration the last week of the course, an oral presentation per group, and the report.

  ➢ An oral final exam in January to evaluate the theoretical part of the course count for **50%**.

Course documents

- \\moodle.epfl.ch
  - ➤→Informatic
    - ➤→ Master
      - ➤→ Embedded Systems

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