INGI2315 Computer systems: real-time aspects

[30h+15h exercises] 4 credits

This course is taught in the 2nd semester

Teacher(s): Jean-Didier Legat, Marc Lobelle (coord.)
Language: French
Level: Second cycle

Aims

- To Be able to design both the software and hardware aspects of real-time systems.

Main themes

- Specific aspects of real-time software : specific concepts, design method, specific functions and algorithms of real-rime operating systems, fault tolerance
- Implementation of small computing systems based on microprocessors

Content and teaching methods

(1) Software aspects
- Introduction to real-time systems
- Software design and implementation methods for real-time systems
- Real-time operating systems
- Fault tolerance
- Introduction to PETRI nets

(2) Hardware aspects
- Introduction to digital electronic systems (logical circuits families, programmable circuits, memories)
- Microprocessor architecture
- Main peripheral circuits of a computing system (interrupt controlers, direct memory access controlers,¿)
- Communication systems (PCI bus)

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

- Prerequisites:
(1) General knowledge of computing systems architecture and ability to program in C (for instance LINF 1252, INGI 2113, INGI 2716)
(2) General knowledge of electronics (for instance ELEC 2752 ELEC 2531).
(3) Passive technical english
- References
Recommended reading
(1) D.A. Patterson, J.L. Hennessy, "Computer organization & design. The hardware/software interface" , Morgan Kaufmann, 1994, 1-55860-282-8.
(2) P.A. Laplante, "Real-time systems design and analysis. An engineer's handbook" , IEEE Press, 1993, 0-7803-0402-0.
(3) A. Burns, A. Wellings, "Real-Time Systems and Programming Languages" , Addison Wesley, 1997, 0-201-40365-X. *
(4) A. M. van Tilborg, G. M. Koob, "Foundations of Real-Time Computing: Scheduling and Resource management" , Kluwer, 1991, 0-7923-9166-7.
- Organisation
(1) Traditional lectures or distance learning
(2) Students will have to design in group a real-time control system. For students in electromecanical engineering, this activity is integrated in a mobile robot project. Students in computing or electronics join normally to the groups of electromechanical engineering students.
This acivity is evaluated and taken into account in the course marks.
(3) Written exam with opportunity of oral presentation during the written exam.
-See also
http://www.dice.ucl.ac.be/~jdl/InfoCours/InfoCours.htm

Other credits in programs

ELEC23	Troisième année du programme conduisant au grade d'ingénieur civil électricien	(4 credits)	
ELME22/M	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (mécatronique)	(4 credits)	Mandatory
INFO23	Troisième année du programme conduisant au grade d'ingénieur civil informaticien	(4 credits)	