Synchronous languages

ENSEEIHT 3A – parcours E&L

2021/2022

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Summary: Objective of the course

- Lecturer
  - Frédéric Boniol
  - ONERA (French research institute in aerospace systems)
  - My teaching and research domain =
    - Embedded systems
    - Real-time programming
    - Formal verification (formal methods for embedded systems)

- Objectives of the course
  - To present the class of Synchronous Languages
    - What are the main principles of the synchronous languages
  - To present LUSTRE
    => a formal data flow synchronous language for programming control systems

Summary: Plan of the course

- Theoretical part: introduction to real-time systems
  - Lecture 1.
    - Brief overview of “real-time” and “embedded systems”
    - Differences between “synchronous” and “asynchronous langages”
  - Lecture 2.
    - LUSTRE (“single-clock”)
  - Lecture 3.
    - LUSTRE (“multi-clock”)
    - Formal aspects of LUSTRE: clock calculus
  - Lecture 4.
    - Formal verification of LUSTRE programs
    - Exercises

Course mark:
- 1h30 exam
- All documents are allowed

- Practical part (Thomas Beck and Pierre-Julien Chaine):
  - 2 sessions on
    - Small programs in LUSTRE
    - Lego Robot

Summary: Schedule of the course

- Tuesday, the 6th of January:8h-9h45
  - Lecture 1
- Tuesday, the 11thof January: 8h-9h45
  - Lecture 2
- Thursday, the 1th of January: 10h15-12h00
  - Lecture 3
- Tuesday, the 18th of January: 10h15-12h00
  - Lecture 4

- Practical sessions:
  - Groupe E: 20 janvier, 25 janvier.
  - Group L1L2: 20 janvier, 25 janvier.
  - Group L3: 18 janvier, 25 janvier.

=> Exam: 31 janvier 14h-15h30