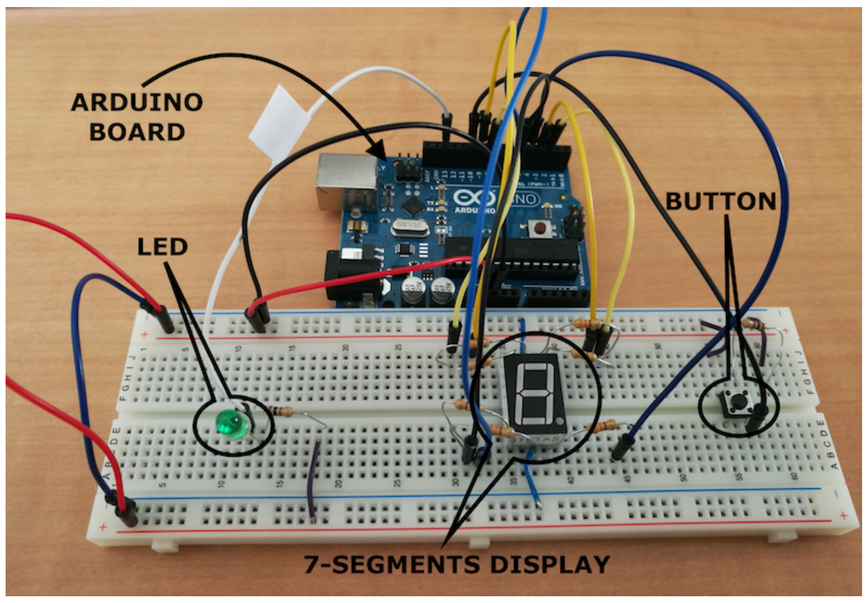
Teaching experiences in Lyon with Lustre and Arduino

Thierry Excoffier, Laure Gonnord, Lionel Morel, Sébastien Mosser

Arduino Reactive Systems



ARDUINO™

- Great, cheap, open-source platform family.
- Arduino UNO: ATmega 328P microcontroller.
- Versatile platforms: used for Real-Time, System, IoT, Robotics, Software Engineering, Domain-Specific Language design ...

Real Time Course (M1, UCBL)

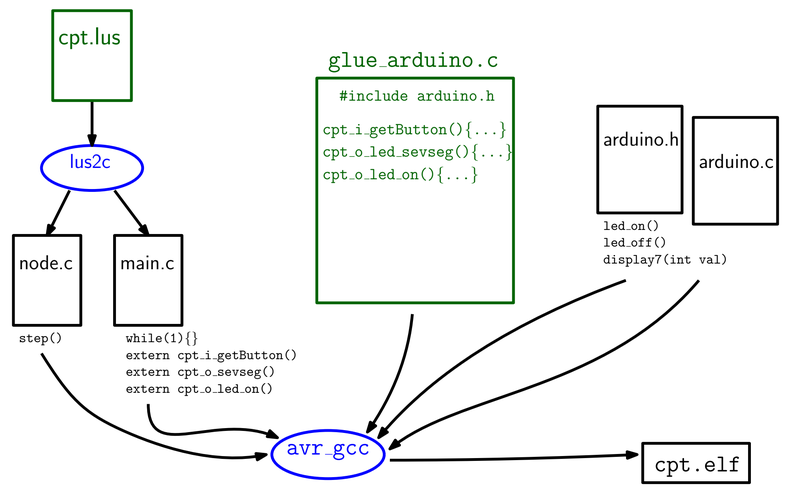
Thierry Excoffier & Laure Gonnord, since 2016/2017.

Context:

- M1 option (30 students), 2nd semester. 10h lecture, 21 hours labs.
- Objective: **revisiting architectural and system courses (License) within the context of real-time systems.**
- One lecture for Lustre: reactive (real-time, critical) systems programming with Lustre.
- Two lab sessions for Lustre/Arduino.

Lustre/Arduino:

- 1st lab: Discovering the Lustre (V4) ecosystem.
- 2nd lab: **Classical Lustre examples revisited**: counter, traffic lights, car lights, on Arduino with buttons and leds.



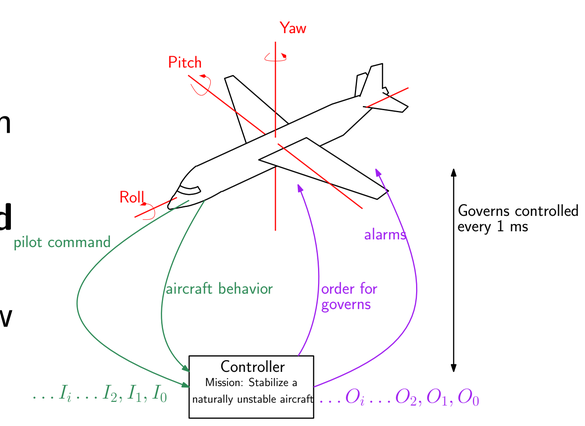
Seminar: Langage, Compilation, Semantics (LIP)

Laure Gonnord & Lionel Morel, March 2016.

- Objective: **Synchronous languages scratch course**.

Content:

- Critical reactive system design with Lustre.
- Focus on **compilation and static analysis**.
- A quick tour on other dataflow languages.



Software Engineering and Compilation Course (M2, ENSL)

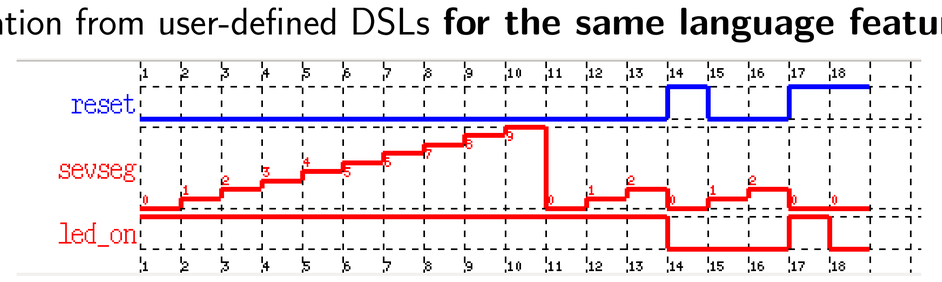
Laure Gonnord & Sebastien Mosser, 2017/2019.

Context:

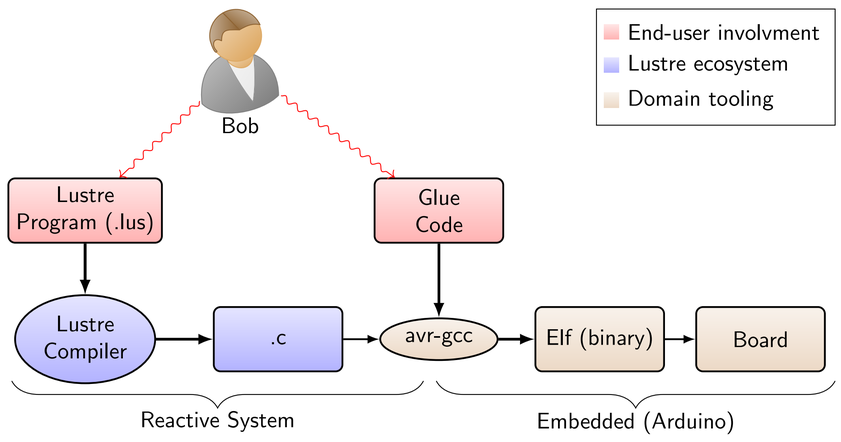
- M2 Course, 6 students. 24 hours lecture + labs.
- Objective: teaching domain-specific modeling, and notions of **Domain Specific Languages** development, both in theory and in practice.

Lustre/Arduino:

- Lab 1: A sequence of abstractions from Arduino low-level code to code generation from user-defined DSLs **for the same language features**:



- Using Lustre as the first example of a **Domain Specific Language for reactive systems**.



Bibliography & Ressources

Follow the QR code for biblio and all other resources!

Grenoble, June 2018, Nicolas Halbwachs' scientific days

http://liris.cnrs.fr/ http://www.ens-lyon.fr/LIP/ http://www.i3s.unice.fr/ http://www.citi-lab.fr/ http://www.univ-lyon1.fr/ http://www.ens-lyon.fr/