

## Infotronics

Number of ECTS credits: 6

Coefficient: 6

### Description:

Executive environments and operating systems: features and resources consumed  
Generating digital signals with an FPGA

### Pedagogical objectives:

Knowledge to be acquired:

- Reasoned choice of the working environment (bare metal, executive environment, operating system) according to the resources and objectives,
- Management of competition for access to data in a multi-task environment (semaphore, mutex)
- Interest of an operating system: multiple tasks (separation of functionality, collaborative work), communication (especially internet-enabled), storage (file systems)

Skills to be acquired:

- Use of an executive environment (FreeRTOS)
- Use of GNU / Linux on embedded system
- Network configuration, OSI layers and functionalities accessible on various computing platforms
- Transfer of data by IP, TCP or UDP - client / server and operation of a transaction by HTlabs (CGI script)
- Build its coherent environment (toolchain, libraries, kernel and tools in user space) development: buildroot
- Abstraction of the hardware by the operating system
- Realization of serial / parallel and parallel / serial interfaces in VHDL
- Signal synthesis (DDS)
- Implementation of communication protocols

### Bibliography:

- R.S. Gaonkar, The Z80 Microprocessor: Architecture, Interfacing, Programming, And Design, Prentice Hall (1992)
- P. Ficheux & E. Bénard, Linux embarqué, 4eme Ed., Eyrolles (2012)
- revue OpenSilicium

### Prerequisite:

Unix command-line environment, C on POSIX operating system, makefile, architecture of a microcontroller; Synthesizable VHDL, time simulation

Lectures Hours: 8

Tutorials Hours: 8

Labs Hours: 40

Knowledge monitoring modalities: 100% continuous assesement

Assesement: Reports of labs and a practical exam, 1 exam

**Leader: Sébastien EUPHRASIE**

**Participants: Jean-Michel FRIEDT**