FAME	ENSEA	
	Computer Architecture: Introduction to Microprocessors and Embedded systems	
US Credits : 3	Lecture : 17h ; Laboratory : 28h	Language : English

Summary

The goals of this course are to understand the main principles of a microprocessor system. It's both based on basic courses about microprocessor and laboratory works on a real embedded system.

Prerequisites
- Digital Electronics.
- C or C++ language.

Contents

This is a lab-oriented course in which classroom topics are explored through in-depth experiments in laboratory projects.


First, the students work on a simulator with a simplified model of a microprocessor. Here, basic concepts are described: data representation, arithmetic and logic unit, RISC principles, pipelining, memory types, assembly language.

Then students have to program a Cortex M4 microcontroller (ARM) based board in assembly language and C. Thanks to this work they discover more advanced topics such as: procedure, compiler, linker, the relation between assembly code and high-level language...

Then students program their own board with a personal project with switches, LEDs, a LCD screen and other peripherals. This is a way to introduce other concepts: I/O, peripheral devices, interrupts.

Courses and laboratory works are mixed. At the beginning, there are mostly courses then at the end mostly laboratory sessions.
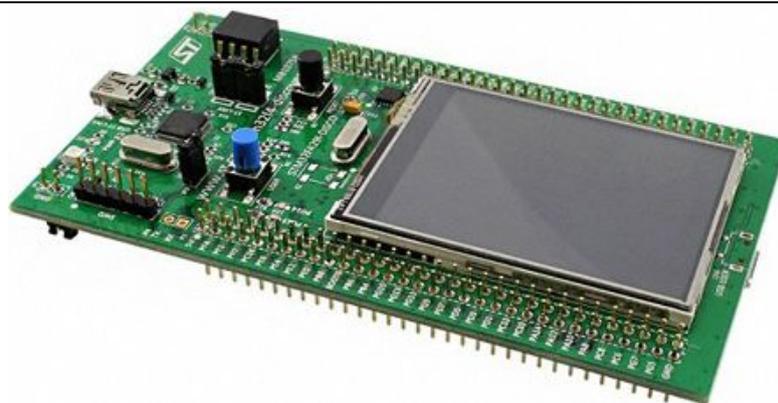
Topics:
- Basic microprocessor principles: fetch, decode and execute cycle + pipeline, memory.
- Machine code, assembly language, assembler, number system.
- From C to assembly language: compiler.
- Exception handling and interrupts.
- Microcontroller and embedded systems.

Organization

One 3-hour session per week for 15 weeks. The group of students is small enough to intertwine formal lecturing, exercises and laboratory. The grading is based on written tests and homework.

Textbook

Similar to the following courses
- IIT Chicago CS 470
- University at Buffalo CSE 341
- University of Pittsburgh CS 0447

- University of Illinois at U-C CS 231 & 232
- Mississippi State University ECE 3724/ECE 4713
- University of Michigan at AA EECS 300 level
- Michigan Tech