

Microcontroller Programming – Syllabus

Instructor: Flavio Ansovini

Address: DITEN, Via All'Opera Pia 11A, 1st floor, room T-15

Duration: 12 hours

Final Exam: yes

PhD Course: INGEGNERIA ELETTRONICA, INFORMATICA, DELLA ROBOTICA E DELLE TELECOMUNICAZIONI

Language: English/Italian

Credits: 6 CFUs

PhD STIET Coordinator: Prof. Mario Marchese

Responsible Department: DITEN – UNIGE

Learning outcomes

After passing the course the student should be able to:

- design and implement an embedded system based on an 32bit microcontroller, taking into account energy conservation and possible software errors,
- program a microcontroller using C, including hardware configuration and interrupt service routines,
- manage parallel processes with different priority and real time constraints without the aid of an operating system,
- select data types and algorithms suitable for the architecture and instruction set of a given microcontroller,
- give a detailed description of limitations of the chosen system design,
- debug a microcontroller application using different tools.

Content

The course is designed to analyze the different features of the microcontroller with a practical approach. This is done by going directly to solve some typical control problems, making best use of the devices internal to the chip. During the course will be described the architecture and internal units of an ARM Cortex-M4 microcontroller; Interfacing of analogue and digital signals, including basics of electronics; Serial communications; Low level programming in C, interrupts service routines; Management of parallel processes without the aid of an operating system, process priority, timing analysis; Instruction and register sets and addressing modes for a given microcontroller family; Efficiency aspects on different data types and code snippets in C; Development tools.

Instructions

Lectures, laboratory work and project supervision.