

Concepts and hardware for data transmission

Introducing

Description

- Description and programming in Arm and x86 assembly languages.
- Description and use of a standardized C compilation chain via scripts, as well as the use of associated debugging tools.
- Description and analysis of the main aspects of the software's lower layers (function calls, data storage, associated security aspects) at C and assembly language level.
- Description and optimization of the use of hardware resources, particularly memory.
- Description and analysis of hardware vulnerabilities.
- Study of DFT, setup DFT parameters (window, number of points) according to a given application, (MATLAB)
- Study of spectrum aliasing phenomena, then design of an anti-aliasing filter,
- programming on STM32 controller for the laser shooting game in ASM and C.

Objectives

The module is divided into two parts, one dealing with assembler language and associated hardware architectures, the other based on numerous practical sessions, combining signal, electronics and embedded programming in assembler and C on STM32 controller. At the end of the module assembly language and hardware architectures, students will be able to program in assembly language, identify and correct software problems (resource under-utilization, bugs) in C and assembly language, and identify potential

hardware vulnerabilities.

The aim of the second part composed of 11 practical sessions is to study a telecommunication-type transmission system (optical link) at all levels, from signal aspects to on-board programming in ASM and C, including a small-scale electronic implementation on a test plate. The supporting application is a multi-player laser shooting game with use of DFT to identify players

Necessary prerequisites

- Knowledge of computer architecture and internal functional description (processor, memory, caches).
- C language.
- electronics and signal basics strongly recommended

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse