Modules IG.2307 / II.2407

Data Acquisition and Processing

Person in charge: Maria Trocan
Prerequisites: IE.1101 / IE.1201
Organization: Class– Labs – Project (42h + 80h of personal work)
Assessment: Exam / Project defense
ECTS: 5 credits

Overview

"Data processing" is a very broad notion. In this class, the most important operations on these data, regardless of the technical process, and thus including the acquisition, recording, storage, retrieval, consultation, communication, transfer etc. will be studied.

The purpose of this module is to acquire the processing bases of deterministic and random data: representation, analysis, filtering.

Application areas are vast, since processing technologies are applied in all digital systems at the data acquisition, transfer and restitution, in order to improve the quality of these data, transform or extract information.

Objectives

Skills

This module focuses on strengthening the core level of problem solving in signal processing, e.g.: problem analysis, identification of the signal type (time signal, image, etc.), its characteristics (deterministic, random, stationary noise model, etc.), accuracy in choosing the necessary elements for problem solving (mathematical tools, filters, simulation tools, etc.).

The students should be able to develop a mathematical model for problem solving, by taking into account the signal characteristics and the raised constraints, and to find solutions by establishing a functional scheme of all the stages necessary in signal processing.

Moreover, they should be able to simulate the processing chain, to validate the formal solution based on the simulation results and to determine the optimal solution.

Knowledge

This module enables students to develop the following concepts and skills.

- **Concepts**
  - Data types: qualitative, quantitative
  - Qualitative, quantitative data sampling
  - Deterministic data processing:
    - Data transforms, filtering, linear prediction
  - Random data processing:
    - Distributions, estimation, measure errors
    - Correlation, recursive filtering, regression
- **Know-how**
  - Data acquisitions and simulations in Matlab/ LabView.

Teaching method

Class – Labs– Project.

Bibliography

Associated class notes.