Signal Processing for communications

Component
École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications

In brief

- **plugin.odf-inp:PLUGINS_ODF_COURSE_NBHOURS_TXT:** 4 lectures, 4 sessions of practical work
- **Code:** N9MS01A

Presentation

Objectives

Two parts in this course: 1) Introduce theoretical tools for signal processing, 2) Digital signal processing (implementation).

Objectives for the first part (theoretical tools) :

- Understand the different classes of deterministic and random signals with the definitions of the autocorrelation function and the power spectrum density

- Understand the concept of linear filtering and the Wiener Lee relationships

- Understand the principles of sampling and the Shannon theorem

- Understand the interest of non-linear transformations applied to deterministic and random signals and how to apply Price's theorem

Objectives for the second part (digital signal processing) :

- To be able to correctly sample a signal and to generate simple digital signals.

- To be able to estimate digitally the aucorrelation function and to perform a frequency representation (Fourier transform, Power Spectral Density) of a signal.

- To be able to determine impulse responses for simple filters (Finite Impulse Response, or FIR, filters) and to synthesize them, meaning to choose their parameters to meet some requirements.

- To be able to filter a signal and to analyze the obtained result.

Description

For the first part (theoretical tools) :

- Autocorrelation and power spectral density

- Sampling

- Linear Filtering

- Non-linear transformations and Price's theorem

For the second part (digital signal processing) :

- Sampling and quantization.

- From theoretical to digital tools for the autocorrelation function and the Fourier transform : what are the approximations to be done ? what are their consequences ?

- Digital filters (FIR and IIR) and FIR synthesis.

Pre-requisites

Bases on deterministic signals (energy, power, periodicity)

Random variables and vectors

Useful info

Place

Toulouse