

Signal Processing

Digital Signal and Image Processing

IDENTIFICATION

CODE : GE-5-S1-EC-TDSI
ECTS : 12.0

HOURS

Lectures : 94.0 h
Seminars : 46.0 h
Laboratory : 17.0 h
Project : 20.0 h
Teacher-student
contact : 177.0 h
Personal work : 80.0 h
Total : 257.0 h

ASSESSMENT METHOD

TdSI1: examen de 2h, note de TP
FPGA et note de TP DSP
TdSI2: examen de 3h, note de projet
TdSI3: examen de 3h

TEACHING AIDS

Powerpoint files (Moodle)
Hard copy of powerpoint files,
Notes for Laboratory sessions
Matlab software

TEACHING LANGUAGE

French

CONTACT

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AIMS

- Mastering basic methods of digital signal processing and their implementation in real time with DSP and FPGA.
- Mastering the main methods of information processing and natural or synthetic image processing
- Mastering the theoretical bases and knowledge of typical applications of modeling random signals, the theory of estimation and decision.

CONTENT

TdSI1 :Digital signal processing

- Signal analysis (lecture 6 h, tutorial 12h using Matlab)
- Digital Signal Processors (DSP) (lecture : 8h, laboratory : 8h)
- Hardware for signal processing (lecture :4h, laboratory : 8h : VHDL and FPGA)
- Industrial seminar (2h): Times-frequency techniques.

TdSI2 : Digital image processing

- Information and communication theory (lecture :8h)
- Image processing for computer vision (lecture :16h, tutorial:5h using Matlab)
- Orthogonales transforms, wavelets, applications (lecture :10h,laboratory 3h using Matlab)
- Computer graphics (lecture : 8h, tutorial 3h using Matlab).
- Industrial seminar (4 h) Computer vision for quality control, 3D images acquisition.
- Industrial projects (20 h)

TdSI3 : Modeling, estimation, decision

- Random Signals Modeling and applications (lecture 10h, tutorial 4h using Matlab)
- Speech analysis and synthesis (lecture 9h with object lesson)
- Estimation and Decision theory (lecture 10h, tutorial 4h using Matlab)
- Industrial seminar (2h) Radars fundamentals.

BIBLIOGRAPHY

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Baudoin G., Virolleau F., Les processeurs de traitement du signal, famille 320C5X, Dunod, 1998
T.M. Cover, J.A. Thomas, "Information theory", Wiley Interscience, 1991
A. K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, USA, 1986.
E. Stollnitz, T. DeRose, D. Salesin, Wavelets for computer graphics . Morgan Kaufman, USA, 1996.
M. Rabbani P. W. Jones, Digital Image Compression Techniques, SPIE Optical Engineering Press, USA, 1991.
J.D. Foley, A Van Dam, S.K. Feiner, J.F. Hugues, Computer Graphics: Principles and Practice", Addison-Wesley, 2nd ed, 1992

PRE-REQUISITE

- 4GE Signal processing course,
- Basic background in mathematics and probabilities

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