Technology
Arts Sciences
TH Köln

Course
SMP - Signalprocessing using Matlab/Python and Microprocessors

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General information

Long name	Signalprocessing using Matlab/Python and Microprocessors
Approving CModule	SMP_BaET, SMP_BaTIN
Responsible	Prof. Dr. Harald Elders-Boll Professor Fakultät IME
Level	Bachelor
Semester in the year	winter semester
Duration	Semester
Hours in self-study	78
ECTS	5
Professors	Prof. Dr. Harald Elders-Boll Professor Fakultät IME Prof. Dr. Uwe Dettmar Professor Fakultät IME Prof. Dr.-Ing. Christoph Pörschmann Professor Fakultät IME
Requirements	Basic procedural programming skills Basic knowledge of digital signal processing: Sampling Theorem, Digital Filter, Fourier Transform
Language	German and English
Separate final exam	Yes

Final exam

Details

In their projects students implement given methods for digital signal processing in small teams and thereby show their ability to develop signal processing applications for various purposes.

For the final grade the poject work, the project results, the final project presentation and the written project report are evaluated and scored according to different criteria and the final grade is derived form the total score.

Minimum standard

50% of the maximum achievable total score.

Exam Type

In their projects students implement given methods for digital signal processing in small teams and thereby show their ability to develop signal processing applications for various purposes.

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Lecture

Learning goals

Knowledge

Principles of Digital Signal Processing:
Sampling and Reconstruction
Digital Filters
DFT and FFT
Fast FFT-based Convolution
Sectral Analysis
Signal Generation

Real-time Signal Processing:
Interrupt and Polling
Block-based Signal Processing

Skills

Apply fundamentals of digital signal processing:
Understanding of and ablilty to explain the fundamental principles of digital signal processing
Ability to compare and evaluate different digital filter types and different implementations

Implementation of real-time DSP:
Ability to explain the general problem of real-time DSP
Abilty to name aspects influencing the processing speed
Understanding of and ablilty to explain the fundamental methods of real-time digital signal processing

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	1
Tutorial (voluntary)	0

Separate exam

none

Practical training

Learning goals

Skills

Implementation of fundamental methods and procedures for signal processing in Python/Matlab and on microprozessors.

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	2
Tutorial (voluntary)	0

Separate exam

none

Project

Learning goals

Skills

Implementation Python/Matlab:
Program, debug and optimize algorithm in Python Matlab.

Implementierung on microporocessor:
Port algorithm to target micorprocessor platform
Familiarity with development environment
Optimize algorithm for target platform

Solve complex tasks in team work:
Plan simple projects
Keep agreements and deadlines
Schedule and carry out reviews

Implementation of DSP algorithm on microporcessor platform:
Understand given methods for digital signal processing
Obtain required references for given methods
Translate mathematical methods to program code
Test, verify, and optimize program code

Presentation of results:
Presentation of project results

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Project	1
Tutorial (voluntary)	0

Separate exam

none