

## Digital Signal Processing

### Location

Campus Offenburg, room B 103

### Profile and objectives

In many areas of electrical engineering, analog signal processing is being replaced by a digital approach. Samples are taken from a voltage curve by an analog/digital converter in a given grid (e.g. approx. 50000 per second for audio signals, approx. 20 million per second for video signals), which are then processed further as coded numerical values. A processor processes the incoming input number sequence according to a specified algorithm; the output number sequence can be converted back into an ordinary analog signal by a digital/analog converter if required.

Processing is often performed by a program on an integrated circuit. Signal processors are special microprocessors that can perform arithmetic operations very quickly.

The goal of the laboratory is to deepen the theoretical knowledge acquired in associated lectures through practical experience.

### Scientific head of laboratory

Prof. Dr.-Ing. Werner Reich

### Laboratory assistant

Dipl.-Ing. (FH) Ralf Hilterhaus, M.Sc.

### Equipment

The experiments are equipped with networked PCs on which the design of the filters and the evaluation of the results is made possible under the operating systems Linux and Windows XP and the MATLAB mathematics program system. In general, the processes are not only simulated, but electrical signals are processed in real time and analyzed by measuring instruments such as oscilloscopes, spectrum analyzers, signal analyzers and audio measuring stations.

### Internships and Tutorials

Experiments on the following topics are offered:

- Analog-to-digital and digital-to-analog conversion
- Recursive (IIR) filters
- Non-recursive (FIR) filters
- algorithms based on the Fast Fourier Transform (FFT)
- Multiratenverarbeitung
- iterative algorithms

