2.6.2 Digital Systems

Digital Systems

Module Summary
Module code: EEIB620
Module coordinator: Prof. Dr. Strohrmann
Credits (ECTS): 6 Points
Semester: 6. Semester (EITB340A) / 6. Semester (EITB640S)
Pre-requisites with regard to content: Competencies acquired in lectures Mathematics 1 - 3, System Theory, Micro-Controller
Pre-requisites according to the examination regulations: Regarding to the examination regulations no pre-requisites are required
Competencies: Students will be able to describe and analyze digital signals and systems in the time, z, and frequency domains by • describing signals in the time domain mathematically as signal sequences • applying the z-transformation to discrete-time signals • reading system properties from impulse responses and transfer functions • determine spectra of energy and power signals • design simple discrete-time filters and • apply the Fast Fourier Transform • to develop an understanding of digital signal processing. • Obtain an overview of different bus systems by • learning principles of signal propagation, signal formatting, and error detection. • covering different bus access methods • applying the ISO/OSI layer model • working out different bus systems in order to be able to select and program suitable interfaces for special applications
Assessment: Exam, 90 minutes and Project.
Differentiation from other modules This module covers the basics of bus systems and digital systems, which are required and deepened in more advanced modules.

Course: Bus Systems
Module code: EEIB621
Lecturer: Prof. Dr. Thorsten Leize
Scope of weekly semester hours (SWS): 2

Semester of delivery: Summer semester
Type/mode: Lecture with integrated excercise, Compulsory subject
Language of instruction: English
Content: • Signal propagation, signal formatting, error detection   • Bus access types   • ISO/OSI layer model   • Different bus systems for different application areas: • Ethernet and TCP/IP family   • Field bus systems (serial, HART, Profibus)   • Automotive bus systems, especially CAN   • I²C as an example of shortrange bus systems.
Recommended reading: • See Ilias

Course: Digital Systems Theory
Module code: EEIB622
Lecturer: Prof. Dr. Strohrmann
Scope of weekly semester hours (SWS): 4
Semester of delivery: Summer semester
Type/mode: Lecture, Compulsory subject
Language of instruction: English
Content: • Signal sampling and reconstruction   • Systems in the time domain, difference equation, system properties, impulse response, convolution, correlation function   • Signals and systems in the z-domain, transfer function of discrete-time systems   • Spectrum of discrete-time signals, frequency response of discrete-time systems   • Fundamentals of the design of digital filters   • Fast Fourier Transform
Recommended reading: • Presentations and Media on Ilias learning platform   • Oppenheim, Alan: Discrete-Time Signal Processing, Pearson Education Limited, 2013   • Chaparro, Luis: Signals and Systems using MATLAB, Academic Press, 2018   • Lyons, Richard G.: Understanding Digital Signal Processing, Pearson India, 2011