

<b>Data field</b>	<b>Explanation</b>
Module number	WP02
German title / English title	Modellbasierter Entwurf digitaler Kommunikationssysteme / Model-Based Digital Communication Systems Design
Credits	5 ECTS
Workload	68 Contact hours (4 SWS Ü), 82 Hours of independent study
Subject coverage	Subject-Specific Specialization
Learning outcomes	Students know the fundamentals of fast and efficient digital signal processing in digital communication systems. They have got an overview about typical devices and architectures for implementing such signal processing and master the integration and the embedding of hardware and software in versatile prototype systems using a model-based approach and automatic code generation. They can design, simulate and verify signal processing algorithms and apply their knowledge in state-of-the-art platforms for communication systems, e.g. for computer vision or software defined radio (SDR).
Requirements	Recommendation: Basic knowledge in digital and microprocessor technology, digital communication systems and signal processing
Level	1./2. Semester
Type of module	Seminar, Laboratory Training
Status	Required-Elective module
Semesters when offered	Every semester
Method of assessment / Type of examination	The method of assessment / type of examination must be defined by the lecturer within the deadline determined in §19 (2) RSPO. Should the deadline pass without determination of the form of assessment in the module, the following method of assessment / type of examination applies: 50% Written examination (90 minutes), 50% Written laboratory report (10-15 pages) of the laboratory group with consultation (15-30 minutes)
Grade assessment	See study and examination regulations
Content	<ul style="list-style-type: none"> <li>• Fundamentals of fast and efficient digital signal processing (number representation, pipelining, adder trees, distributed arithmetic, CORDIC architectures, ...)</li> <li>• Devices and architectures for fast and efficient signal processing in digital communication systems (General Purpose Processors, DSP, FPGA, HW accelerators, bus architectures)</li> <li>• Integration and embedding hard- and software in versatile prototype systems using a model based approach and automatic code generation</li> <li>• Design of DSP algorithms, simulation of the hardware, generation of C or HDL code and verification in model based prototype systems</li> </ul>
Reading list	U. Meyer-Baese: Digital Signal Processing with Field Programmable Gate Arrays, Springer E. Gryver: Implementing Software Defined Radio, Springer S. Pollin, M. Timmers, L. van der Perre: Software Defined Radios – From Smart(er) to Cognitive, Springer
Further information	Language employed in the module: English
Required Room type	Ü-Sem, Ü-Lab