EM 1: Processes, Methods & Tools
At the beginning an introduction to embedded systems and software engineering is given. Processes, methods and tools from object oriented approaches, via the V-model to agile methods are presented. Among those, HW-/SW-Co-design and rules how to decide which way to go are explained. All these aspects are discussed considering the constraints of distributed development all around the world. How to assess these approaches according to SPICE and CMMI and how to follow the demands of safety (relying on ISO 26262) and security is introduced focusing on the transportation industry.

EM 2: Components of Electronic Systems
In order to realize an embedded system in the end concrete components need to be used. Controllers and processors or ASICS and FPGAs will implement the application. The interfaces to the environment is enabled by actuators and sensors. All these technologies will be explained in this module.

EM 3: Data Communication Technologies & Systems
The concrete components work together collaboratively. Data communication between them is needed. Signals carry information to achieve that on a wired bus or even over the air. Communication protocols will be presented for specific demands such as car2car communication or industry 4.0.

EM 4: Implementation & Component Realization (Hard-/Software)
Now, knowing all the processes, methods and tools, all the components and how to combine them the next step is to implement and realize the embedded mechatronic system. Synthesis in hardware or software must be considered. Especially in the software area coding structures, code generation and clever programming are essential. A case study will help to get used to current standards and quasi-standards.

EM 5: System Integration & Validation of Electronic Systems
Implementation and integration leads to testing the overall system according to the early requirements. During the overall process of engineering, testing has been prepared and done in order to check the maturity level. In simulations and prototyping environments quality assurance has been executed. At the end of those phases for the first time the real system can be tested to check finally the user requirements in a Hardware-in-the-Loop environment or even in real test scenarios.

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