Modulbezeichnung (Kürzel)	**Digitalization and IoT Data Processing** (DIDP)
Modulbezeichnung (eng.)	Digitalization and IoT Data Processing
Semester (Häufigkeit)	1 (jedes Sommersemester)
ECTS-Punkte (Dauer)	5 (1 Semester)
Art	Pflichtfach
Sprache(n)	Englisch
Studentische Arbeitsbelastung	60 h Kontaktzeit + 90 h Selbststudium
Voraussetzungen (laut MPO)	
Empf. Voraussetzungen	Teilnahme an Modul “xxx“ and Modul “xxx“
Verwendbarkeit	MII
Prüfungsform und -dauer	Realization/Documentation/Presentation of a Digitalization-Practice
Lehr- und Lernmethoden	Vorlesung, Seminar
Modulverantwortliche(r)	A. W. Colombo

Qualifikationsziele
Within a modular reconfigurable smart industrial environment, industrial cyber-physical systems (ICPS) manage, control and monitor physical processes, create a digital copy (cyber-shadow, digital twin (DT)) of the physical world, provide a big, sometimes very big, amount of digitalized data and information exposed in an Internet-based Communication/Information/Service network, and communicate and cooperate with each other and humans in real time. Via the Internet-of-Services, both internal and cross-organizational services can be exposed and/or consumed by participants of the whole networked value chain to perform innovative business. Knowing the technological concepts of ICPS, IIoT and IIoS, the students will understand the set of steps required to digitalize HW- and SW-components and systems of an industrial eco-system. Using Asset Administration Shel (AAS) and Digital Twin (DT) technology, both “Physical“ and “Cyber“ parts of ICPS (“digitalized Things“ or “I4.0-components“) will be specified, developed and prototype implemented for exemplary use cases.

Lehrinhalte
Learning the engineering process for digitalizing and networking “Things“/“Assets“ located within an IEC 62264 / IEC 61512 infrastructure, migrating them to be Industrial Cyber-Physical Components. Learning a set of technologies and architectural patterns to enable the digitalization of industrial cyber-physical systems under the DIN SPEC 91345:2016-04 (RAMI 4.0) and Industrial Internet-Reference Architecture (IIRA) standards. Using the Asset Administration Shell (AAS) as backbone technology, students will learn approaches, standards and tools for specifying and prototype implementing the 6 layers of the vertical dimension of RAMI 4.0 in real industrial use cases. Acquiring background knowledge for specifying and implementing service-oriented, edge- and cloud-based and agent-based functional and business processes; virtualizing, building digital models in a learning factory, performing simulation of production systems.

Literatur
Industrial Cloud-Based Cyber-Physical Systems. The IMC-AESOP Approach, doi:10.1007/978-3-319-05624-1; DIN SPEC 91345: The Reference Architectural Model Industrie 4.0 (RAMI 4.0). ZVEI - German Electrical and Electronic Manufacturers’ Association, Automation Division; Engineering human-focused Industrial Cyber-Physical Systems in Industry 4.0 context, doi:10.1098/rsta.2020.0366; A Survey on Edge and Edge-Cloud Computing Assisted Cyber-Physical Systems, doi: 10.1109/TII.2021.3073066; https://www.iiconsortium.org/pdf/Digital-Twin-and-Asset-Administration-Shell-Concepts-and-Application-Joint-Whitepaper.pdf.

Lehrveranstaltungen

Dozenten/-innen	**Titel der Lehrveranstaltung**	**SWS**
A. W. Colombo	Digitalization and Data Transport	2