Module title: Advanced Sensors

Module summary
Module code: SSTM320
Module coordinator: Prof. Dr. Harald Sehr
Credits (ECTS): 6
Semester: 3rd semester
Pre-requisites with regards to content: Basic knowledge in physics, optics and electronics
Pre-requisites according to the examination regulations: none
learning outcomes and competencies: Upon successful completion, the students… • understand the different working principles of sensors and are able to choose a suitable sensor for a given application • understand the physics and technology of modern light sources and optical detectors • can design advanced optical sensing systems • can design electronic circuits for signal conditioning understand … • are able to evaluate transfer functions and sensor characteristics of flow and fill level sensors. • are able to apply advanced software to evaluate information from laboratory measurement systems.
Assessment: Assessment is done by a written exam (120 minutes) + lab work (passed/not passed, 1 semester)

Course: Optical Sensors
Module code: SSTM321
Lecturer: Prof. Dr.-Ing. Christian Karnutsch
Contact hours: 2 SWS
Semester of delivery: yearly, summer semester
Type/mode: Lecture, mandatory
Language of instruction: English
Content: • Light sources for optical sensing • detection of optical radiation • advanced optical sensing systems • fiberoptic sensors • interferometric sensors • modern application examples
Recommended reading: Light-emitting Diodes, EF Schubert, Cambridge University Press Understanding Fiber Optics, J Hecht, Prentice Hall International Fiber Optic Sensors: An Introduction for Eng. and Scientists, E Udd, Wiley Advanced Photonic Structures for Biological and Chemical Detection, X Fan, Springer

Optics, Eugene Hecht, Addison-Wesley
Comments: Lecture notes and all other course materials are available on ILIAS.

Course: Sensor Applications
Module code: SSTM322
Lecturer: Prof. Dr. Harald Sehr
Contact hours: 2 SWS
Semester of delivery: yearly, summer semester
Type/mode: Lecture, mandatory
Language of instruction: English
Content: • Fluid mechanical basics of flow measurement technology • Characteristics and measuring principles of flow measurement technology • Design and operating principles of flow measurement systems • Characteristics and measuring principles of level sensors • Design and operating principles of level measurement systems • Surface wave sensor technology • Wireless sensor systems • Energy harvesting • Application examples
Recommended reading: • Liptak: Instrument Engineers‘ Handbook, Process Measurement and Analysis, CRC Press • Considine: Process Instruments and Controls Handbook, McGraw-Hill • Fraden: Handbook of Modern Sensors, AIP Press, Springer • Niebuhr, Lindner: Physikalische Messtechnik mit Sensoren, Oldenburg • Hoffmann: Taschenbuch der Messtechnik, Hanser • Tränkler: Taschenbuch der Messtechnik, Oldenbourg • Finkenzeller: RFID Handbuch, Hanser
Comments: -

Course: Sensors Lab B
Module code: SSTM323
Lecturer: Prof. Dr. Helfried Urban
Contact hours: 2 SWS
Semester of delivery: yearly, summer semester
Type/mode: Laboratory, mandatory
Language of instruction: English
Content: Laboratory experiments set-up with modern measurement tools and computer control. Application of software tools for sensor signal evaluation.
Recommended reading: • Stonick, Virginia L / Bradly, Kevin, Labs for signals and systems using MATLAB • Doeblin, Ernest O, Measurement Systems
Comments: -