2.6.1.4. Focal Subjects 2: Physical Sensors

Physical Sensors

Module overview
EDP designation: NN, (EITB450, German course)

Module Responsible(s): Prof. Dr. Harald Sehr
Module scope (ECTS): 5 points
Classification (semester): 4th semester
Content Requirements: Physics, direct current technology, alternating current technology, fields, electronics, measurement technology
Prerequisites as per SPO: According to SPO, no formal requirements are necessary.
Competencies: The participants • can explain functional principles of different physical sensors • can explain and interpret essential basic terms and parameters of various sensors • can independently select a suitable sensor principle based on given requirements • can design and dimension signal processing circuits for sensor systems by • Determine and evaluate sensor parameters, • describe the operating principles of various sensors verbally with the aid of sensor characteristics and by means of formula relationships, • Analyze applications and areas of use of various sensor systems, • Analyze tasks from sensor technology and assign suitable sensor parameters and properties, • set up various sensor systems and their signal conditioning circuits in the laboratory and determine parameters and sensor characteristics by measurement, in order to be able to select or develop sensors for specific requirements in their later careers.
Examination performance: Written exam, 120 minutes
Usability: This module builds on teaching content from the foundation course and the third semester and provides essential core competencies for the sensor and environmental measurement technology fields of study. In addition, the module provides knowledge necessary for understanding more advanced courses, e.g. bio- and chemosensorics.

Course: Physical sensors
EDP designation: NN, (EITB451S, EITB451U, German course)
Lecturer(s): Prof. Dr. Harald Sehr
Scope (SWS): 4
Cycle: Summer semester
Type, mode: lecture, compulsory subject
Teaching language: English
Contents: • Basic concepts of sensor technology

• Properties and characteristics of sensors • Resistive sensors • Capacitive sensors • Inertial sensors • Thermocouples • Piezoelectric sensors • Magnetic field sensors • Induction sensors • Inductance sensors • Eddy current sensors • Sensor signal conditioning • Overview of sensor manufacturing technologies
Recommended reading: • Niebuhr, Lindner: Physical Measurement Technology with Sensors, Oldenburg • Hering, Schönfelder: Sensors in Science and Technology, Vieweg + Teubner • Reif, K.: Sensoren im Kraftfahrzeug, Springer Schrüfer, E.: Elektrische Messtechnik, Hanser • Schiessle, E.: Sensor Technology and Measurement Recording, Vogel • Schiessle, E.: Industrial Sensor Technology, Vogel • Hoffmann, J.: Pocketbook of Measurement Technology, Hanser • Schanz: Sensors - Sensor technology for practitioners, Hüthig

Course: Laboratory Physical Sensors
EDP designation: EITB452S, EITB452U
Lecturer(s): Prof. Dr. Harald Sehr
Scope (SWS): 2
Cycle: winter semester and summer semester
Type, mode: laboratory, compulsory subject
Teaching language: English
Contents: • Resistive temperature measurement • Bending beam force sensors with strain gauges • Capacitive distance measurement • Differential transformer with carrier frequency amplifier • Distance and displacement measurement with eddy current sensors • Vibration analysis with piezoelectric sensors
Recommended reading: • Niebuhr, Lindner: Phys. measurement technology with sensors, Oldenburg • Schrüfer, E.: Elektrische Meßtechnik, Hanser