2.2 Sensor Actor Networks

Sensor Actor Networks

Module summary
Module code: STM220
Module coordinator: Prof. Dr. Thorsten Leize
Credits (ECTS): 6
Semester: 2
Pre-requisites with regard to content:
Pre-requisites according to the examination regulations: --
Competencies: Students will be able to understand different bus systems and choose an appropriate bus system. Furthermore they know how to design and configure applications of bus systems in sensor systems.
Assessment: Oral (20 minutes) or written exam (60 minutes)

Course: Bus Systems & Local Area Networks
Module code: STM221
Lecturer: Prof. Dr. Thorsten Leize
Contact hours: 2
Semester of delivery: Winter Semester
Type/mode: lecture
Language of instruction: English

Content:
• Signal propagation, signal formatting, error detection
• Bus access types
• ISO/OSI layer model
• Different bus systems for different application areas:
  ○ Ethernet and TCP/IP family
  ○ Field bus systems (serial, HART, Profibus)
  ○ Automotive bus systems, especially CAN
  ○ *I^2C as an example of short range bus systems.*

Recommended reading:

Course: Computer Aided Labs A
Module code: STM222
Lecturer: Prof. Dr. Helfried Urban
Contact hours: 4SWS
Semester of delivery: Winter Semester
Type/mode: lab
Language of instruction: English
Content:Students learn and will be able to set experiments and handle the basics of:

- Low pass filtering via RC-Low-Pass, principles of transfer function, Bode-diagram, working with digital oscilloscope, measuring phase angles, input vs. output voltage, cut-off frequency, measurement of the behavior of an operational amplifier at different gains.
- Correlation techniques, fundamental mathematical properties of cross- and autocorrelation, application of correlation techniques by setting up an ultrasonic sensor for liquid level measurement, discussion of the properties of an ultrasonic transmitter / receiver, signal conditioning.
- Damped and forced mechanical oscillations by setting up a model of a multistage building with up to three coupled parallel springs. Mathematical properties of mechanical oscillations, Fourier-formalism and frequency analysis, recognizing possible modes of oscillations (relation of phase
- angles).

Recommended reading:
Books / text sources about passive electronic filtering methods, operational amplifiers, mathematics of correlation techniques, principles of mechanical oscillations and mathematics of Fourier formalism / frequency analysis. Also books recommended for the lectures / modules of Sensors A / B of Prof. Sehr.

Comments: lab is splitted into three separate experiments which must be finalized by writing a complete report with discussion of methods and results for each experiment.