Course Introduction to Fieldbus Systems

Course
- Meets requirements of following modules(MID)
- Course Organization
- Assessment

Course components
- Lecture/Exercise
- Lab

Responsible: Prof. Dr. Rainer Bartz

Course

Meets requirements of following modules(MID)

- in active programs
  - Ba ET2012 FG
  - Ba ET2010 FG
  - Ba TIN2012 FG
  - Ba TIN2010 FB1
  - Ma Mechatronik FG

Course Organization

Version	
created	2013-06-20
VID	1
valid from	WS 2012/13
valid to	

Course identifiers	
Long name	Introduction to Fieldbus Systems
CID	F07_FG
CEID (exam identifier)	

Contact hours per week (SWS)	
Lecture	2
Exercise (unsplit)	
Exercise (split)	1
Lab	1
Project	
Seminar	
Tutorial(voluntary)	

Total contact hours	
Lecture	30
Exercise (unsplit)	
Exercise (split)	15
Lab	15
Project	
Seminar	
Tutorial (voluntary)	

Max. capacity	
Exercise (unsplit)	
Exercise (split)	30
Lab	8-12
Project	
Seminar	

Total effort (hours): 150

Instruction language

- German, 95%
- English, 5%

Study Level

- Undergraduate

Prerequisites

- basic programming skills, incl.: for, while, if, switch
- data types in programming languages

Textbooks, Recommended Reading

- eigenes Skript / own script
- Schnell, G.: Bussysteme in der Automatisierungstechnik, Vieweg
- Zimmermann, W.; Schmidgall, R.: Bussysteme in der Fahrzeugtechnik, Vieweg

Instructors

- Prof. Dr. Rainer Bartz

Supporting Scientific Staff

- tba

Transcipt Entry

Introduction to Fieldbus Systems

Assessment

Type	
wE	written exam

Total effort [hours]	
wE	10

Frequency: 2/year

Course components

Lecture/Exercise

Objectives

Contents

- topologies in communication networks: point-to-point, line, ring, star
- notations in communication standards: service description, sequence diagram, state chart (Mealy-type)
- ISO/OSI reference model: layer, encapsulation, functionality, service types (peer-to-peer, local), PDU-SDU-PCI-ICI, connection-oriented and connectionless communication
- bit coding: digital (NRZ, PRZ, BiPhase-L, DPLM,...), analog (ASK, FSK, PSK, ...)
- physical layer definitions of RS-232, RS-485
- error detection: parity, block codes, checksum, CRC, ...
- media access schemes: master/slave, token, CSMA/CD, CSMA/CA, ...
- PhL and DLL of CAN (controller area network): content-based adressing, arbitration, error detection, standard vs. extended CAN, bit timing, fault management, acknowledge mechanism, services and protocols

Acquired Skills

- students acquire fundamental knowledge on industrial communication systems
- they understand how communication standards are specified and can apply them to given tasks
- they understand fundamental concepts in the physical layer and can apply coding standards to create and analyze corresponding signal traces
- they understand data link layer functionality and can explain media access and error correction algorithms
- they know about all relevant aspects of CAN as a representative for industrial communications

Operational Competences

- students can apply widespread error detection algorithms
- they can specify functionality and services of layers, using standard notation
- they are able to analyze protocols and extract information from data streams
- they are able to create protocol compliant data streams for transmitting specific information

Additional Component Assessment

Type	
fPS	supervised/assisted problem solving

Contribution to course grade	
fPS	not rated

Frequency: 1/year

Lab

Objectives

Contents

- microcontroller platform for fieldbus implementation
- development tools for embedded systems
- programming in C language for systems without OS
- performing CAN communication from a microcontroller program
- microcontroller architecture

