Smart measurement and control systems - course description

General information

Course name	Smart measurement and control systems
Course ID	11.9-WE-AutP-SMandCS-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Automatic Control and Robotics
Education profile	academic
Level of studies	Erasmus programme
Beginning semester	winter term 2017/2018

Course information

Semester	6
ECTS credits to win	4
Course type	obligatory
Teaching language	english
Author of syllabus	

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam
Laboratory	30	2	-	-	Credit with grade

Aim of the course

- familiarizing students with the construction, functioning and basics of designing intelligent measuring and control systems,
- familiarizing students with selected communication standards used in intelligent measurement and control systems,
- shaping basic skills among students in configuring, programming and testing measurement and control systems.

Prerequisites

SCADA systems, embedded systems, industrial automation devices, hardware control systems

Scope

Basics of intelligent measurement and control systems. Evolution of measurement and control systems. ISA reference communication model. Architecture of network measurement and control systems. Intelligent Nodes. Dedicated operating systems for measuring and control systems nodes. Characteristic features of intelligent measuring and control systems. Communication protocols of measurement and control systems. Characteristics of selected standard communication protocols: PROFIBUS, CAN, LonWorks and INTERBUS-S. Industrial Ethernet. Integration, configuration and management of measurement and control systems. Internet technologies in measurement and control systems. Dedicated web servers. Technology for creating applications and configuring dedicated web servers. Examples of dedicated web server solutions. Wireless measuring and control systems. Communication protocols of wireless measuring and control systems. Wireless sensor networks. IoT in measuring and control systems. Selected areas of application. Assessment of communication parameters. Design basics. Analysis of communication efficiency and time parameters of the designed measuring and control system. Criteria for choosing a communication protocol. Examples of measurement and control systems with distributed intelligence.

Teaching methods

lecture: discussion, consultation, conventional lecture

laboratory: discussion, consultation, group work, project method

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Has basic knowledge in the field of construction and functioning of intelligent measuring and control systems		• activity during the classes • an exam - oral, descriptive, test and other	• Lecture
Is able to build, run and test a measuring and control system with a selected communication protocol		• activity during the classes • an observation and evaluation of the student's practical skills	• Laboratory
Knows and understands the basics of designing methods for intelligent measurement and control systems		• activity during the classes • an exam - oral, descriptive, test and other	• Lecture
Is aware of the costs and benefits arising from the use of intelligent measuring and control systems		• an exam - oral, descriptive, test and other	• Lecture

Assignment conditions

Lecture - the pass condition is to obtain a positive grade from the written exam.

Laboratory - the condition for passing is obtaining positive grades from all laboratory exercises, planned to be implemented under the laboratory program

Components of the final grade = lecture: 50% + laboratory: 50%

Recommended reading

1. Bolton W.: Instrumentation and Control Systems. Newnes, 2015.

Further reading

Notes

Modified by dr hab. inż. Wojciech Paszke, prof. UZ (last modification: 01-05-2020 10:33)