Decentralized systems of control engineering and robotics - course description

General information

Course name	Decentralized systems of control engineering and robotics
Course ID	11.9-WE-AutD-DSoCEaR-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Automatic Control and Robotics / Computer Control Systems
Education profile	academic
Level of studies	Second-cycle Erasmus programme
Beginning semester	winter term 2022/2023

Course information

Semester	3
ECTS credits to win	5
Course type	obligatory
Teaching language	english
Author of syllabus	• dr hab. inż. Paweł Majdzik, prof. UZ

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	-	-	Credit with grade
Laboratory	30	2	-	-	Credit with grade

Aim of the course

- To give knowlege about decentralized automation and robotics systems
- To provide understanding individual degrees of decentralization of control systems
- To provide the ability to design of decentralized automation and robotics systems

Prerequisites

PLC programing, SCADA systems

Scope

Introduction. Functional structures of computer automation systems. Hardware structures - classification. Characteristics of systems: DCS, hybrid system, SCADA system Review of DCS system structures, network solutions, redundancy. Overview of stations: functions, hardware structures, redundancy, software. Development fields: new functions of DCS systems, advanced control algorithms and diagnostics in DCS systems.
Introduction to Proficy Process Systems. Designing DCS systems. Architecture servey of Proficy Process Systems. Engineering stations. Process data processing. Operator consoles. Archiving and processing of data.
Distributed system structures - topology, advantages and disadvantages. Automation systems with hardware and software redundancy. Representation of industrial process data in automation systems.

Teaching methods

Lectures, laboratory exercises.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Can implement the proposed DCS system, and can plan and carry out its tests		• a discussion • activity during the classes	• Laboratory
Can prepare and carry out a project of DCS applications for the control and supervision of industrial processes		• activity during the classes • internship's documentation	• Lecture • Laboratory
Can list and characterize various solutions of DCS class systems (decentralized control systems) and their structures		• a discussion • an evaluation test	• Lecture • Laboratory

Assignment conditions

Lecture – the passing condition is to obtain a positive mark from test.

Laboratory – the passing condition is to obtain positive marks from all laboratory exercises to be planned during the semester.

Calculation of the final grade: lecture 50% + laboratory 50%

Recommended reading

1. A.G. Aghdam, J. Lavaei: Decentralized control of interconnected systems, VDM Verlag, Berlin, 2008

2. Bailey D. I E. Wright: Practical SCADA for Industry, Elsevier, London, 2003

Further reading

1. GE Fanuc: Proficy Process Systems - www.astor.com.pl

2. Żak S, Systems and Control, Oxford University Press, New York, 200

Notes

Modified by dr hab. inż. Wojciech Paszke, prof. UZ (last modification: 11-04-2022 09:05)

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