Intelligent Control and Measurement Systems - course description

General information

Course name	Intelligent Control and Measurement Systems
Course ID	11.9--AutP-ICaMS-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Automatic Control and Robotics
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2022/2023

Course information

Semester	6
ECTS credits to win	5
Course type	optional
Teaching language	english
Author of syllabus	• dr inż. Emil Michta, prof. UZ • dr inż. Adam Markowski

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
Laboratory	30	2	-	-	Credit with grade
Lecture	30	2	-	-	Exam

Aim of the course

- introduce students to the construction, operation and basics of designing intelligent measurement and control systems,
- introduce students to selected communication standards used in intelligent measurement and control systems,
- shaping among students basic skills in the field of configuration, programming and testing of measurement and control systems.

Prerequisites

SCADA Systems, Embedded Systems, Industrial Automation Devices, Control Systems

Scope

Basics of intelligent measurement and control systems. Evolution of measurement and control systems. ISA communication reference model. Architectures of network measurement and control systems. Smart nodes. Dedicated operating systems of measurement and control systems nodes. Characteristic features of intelligent measurement and control systems. Communication protocols for 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. Wireless measurement and control systems. Communication protocols for wireless measurement and control systems. Wireless sensor networks. IoT in measurement and control systems. Selected application areas. Assessment of communication parameters. Basics of design. Analysis of communication efficiency and time parameters of the designed measurement and control system. Criteria for selecting a communication protocol. Examples of measurement and control systems with distributed intelligence.

Teaching methods

lecture: discussion, consultation, conventional lecture

laboratory: discussion, consultations, group work, project method

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Has basic knowledge of the construction and operation of intelligent measurement and control systems		• activity during the classes • an exam - oral, descriptive, test and other	• Lecture
Can build, run and test a measurement 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 the methodology of designing intelligent measurement and control systems		• activity during the classes • an exam - oral, descriptive, test and other	• Lecture
Is aware of the costs and benefits resulting from the use of intelligent measurement and control systems		• an exam - oral, descriptive, test and other	• Lecture

Assignment conditions

Lecture - the condition for obtaining credit is to obtain a positive grade from the written exam.

Laboratory - the condition for obtaining credit is positive grades from all laboratory exercises planned for implementation under the laboratory program

Final grade components = lecture: 50% + laboratory: 50%

Recommended reading

1. Hughes T. A.: Measurement and Control Basics. Instrument Society of America, 2015.
2. Guruprasad R.K., Santhosh K.V.: Smart Sensors Measurements and Instrumentation, Springer, 2021.
3. Mukhopadhyay S., Ch.: Intelligent Sensing, Instrumentation and Measurements, Springer, 2013

Further reading

Notes

Modified by dr inż. Emil Michta, prof. UZ (last modification: 14-04-2022 21:50)