

Digital measurement systems - opis przedmiotu

Informacje ogólne	
Nazwa przedmiotu	Digital measurement systems
Kod przedmiotu	06.5-WE-ELEKTP-DigMeasS-Er
Wydział	Wydział Nauk Inżynieryjno-Technicznych
Kierunek	Elektrotechnika
Profil	ogólnoakademicki
Rodzaj studiów	Program Erasmus pierwszego stopnia
Semestr rozpoczęcia	semestr zimowy 2021/2022

Informacje o przedmiocie	
Semestr	6
Liczba punktów ECTS do zdobycia	4
Typ przedmiotu	obieralny
Język nauczania	angielski
Sylabus opracował	• dr inż. Leszek Furmankiewicz

Formy zajęć					
Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Wykład	30	2	-	-	Zaliczenie na ocenę
Laboratorium	30	2	-	-	Zaliczenie na ocenę

Cel przedmiotu

- To provide knowledge about: the measurement systems organization, principle of operation and characteristics of measurement systems elements.
- To provide knowledge about the communication standards used in wired and wireless measurement systems.
- Forming skills in the area of software designing for measurement systems.
- Forming skills in the area of hardware structure designing of simple measurement systems and measurement and control systems.

Wymagania wstępne

Metrology, Measurement transducers, Electronic measurement instruments.

Zakres tematyczny

Measuring systems - introduction. Definition, classification, basic tasks, basic configurations, kinds of transmission, methods of transmission coordination, functional blocks of measuring and control systems.

Data acquisition systems. Destination of data acquisition systems, configurations, basic functional blocks: conditioning system, multiplexer, measuring amplifier, isolating amplifier, filters. Programming of data acquisition systems.

Interfaces of measuring systems: Definition and classification of interfaces. Serial interfaces: RS -232, RS -422, RS -485, serial interfaces programming. Parallel interface IEEE 488.2: principal tags of IEEE 488.2 standard, bus of the interface, types of devices. Requirement relating to controller requirements relating to devices. VXI and PXI standard. Principal tags of VXI and PXI, card chassis, bus. LXI standard. IOLink interface.

SCPI standard. SCPI device model, structure of commands, trigger system, status system. Profile of commands for Example devices.

Digital industrial nets. Net: MODBUS, PROFIBUS, PROFINet, CAN. Wireless measuring systems. Radiomodems. Bluetooth and ZigBee standards.

Virtual measurement instruments. Definition, structure and basic tags of virtual instruments. Programming of virtual instruments. Metrological and computer characteristics of virtual instruments. Measuring systems programming. Programming of measuring systems using software development environments. Characteristics of integrated environments: LabWindows, LabView, Agilent Vee. VISA library.

Visualization systems. Structure of company computer system, functions of SCADA, measuring and control instruments in SCADA, design of visualization systems. Examples of SCADA applications.

Design and starting of measuring systems. General principles of design. Task analysis, consolidation of requirements, stages of design. Starting of hardware and starting of software.

Metody kształcenia

Lecture, laboratory exercises.

Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

Opis efektu	Symboleefektów Metody weryfikacji	Forma zajęć
Can design communication software for measurement systems based on fundamental communication interfaces	<ul style="list-style-type: none"> • bieżąca kontrola na zajęciach • obserwacje i ocena umiejętności praktycznych studenta 	<ul style="list-style-type: none"> • Laboratorium
Can design visualization software for measurement systems with the application of dedicated programming environments	<ul style="list-style-type: none"> • bieżąca kontrola na zajęciach • obserwacje i ocena umiejętności praktycznych studenta 	<ul style="list-style-type: none"> • Laboratorium
Understands organization principles of measurement and measurementcontrol systems	<ul style="list-style-type: none"> • test końcowy 	<ul style="list-style-type: none"> • Wykład

Warunki zaliczenia

Lecture – obtaining a positive Grade in written or oral Exam.

Laboratory – the main condition to get a pass are sufficient marks for all exercises and tests conducted during the semester.

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

Literatura podstawowa

1. Lesiak P., Świsulski D.: Computer Measuring Technique in Examples, PAK, Warsaw, 2002 (in Polish).
2. Nawrocki W.: Distributed Measuring Systems, WKŁ, Warsaw 2006 (in Polish).
3. Pietrusiewicz K., Dworak P.: Programmable Automation Controllers PAC. Nakom, Poznań, 2007. (in Polish).
4. Nawrocki W.: Measurement Systems and Sensors. Artech House Publishers, 2005.
5. Bentley J. P.: Principles of Measurement Systems, Pearson Education Limited, Harlow, England, 2005.
6. Caristi A., J.: IEEE-488 General Purpose Instrumentation Bus Manual, Academic Press, INC., San Diego, California, 1992.
7. Bailey B., Wright E.: Practical SCADA for Industry. Newnes, 2003.
8. Clarke G., Reynders B.: Practical Modern SCADA Protocols. Newnes 2004.

Literatura uzupełniająca

1. Johnson G.W., Jennings R.: LabView Graphical Programming, MacGraw-Hill, New York, 2006.

Uwagi

Zmodyfikowane przez dr inż. Leszek Furmankiewicz (ostatnia modyfikacja: 14-07-2021 09:56)

Wygenerowano automatycznie z systemu SylabUZ