Visualization systems - course description

General information

Course name	Visualization systems
Course ID	11.9-WE-INFD-VisualSyst-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Computer Science
Education profile	academic
Level of studies	Second-cycle Erasmus programme
Beginning semester	winter term 2022/2023

Course information

Semester	2
ECTS credits to win	5
Course type	obligatory
Teaching language	english
Author of syllabus	• 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
Lecture	15	1	-	-	Credit with grade
Laboratory	30	2	-	-	Credit with grade
Project	15	1	-	-	Credit with grade

Aim of the course

To familiarize students with the basic functions and structure of visualization systems.

To shape basic skills in the creation of applications for visualization of industrial processes.

To shape basic skills in designing applications for visualization of industrial processes.

Prerequisites

Principles of programming, Microcomputer circuits and systems, Computer networks.

Scope

Introduction. Monitoring and visualisation of industrial processes. The genesis of visualization systems. Structure and functions of visualisation systems - HMI, SCADA. Requirements put forward for visualisation systems. Visualisation systems in the information structure of an enterprise SCADA, MES, ERP. Exemplary applications of visualisation systems.

Elements of visualisation systems. Intelligent measurement-control devices in visualisation systems. Architecture of a communication layer of visualisation systems. Communication protocols in visualisation systems. The use of radio modems in visualization system.

The use of visualization systems. Configuring visualization systems in developing synoptic screens, defining variables, scripting and animation links, configuring alarms and trends, archiving variables, creating reports in text files. The use of advanced modules to create recipes.

Object-oriented technologies in visualization systems. The integration of visualization systems with database systems. The use of object-oriented technology for the exchange of data between the visualization application and industrial automation devices (PLCs).

The procedure for designing visualization systems. Strategies of designing synoptic screens of visualization systems.

Teaching methods

Lecture, laboratory exercises, project.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Can make a simple application for visualization of industrial processes containing synoptic images		• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Can apply the right strategy in industrial process visualization application design		• a project • an ongoing monitoring during classes	• Laboratory • Project

Outcome description	Outcome symbols	Methods of verification	The class form
Can use the functions associated with recipes in the applications for visualization of industrial processes		• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Knows and can apply variable alarm mechanisms, real-time variable value tracking and historic variables servicing mechanisms		• a quiz • an ongoing monitoring during classes	• Lecture • Laboratory
Understands the need for application of visualization systems, can present basic functions and visualization system structure		• a quiz	• Lecture

Assignment conditions

Lecture – the credit is given for obtaining a positive grade in written or oral tests carried out at least once in the semester.

Laboratory – the credit is given for positive grades in all laboratory exercises to be carried out according to the laboratory syllabus.

Project – the credit is given for positive grades in project exercises to be carried out according to the syllabus.

Calculation of the final grade: lecture 40% + laboratory 30% + project 30%

Recommended reading

1. Winiecki W., Nowak J., Stanik S.: Graphic integrated software environments for designing measuring – controlling systems, Mikom, Warszawa, 2001 (in Polish).

2. Kwaśniewski J.: PLC in engineering practice, BTC, Legionowo, 2008 (in Polish).

3. Kwiecień R.: Computer systems for industrial automation, Helion, Gliwice, 2012 (in Polish).

4. Wonderware InTouch HMI Visualisation Guide, Invensys, 2012.

5. Wonderware InTouch HMI Data Management Guide , Invensys, 2012.

6. Wonderware InTouch HMI Alarms and Events Guide, Invensys, 2012.

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

Further reading

Notes

Modified by dr inż. Adam Markowski (last modification: 13-04-2022 14:21)