

Fakulta strojní VŠB – TUO

Department of Control Systems and Instrumentation

Automatic Control Devices

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Lectures

1. Familiarization with the issues and content of the studied subject. Distribution of automatic control means and their characteristics (program and technical means), control systems, hierarchical structure.
2. Overview of the principles of sensors, methods of evaluation (follow-up to the subjects Automation technology, Measurement and sensor technology).
3. Actuators and their drives.
4. Distributed control systems, teamwork, its implementation and system engineer skills. SCADA/MMI systems, their properties and deployment in a hierarchical control structure (practical examples).
5. Industrial networks, basic types, 7 layer model, physical layer.... application layer (protocol design, access methods, ...).
6. Wifi networks, configuration of access points and AD-HOC configuration, connection of control systems to the technological process, nomenclature (ILAN, LAN, WLAN). A sample of the laboratory set-up.

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Lectures

7. Control systems, programmable logic control, internal structure, development environment, PLC programming, PLC connection to the controlled system.
8. Description of single-chip computers, description of selected implemented modules.
9. Programming single-chip computers using a higher level programming language.
10. Procedures for debugging the proposed algorithms directly for the selected real task.
11. Devices supporting I2C, SPI inter-circuit communication (MEMS, memories, converters, ...).
12. Intelligent sensors, their internal structure and description of implementation.
13. Time reserve.

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Přednáška č. 1

Familiarization with the issues and content of the studied subject. Distribution of automatic control means and their characteristics (program and technical means), control systems, hierarchical structure. (questions č. 1, 13, 14).

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What do you find out?

- Content of the studied subject
- Distribution of means of automatic control
 - Program means
 - Technical means
 - Communication links
- Control
- Regulation
- Management systems
- Management types
 - Central control
 - Distributed control systems
 - Hierarchical structure
 - Basic system concepts (system, element, connection).

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Expanding knowledge in the field of:

Distribution of means of automatic control
 Characteristics of groups of technical means
 Distribution of software and technical resources
 Types of control systems
 Hierarchical management structure

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Control

Control
Feedback control

Logic control







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Management methods and implementation

Logic control



Min.	Max.	Výstup (n-1)	Výstup
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	X
1	1	1	X

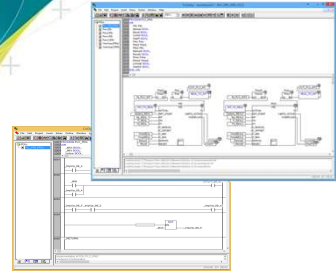
		Max., Výstup (n-1)			
		00	01	11	10
Min.	0	0	1	0	0
	1	1	1	X	X

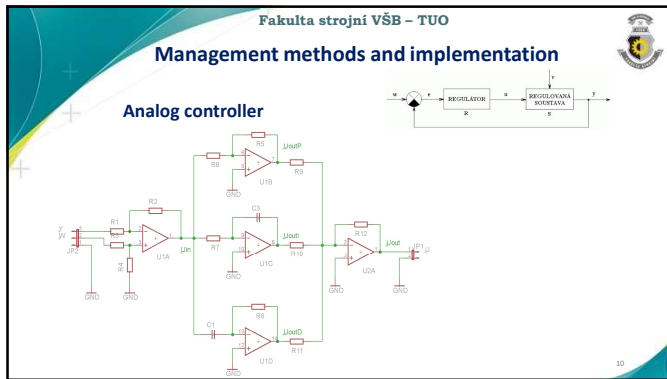
Výraz 1 Výraz 2

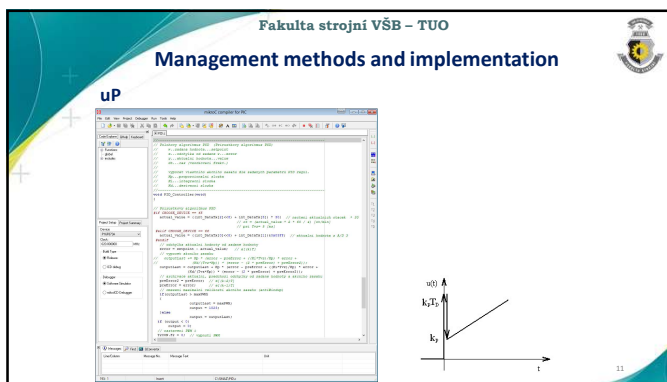
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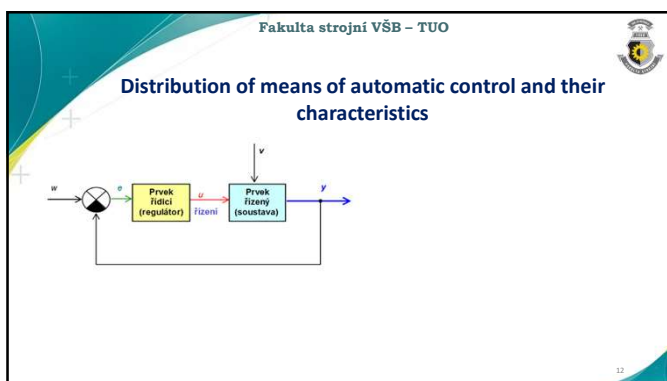
Management methods and implementation

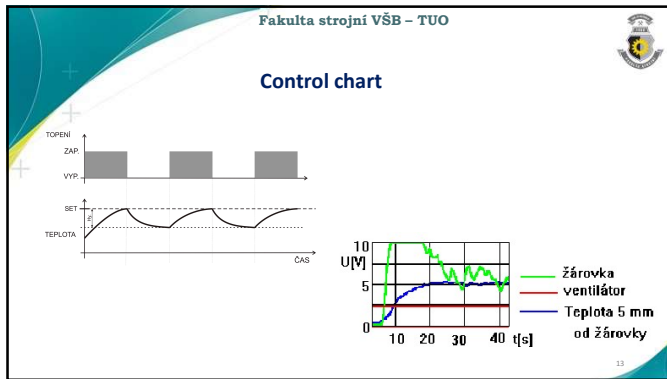
PLC

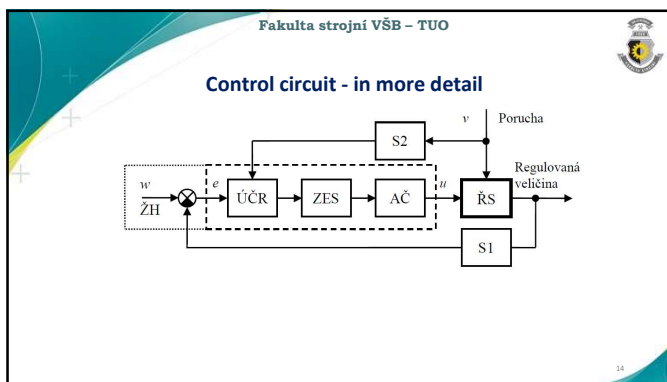


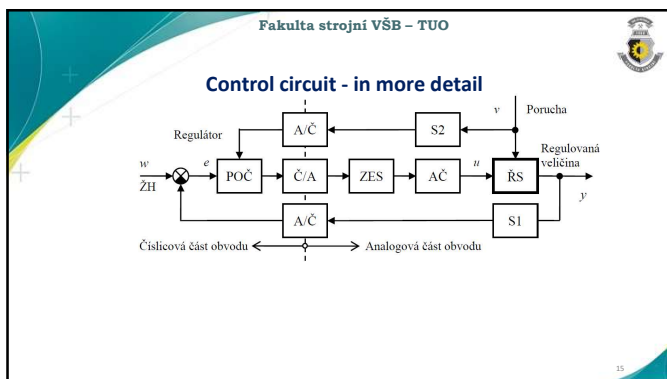


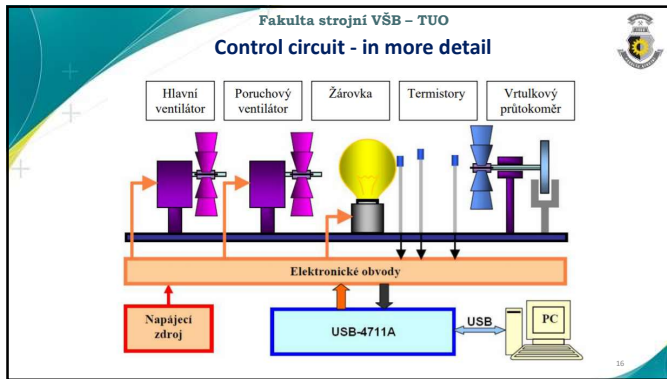


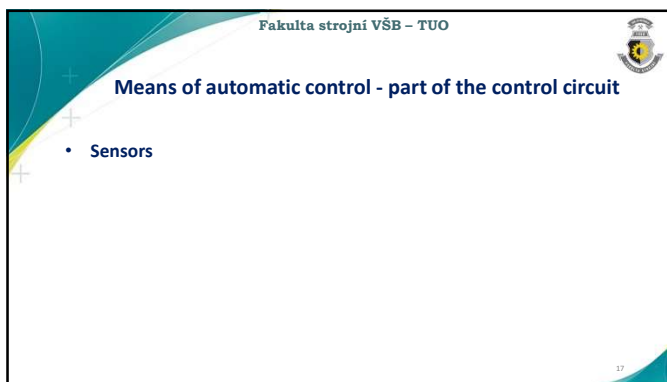










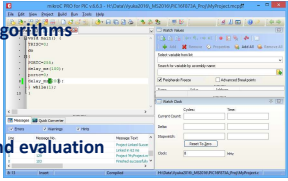




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Types of programs

- Software implementing its own algorithm
- Program support for creating algorithms
- ...
- Program support for analysis and evaluation



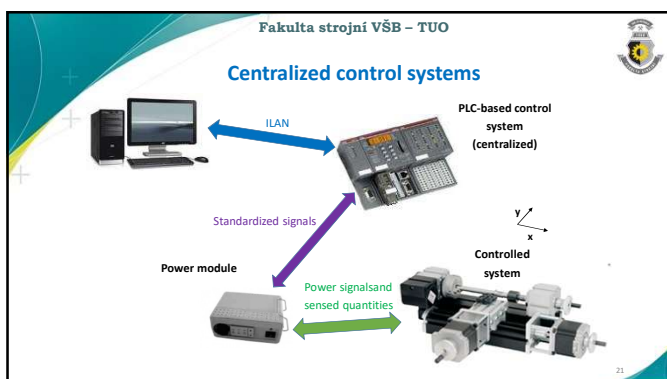
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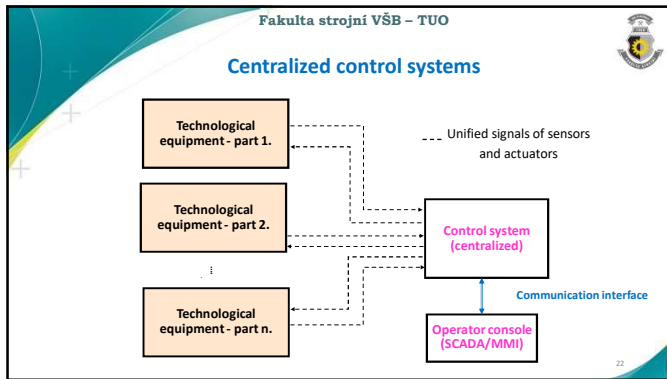
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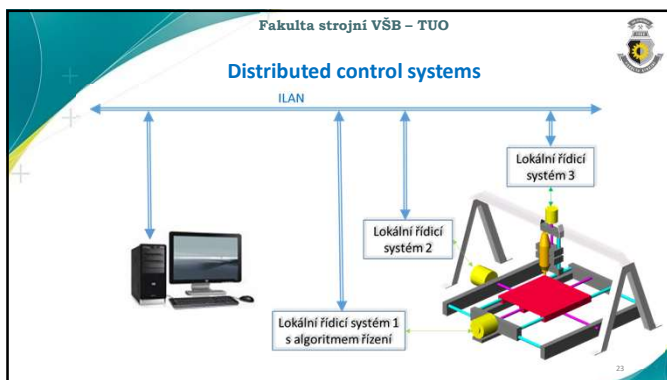
Requirements for control systems

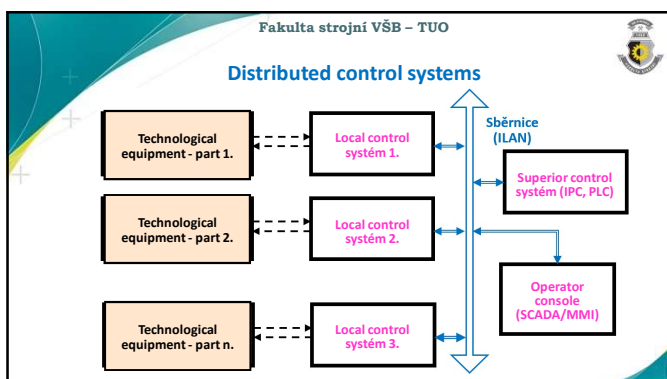
- Increasing productivity

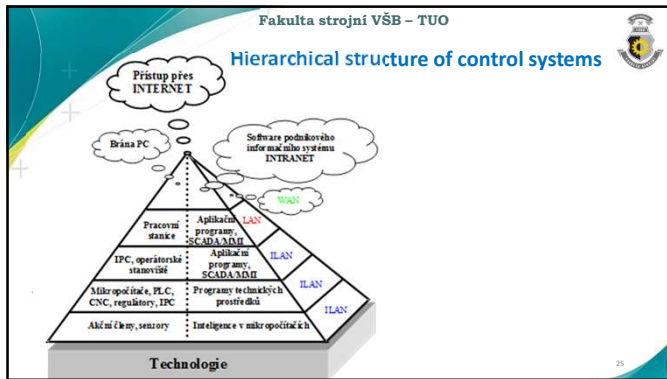
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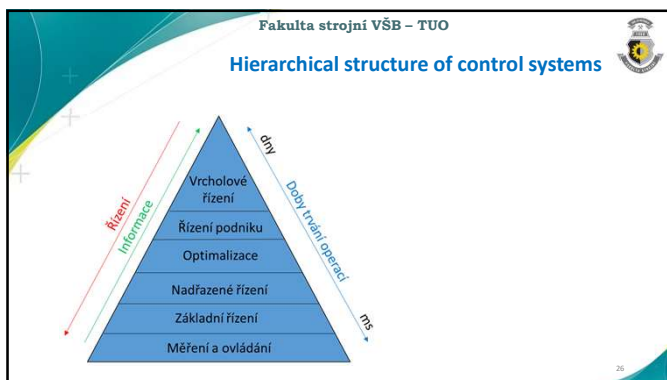


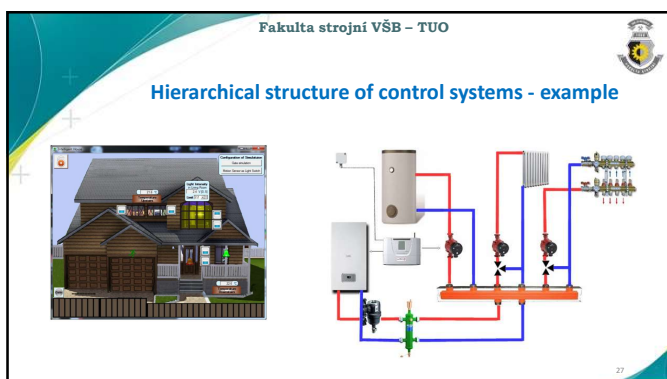


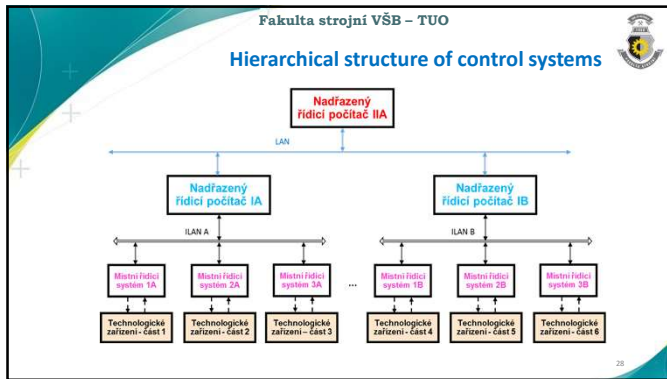


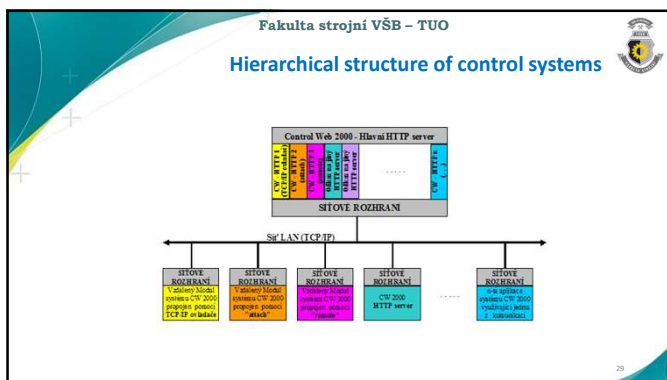


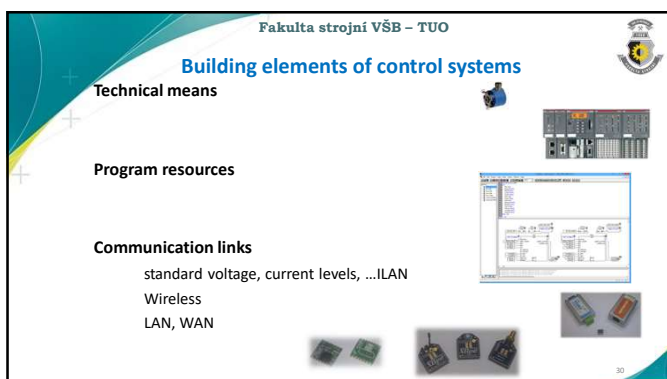












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Synthesis of control circuits

$$CO(k) = CO(k-1) + k_p(PV(k) - PV(k-1)) + k_i Te(k) - \frac{k_D}{T}(PV(k) - 2PV(k-1) + PV(k-2))$$

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Design of distributed control systems

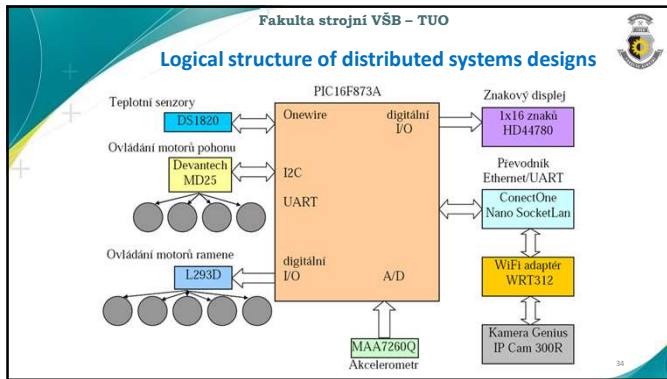
Specification of the assignment of the solved task

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Physical layout of distributed systems designs

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Katedra automatizační techniky a řízení

What was the content of the lecture

- Content of the studied subject
- Distribution of means of automatic control
 - Program resources
 - Technical means
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- Management types
 - Central management
 - Distributed control systemshierarchical structure
 - Basic system concepts (system, element, connection).

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Katedra automatizační techniky a řízení

Thank you for your attention ...

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