

Fakulta strojní VŠB – TUO

Katedra automatizační techniky a řízení

**Control Instrumentation
2024**

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Katedra automatizační techniky a řízení

**Lecture No. 6
Control systems, software resources**




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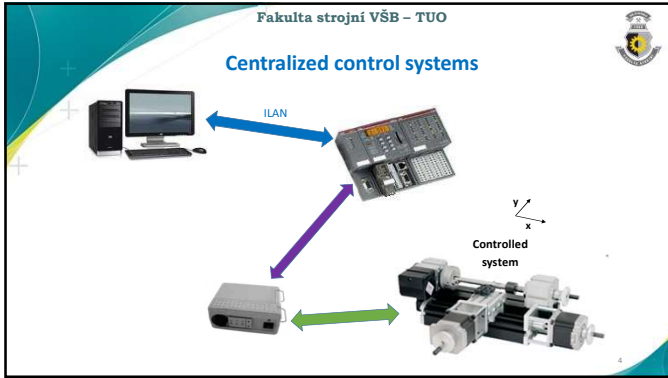
Katedra automatizační techniky a řízení

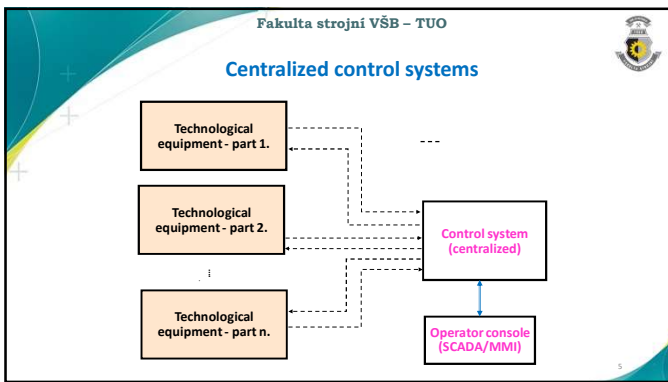
What do you find out?

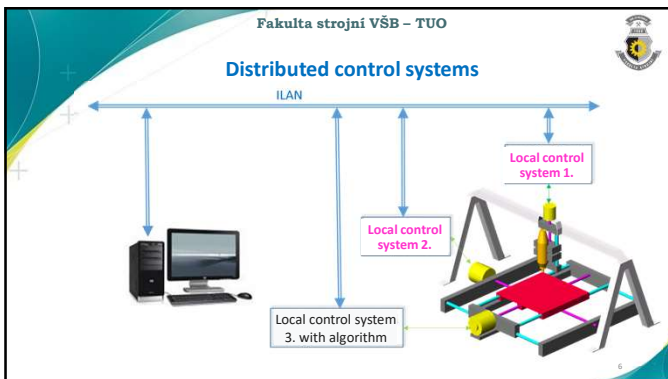
- Control system - types
- Regulators
- PLC
- IPC
- Microcontrollers
- Embedded computers
- Program support

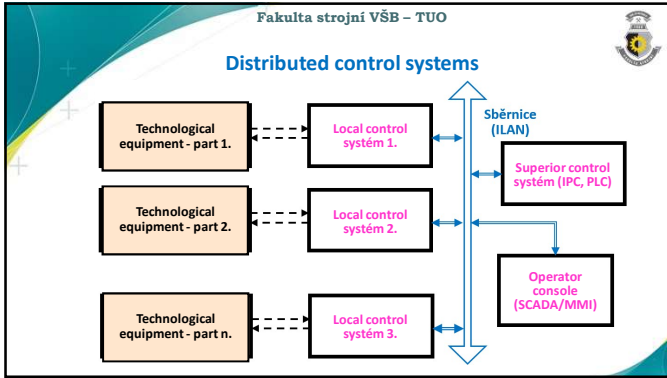


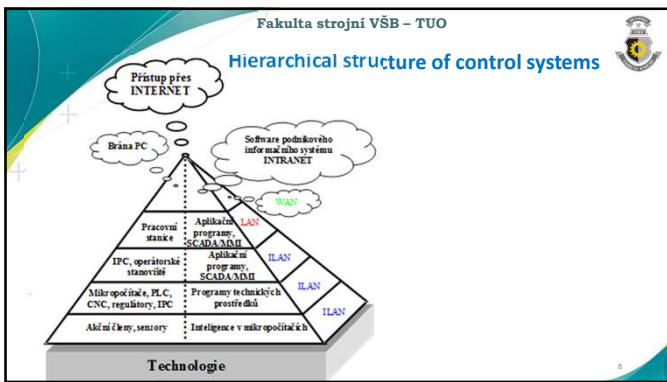
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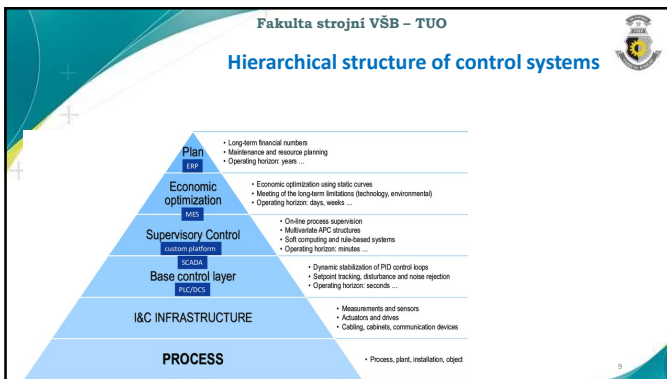












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Hierarchical distributed control system

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Control chart

PID

ON-OFF regulation

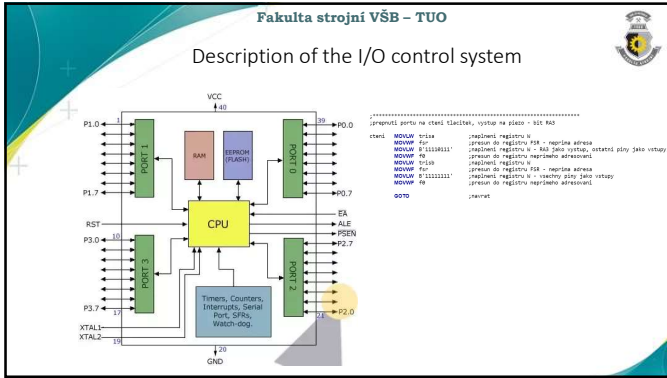
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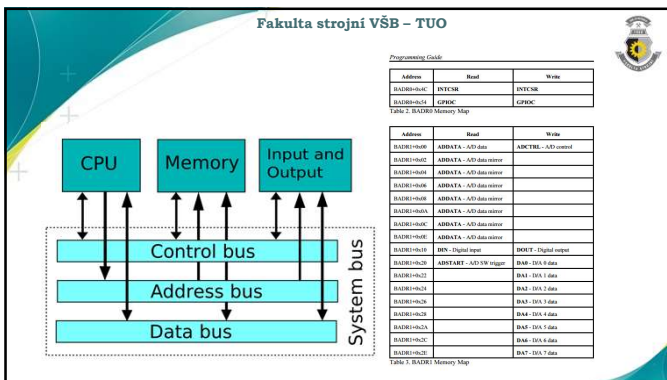
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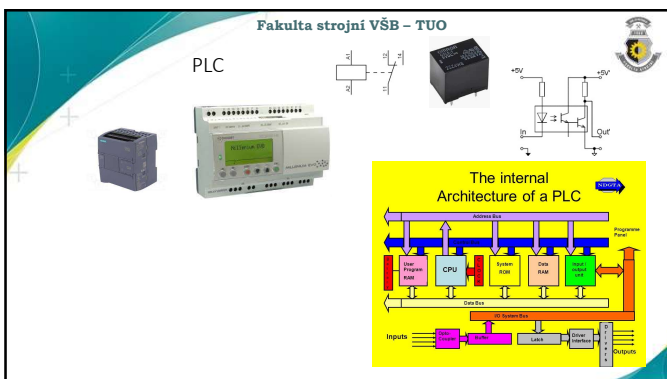
- žárovka
- ventilátor
- Teplota 5 mm od žárovky

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Regulators







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Programming language

- LD %I0.0 ;naplnění hodnotou ze vstupu 0
- OR %M0 ;logický součet s paměti M0
- ANDN %I0.1 ;logický součin se vstupem
- ST %Q0.0 ;nastavení výstupu 0
- ST %M0 ;nastavení paměti 0

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IPC

Compact
Modular
Single board
...

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Ten commandments IPC

- Robustness –
- Dust resistance –
- Impact resistance–
- Water resistance –
- Temperature resistance –

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Ten commandments IPC

- Spolehlivost –
- Expediency –
- Compactness –
- Time guarantee –
- Functionality –

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Von neumann vs harvard

Von Neumann Machine

Harvard Machine

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Single chip computer (Microcontroller, MCU, μ C)

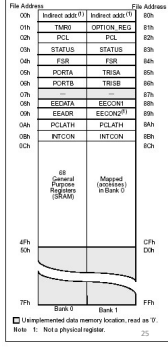
- A single-chip computer is

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TABLE 2-1: SPECIAL FUNCTION REGISTER FILE SUMMARY

Table with columns: Addr, Name, Bit 7, Bit 6, Bit 5, Bit 4, Bit 3, Bit 2, Bit 1, Bit 0, Value on Power-On RESET, Details on page. Rows include registers like CLK, FPC, TMR0, IOL, STATUS, FSR, PORTA, PORTB, PORTC, PORTD, PORTF, LEGATA, LEGATB, LEGATC, LEGATD, LEGATE, LEGATF, OPTION_REG, INTCON, INTCON2, INTCON3, INTCON4.

PIC16F84A



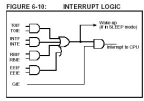
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Working with registries

REGISTER 23: INTCON REGISTER (ADDRESS 08h, 8Bh)

Table with columns: Bit 7, Bit 6, Bit 5, Bit 4, Bit 3, Bit 2, Bit 1, Bit 0. Legend: 0 = Disable bit, 1 = Enable bit, W = Variable bit, U = Unimplemented bit, - = Bit is cleared, - = Bit is set on power-on.

- Bit 7: GIE Global Interrupt Enable bit
Bit 6: EIE EE-Write Protect Interrupt Enable bit
Bit 5: TMR0IF TMR0 Overflow Interrupt Enable bit
Bit 4: INTF INTCON External Interrupt Enable bit
Bit 3: RBIF RB Port Change Interrupt Enable bit
Bit 2: TMR0IF TMR0 Overflow Interrupt Flag bit
Bit 1: INTF INTCON External Interrupt Flag bit
Bit 0: RBIF RB Port Change Interrupt Flag bit




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Table with columns: Mnemonic, Operands, Description, Cycles, 16-Bit Opcode, Status Affected, Notes. It lists various instructions categorized into BYTE-ORIENTED FILE REGISTER OPERATIONS, BIT-ORIENTED FILE REGISTER OPERATIONS, and LITERAL AND CONTROL OPERATIONS.

Instruction


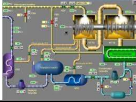


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Program support of control systems

- Firmware,
- Development environments
- Graphical environment –
- Programs for evaluating measured data... .



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What did you learn?

- Control system - types
- Regulators
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