

Fakulta strojní VŠB – TUO

Department of Control Systems and Instrumentation

Automatic Control Devices

(support for notes)

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Lecture No. 3

Actuators and their drives

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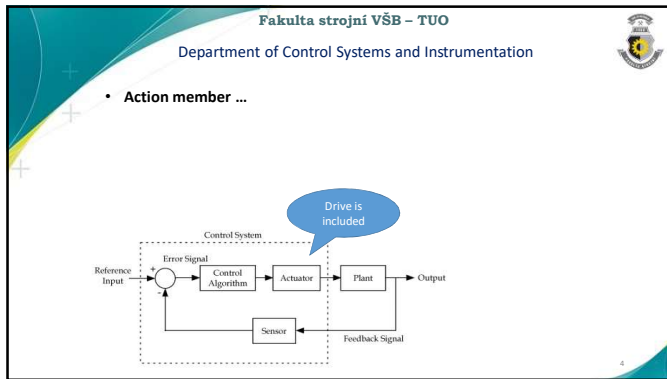
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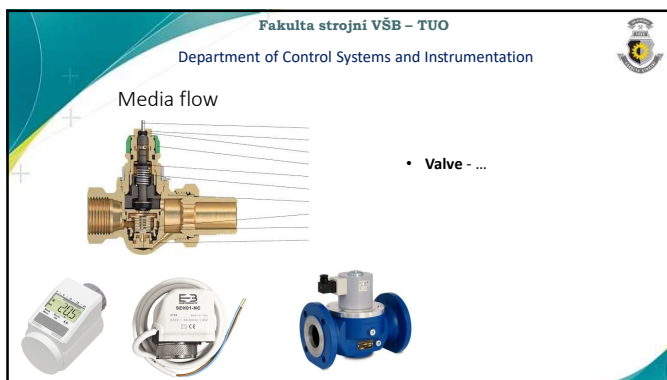
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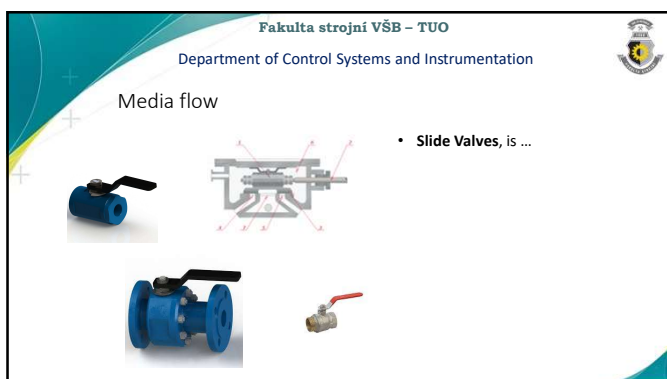
What do you find out?

- Actuators
- Drives, structure, management
 - DC motors
 - AC motors
 - Piezomotors
 - Coils, magnets
-

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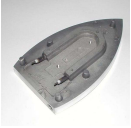






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Temperature

- Heating coil – ...

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Air flow

- The active element ...

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Rotational movement








- The action ...

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Linear motion



- For actuators ...

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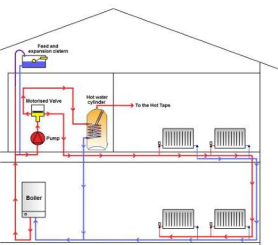
The angle of rotation



- Flap
- ...

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Use of drives for actuators in regulation



- An electric drive
-

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Drives

- Drives can be divided according to the form of energy consumed as follows
 - ...
- Mechanical drives can perform two types of motion
 - ...

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Actuators (example depends on technology)

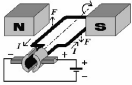
- **Regulators for controlling the flow of gases, air and liquids**
 - ...



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Drives

- **Electric drives**



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Drives

AC motors

- Single-phase motor
 - synchronous motor
 - asynchronous motor
- Three-phase motor
 - synchronous motor
 - asynchronous motor

synchronous motor
asynchronous motor

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Asynchronous motors

The three-phase asynchronous motor is

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Asynchronous motors

moment-rotation characteristics

The phases (coils) of an asynchronous motor can be ...

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Asynchronous motors

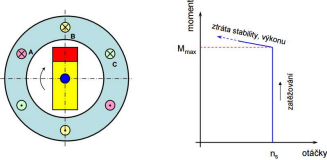
We can control asynchronous motors:



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Synchronous motors

Three-phase synchronous motors are structurally ...



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Single-phase commutator motors

The speed of an asynchronous motor is limited by the ...

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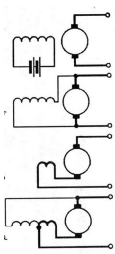
DC motors

According to the excitation, we distinguish:
with foreign (a) –

by derivation (b) –

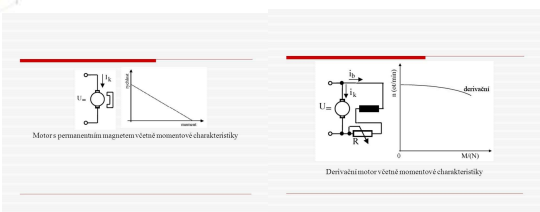
series (c) –

compound (combined) (d) –



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DC motors



Motor s pemsamimn magneten včetm momentu-čakternitky

Derivát motor včetm momentu-čakternitky

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Commutator

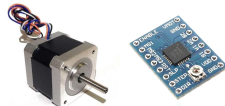
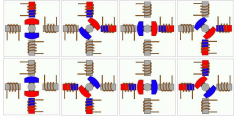
Commutator
is a...



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Stepper motors

A stepper motor is

Advantages

- ...

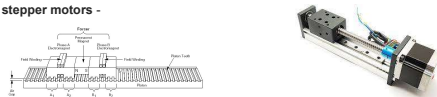
A disadvantage

-

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Stepper motors

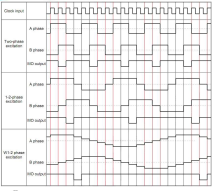
- Passive Stepper Motors –
- Active stepper motors –
- Hybrid stepper motors –
- Linear stepper motors -



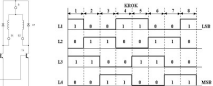
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Stepper motors

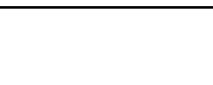
A full step means ...

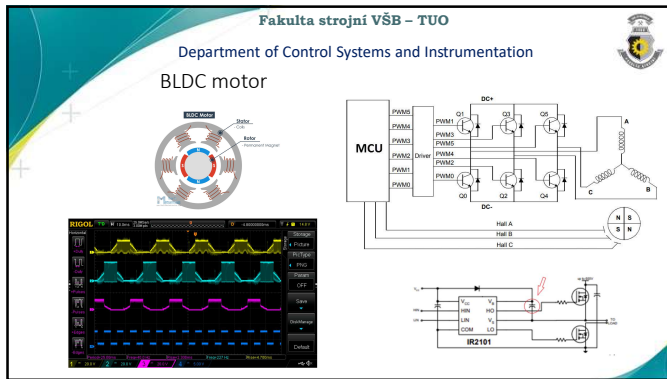


Half-step The term "half-step" ...

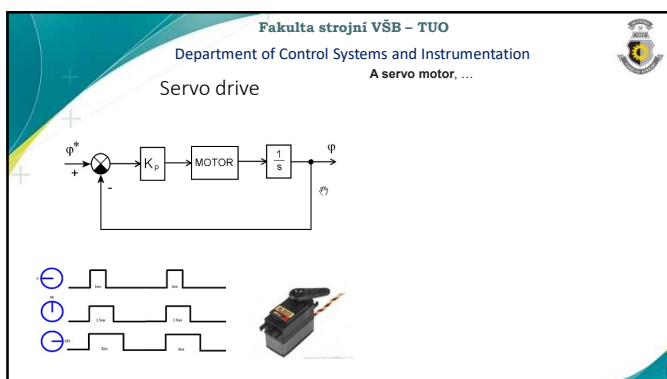


Micro Stepping









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Linear motors

The diagram compares a rotary motor and a linear motor. The rotary motor shows a rotor with permanent magnets and a stator with windings. The linear motor shows a similar setup but with a linear air gap. Below, a 'What is Linear Induction Motor?' section shows a cross-section of a linear induction motor with a rotor and stator. To the left, there are images of various linear motor actuators. At the bottom right, it says 'Electrical 4 U'.

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Piezoactuators

Piezoelectric phenomenon is the ...

The diagram illustrates the piezoelectric phenomenon. It shows three piezoelectric actuators (blue blocks) with internal wiring. Below, a diagram shows a piezoelectric material (cylinder) being compressed by a force (red arrow), which generates an electric charge (red and blue dots). To the right, there are images of various piezoelectric actuators and a diagram of a piezoelectric material structure.

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Connection of components

The diagram shows a piezoelectric actuator assembly. It consists of an upper part, a middle part, and a bottom part (base). The assembly is connected to a power supply (48 V) and a LAN (RS485). The piezomotor is labeled as LT2020A-0800100. The power supply is labeled as 48 V. The LAN is labeled as RS485. The piezomotor is also labeled as LT2020A-10101A00.

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Electromagnets

An electromagnet is a coil with ...

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What was the content of the lecture

- Actuators
- Drives, structure, management
 - DC motors
 - AC motors
 - Piezomotors
 - Coils, magnets
-

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Thank you for your attention ...

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