

ME 161

Introduction to Mechanical Engineering

Lec Note 5: Brig Gen Humayun

5. Electromechanical system/robotics

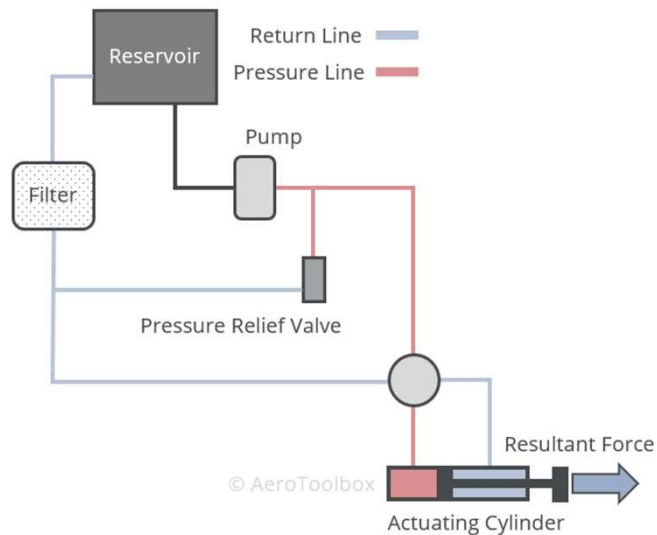
Please go through class notes and reference materials discussed in the class. This is just a guideline for those who missed the classes

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1

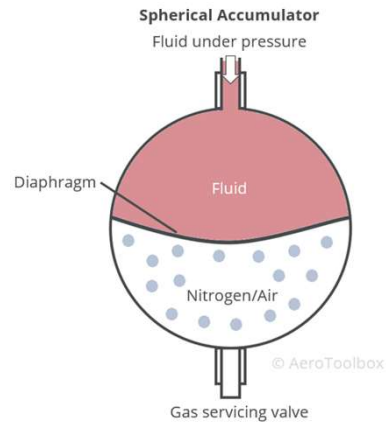
Simple Hydraulic System Schematic



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2



Accumulators

An accumulator provides a means to store fluid under pressure at different points throughout the system which can then be used to **dampen pressure surges** or **supplement the pump** under high operating loads. Accumulators also provide limited system operation in the event of a failure of the pump

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3

• Actuators

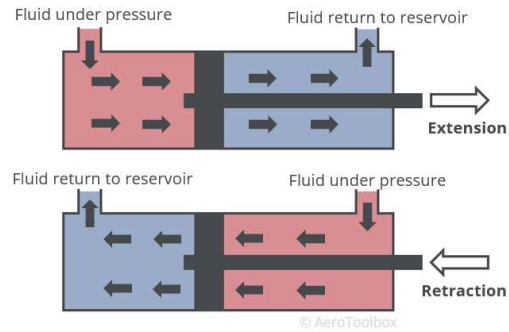
- The purpose of an actuator is to convert fluid pressure into a mechanical force that can be used to perform useful work. Work is the product of force and displacement and so applying a pressure to one side of an actuator will cause that actuator to move with a force equal to the pressure difference multiplied by the actuator's cross-sectional area, and perform work such that energy in the system is conserved.

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4

Double Action Actuator



LINEAR ACTUATOR

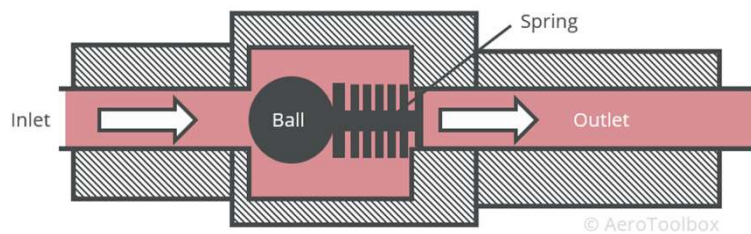
A **linear actuator** consists of a cylinder and piston arrangement where one side of the piston is connected to a rod which actuates depending on the pressure acting on the piston. A **double-action actuating cylinder** is designed to extend and retract under pressure. Fluid under pressure enters one side of the cylinder, pushing the piston and causing the lower pressure fluid on the other side of the piston to return to the reservoir. A selector valve allows the direction of motion to be reversed such that fluid under pressure can enter the previously low-pressure side of the actuator, reversing the actuator direction.

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5

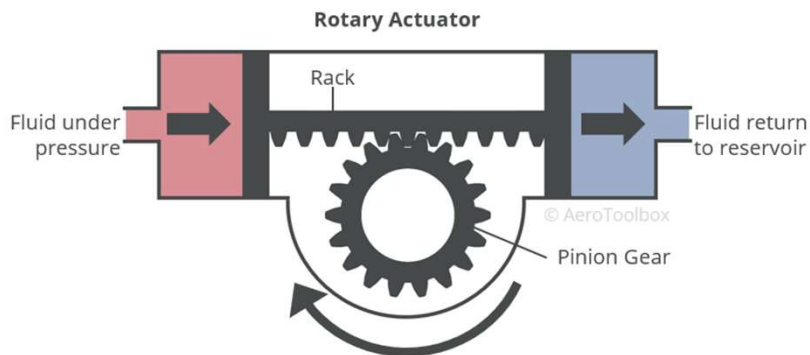
In-line Check Valve



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6



ROTARY ACTUATOR

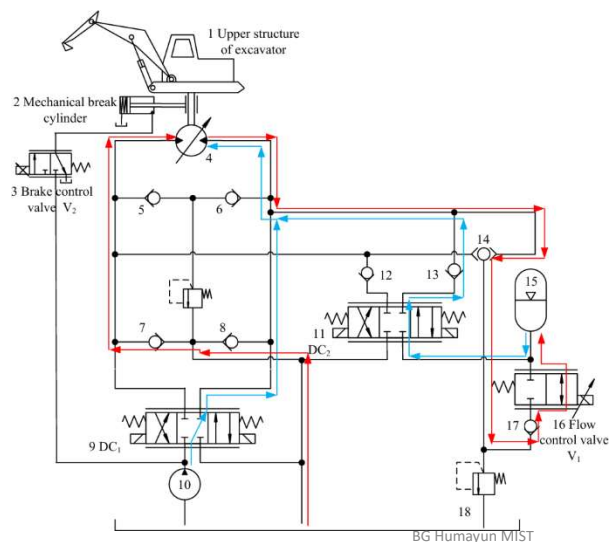
A rotary actuator converts the pressure differential set up by the hydraulic system into a rotary motion, usually through a rack-and-pinion arrangement. This is a common arrangement used in a hydraulically assisted nose-wheel steering mechanism.

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7

Excavator hydraulic components

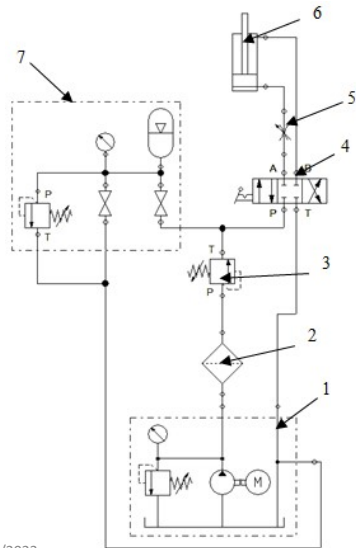


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8

Hydraulic car lifter

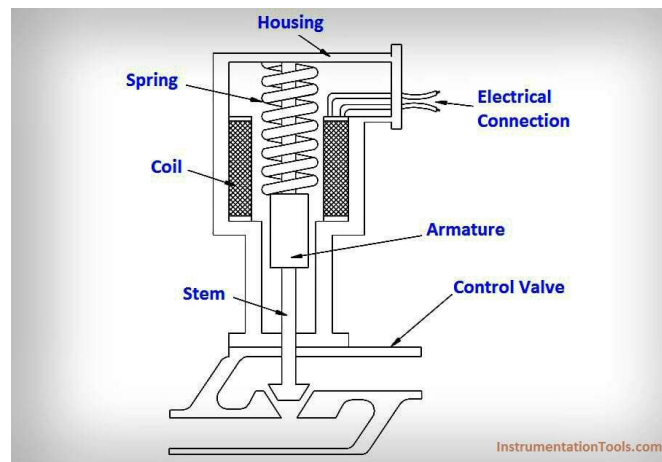


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9

How does solenoid actuated valve works

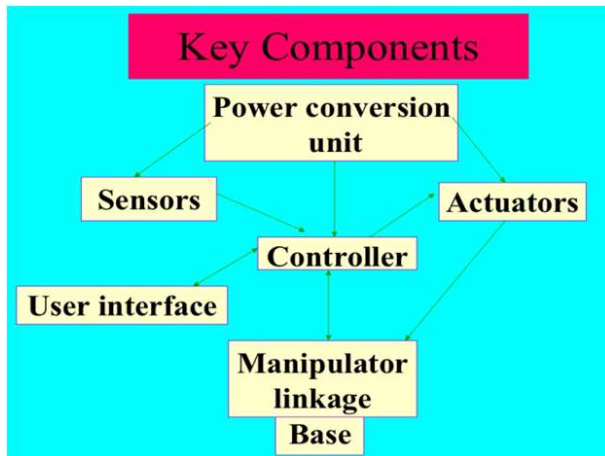


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10

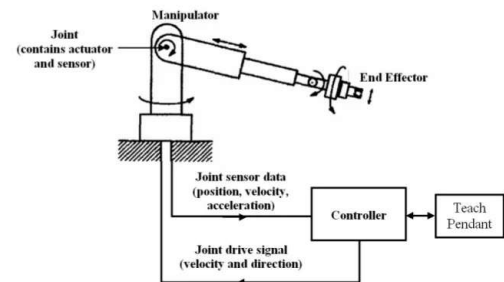
Key components of robot



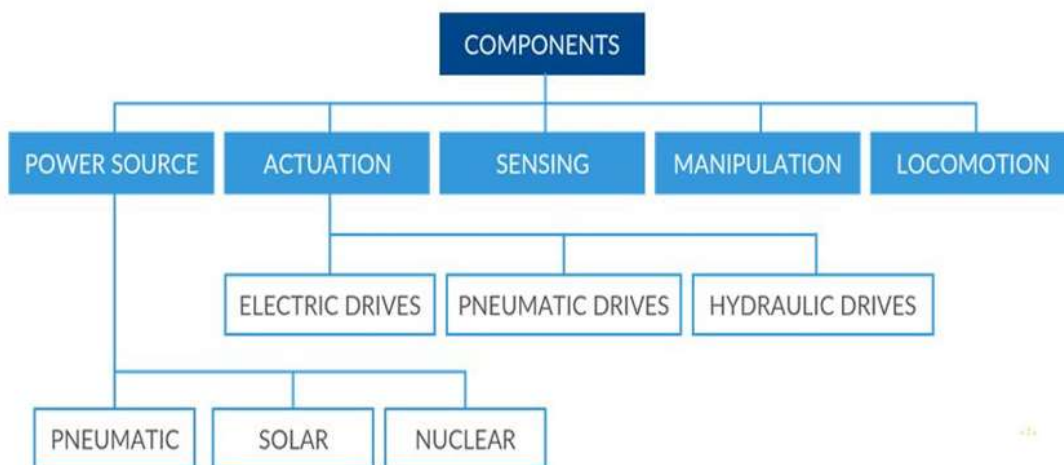
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Basic Components..



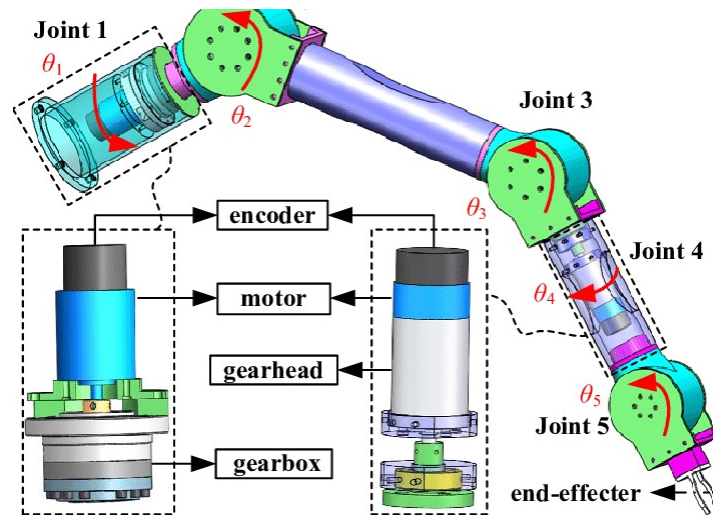
11



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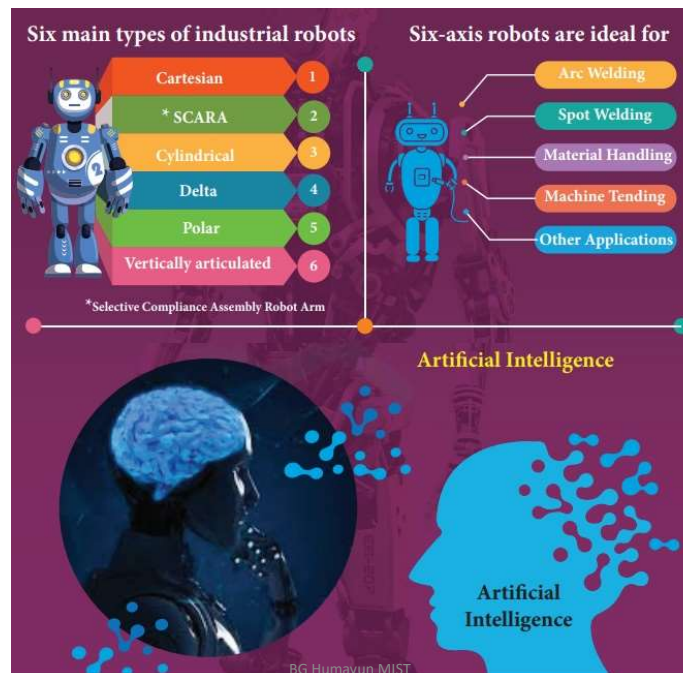
12



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13



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14