



Introduction to Robotics

CSE 461

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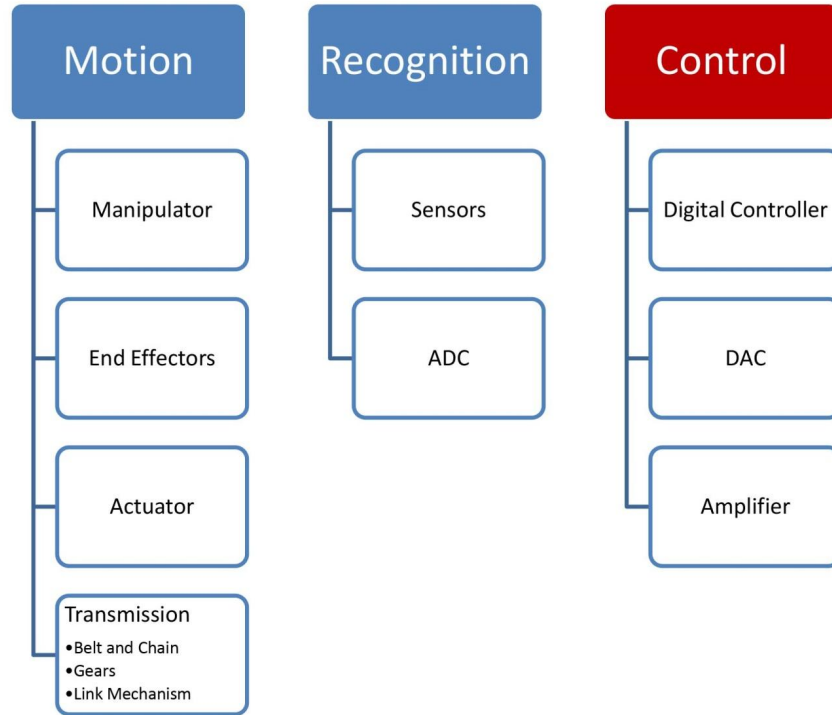
Brac University

Lecture 4: Chapter 1(Introduction to robotics: basics)

Previous Class

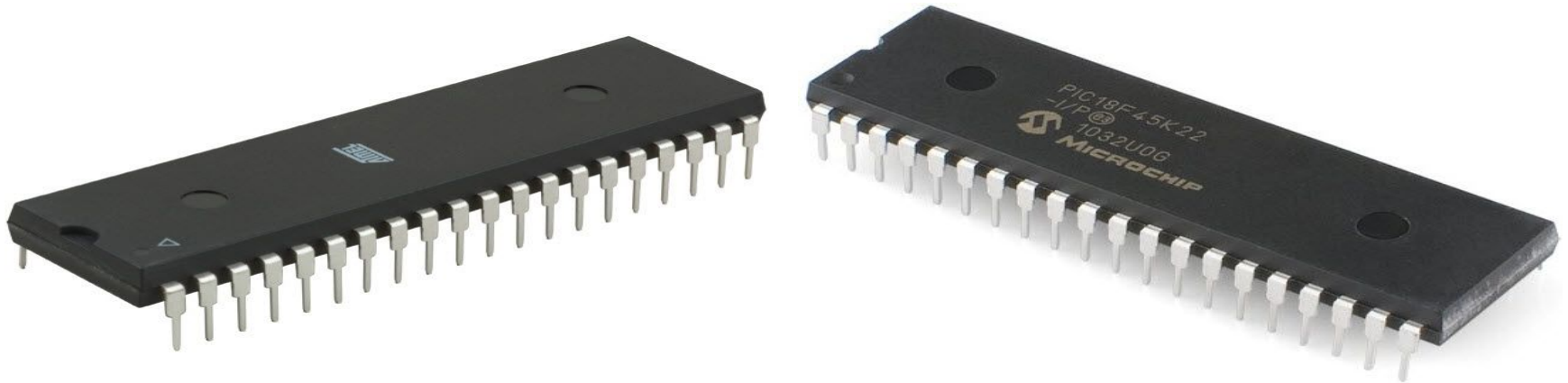
1. Subsystem

Subsystems



Microcontrollers

A microcontroller is a small, integrated circuit that contains a processor, memory, and input/output peripherals.



Arduino



Arduino



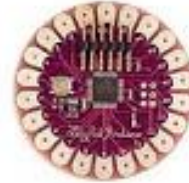
Arduino Uno



Arduino Leonardo



Arduino Mega 2560



Arduino LilyPad



Arduino Mega ADK



Arduino Fio



Arduino Ethernet



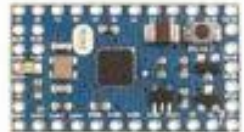
Arduino Pro



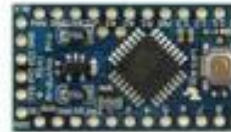
Arduino BT



Arduino Nano

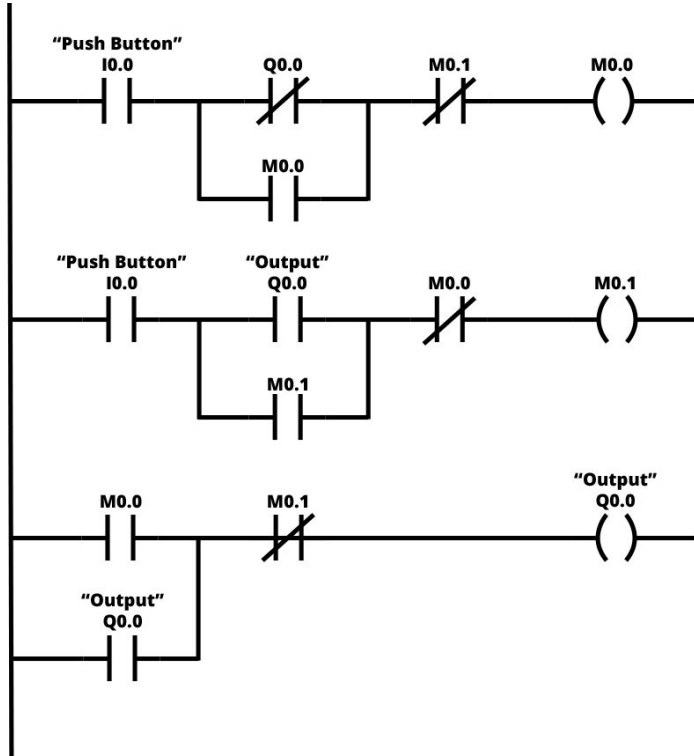


Arduino Mini

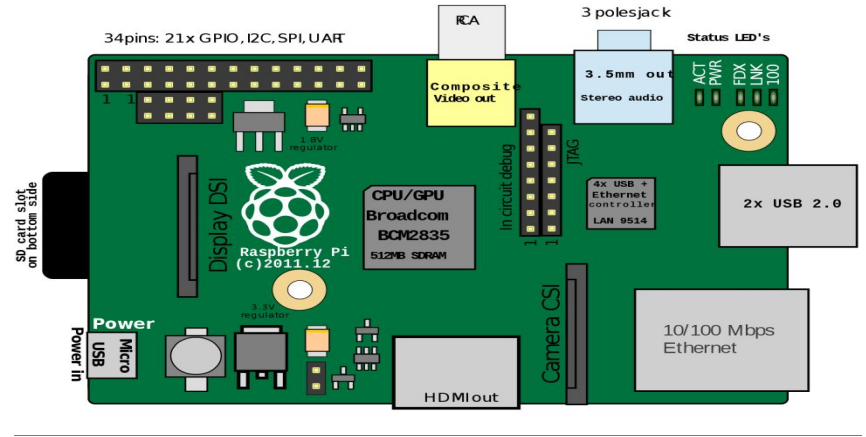


Arduino Pro Mini

Programmable Logic Controller (PLC)



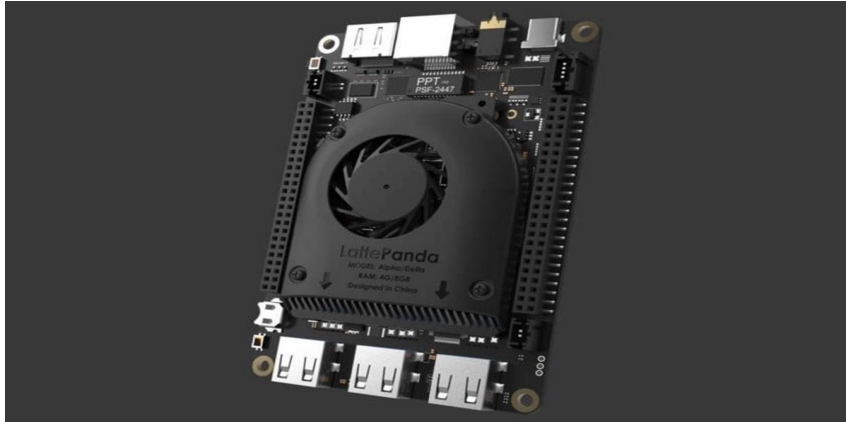
Single board Computer



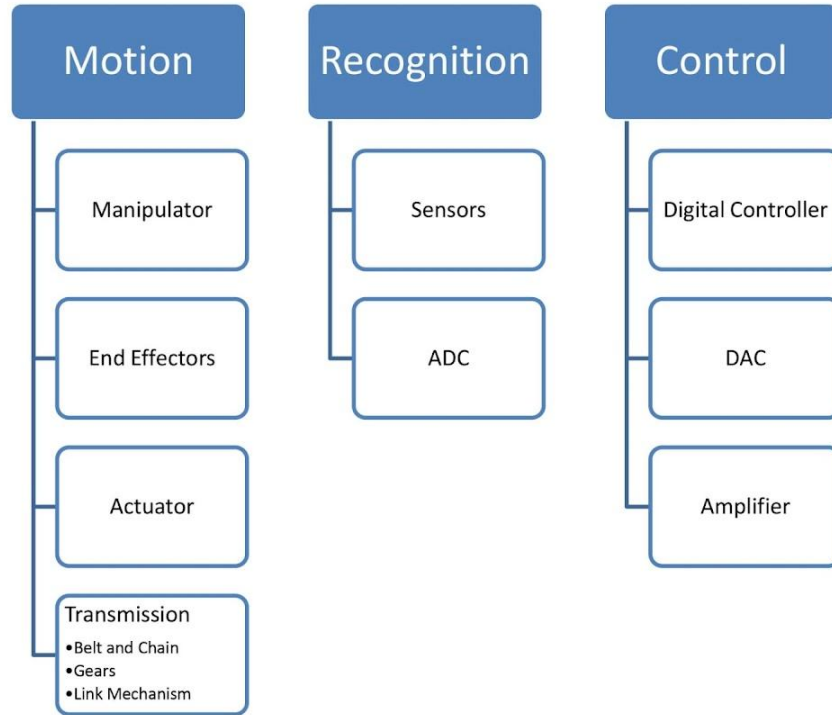
Raspberry PI 4, Tinkerboard



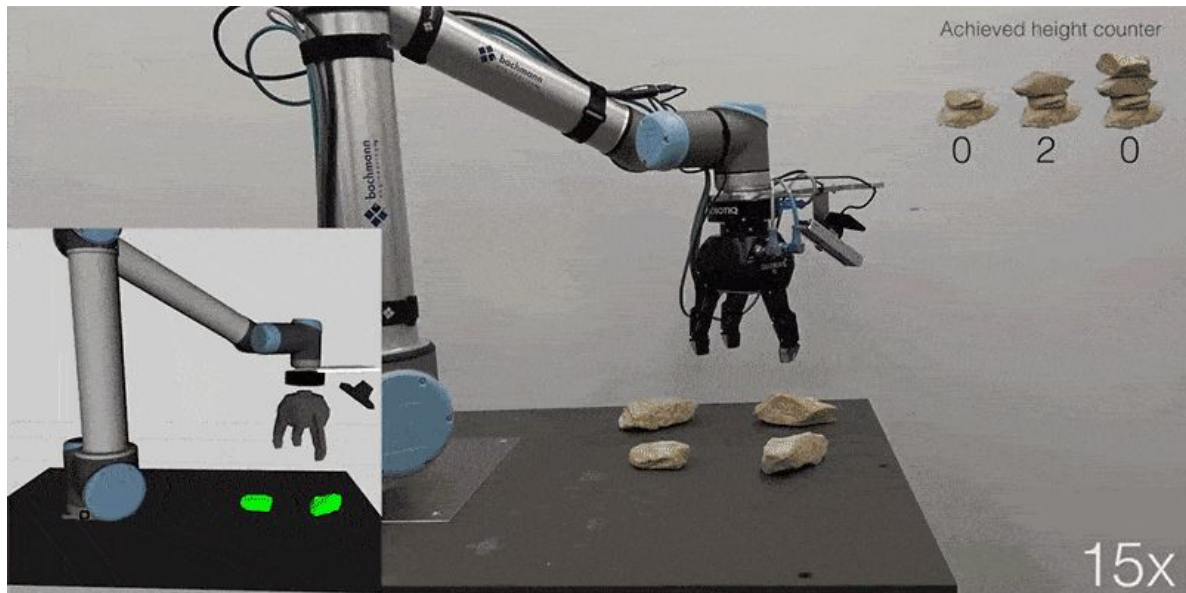
Little Panda and Jetson nano



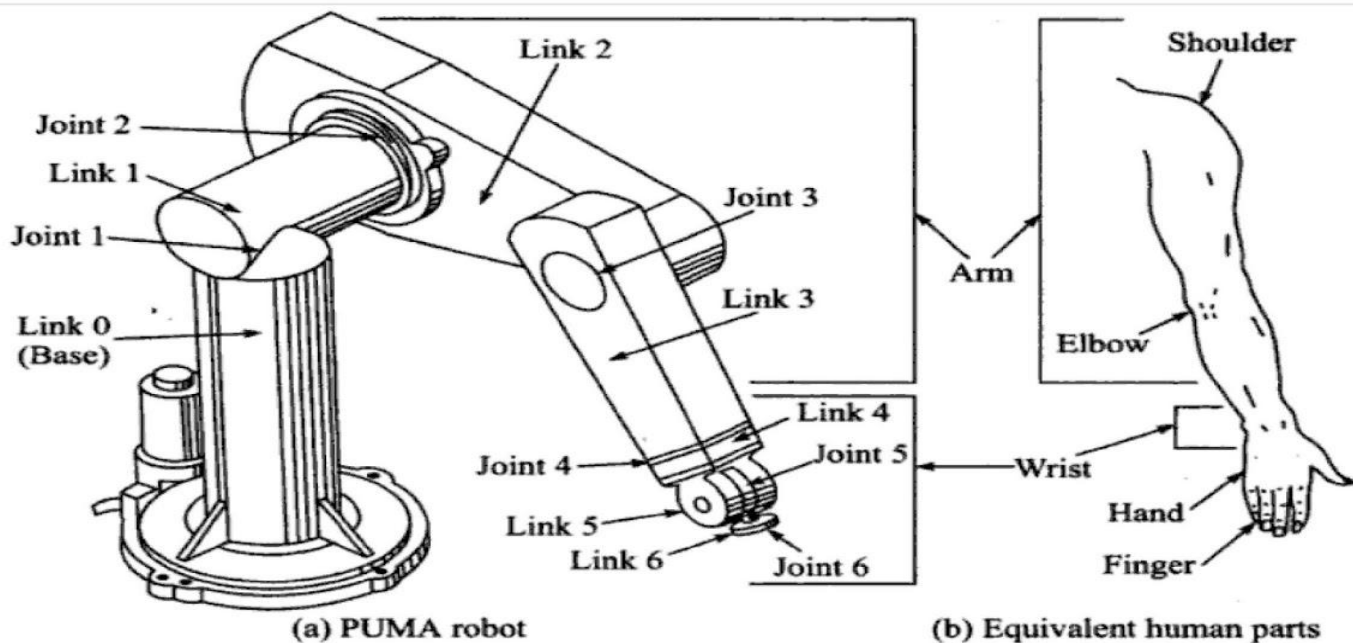
Subsystems



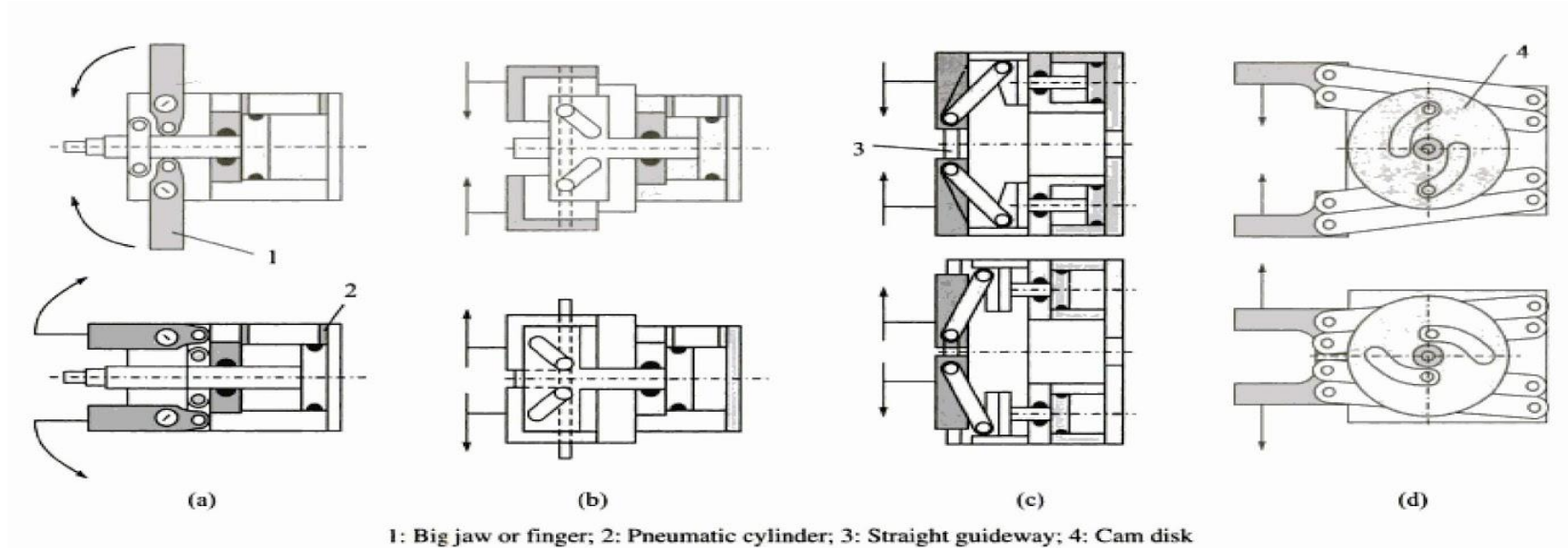




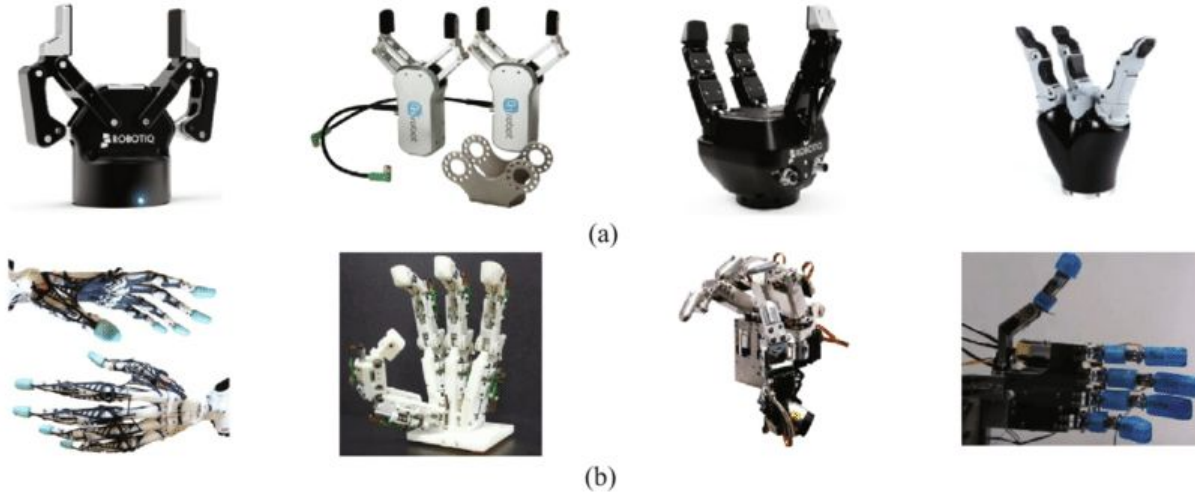
Manipulator



End-effector

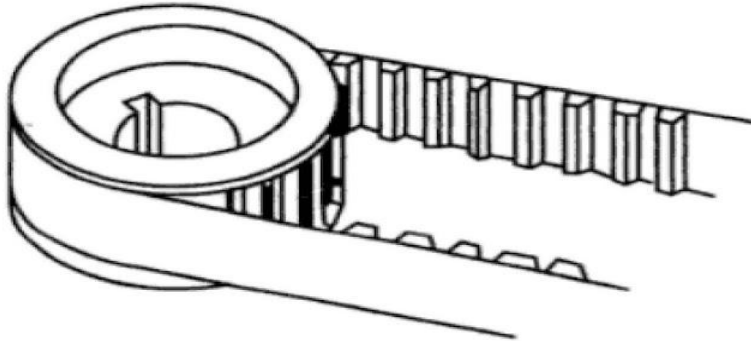


End Effector

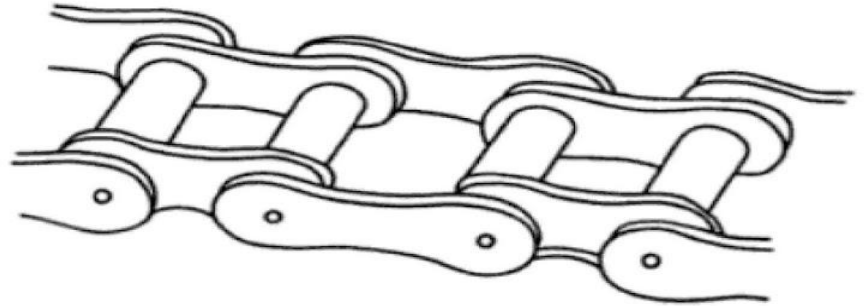


Two types of fingered end-effectors: (a) gripper type, (b) anthropomorphic type

Transmission (Belt and chain)

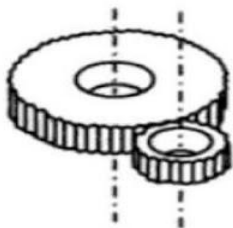


(a) Synchronous belt

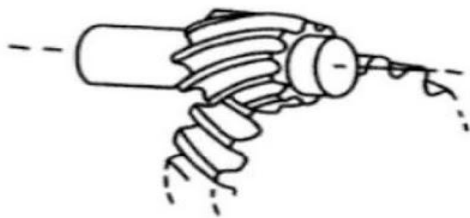


(b) Roller chain

Transmission (Gears)



Spur gears



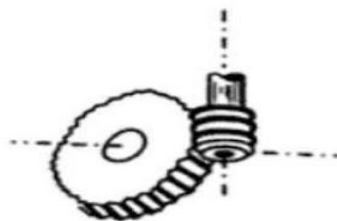
Helical gears



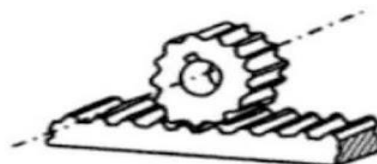
Straight bevel



Spiral bevel



Worm



Rack and pinion

Actuators



Pneumatic Actuator

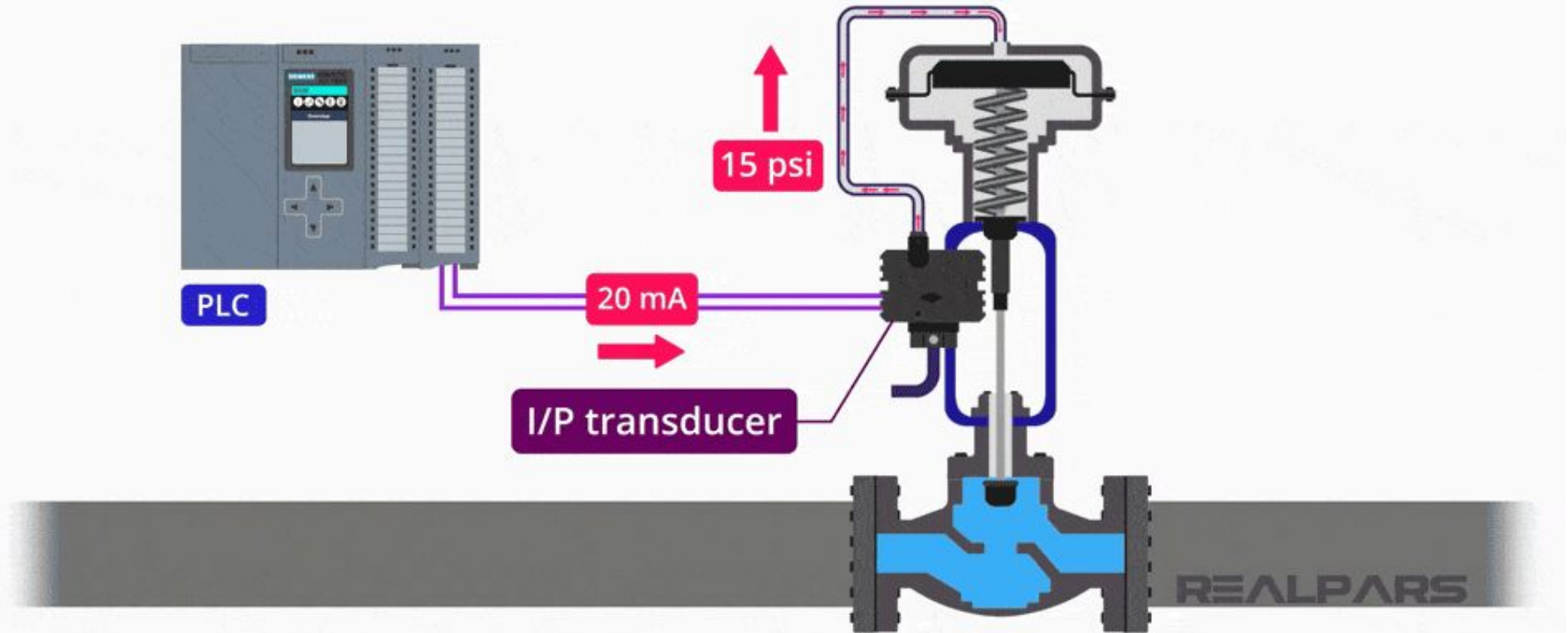


Hydraulic Actuator

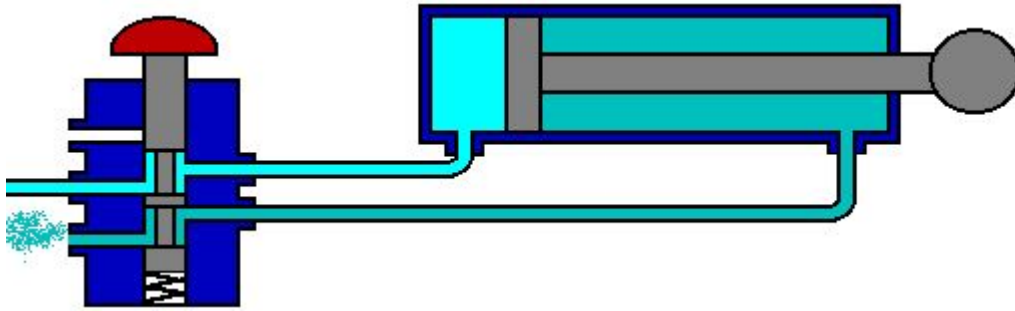


Electric Actuator

Pneumatic



Hydraulic



Electric

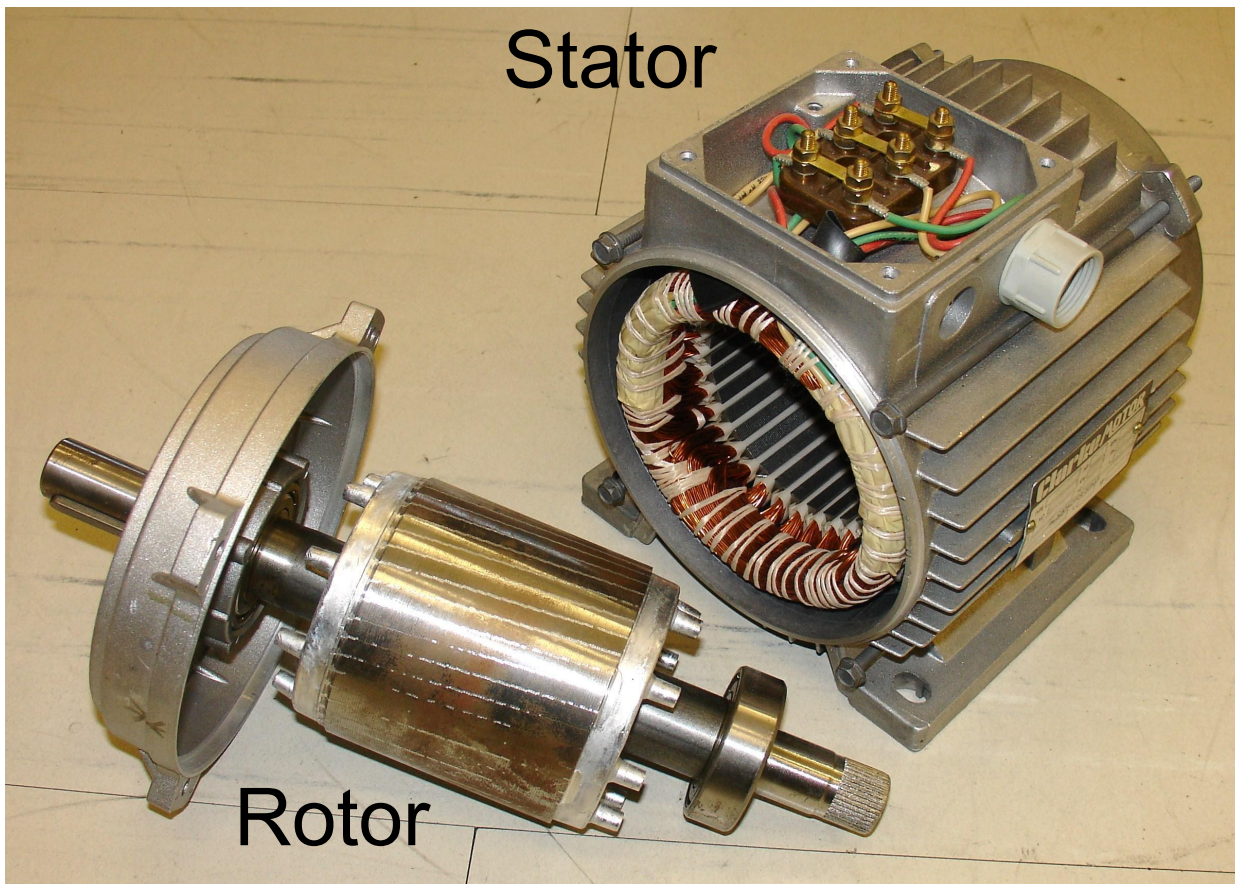


Characteristics	Pneumatic	Hydraulic	Electric
Efficiency	Low	Low	High
Reliability	Excellent	Good	Good
Maintenance	High user-maintenance	High user-maintenance	Little to no maintenance
Purchase Cost	Low	High	High
Operating Cost	Moderate	High	Low

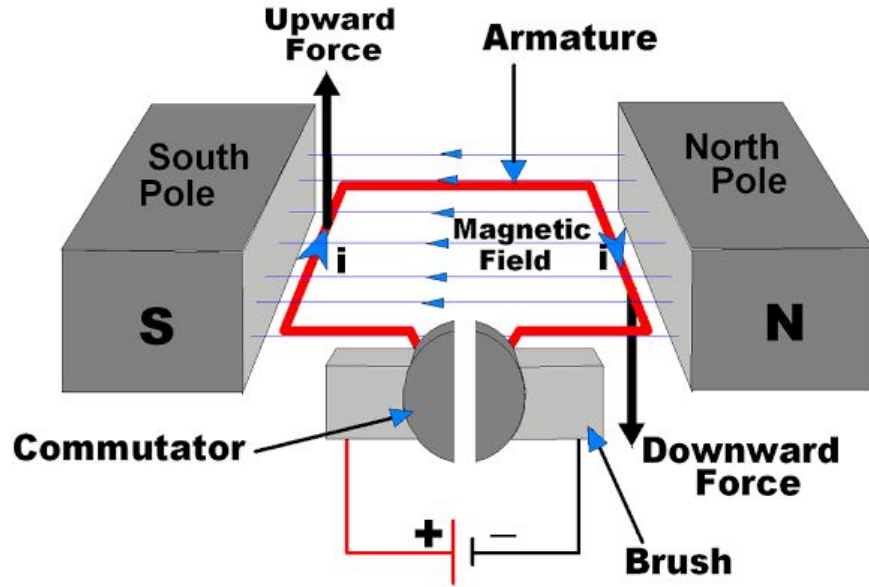
Motor

Stator

Rotor

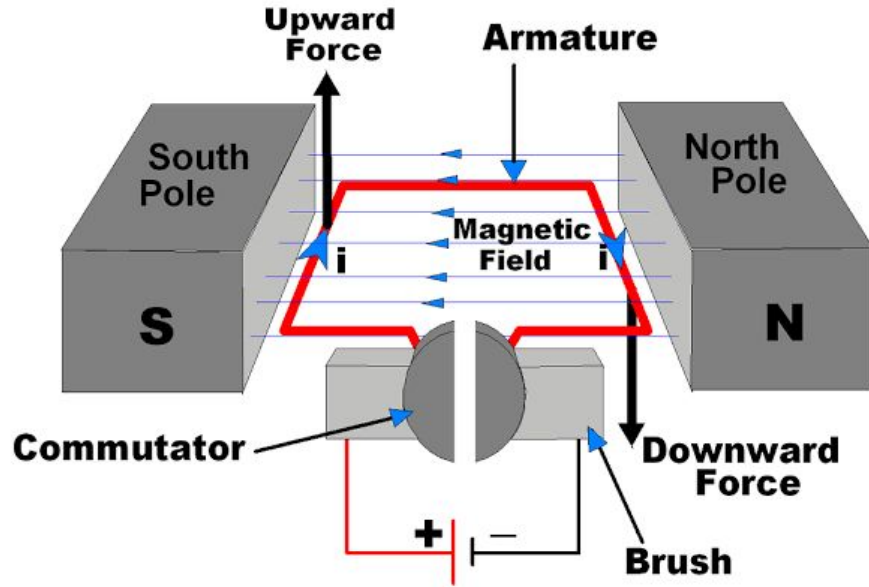


DC motor

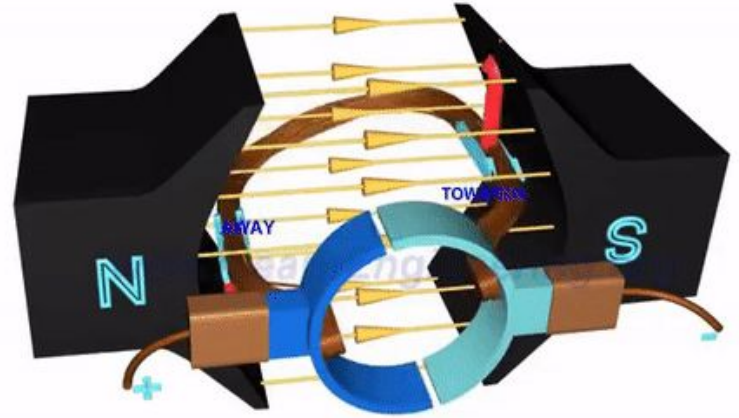


DC Motor Conceptual Diagram

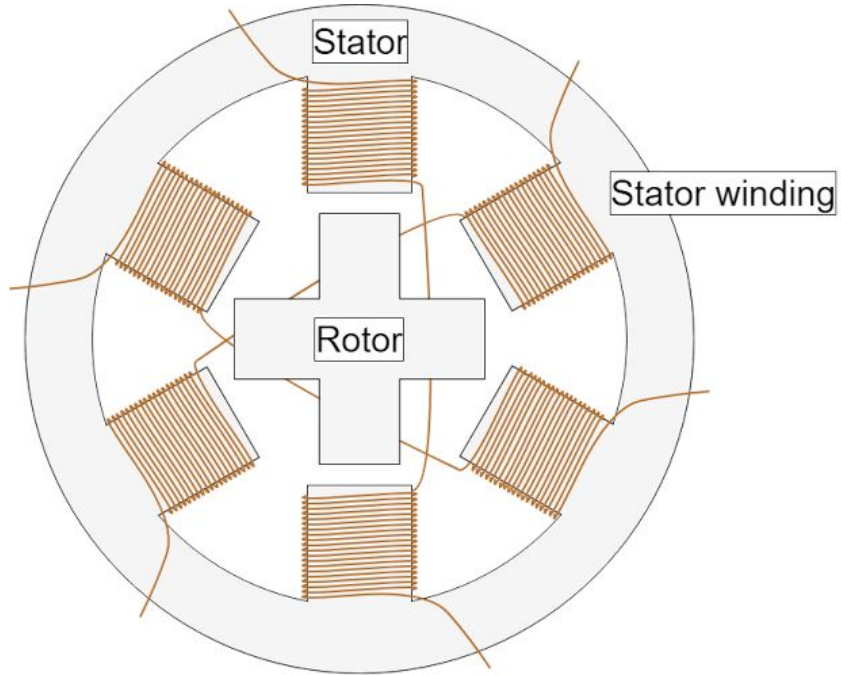
DC motor



DC Motor Conceptual Diagram

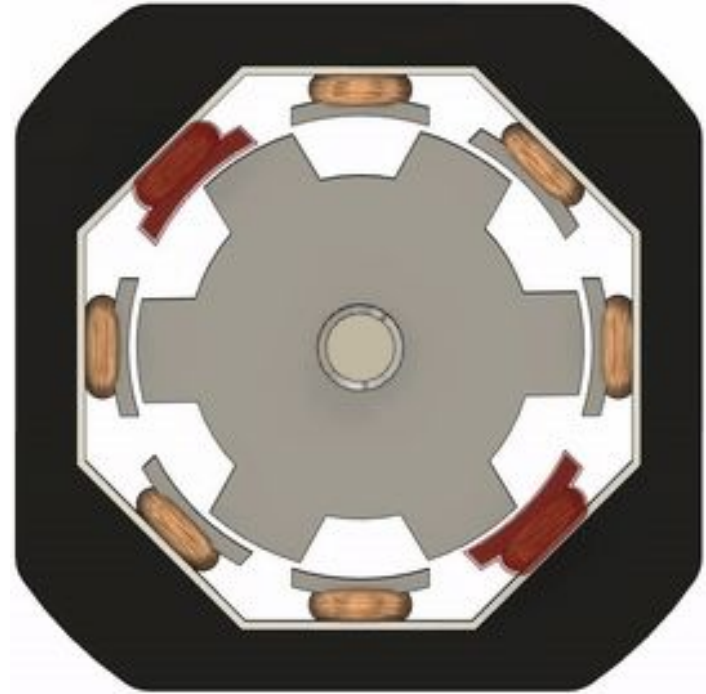
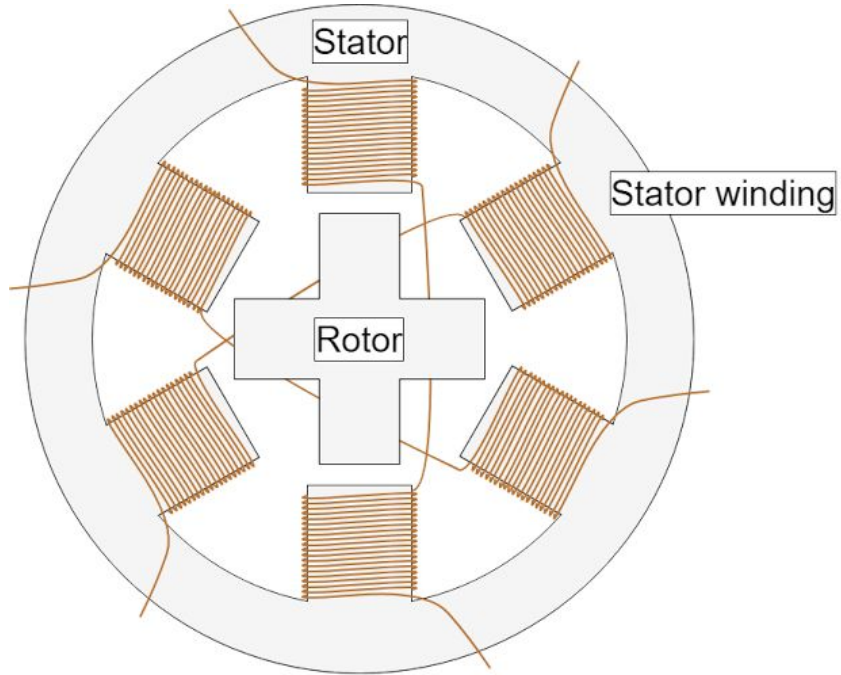


Stepper Motor



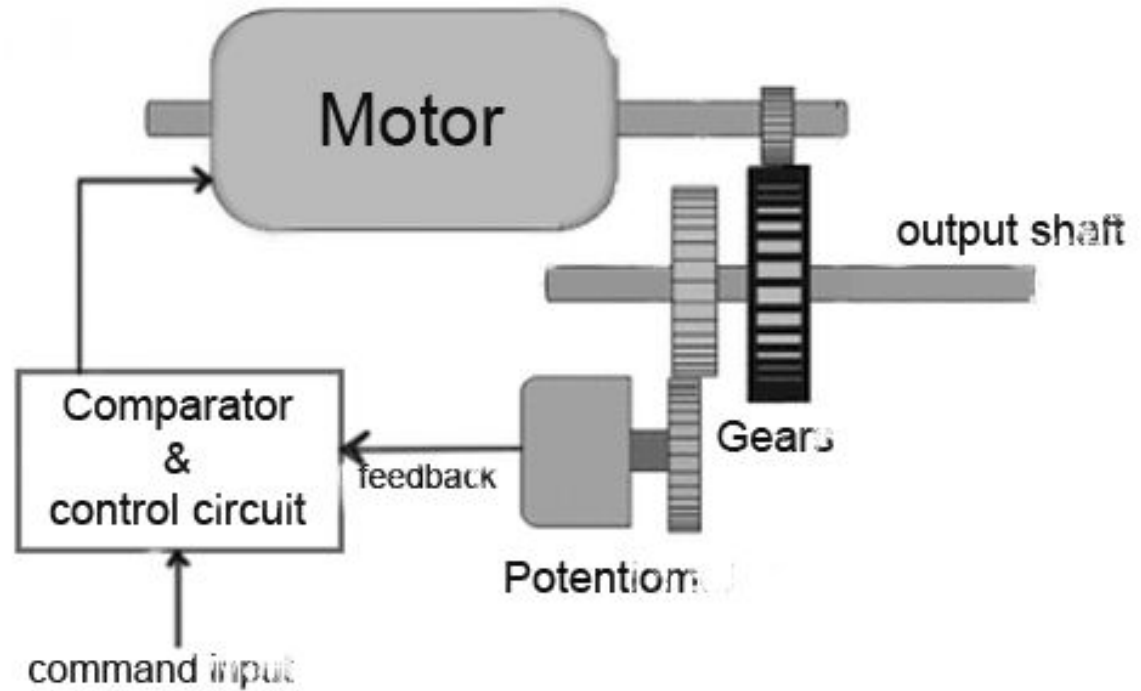
<https://youtu.be/eyqwLiowZiU>

Stepper Motor



<https://youtu.be/eyqwLiowZiU>

Servo Motor



Next Class

- Quiz

Thank You