



# Introduction to Robotics

## CSE 461

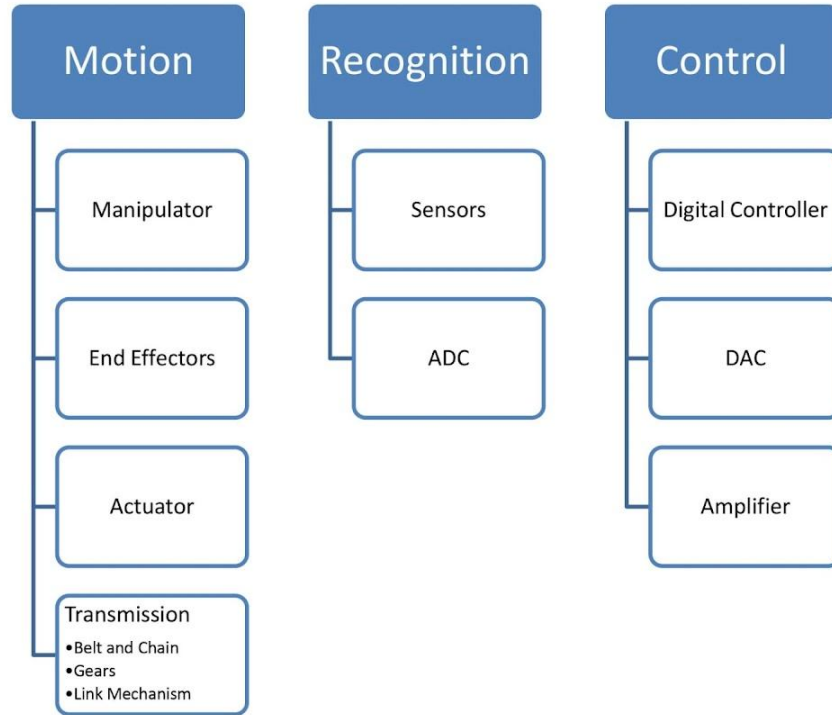
Lecture 4 : Chapter 1(Introduction to robotics: basics)

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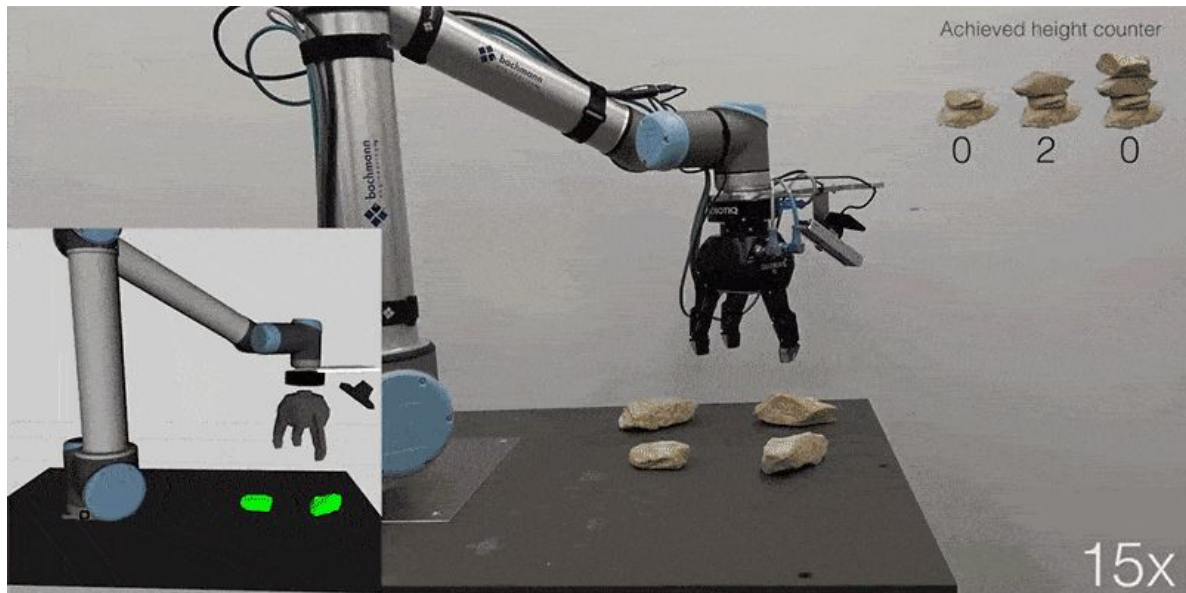
# Previous Class

1. Recognition Subsystem
2. Control Subsystem

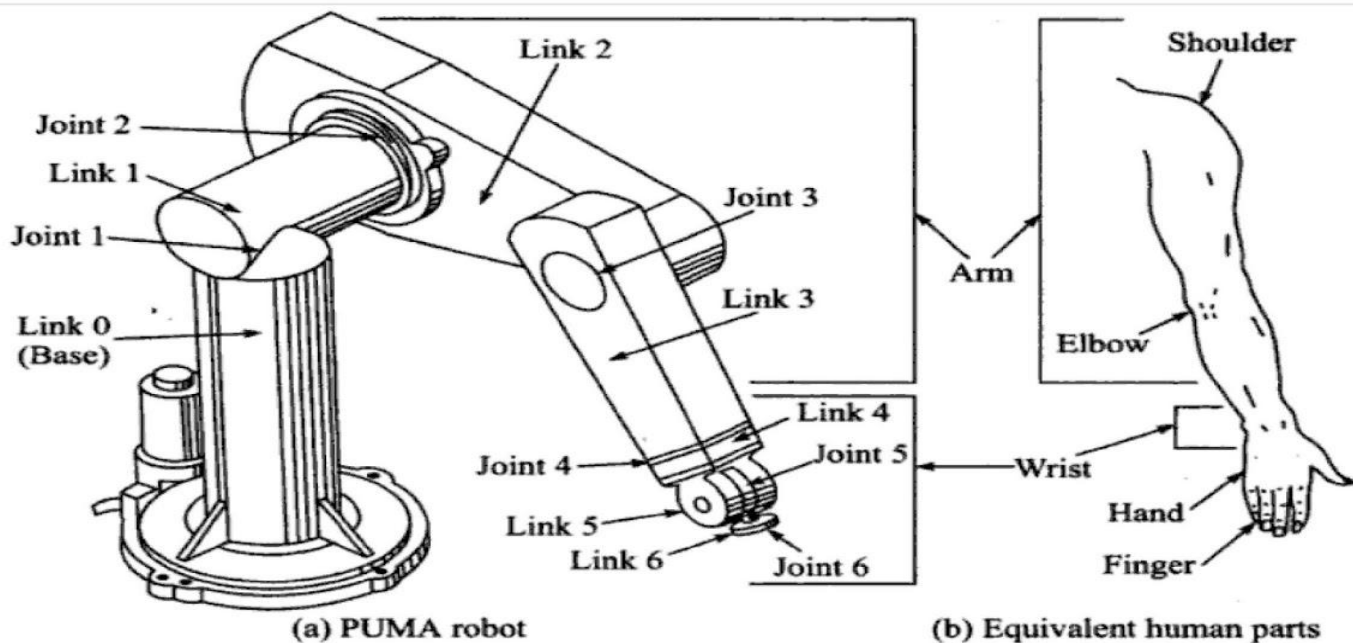
# Subsystems



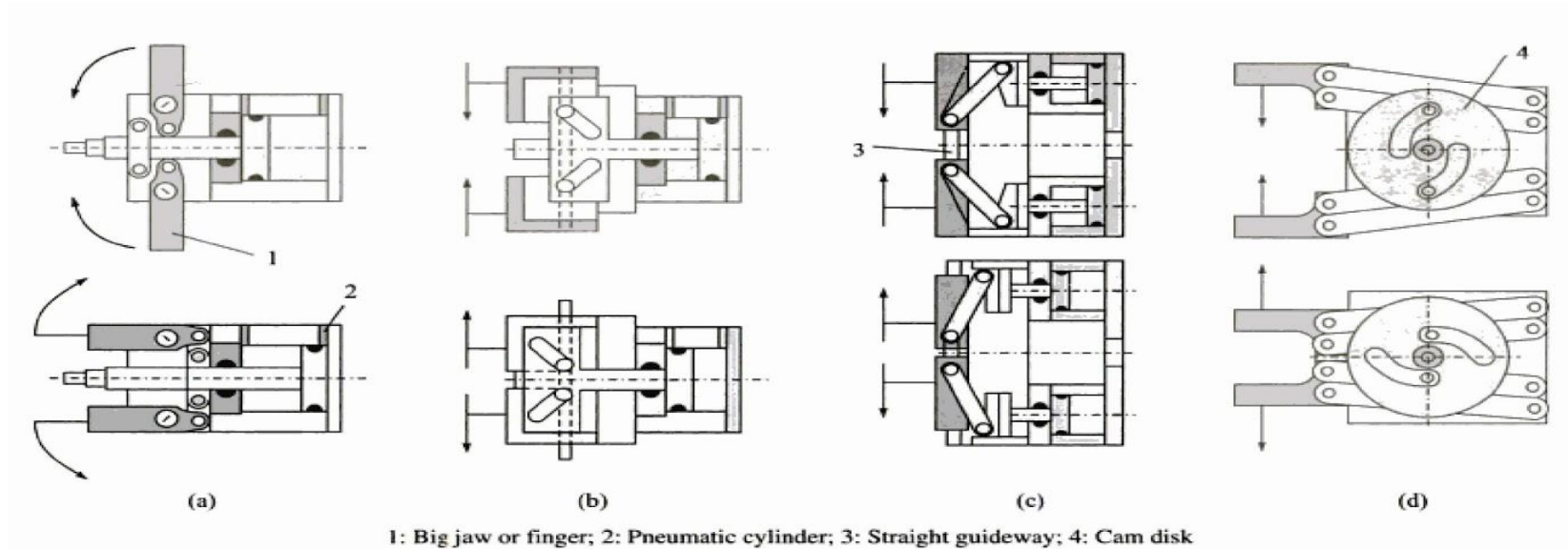




# Manipulator



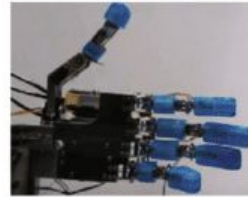
# End-effector



# End Effector



(a)

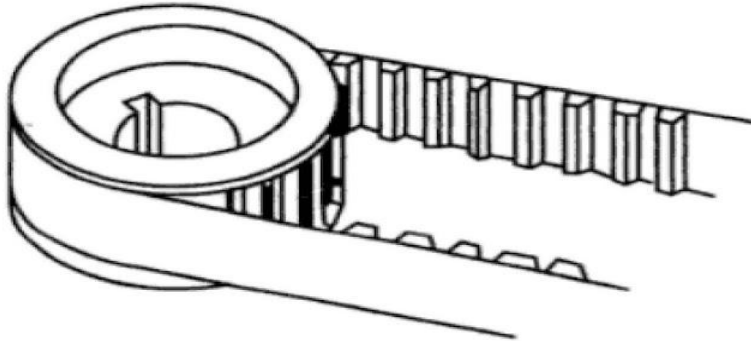


(b)

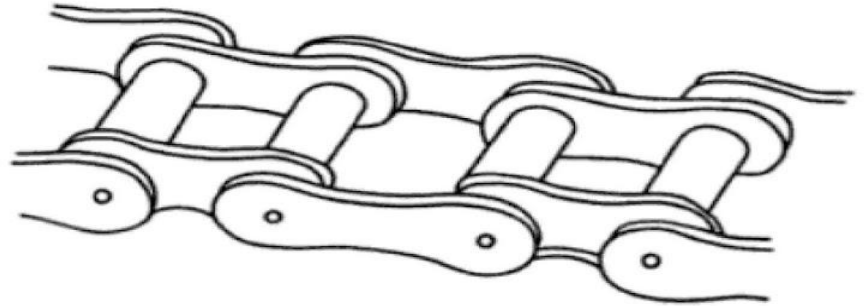
**Two types of fingered end-effectors: (a) gripper type, (b) anthropomorphic type**



# Transmission (Belt and chain)

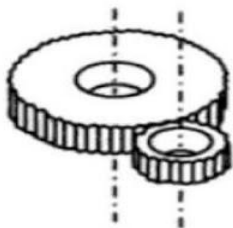


(a) Synchronous belt

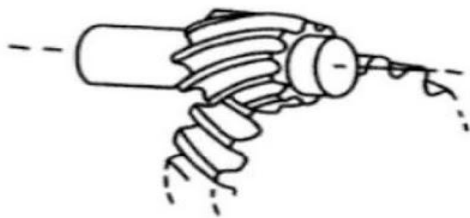


(b) Roller chain

# Transmission (Gears)



Spur gears



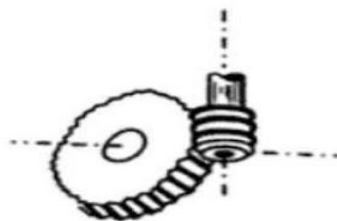
Helical gears



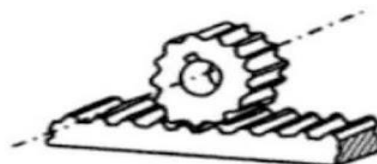
Straight bevel



Spiral bevel



Worm



Rack and pinion

# Actuators



Pneumatic Actuator

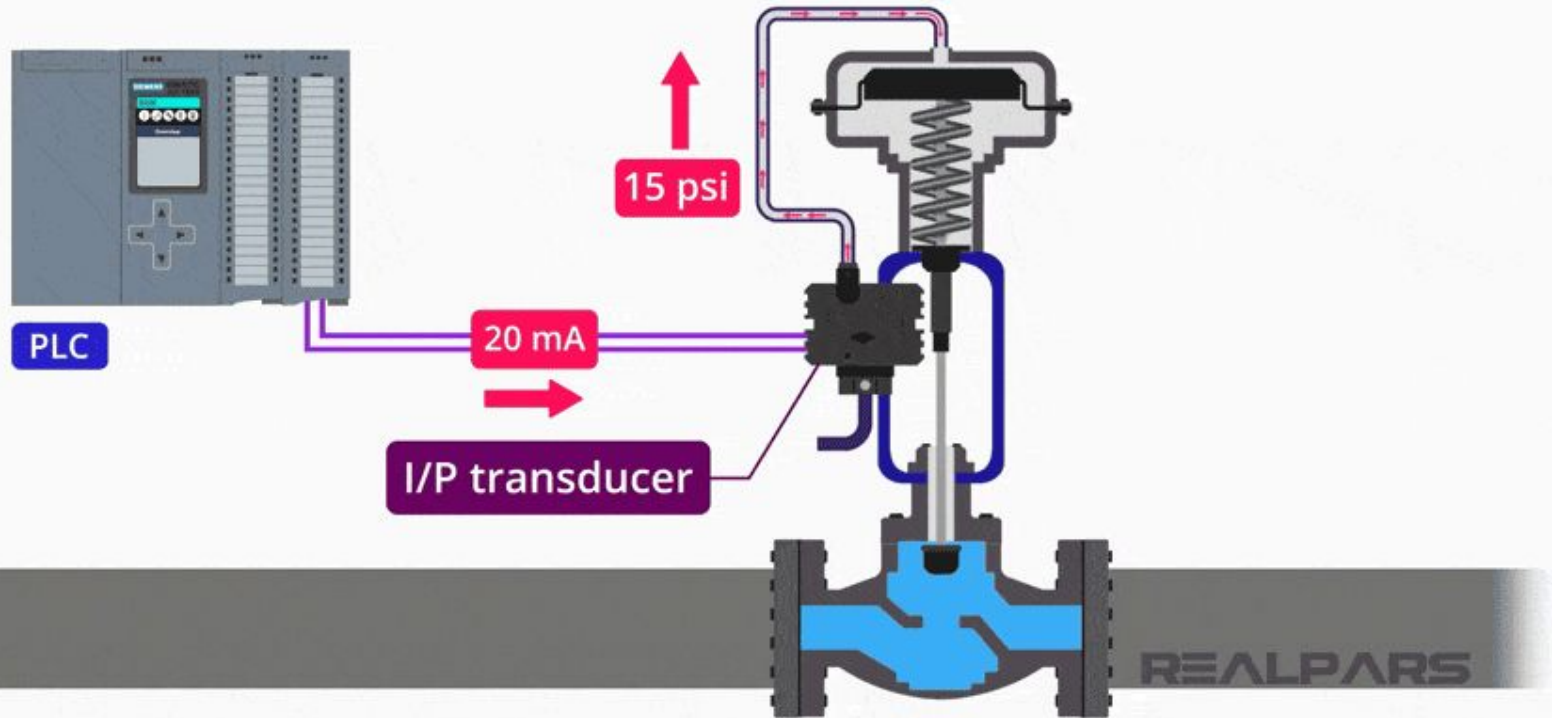


Hydraulic Actuator

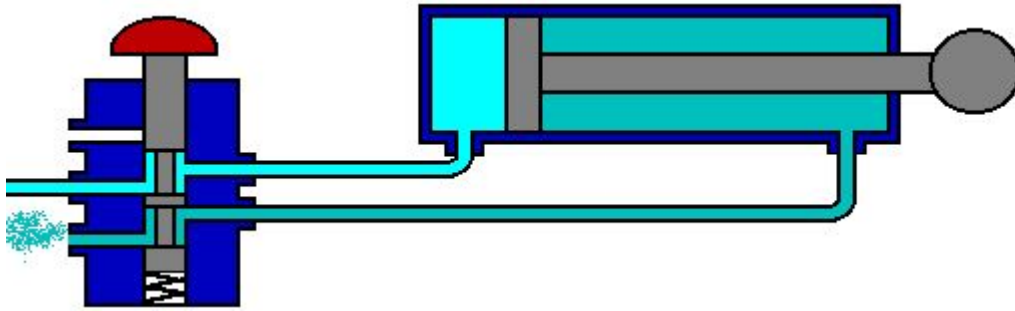


Electric Actuator

# Pneumatic



# Hydraulic



Electric



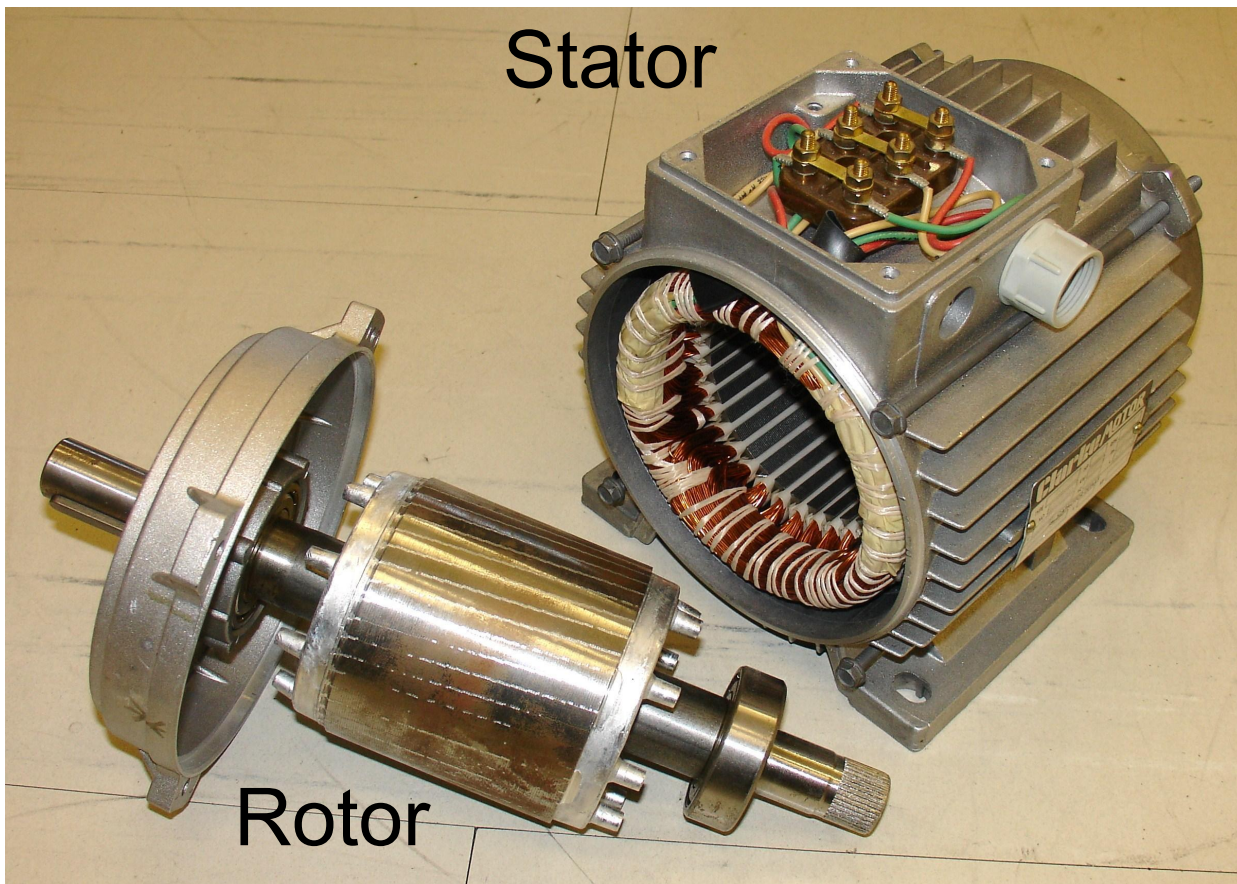
Characteristics	Pneumatic	Hydraulic	Electric
Efficiency	Low	Low	High
Reliability	Excellent	Good	Good
Maintenance	High user-maintenance	High user-maintenance	Little to no maintenance
Purchase Cost	Low	High	High
Operating Cost	Moderate	High	Low



Motor

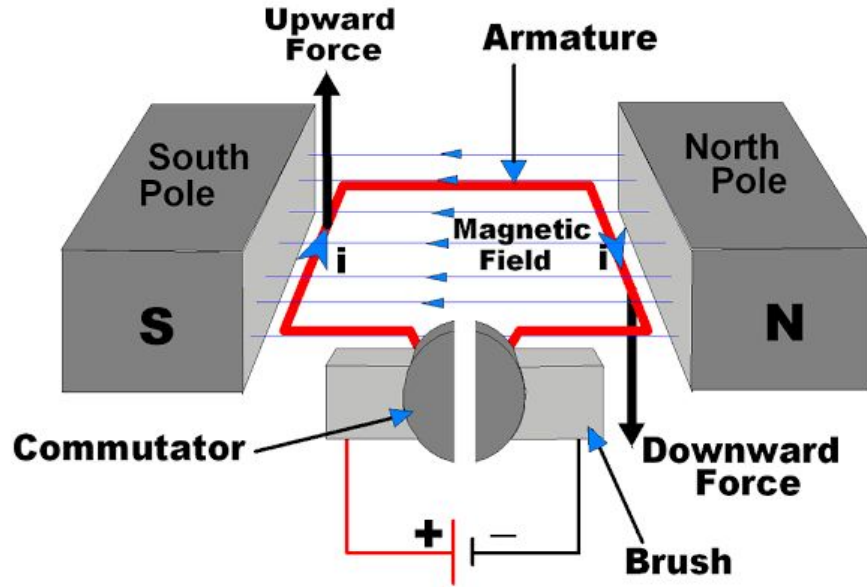
Stator

Rotor



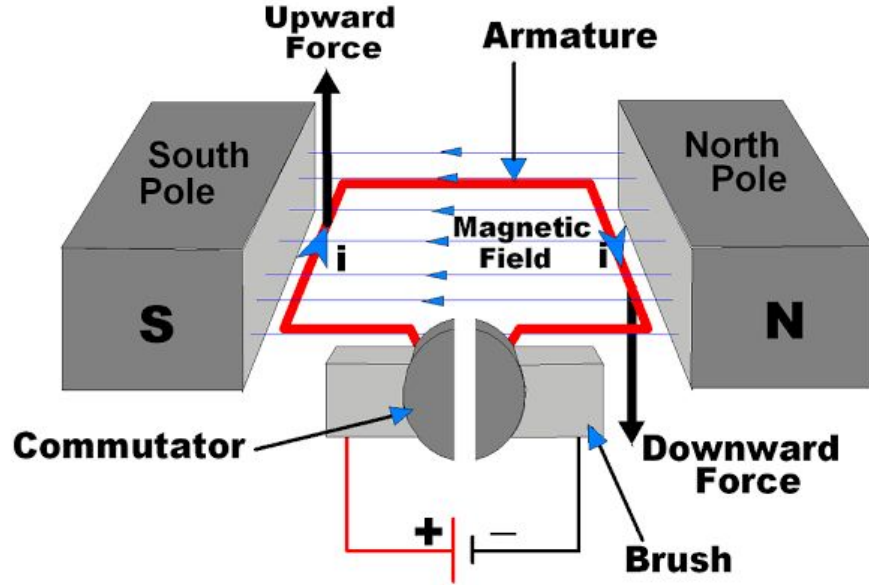


# DC motor

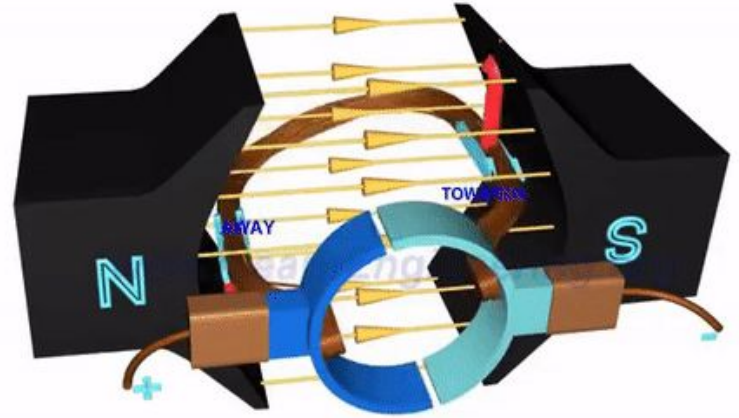


DC Motor Conceptual Diagram

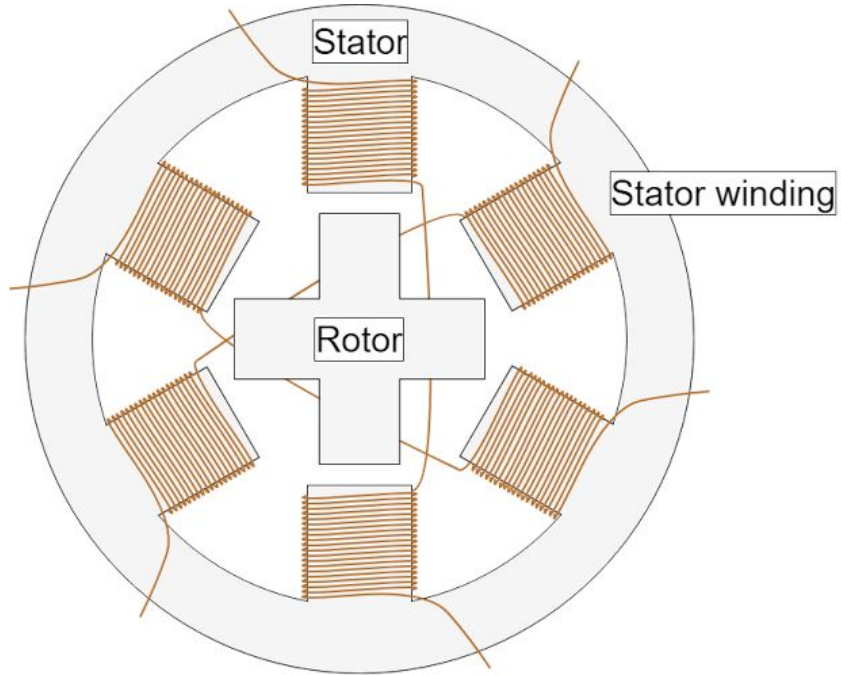
# DC motor



DC Motor Conceptual Diagram

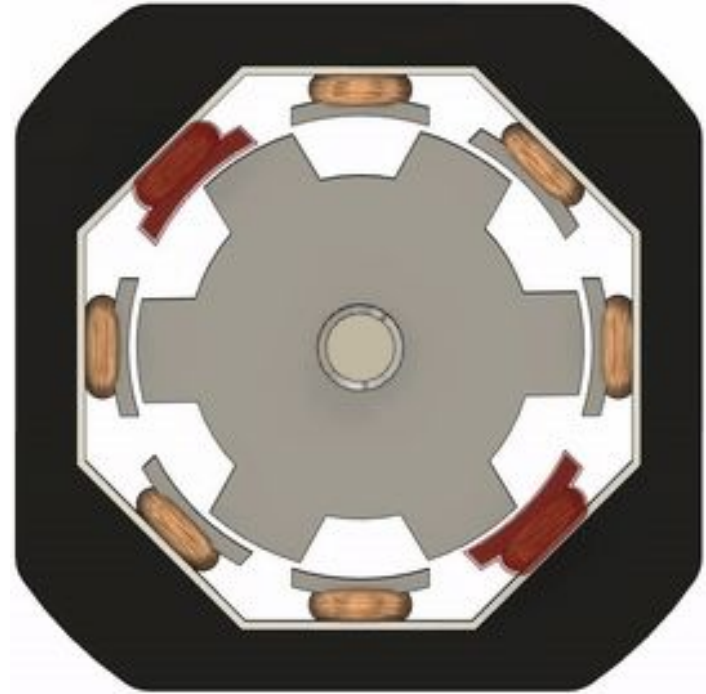
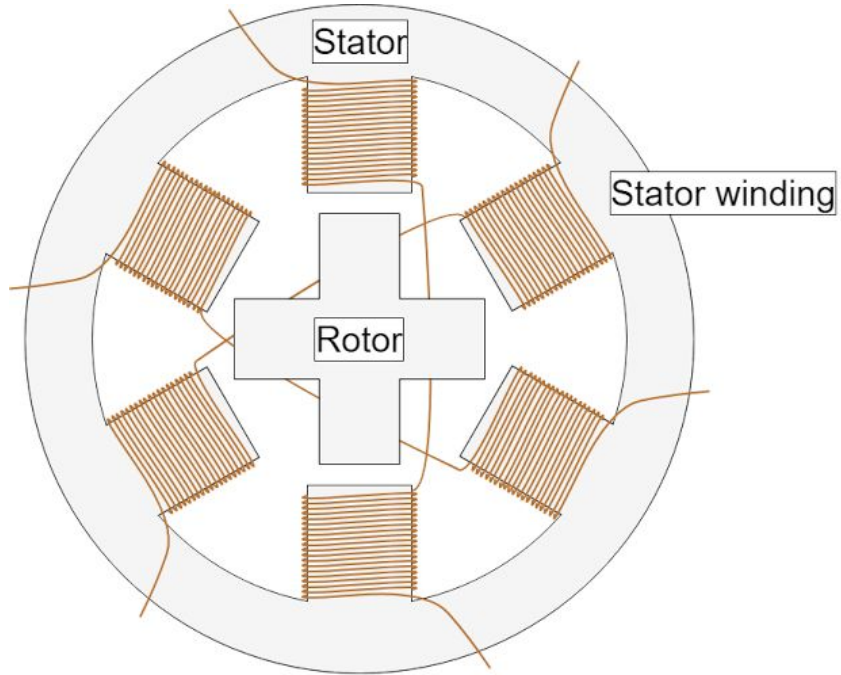


# Stepper Motor



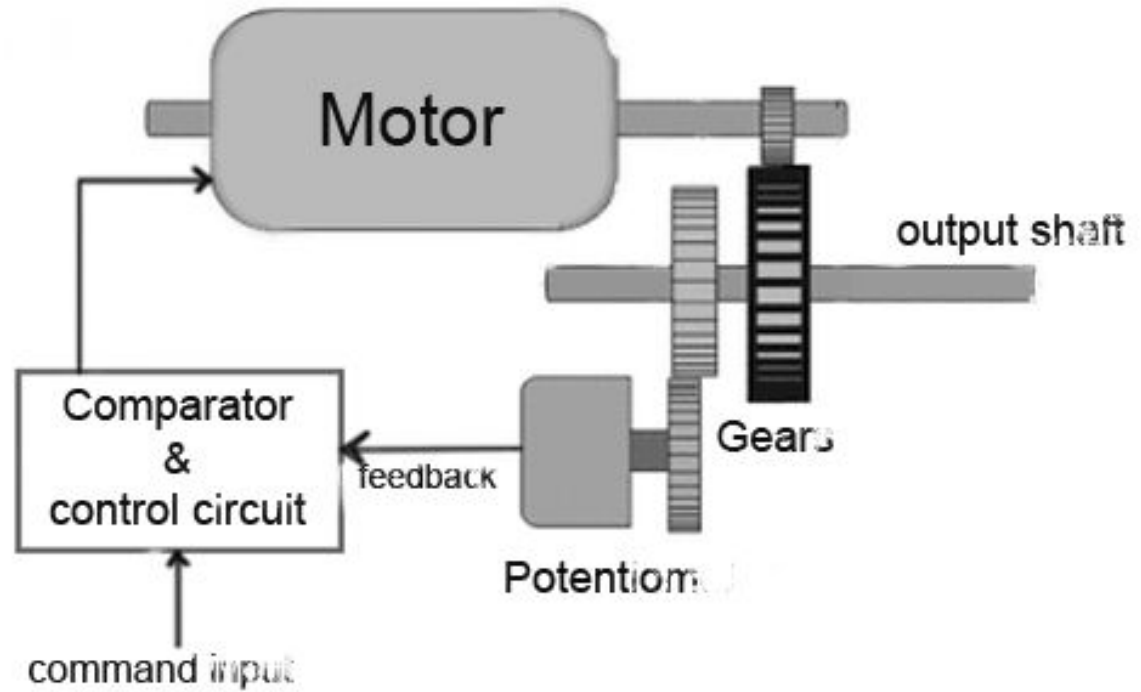
<https://youtu.be/eyqwLiowZiU>

# Stepper Motor



<https://youtu.be/eyqwLiowZiU>

# Servo Motor



# Next Class

- Quiz

Thank You