

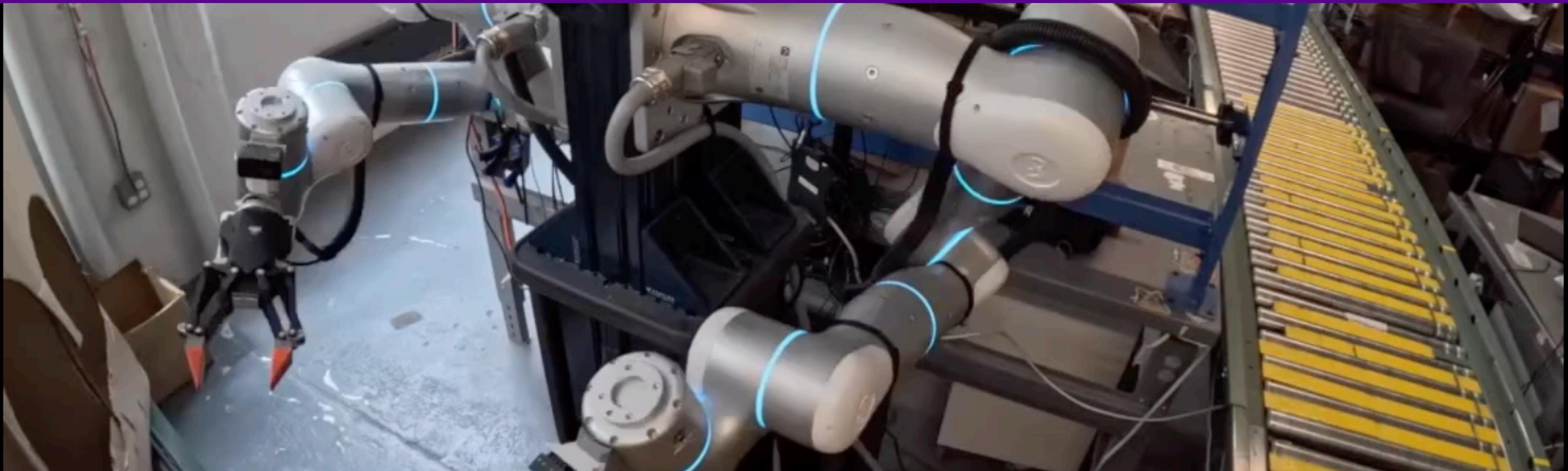


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Robotic Manipulation & Locomotion

Lecture 01B - Robot Parts





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Agenda

- 1. Robotic Systems**
 - As described with block diagrams

- 2. Robot hardware basics**
 - Joints and Links



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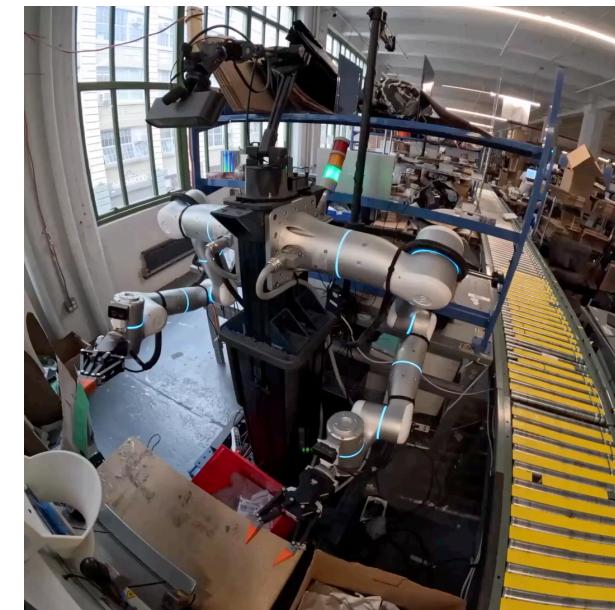


Robot Software

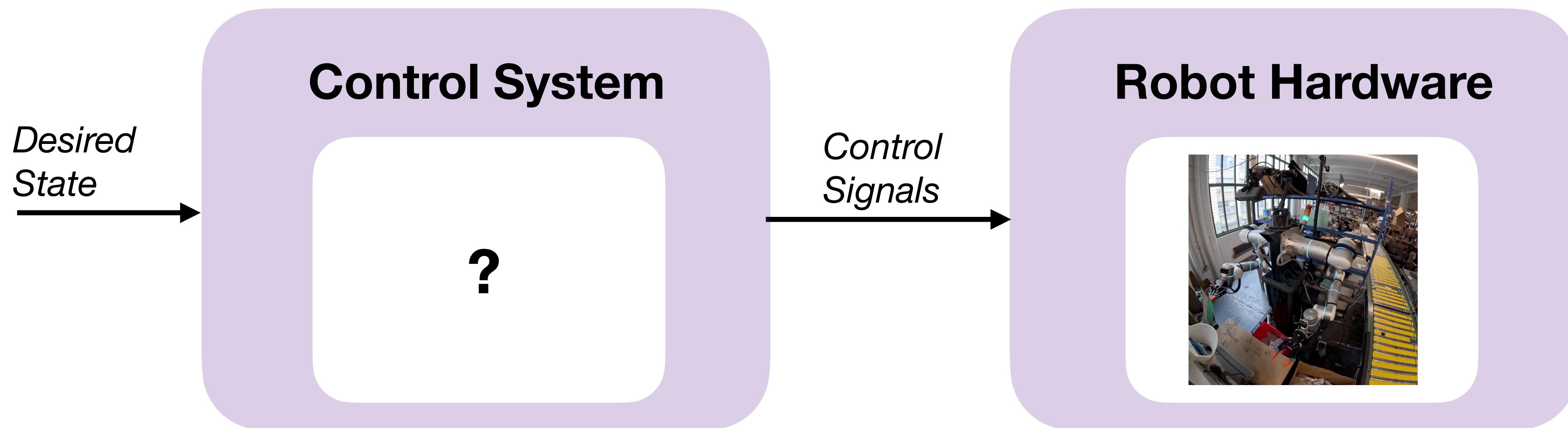
- How do we make the robot hardware do what we want it to do?



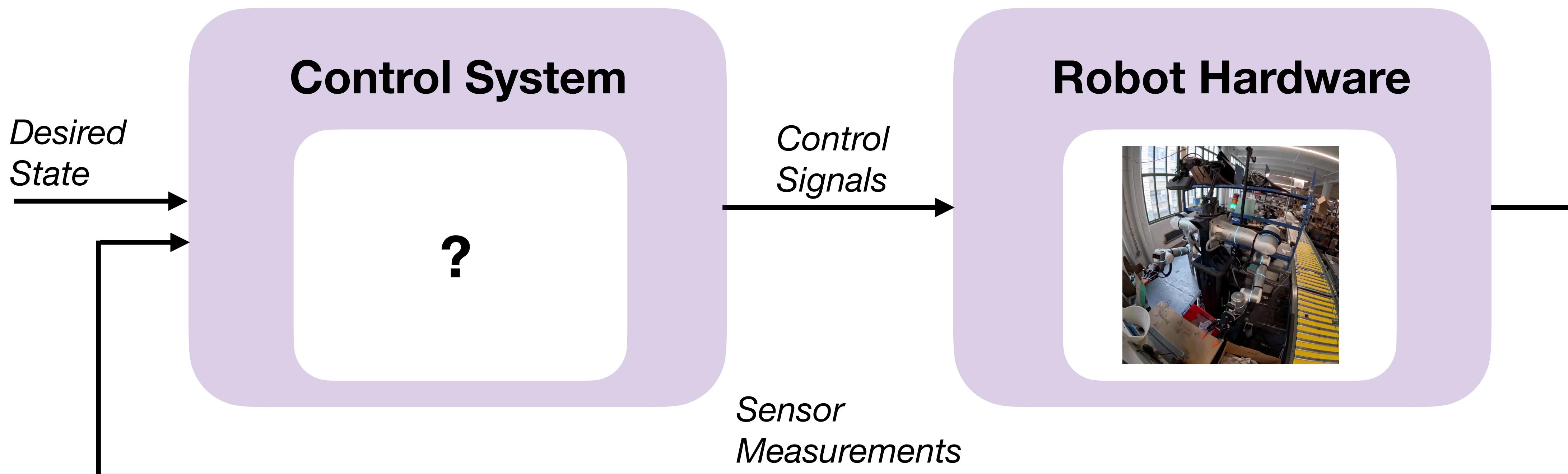
Robot Hardware



OPEN LOOP CONTROL



CLOSED LOOP CONTROL



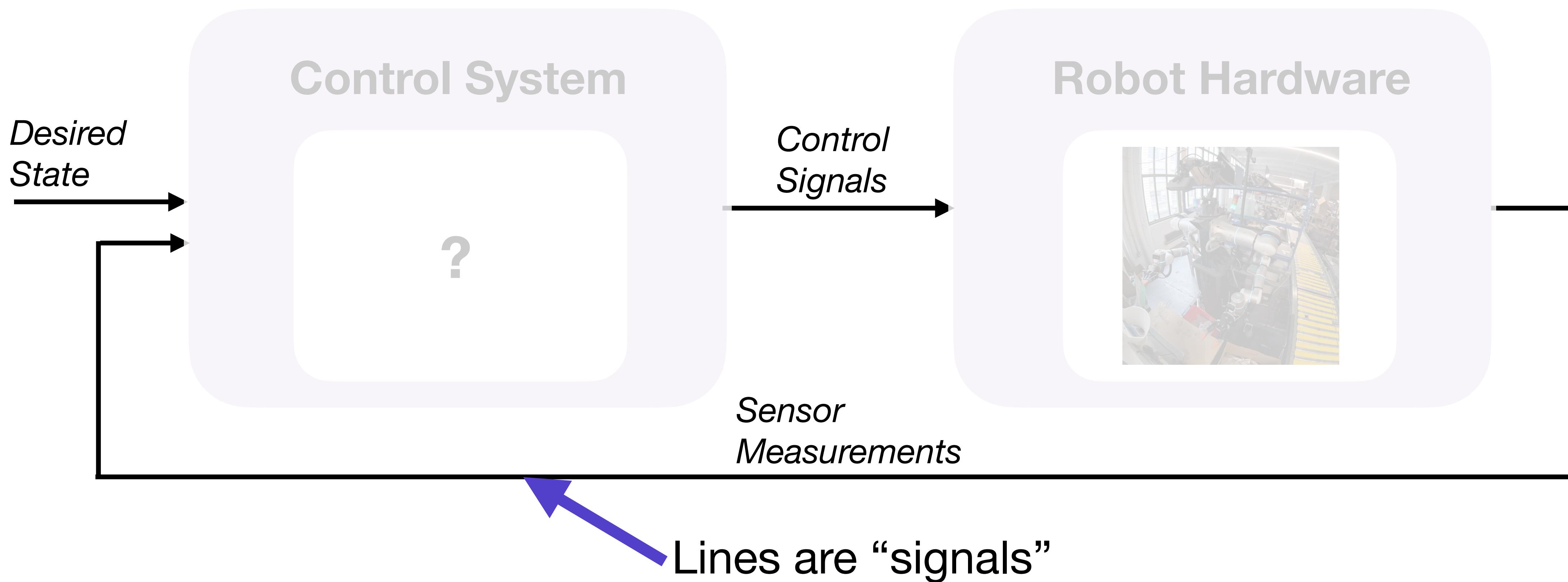


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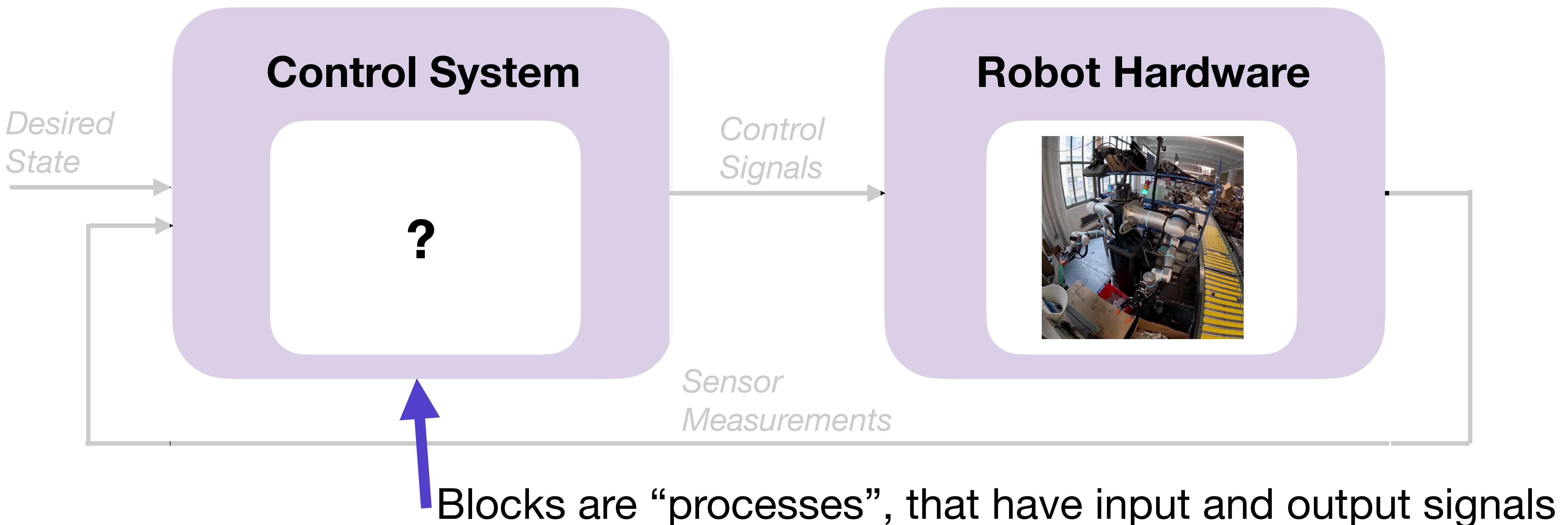
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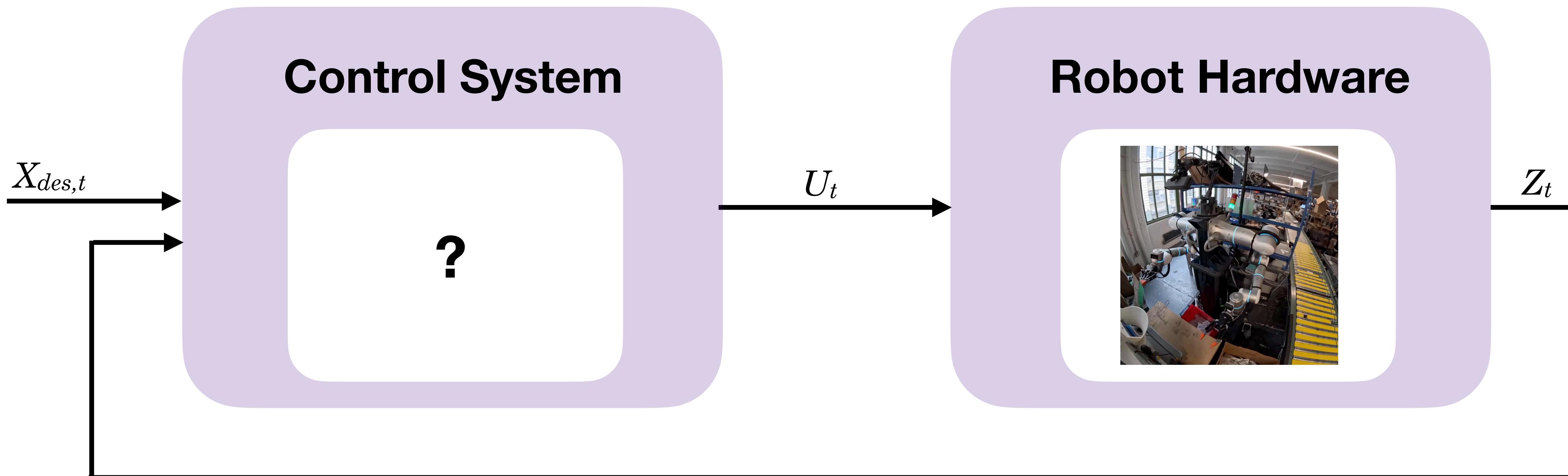
BLOCK DIAGRAMS



BLOCK DIAGRAMS



CLOSED LOOP CONTROL





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Robotic Manipulation & Locomotion

Robot Hardware Basics

Robot Hardware

- Configurations for Motion
 - Manipulation vs Mobile
 - Motored Wheels + Chassis
 - Flying robots
 - Swimming robots
 - Joints and links
- Actuators
- Sensors

Robot Hardware



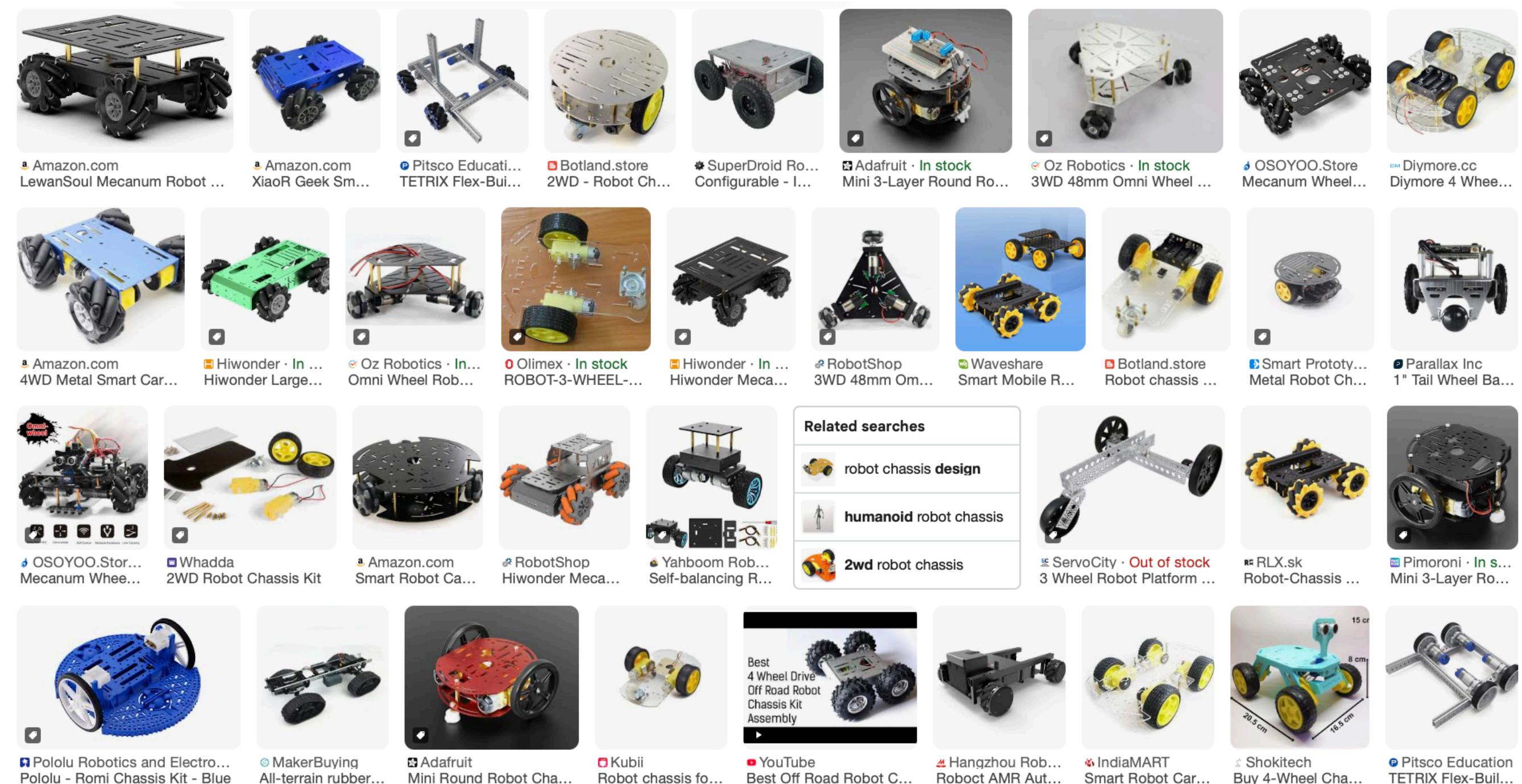
Robot Hardware Configurations

- Manipulation vs Mobile (in the 90s...)



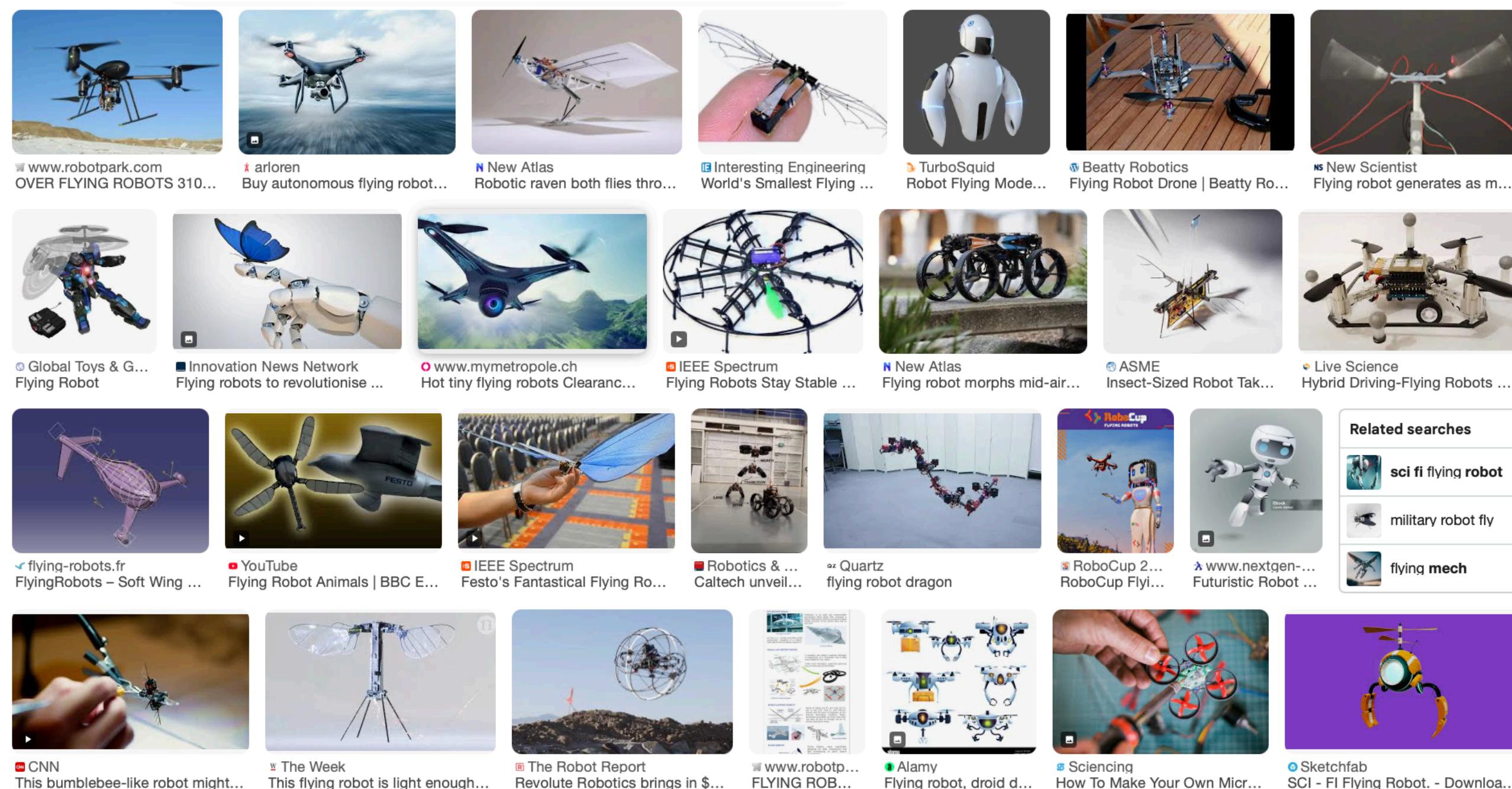
Robot Hardware Configurations

- Motored wheels + Chassis



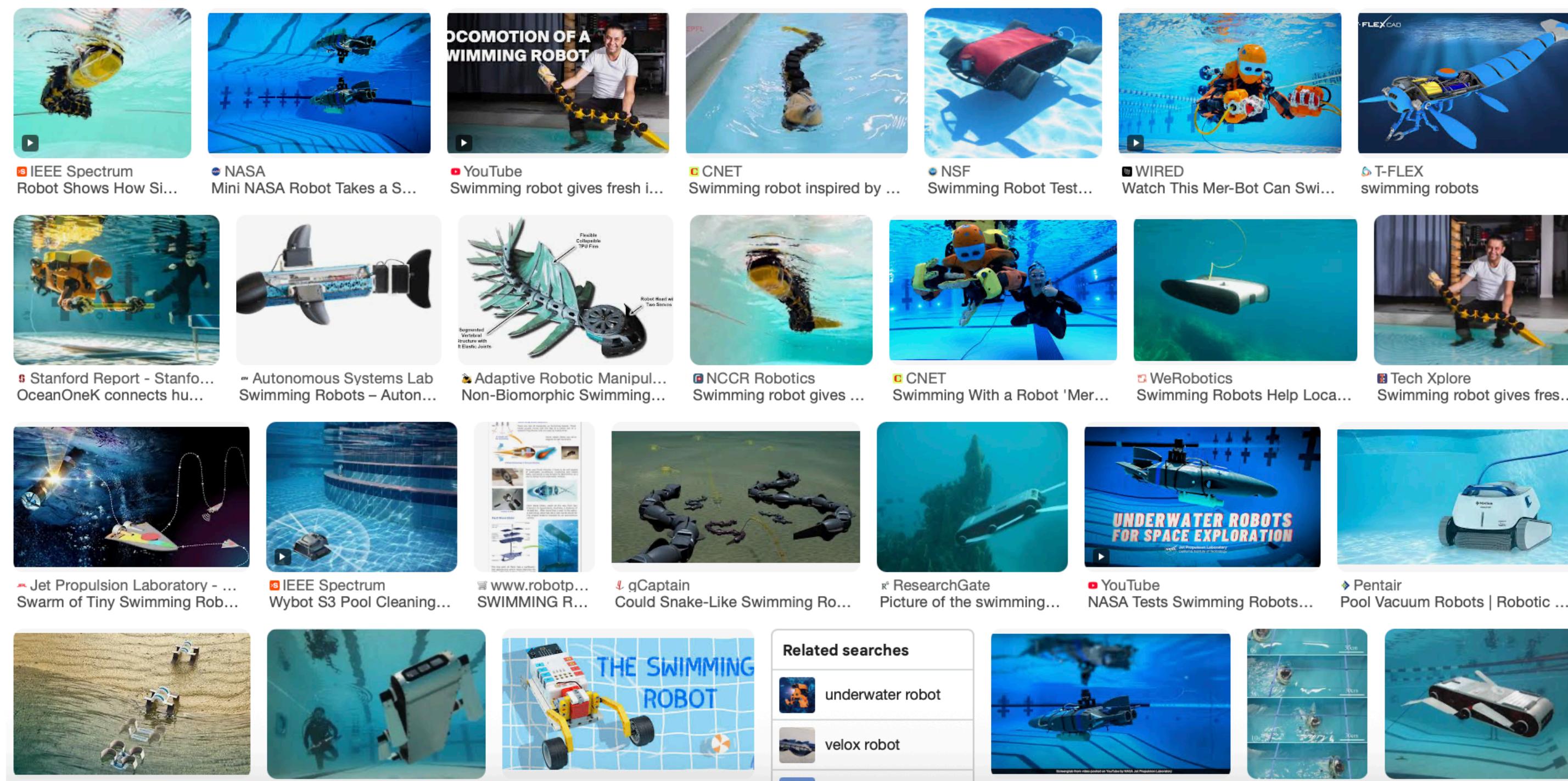
Robot Hardware Configurations

- Flying robots with wings and propellers



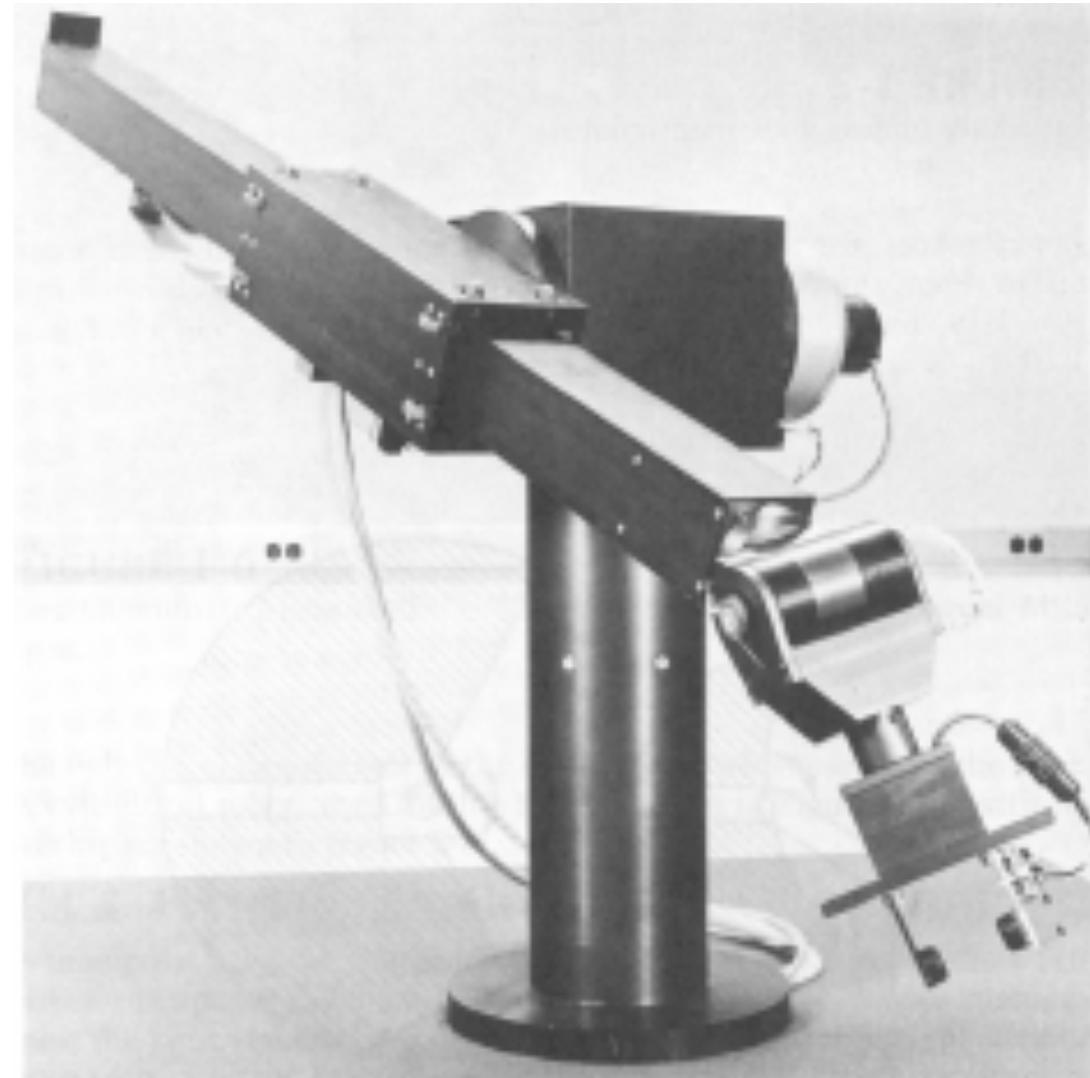
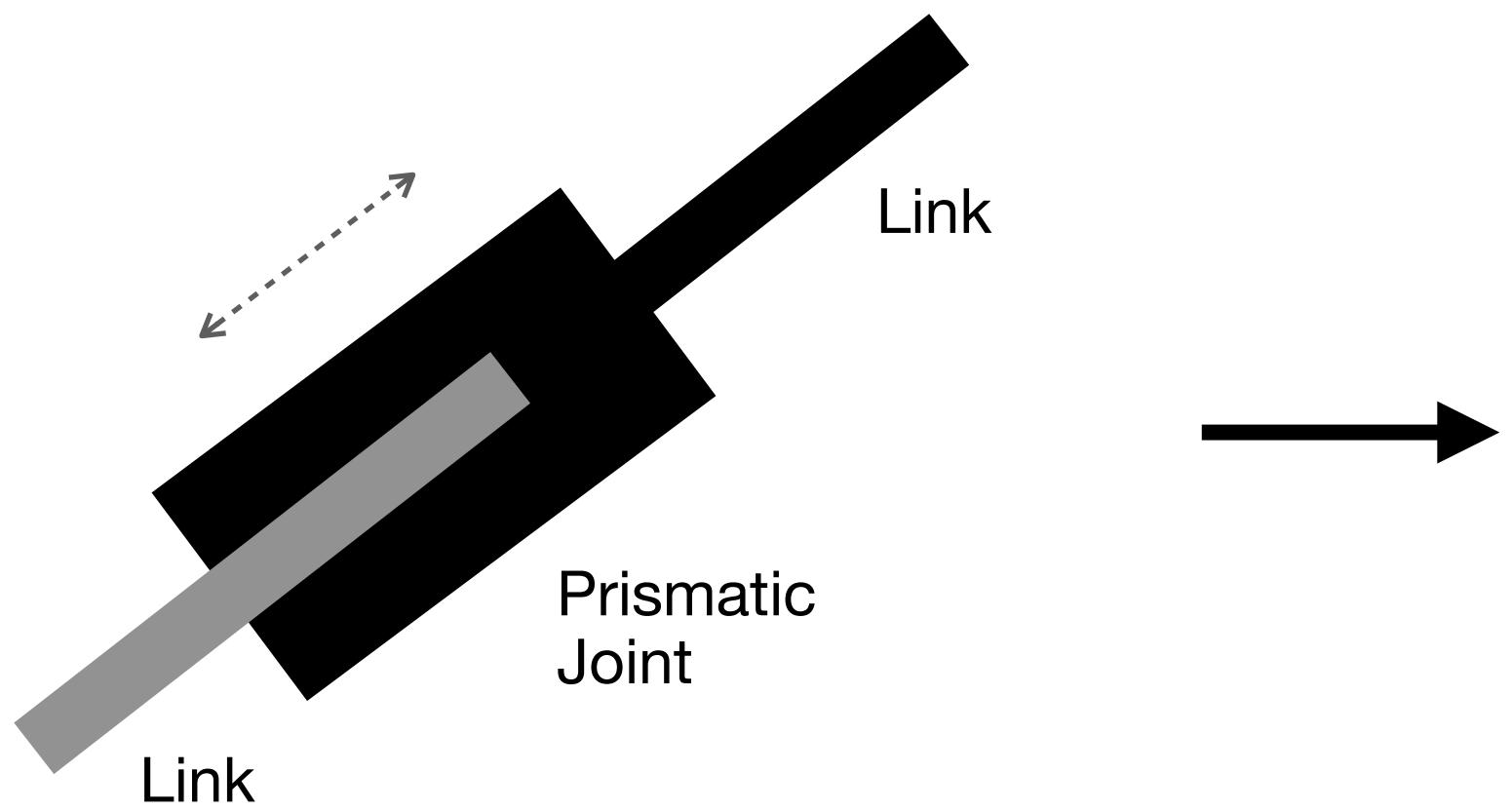
Robot Hardware Configurations

- Swimming robots with control surfaces and propellers



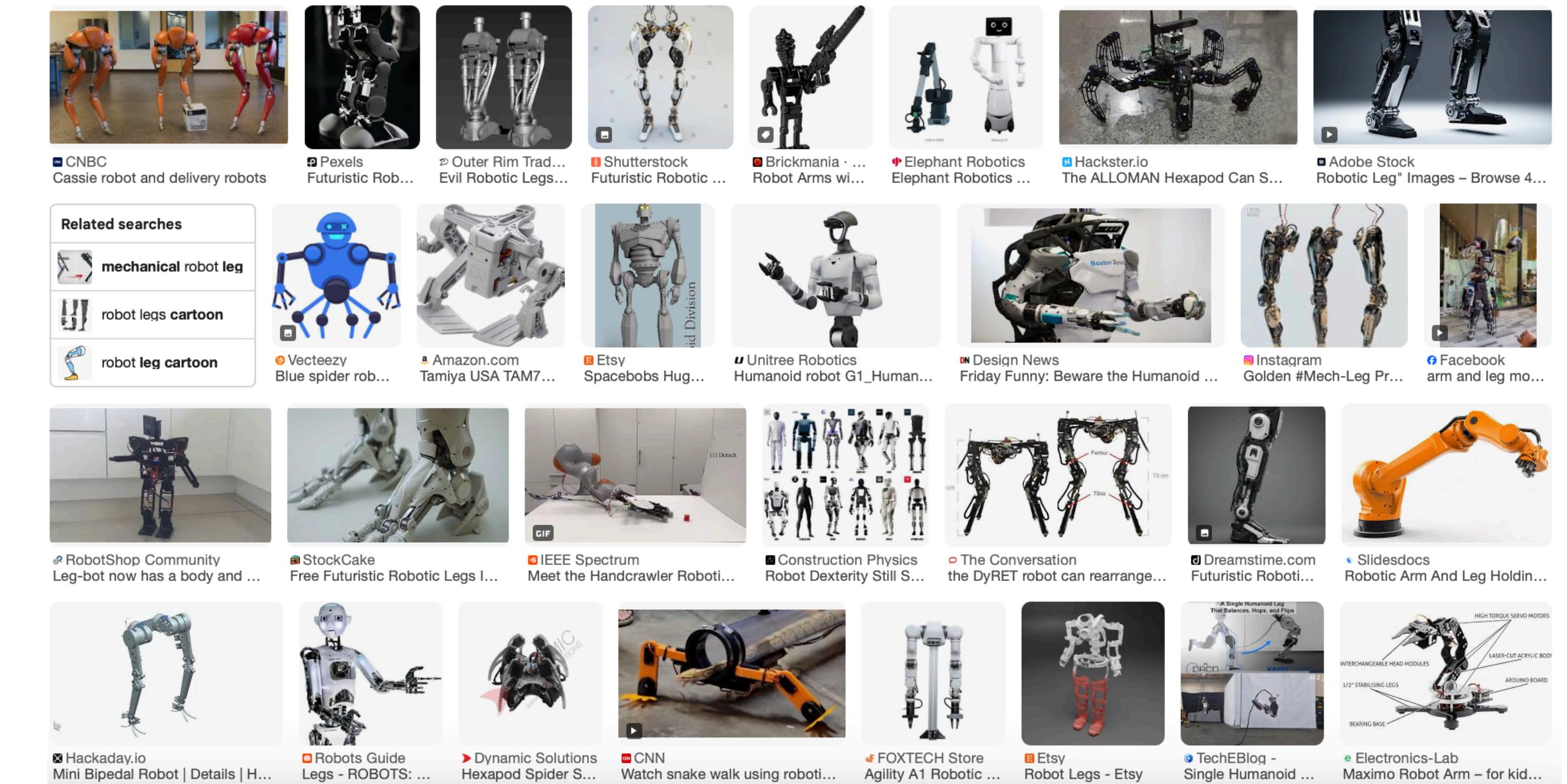
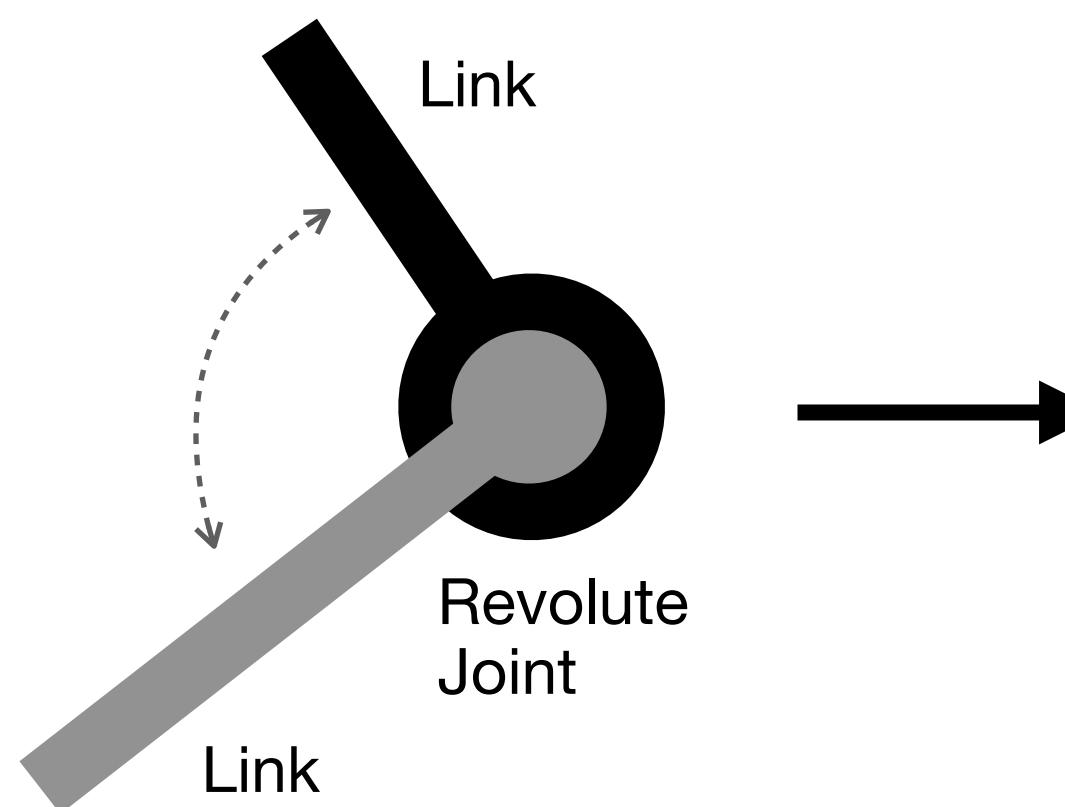
Robot Hardware Configurations

- Prismatic Joints + links



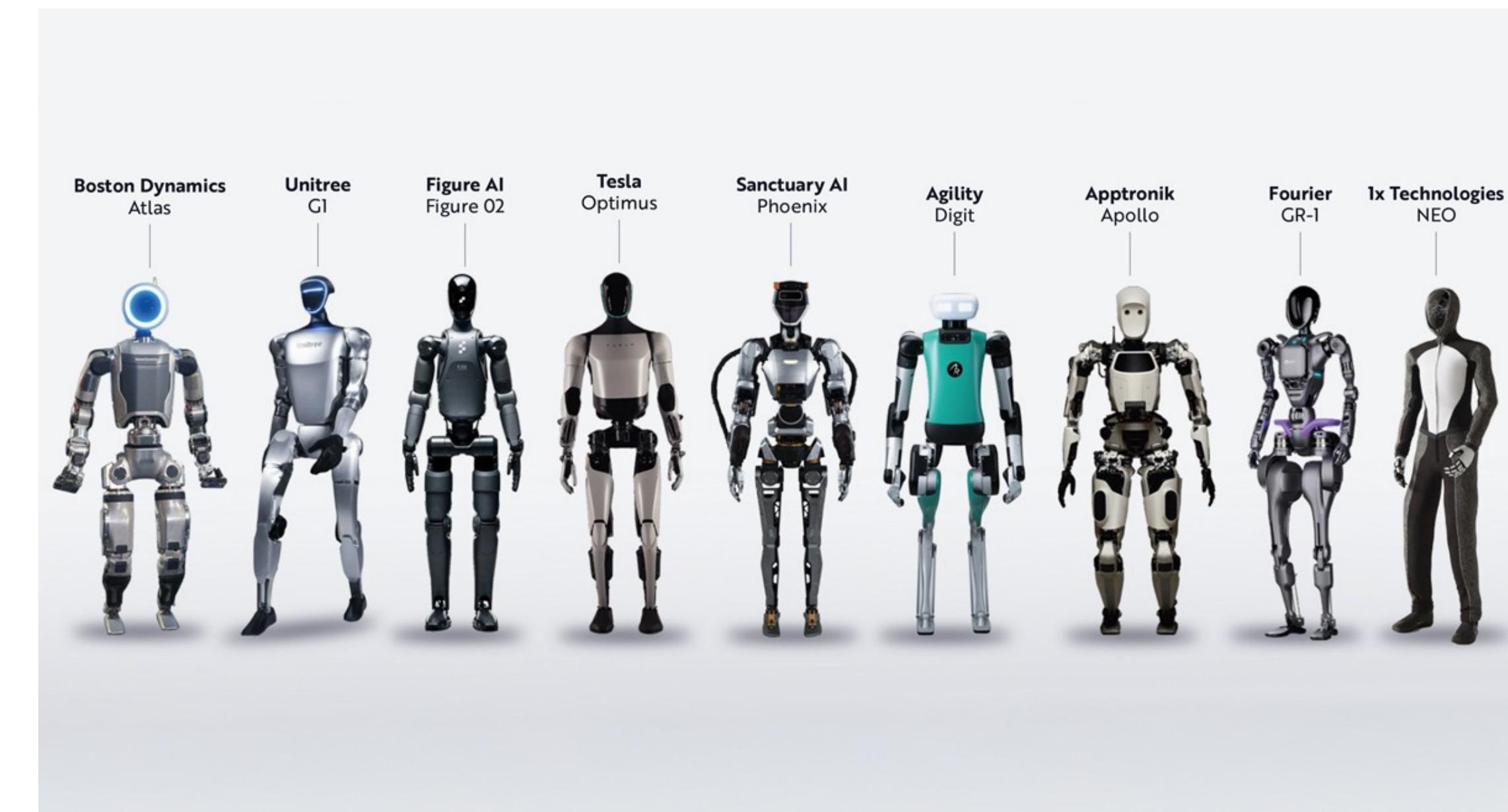
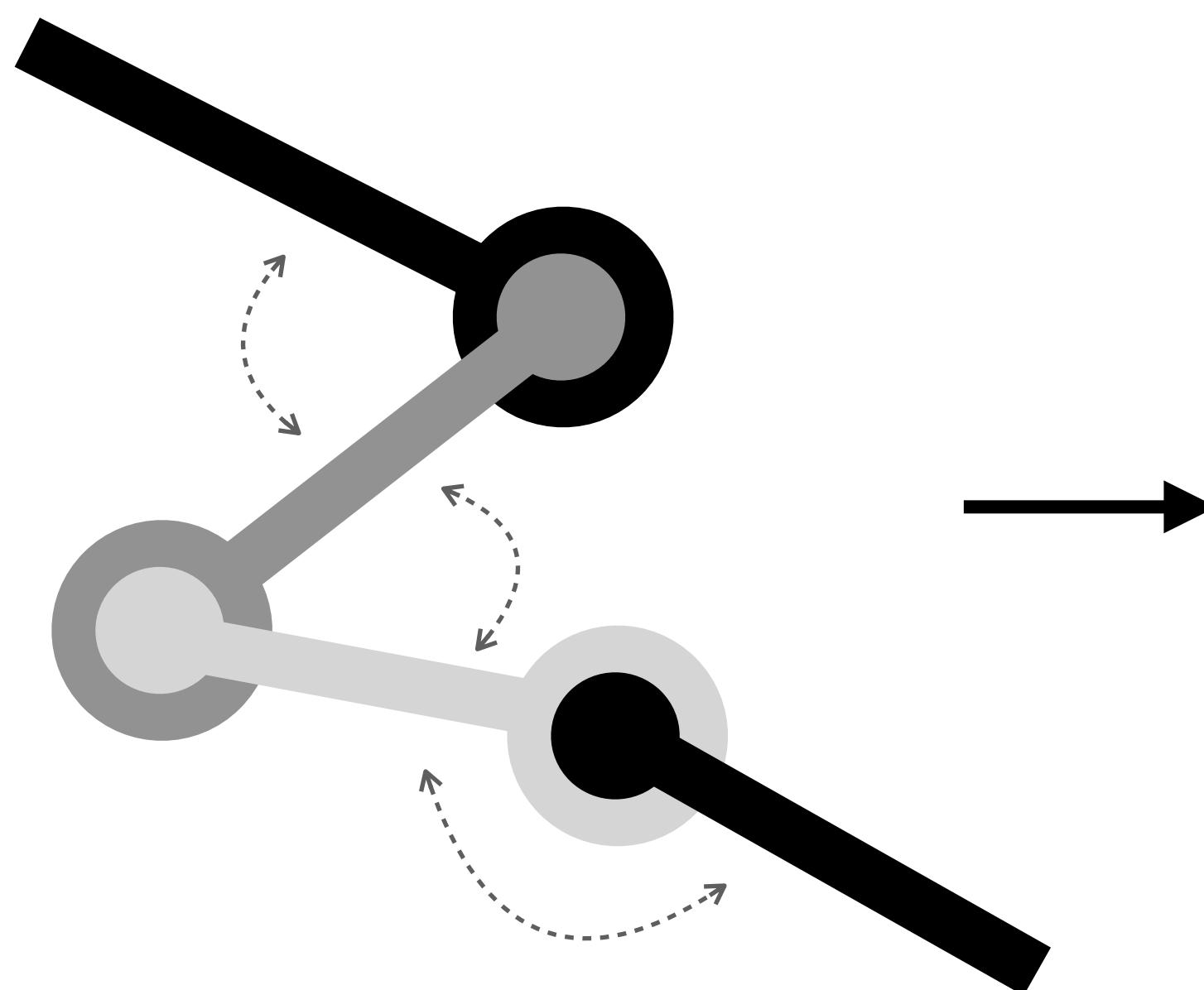
Robot Hardware Configurations

- Rotary Joints + links



Robot Hardware Configurations

- Rotary Joints + links



Robot Hardware Actuators



Electric motor



Hydraulic actuator

Pneumatic (artificial muscle)



Robot Hardware Sensors



Linear or rotational
position sensor
(encoder or potentiometer)



Inertial Measurement Unit (IMU)
Accelerometer + Gyroscope



Force sensor



Stereo camera



LIDAR

GPS, temperature sensor,
current sensor, tactile
sensors, distance sensor,
sonar, etc.