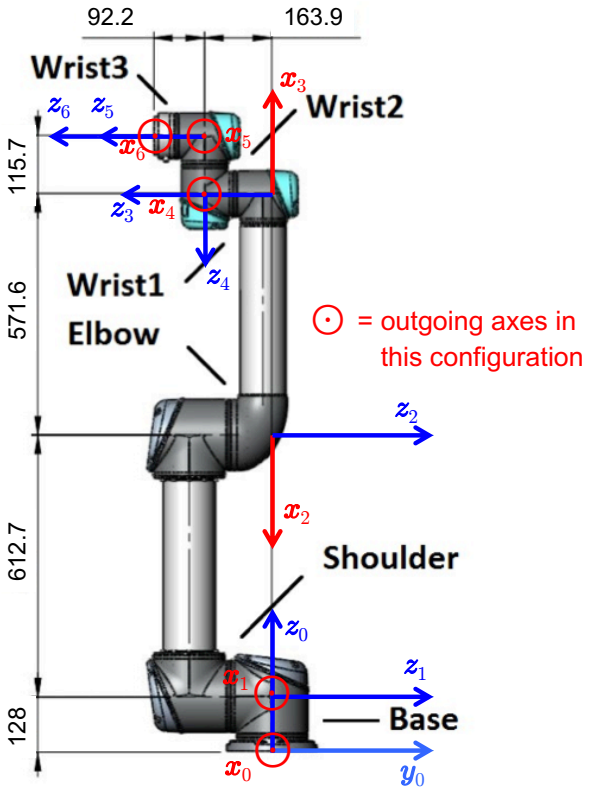
Robotics I - Extra sheet #1 (for Exercise 2)

November 29, 2019

Name: _____



i	α_i	a_i	d_i	θ_i
1				
2				
3				
4				
5				
6				

Insert the constant parameters (mm or rad) and the value of $\boldsymbol{\theta}$ (in rad) in the shown configuration.

Robotics I - Extra sheet #2 (for Exercise 5)

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Answer to the questions or comment/complete the statements, providing also a *short* motivation/explanation (within the given lines of text) for each of the 7 items.

1. Are there 3-dof robots with just a single inverse kinematics solution in their primary workspace? If so, which ones? If not, why?

2. In order to measure the joint velocities of a robot, extra dedicated sensors may not be needed since ...

3. A large reduction ratio for a robot joint transmission is good because ..., and is bad because ...

4. Use of link acceleration measurements to generate torques that move the robot may be critical. Why?

5. Compare an incremental encoder with $N = 900$ pulses per turn and quadrature electronics, mounted on a motor connected to the link with a reduction ratio $n_r = 40$, with a 16-bit absolute encoder mounted directly on the link side of the transmission. Which is better in terms of link position resolution?

6. An installed 6-dof industrial robot has repeatability $\rho = 0.1$ [mm] and accuracy $\delta = 0.6$ [mm] in a certain region of its workspace. Which of these two parameters can be improved, and how?

7. An object of mass $m = 5$ [kg] is hanging statically to a 6D F/T sensor, whose only non-zero outputs are $f_z = -49.05$ [N], $\mu_x = 7.3575$ [Nm]. Where is the object center of mass located in the sensor frame?