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Question 1

Ignoring the gripper, the simulation robot has 6 DOF; The kinematic arrangement of the robot without gripper is RRRR, and with gripper is RRRR(R)

Symbolic representation of robot in the zero configuration:

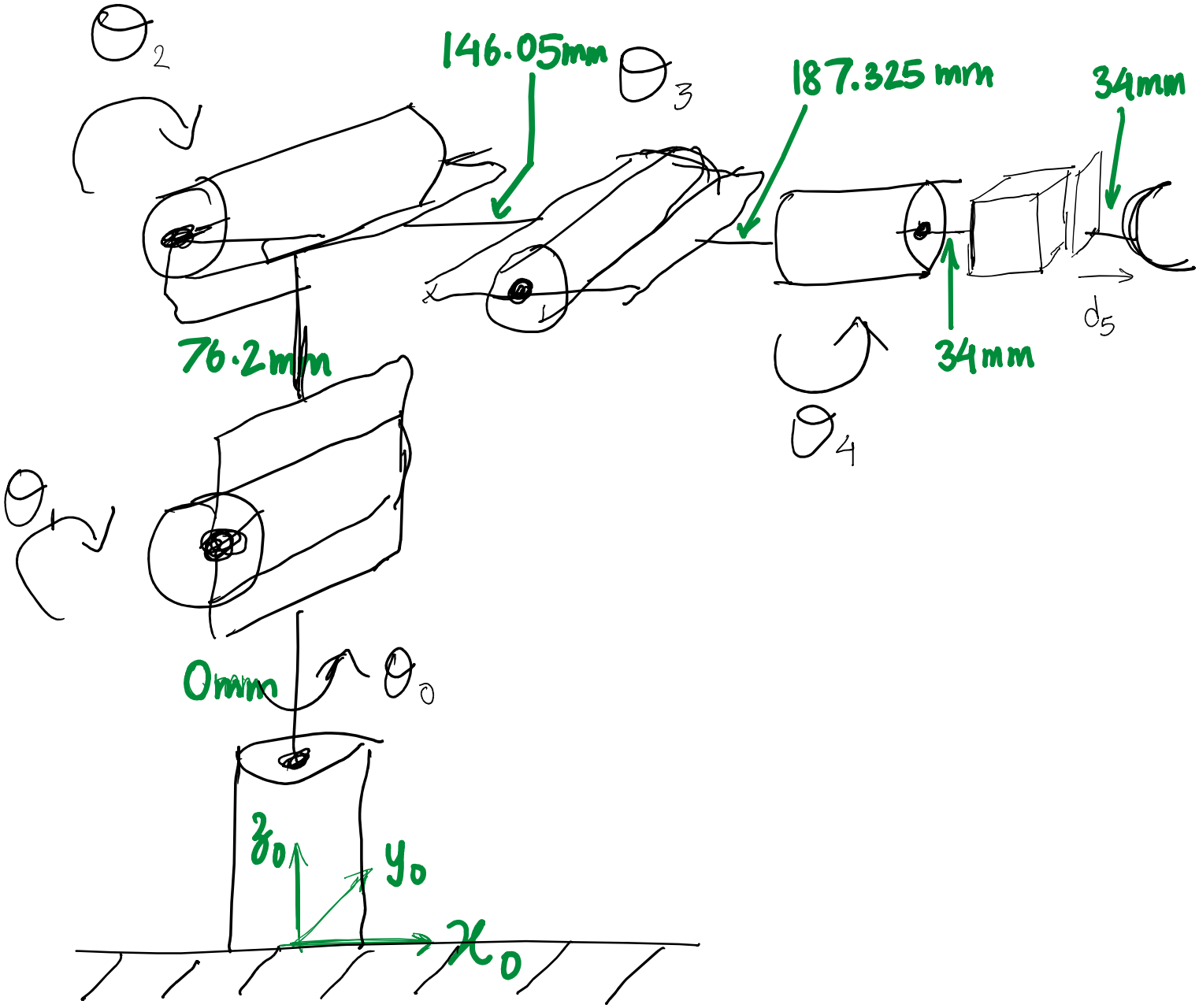

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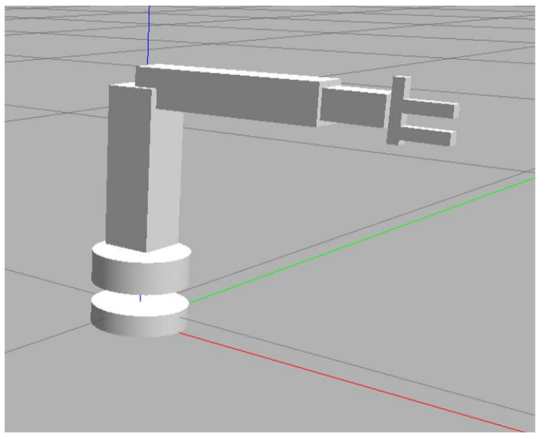
Image of robot in zero configuration



Question 2:

$$\text{Distance}_x = 187.325 + 34 + 34 = 255.325$$

$$\text{Distance}_y = 76.2 + 146.05 = 222.25$$

$$H_e^0 = \begin{bmatrix} 0 & 0 & 1 & 225.325 \\ 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 222.25 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Question 3:

$$T_e^0 = \begin{bmatrix} 0 & 1/\sqrt{2} & 1/\sqrt{2} & 255.325\cos\left(\frac{\pi}{4}\right) \\ 0 & -1/\sqrt{2} & 1/\sqrt{2} & 255.325\sin\left(\frac{\pi}{4}\right) \\ 1 & 0 & 0 & 222.25 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

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Question 4:

$$T_e^0 = \begin{bmatrix} -1 & 0 & 0 & 0 \\ 0 & 1/\sqrt{2} & -1/\sqrt{2} & -255.325\cos\left(\frac{\pi}{4}\right) \\ 0 & -1/\sqrt{2} & -1/\sqrt{2} & 222.25 - 180.542 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$