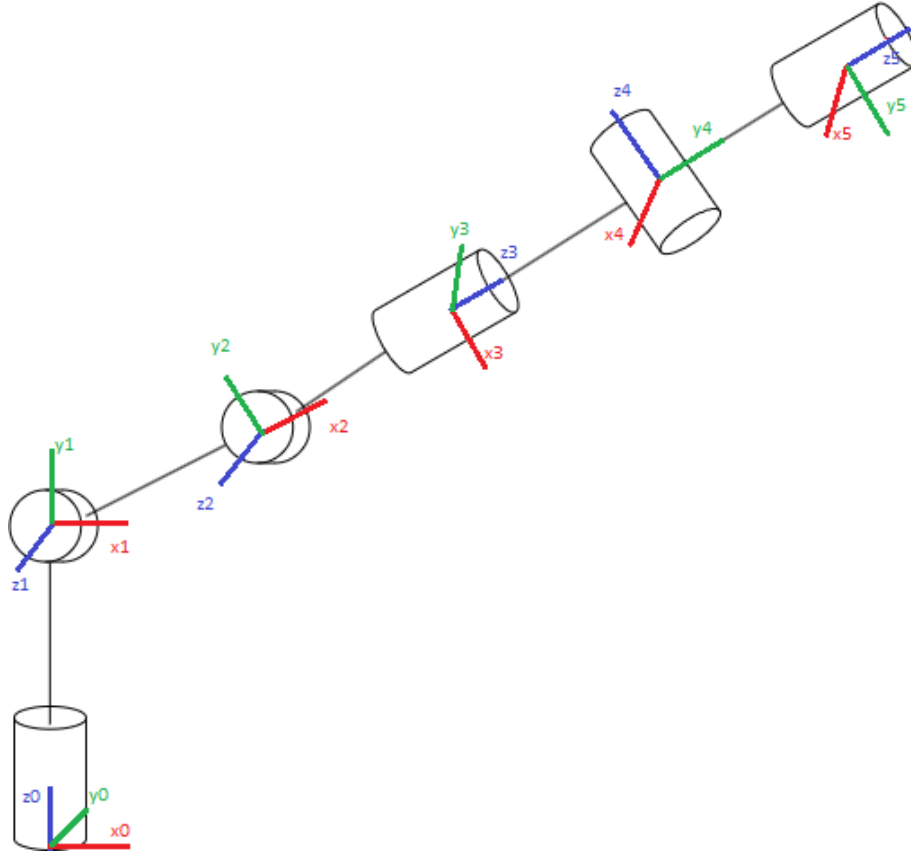


## Robot model scheme



I changed frames assignment using DH parameters:

	$a$	$d$	$\alpha$	$\theta$
1	0	$d_1$	$\frac{\pi}{2}$	$\theta_1$
2	$d_2$	0	0	$\theta_2$
3	0	0	$-\frac{\pi}{2}$	$\theta_3 - \frac{\pi}{2}$
4	0	$d_3 + d_4$	$\frac{\pi}{2}$	$\theta_4 - \frac{\pi}{2}$
5	0	0	$\frac{\pi}{2}$	$\theta_5$
6	0	$d_5$	0	$\theta_6$

## Derivation of the solution

### Jacobian

Since the manipulator consists only of revolute joints, I used formula for revolute joints from geometrical approach:

$$J(q) = \begin{pmatrix} J_{p_i} \\ J_{\omega_i} \end{pmatrix} = \begin{pmatrix} z_{i-1} \times (p_e - p_{i-1}) \\ z_{i-1} \end{pmatrix}$$

### Singularity check

To check for singularity I calculated rank of the matrix and checked if it is equal to 6

### Cartesian velocity

Vector of velocities in cartesian space (or twist) can be found as

$$\begin{pmatrix} v \\ \omega \end{pmatrix} = J\dot{q}$$