Parameters for calculations of kinematics and dynamics - 45257

Parameters for calculations of kinematics and dynamics

Examples are valid for:
CB3 Software version: 3.7.0
e-Series Software version: 5.1.0

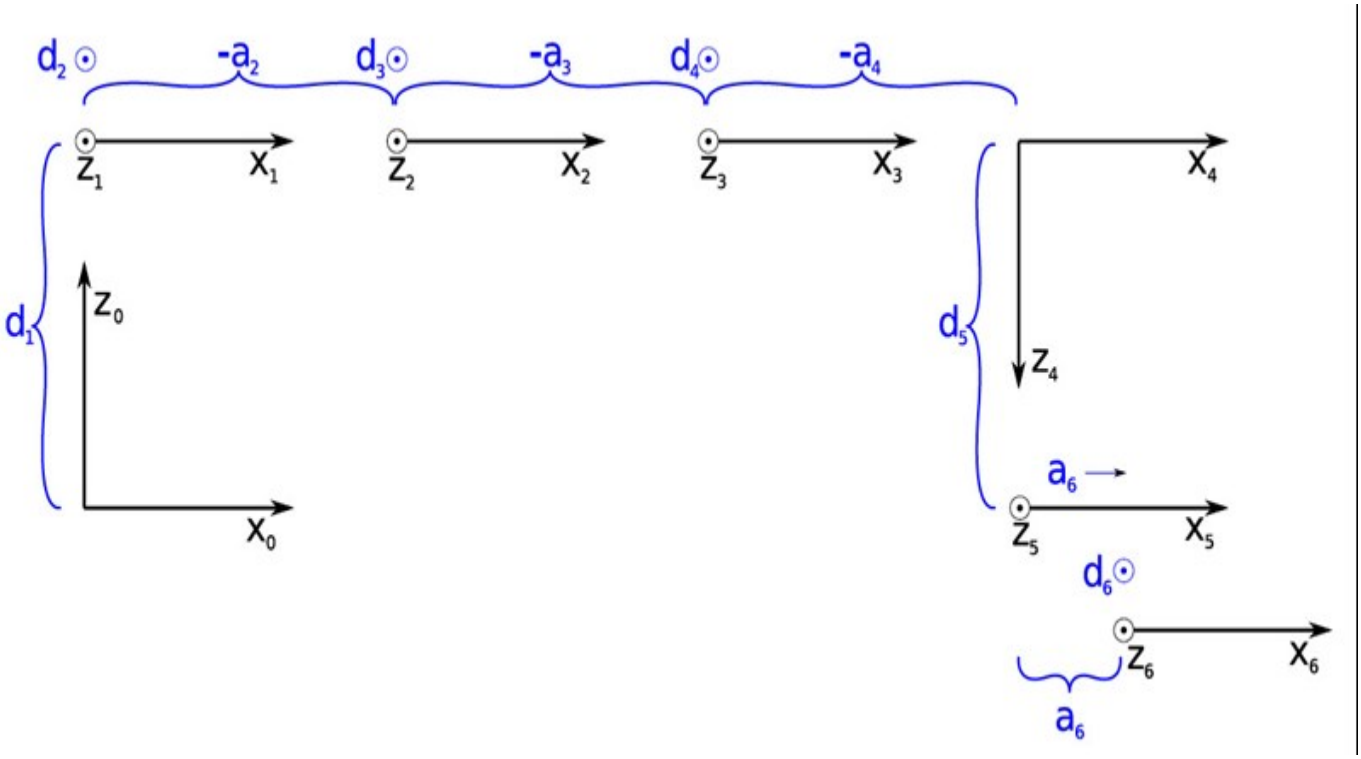
Denavit–Hartenberg parameters are used to calculate kinematics and dynamics of UR robots.

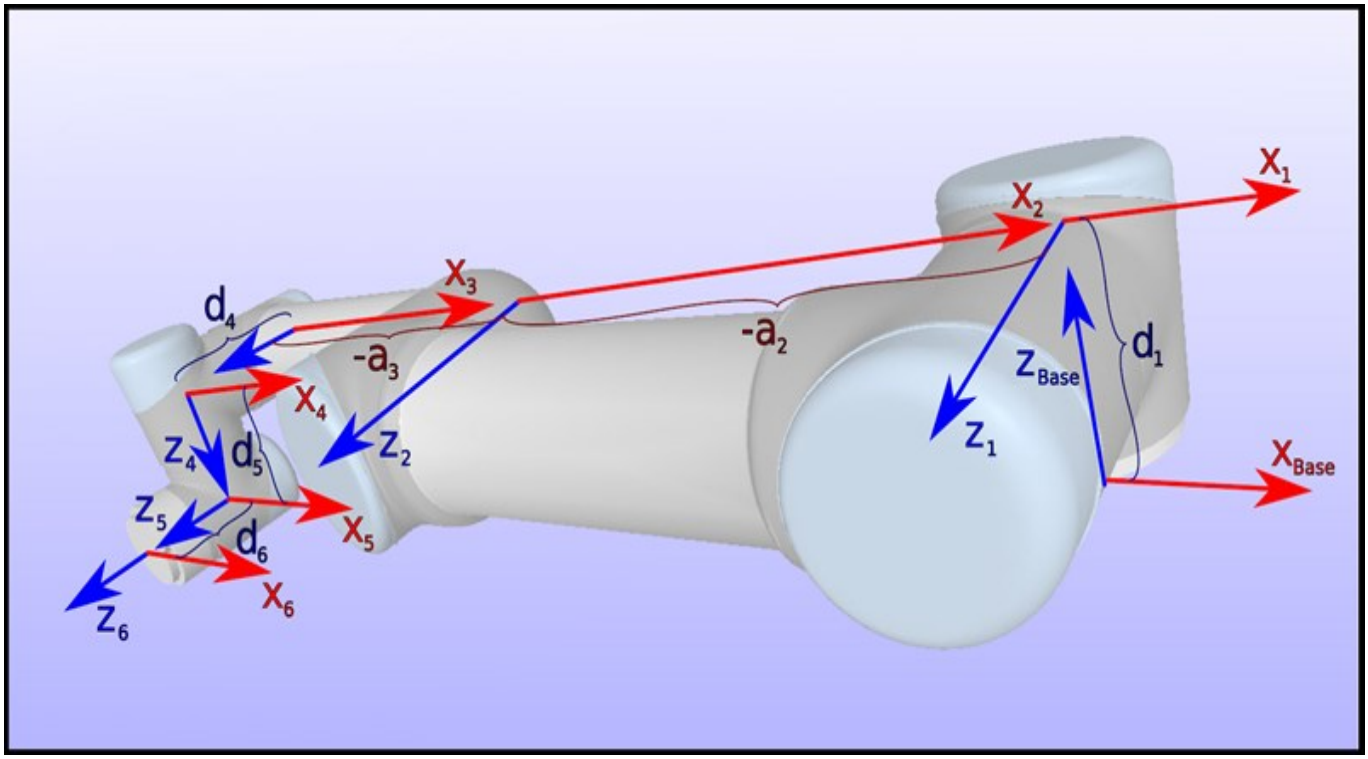
The definition of the Denavit–Hartenberg parameters can be found here:
http://en.wikipedia.org/wiki/Denavit%E2%80%93Hartenberg_parameters
(http://en.wikipedia.org/wiki/Denavit%E2%80%93Hartenberg_parameters)

Note: UR "a" parameter = Wikipedia "r" parameter.

Animation to explain the Denavit–Hartenberg parameters: https://www.youtube.com/watch?v=rA9tm0gTln8
(https://www.youtube.com/watch?v=rA9tm0gTln8)

The Denavit–Hartenberg parameters in UR robots are described as the below diagrams.





The Denavit–Hartenberg parameters of UR robots are shown as below.

UR3e

Kinematics	theta [rad]	a [m]	d [m]	alpha [rad]	**Dynamics**	Mass [kg]	Center of Mass [m]
Joint 1	0	0	0.15185	π/2	Link 1	1.98	[0, -0.02, 0]
Joint 2	0	-0.24355	0	0	Link 2	3.4445	[0.13, 0, 0.1157]
Joint 3	0	-0.2132	0	0	Link 3	1.437	[0.05, 0, 0.0238]
Joint 4	0	0	0.13105	π/2	Link 4	0.871	[0, 0, 0.01]
Joint 5	0	0	0.08535	-π/2	Link 5	0.805	[0, 0, 0.01]
Joint 6	0	0	0.0921	0	Link 6	0.261	[0, 0, -0.02]

UR5e

Kinematics	theta [rad]	a [m]	d [m]	alpha [rad]	**Dynamics**	Mass [kg]	Center of Mass [m]
Joint 1	0	0	0.1625	π/2	Link 1	3.761	[0, -0.02561, 0.00193]
Joint 2	0	-0.425	0	0	Link 2	8.058	[0.2125, 0, 0.11336]
Joint 3	0	-0.3922	0	0	Link 3	2.846	[0.15, 0.0, 0.0265]
Joint 4	0	0	0.1333	π/2	Link 4	1.37	[0, -0.0018, 0.01634]
Joint 5	0	0	0.0997	-π/2	Link 5	1.3	[0, 0.0018,0.01634]
Joint 6	0	0	0.0996	0	Link 6	0.365	[0, 0, -0.001159]

UR10e

Kinematics	theta [rad]	a [m]	d [m]	alpha [rad]	**Dynamics**	Mass [kg]	Center of Mass [m]
Joint 1	0	0	0.1807	π/2	Link 1	7.369	[0.021, 0.000, 0.027]
Joint 2	0	-0.6127	0	0	Link 2	13.051	[0.38, 0.000, 0.158]
Joint 3	0	-0.57155	0	0	Link 3	3.989	[0.24, 0.000, 0.068]
Joint 4	0	0	0.17415	π/2	Link 4	2.1	[0.000, 0.007, 0.018]
Joint 5	0	0	0.11985	-π/2	Link 5	1.98	[0.000, 0.007, 0.018]
Joint 6	0	0	0.11655	0	Link 6	0.615	[0, 0, -0.026]

UR3

Kinematics	theta [rad]	a [m]	d [m]	alpha [rad]	**Dynamics**	Mass [kg]	Center of Mass [m]
Joint 1	0	0	0.1519	π/2	Link 1	2	[0, -0.02, 0]
Joint 2	0	-0.24365	0	0	Link 2	3.42	[0.13, 0, 0.1157]
Joint 3	0	-0.21325	0	0	Link 3	1.26	[0.05, 0, 0.0238]
Joint 4	0	0	0.11235	π/2	Link 4	0.8	[0, 0, 0.01]
Joint 5	0	0	0.08535	-π/2	Link 5	0.8	[0, 0, 0.01]
Joint 6	0	0	0.0819	0	Link 6	0.35	[0, 0, -0.02]

UR5

Kinematics	theta [rad]	a [m]	d [m]	alpha [rad]	**Dynamics**	Mass [kg]	Center of Mass [m]
Joint 1	0	0	0.089159	π/2	Link 1	3.7	[0, -0.02561, 0.00193]

Joint 2	0	-0.425	0	0	Link 2	8.393	[0.2125, 0, 0.11336]
Joint 3	0	-0.39225	0	0	Link 3	2.33	[0.15, 0.0, 0.0265]
Joint 4	0	0	0.10915	π/2	Link 4	1.219	[0, -0.0018, 0.01634]
Joint 5	0	0	0.09465	-π/2	Link 5	1.219	[0, 0.0018,0.01634]
Joint 6	0	0	0.0823	0	Link 6	0.1879	[0, 0, -0.001159]

UR10

Kinematics	theta [rad]	a [m]	d [m]	alpha [rad]	**Dynamics**	Mass [kg]	Center of Mass [m]
Joint 1	0	0	0.1273	π/2	Link 1	7.1	[0.021, 0.000, 0.027]
Joint 2	0	-0.612	0	0	Link 2	12.7	[0.38, 0.000, 0.158]
Joint 3	0	-0.5723	0	0	Link 3	4.27	[0.24, 0.000, 0.068]
Joint 4	0	0	0.163941	π/2	Link 4	2	[0.000, 0.007, 0.018]
Joint 5	0	0	0.1157	-π/2	Link 5	2	[0.000, 0.007, 0.018]
Joint 6	0	0	0.0922	0	Link 6	0.365	[0, 0, -0.026]