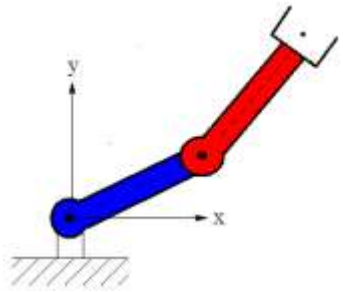
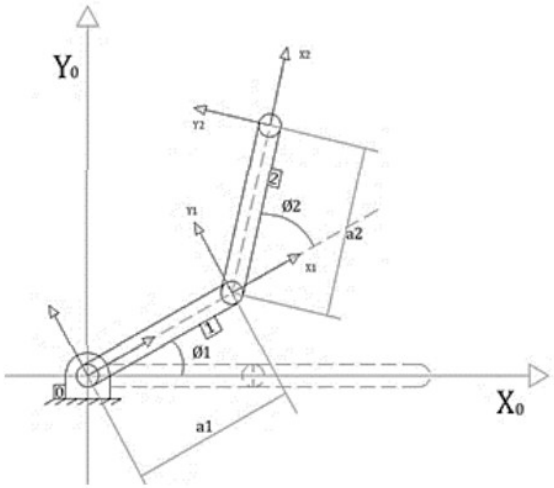
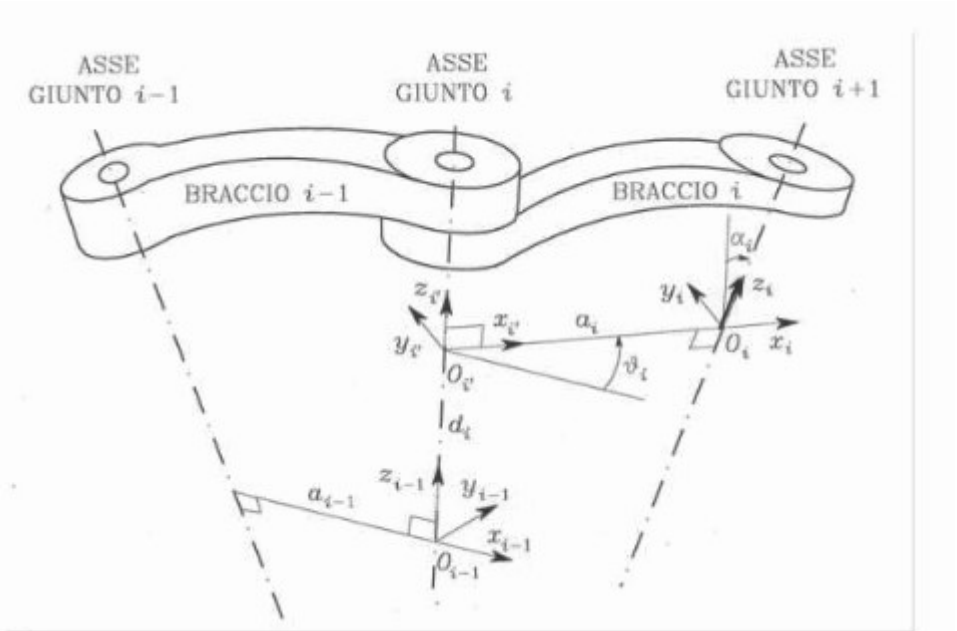
CONVENZIONE DI DENAVIT-HARTENBERG CLASSICA E MODIFICATA

(Prof. Fischetti P.)

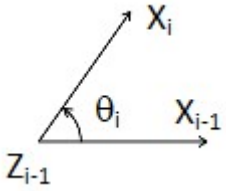
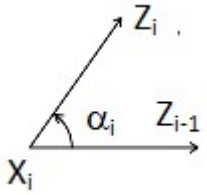
Matrici di rotazione		
$R_x(\theta) = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & C\theta & -S\theta & 0 \\ 0 & S\theta & C\theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$	$R_y(\theta) = \begin{bmatrix} C\theta & 0 & S\theta & 0 \\ 0 & 1 & 0 & 0 \\ -S\theta & 0 & C\theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$	$R_z(\theta) = \begin{bmatrix} C\theta & -S\theta & 0 & 0 \\ S\theta & C\theta & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

Esempio Braccio Planare 2DOF	
	

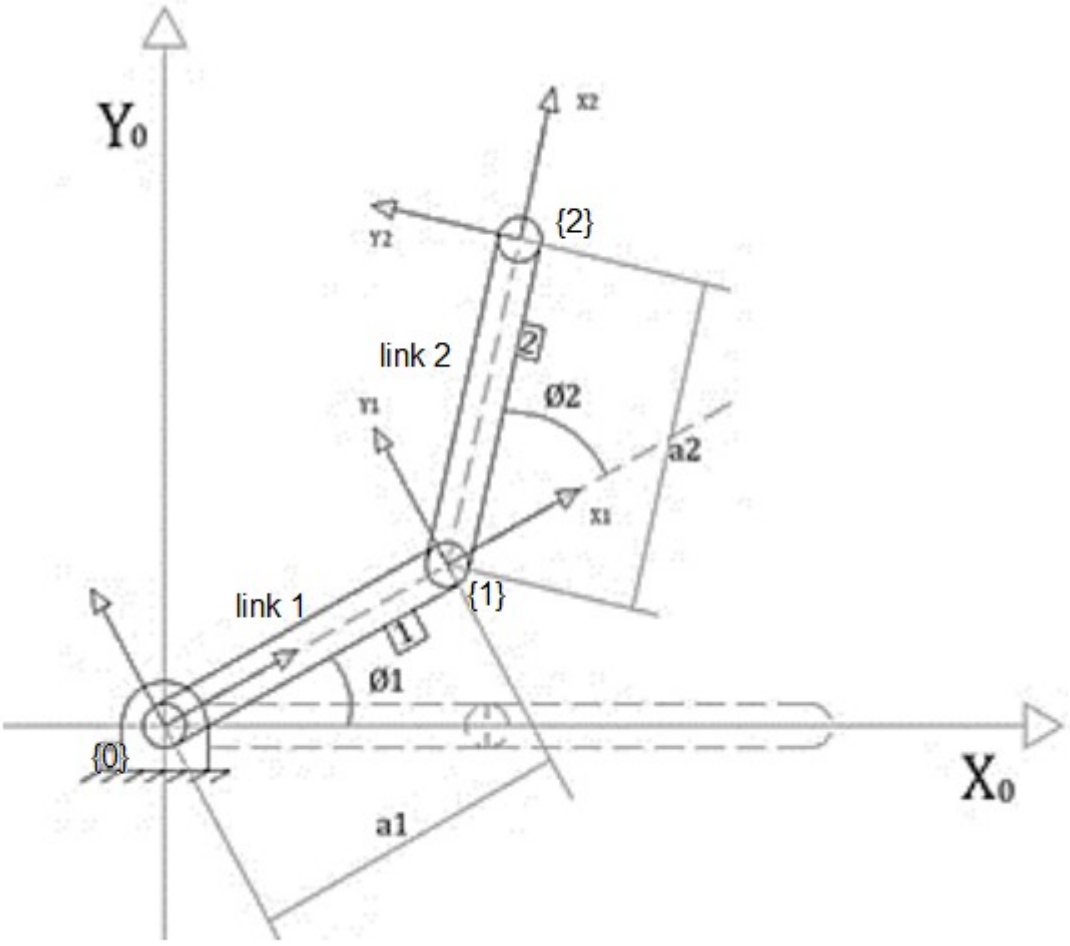
DH - CLASSICA



1. A rotation θ_i about $\mathbf{z}_{i-1}$ axis;
2. A translation d_i along the $\mathbf{z}_{i-1}$ axis ;
3. A translation a_i along the x_i axis
4. A rotation α_i about x_i axis.

		$d_i = \|\| X_i - X_{i-1} \|\|_{Z_{i-1}}$	$a_i = \|\| Z_i - Z_{i-1} \|\|_{X_i}$
$^{i-1}T_i = R(z_{i-1},\theta_i)T(z_{i-1},d_i)T(x_i,a_i)R(x_i,\alpha_i)$		$T_i^{1-1} = \begin{bmatrix} C\theta_i & -S\theta_i \cdot C\alpha_i & S\theta_i \cdot S\alpha_i & a_i \cdot C\theta_i \\ S\theta_i & C\theta_i \cdot C\alpha_i & -C\theta_i \cdot S\alpha_i & a_i \cdot S\theta_i \\ 0 & S\alpha_i & C\alpha_i & d_i \\ 0 & 0 & 0 & 1 \end{bmatrix}$	

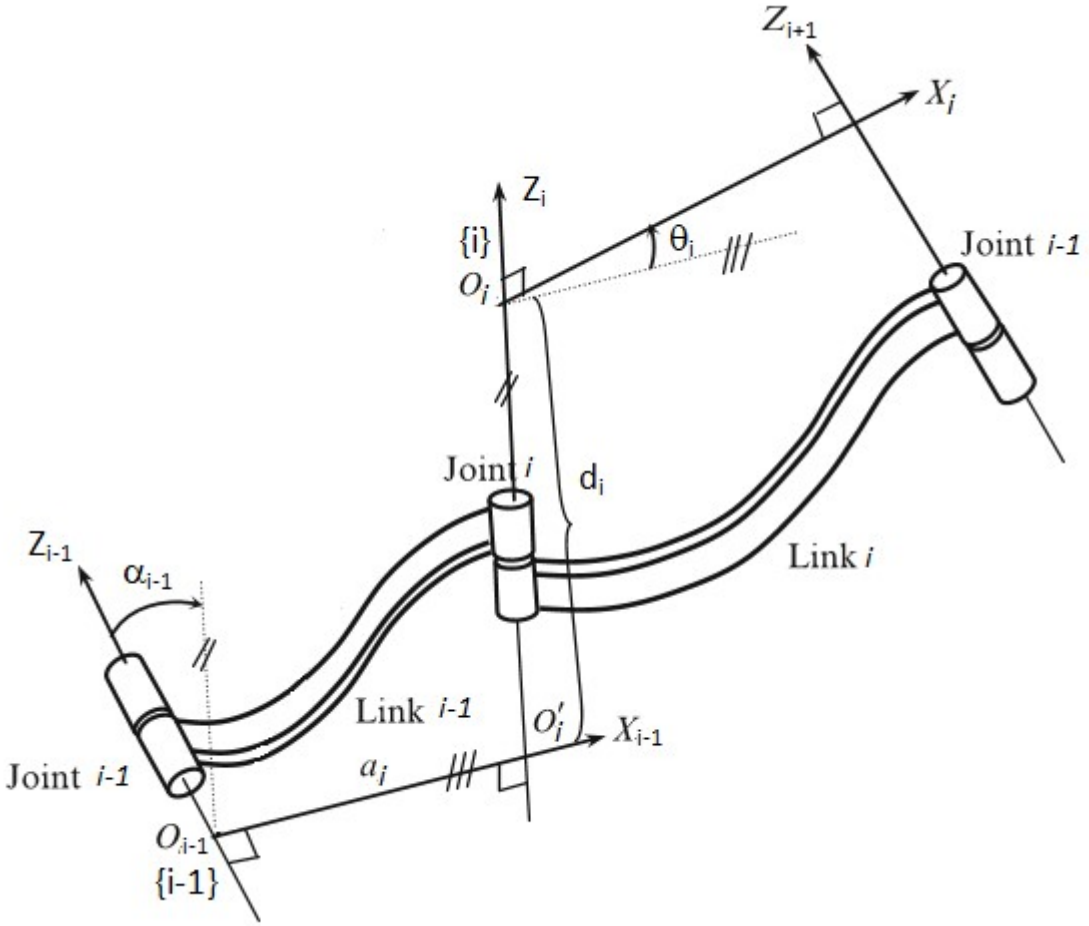
Esempio Braccio Planare 2DOF:



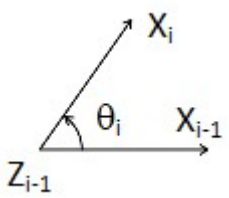
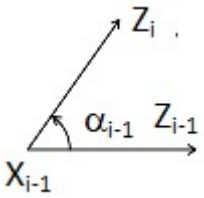
Parametri Joint-link nella convenzione D-H Classica

Link,i	θ_i	d_i	α_{i-1}	a_{i-1}
1	θ_1	0	0	a_1
2	θ_2	0	0	a_2

DH-MODIFICATA

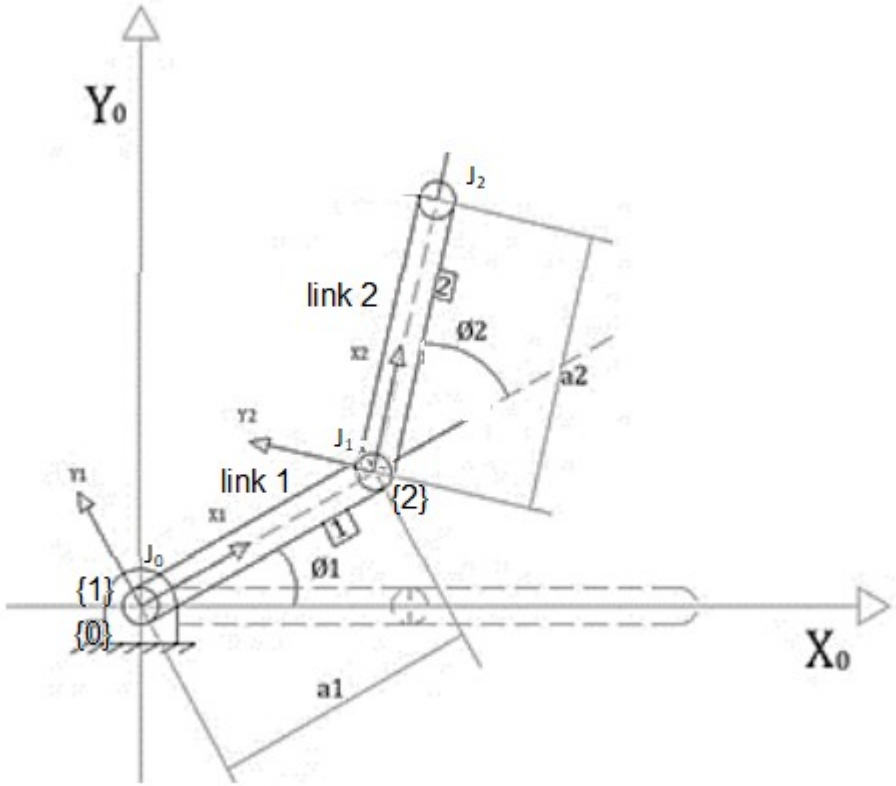


1. A rotation α_{i-1} about x_{i-1}.
2. A translation a_{i-1} along the x_{i-1} axis
3. A rotation θ_i about $\boldsymbol{z_i}$;
4. A translation d_i along the same axis $\boldsymbol{z_i}$;

		$d_i = \lvert\lvert X_i - X_{i-1} \rvert\rvert_{Z_{i-1}}$	$a_i = \lvert\lvert Z_i - Z_{i-1} \rvert\rvert_{X_i}$

$$ {}^{i-1}T_i = R(x_{i-1},\alpha_{i-1})T(x_{i-1},a_{i-1})R(z_i,\theta_i)T(z_i,d_i) \qquad T_i^{1-1} = \begin{bmatrix} C\theta_i & -S\theta_i & 0 & a_{i-1} \\ S\theta_i \cdot C\alpha_{i-1} & C\theta_i \cdot C\alpha_{i-1} & -S\alpha_{i-1} & -d_i \cdot S\alpha_{i-1} \\ S\theta_i \cdot S\alpha_{i-1} & C\theta_i \cdot S\alpha_{i-1} & C\alpha_{i-1} & d_i \cdot C\alpha_{i-1} \\ 0 & 0 & 0 & 1 \end{bmatrix} $$

Esempio Braccio Planare 2DOF:



Link,i	θ_i	d_i	α_{i-1}	a_{i-1}
1	θ_1	0	0	0
2	θ_2	0	0	a_1

Riferimenti:

http://jntuhceh.ac.in/web/tutorials/faculty/873_ic29-2014.pdf