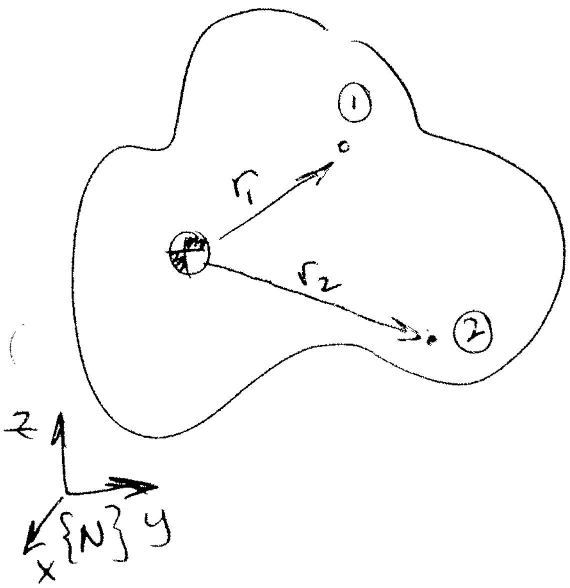
Beginning Grasping

It all boils down to G and J

$$G_i^T = H_i \tilde{G}_i^T \qquad \tilde{G}_i^T = \left[\begin{array}{c|c} (R_{c_i}^N)^T & \cancel{S(r_i^N)} \; -(R_{c_i}^N)^T S^T(r_i^N) \\ \hline 0 & (R_{c_i}^N)^T \end{array}\right]_{(6\times6)}$$



$$= \left[\begin{array}{c|c} (\hat{n}_i^N)^T & (r_i^N \times \hat{n}_i^N)^T \\ (\hat{t}_i^N)^T & (r_i^N \times \hat{t}_i^N)^T \\ (\hat{o}_i^N)^T & (r_i^N \times \hat{o}_i^N)^T \\ \hline & (\hat{n}_i^N)^T \\ 0 & (\hat{t}_i^N)^T \\ & (\hat{o}_i^N)^T \end{array}\right]_{(6\times6)}$$

H_i selects rows of $\tilde{G}_i^T$

PwoF keeps row 1 $\quad H_i = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}_{(1\times6)}$

HF keeps rows 1-3 $\quad H_i = \begin{bmatrix} I_{(3\times3)} & 0_{(3\times3)} \end{bmatrix}_{(3\times6)}$

SF keeps rows 1-4 $\quad H_i = \begin{bmatrix} I_{(4\times4)} & 0_{4\times2} \end{bmatrix}_{(4\times6)}$

$$G^T = \begin{bmatrix} G_1^T \\ \vdots \\ G_{n_c}^T \end{bmatrix}$$

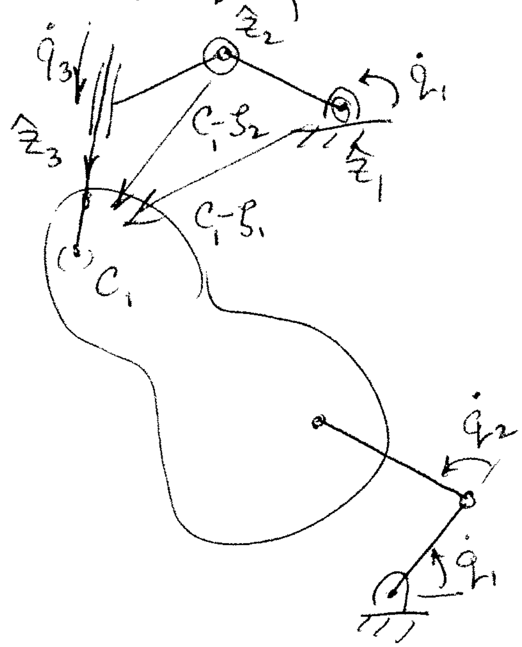
J is harder to define

The tables of $\hat{d}$'s and ℓ's is about as simple as it gets in 3D.

In the plane its a little easier.

Advice: Use all of $\dot{q}$ for each J_i

What matters is the arrangement of the joint axes and the location of the contact (only for revolute joints)



$$H_i \tilde{J}_i = J_i$$

$$J = \begin{bmatrix} J_1 \\ \vdots \\ J_{n_c} \end{bmatrix}$$