```
(%i1)  /*on definit la matrice de Denavit Hartenberg*/

       dhmatrix(a,alpha,r,theta) :=
       matrix(
        [cos(theta)           , -sin(theta)          , 0          , a],
        [sin(theta)*cos(alpha), cos(theta)*cos(alpha), -sin(alpha), -r*sin(alpha)],
        [sin(theta)*sin(alpha), cos(theta)*sin(alpha), cos(alpha) , r*cos(alpha)],
        [0                    , 0                    , 0          , 1]
       ) $

       /*on definit toutes les matrices de changements*/

       "T01";
       T01:dhmatrix(0, 0     , 0 , q1);
       "T12";
       T12:dhmatrix(a1, 0 , 0 , q2);
       "T23";
       T23:dhmatrix(a2, 0 , q3, 0 );
       "T34";
       T34:dhmatrix(0, 0     , 0 , q4);

       /*calcul de T04*/

       T06: T01.T12.T23.T34;

       /*on substitue par les valeurs q1,...,qn*/

       "config 1";

       T06_1:subst(0,q1,T06)$
       T06_1:subst(0,q2,T06_1)$
       T06_1:subst(0,q3,T06_1)$
       T06_1:subst(0,q4,T06_1)$

       T06_1;

       "config 2";

       T06_2:subst(%pi/2,q1,T06)$
       T06_2:subst(0,q2,T06_2)$
       T06_2:subst(0,q3,T06_2)$
       T06_2:subst(0,q4,T06_2)$

       T06_2;

       "config 3";

       T06_3:subst(0,q1,T06)$
       T06_3:subst(%pi/2,q2,T06_3)$
       T06_3:subst(0,q3,T06_3)$
       T06_3:subst(0,q4,T06_3)$

       T06_3;

       "config 4";
```

(%o2) $T01$

(%o3) $$\begin{pmatrix} \cos(q1) & \sin(q1) & 0 & 0 \\ \sin(q1) & \cos(q1) & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o4) $T12$

(%o5) $$\begin{pmatrix} \cos(q2) & \sin(q2) & 0 & a1 \\ \sin(q2) & \cos(q2) & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o6) $T23$

(%o7) $$\begin{pmatrix} 1 & 0 & 0 & a2 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & q3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o8) $T34$

(%o9) $$\begin{pmatrix} \cos(q4) & \sin(q4) & 0 & 0 \\ \sin(q4) & \cos(q4) & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o10) $$\begin{pmatrix} \cos(q1)\,(\cos(q2)\,\cos(q4)\sin(q2)\,\sin(q4))\sin(q1)\,(\cos(q2)\,\sin(q4)+\sin(q2)\,\cos(q4)) & \cos(q1)\,(\\ \sin(q1)\,(\cos(q2)\,\cos(q4)\sin(q2)\,\sin(q4))+\cos(q1)\,(\cos(q2)\,\sin(q4)+\sin(q2)\,\cos(q4)) & \cos(q1)\,(c \\ 0 & \\ 0 & \end{pmatrix}$$

(%o11) $config1$

(%o16) $$\begin{pmatrix} 1 & 0 & 0 & a2+a1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o17) $config2$

(%o22) $$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & a2+a1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o23) $config3$

(%o28) $$\begin{pmatrix} 0 & 1 & 0 & a1 \\ 1 & 0 & 0 & a2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o29) $config4$

(%o34) $$\begin{pmatrix} 0 & 1 & 0 & a2+a1 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o35) $config5$

(%o40) $$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & a2a1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o41) $config6$

(%o46) $$\begin{pmatrix} 1 & 0 & 0 & a2+a1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0.5 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o47) $config7$

(%o52) $$\begin{pmatrix} 1 & 0 & 0 & a2 \\ 0 & 1 & 0 & a1 \\ 0 & 0 & 1 & 0.5 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

(%o53) $T04$

(%o62) $$\begin{pmatrix} c1\ (c2\,c4s2\,s4)\,s1\ (c2\,s4+c4\,s2) & c1\ (c2\,s4c4\,s2)\,s1\ (c2\,c4s2\,s4) & 0 & c1\ (a2\,c2+a1)\,a2\,s1\,s2 \\ s1\ (c2\,c4s2\,s4)+c1\ (c2\,s4+c4\,s2) & c1\ (c2\,c4s2\,s4)+s1\ (c2\,s4c4\,s2) & 0 & a2\,c1\,s2+(a2\,c2+a1)\ s1 \\ 0 & 0 & 1 & q3 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$