```
clc
addpath('C:\Users\YuN\Desktop\Capstone_Project_204\mr');

% the initial configuration
T_sc_initial = RpToTrans(eye(3),[1,0,0.025]');
T_se_initial = RpToTrans(eye(3),[0,0,0.5]');
T_sc_final = RpToTrans(rotz(-pi/2),[0,-1,0.025]');

%the standoff configuration of the end-effector above the cube
a = pi/6;
T_ce_standoff = [[-sin(a),0,-cos(a),0]',[0,1,0,0]',[cos(a),0,-sin(a),0]',[0,0,0.25,1]'];
%the configuration of the e-e relative to the cube while grasping
T_ce_grasp = [[-sin(a),0,-cos(a),0]',[0,1,0,0]',[cos(a),0,-sin(a),0]',[0,0,0,1]'];
% end-effector planned configuration(reference)
T_standoff_initial = T_sc_initial * T_ce_standoff;
T_grasp = T_sc_initial * T_ce_grasp;
T_standoff_final = T_sc_final * T_ce_standoff;
T_release = T_sc_final * T_ce_grasp;
%Construct a cell array for the path
T_configure = {T_se_initial,T_standoff_initial,T_grasp,T_grasp,T_standoff_initial,T_standoff_final,T_release,T_release,T_standoff_final};
% Generating reference trajectory
dt = 0.01;% 0.01 second
Tf = calculateTf(20);%total time = 20 ;the weighted time for each piece
Traj = [];% N * 13 matrix, N is the number of reference frame
grasp_state = 0;
for i = 1:8
    if i == 3
        grasp_state = 1;
    elseif i == 7
        grasp_state = 0;
    end

    Trajectory = Mybot.TrajectoryGenerator(T_configure{i},T_configure{i+1},Tf(i),dt,grasp_state,'Cartesian',5);
    Traj = [Traj;Trajectory];
end
writematrix(Traj,'Traj_1.csv');
disp('Trajectory Generated');
```

```
Trajectory Generated
```

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	0	0	1	0	1	0	-1	0	0	0	0	0.5	0		
2	0	0	1	0	1	0	-1	0	0	2.32E-07	0	0.5	0		
3	-1.16E-06	0	1	0	1	0	-1	0	-1.16E-06	1.85E-06	0	0.5	0		
4	-3.91E-06	0	1	0	1	0	-1	0	-3.91E-06	6.22E-06	0	0.499999	0		
5	-9.22E-06	0	1	0	1	0	-1	0	-9.22E-06	1.47E-05	0	0.499997	0		
6	-1.79E-05	0	1	0	1	0	-1	0	-1.79E-05	2.85E-05	0	0.499994	0		
7	-3.08E-05	0	1	0	1	0	-1	0	-3.08E-05	4.91E-05	0	0.499989	0		
8	-4.88E-05	0	1	0	1	0	-1	0	-4.88E-05	7.76E-05	0	0.499983	0		
9	-7.25E-05	0	1	0	1	0	-1	0	-7.25E-05	0.000115	0	0.499974	0		
10	-0.0001	0	1	0	1	0	-1	0	-0.0001	0.000164	0	0.499963	0		
11	-0.00014	0	1	0	1	0	-1	0	-0.00014	0.000223	0	0.49995	0		
12	-0.00019	0	1	0	1	0	-1	0	-0.00019	0.000296	0	0.499933	0		
13	-0.00024	0	1	0	1	0	-1	0	-0.00024	0.000383	0	0.499914	0		
14	-0.0003	0	1	0	1	0	-1	0	-0.0003	0.000484	0	0.499891	0		
15	-0.00038	0	1	0	1	0	-1	0	-0.00038	0.000602	0	0.499865	0		
16	-0.00046	0	1	0	1	0	-1	0	-0.00046	0.000737	0	0.499834	0		
17	-0.00056	0	1	0	1	0	-1	0	-0.00056	0.000891	0	0.4998	0		
18	-0.00067	0	1	0	1	0	-1	0	-0.00067	0.001064	0	0.499761	0		
19	-0.00079	0	1	0	1	0	-1	0	-0.00079	0.001257	0	0.499717	0		
20	-0.00093	0	1	0	1	0	-1	0	-0.00093	0.001472	0	0.499669	0		
21	-0.00107	0	0.999999	0	1	0	-1	0	-0.00107	0.00171	0	0.499615	0		
22	-0.00124	0	0.999999	0	1	0	-1	0	-0.00124	0.00197	0	0.499557	0		
23	-0.00142	0	0.999999	0	1	0	-1	0	-0.00142	0.002255	0	0.499493	0		
24	-0.00161	0	0.999999	0	1	0	-1	0	-0.00161	0.002565	0	0.499423	0		
25	-0.00182	0	0.999998	0	1	0	-1	0	-0.00182	0.002902	0	0.499347	0		
26	-0.00205	0	0.999998	0	1	0	-1	0	-0.00205	0.003265	0	0.499265	0		
27	-0.0023	0	0.999997	0	1	0	-1	0	-0.0023	0.003656	0	0.499177	0		
28	-0.00256	0	0.999997	0	1	0	-1	0	-0.00256	0.004076	0	0.499083	0		
29	-0.00284	0	0.999996	0	1	0	-1	0	-0.00284	0.004525	0	0.498982	0		
30	-0.00314	0	0.999995	0	1	0	-1	0	-0.00314	0.005005	0	0.498874	0		
31	-0.00347	0	0.999994	0	1	0	-0.99999	0	-0.00347	0.005515	0	0.498759	0		
32	-0.00381	0	0.999993	0	1	0	-0.99999	0	-0.00381	0.006058	0	0.498637	0		
33	-0.00417	0	0.999991	0	1	0	-0.99999	0	-0.00417	0.006633	0	0.498508	0		
34	-0.00455	0	0.99999	0	1	0	-0.99999	0	-0.00455	0.007241	0	0.498371	0		
35	-0.00495	0	0.999988	0	1	0	-0.99999	0	-0.00495	0.007883	0	0.498226	0		
36	-0.00538	0	0.999986	0	1	0	-0.99999	0	-0.00538	0.00856	0	0.498074	0		

Traj

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1275	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.205591	0	
1276	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.210392	0	
1277	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.215062	0	
1278	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.219592	0	
1279	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.223975	0	
1280	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.228201	0	
1281	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.232263	0	
1282	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.236154	0	
1283	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.239867	0	
1284	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.243398	0	
1285	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.24674	0	
1286	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.249891	0	
1287	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.252846	0	
1288	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.255603	0	
1289	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.258161	0	
1290	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.26052	0	
1291	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.262679	0	
1292	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.264641	0	
1293	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.266408	0	
1294	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.267983	0	
1295	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.269371	0	
1296	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.270579	0	
1297	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.271614	0	
1298	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.272484	0	
1299	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.273199	0	
1300	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.273771	0	
1301	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.274211	0	
1302	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.274535	0	
1303	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.274758	0	
1304	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.274896	0	
1305	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.274969	0	
1306	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.274996	0	
1307	0	1	0	0.587785	0	-0.80902	-0.80902	0	-0.58779	0	-1	0.275	0	
1308														
1309														
1310														

Traj

https://youtu.be/dt1a4OrO_iE