

Function Definitions

shuffle(T, gripper_state)

Function: Reorganizes transformation matrix T and gripper state into a vector form

Input: Transformation matrix T, where T is defined as:

$$T = \begin{bmatrix} r_{11} & r_{12} & r_{13} & p_x \\ r_{21} & r_{22} & r_{23} & p_y \\ r_{31} & r_{32} & r_{33} & p_z \end{bmatrix}$$

gripper_state is defined as either 0 (closed), or 1 (open)

Return: Vector vec

$$\text{vec} = [r_{11} \ r_{12} \ r_{13} \ r_{21} \ r_{22} \ r_{23} \ r_{31} \ r_{32} \ r_{33} \ p_x \ p_y \ p_z \ \text{gripper_state}]$$

close_gripper()

Function: closes gripper, appends trajectory to account for actuation speed

open_gripper()

Function: closes gripper, appends trajectory to account for actuation speed

TrajectoryGenerator(Tse_init, Tsc_init, Tsc_final, Tce_grasp, Tce_stand, k):

Function: Generates trajectory for end-effector

Input: Tse_init - initial configuration of the end-effector for the reference trajectory

Tsc_init - cube's initial configuration

Tsc_final - cube's final configuration

Tce_grasp - end-effector's configuration relative to the cube when it is grasping the cube

Tce_stand - end-effector's standoff configuration above the cube, before and after grasping, relative to the cube

k - The number of trajectory reference configurations per 0.01 seconds

main()

Function: Initializes matrices, saves trajectory

Output: reference trajectory, saved as csv file *ref_traj.csv*