ECE 5397/6397: Introduction to Robotics, Spring 2016

HW #2 due Feb. 16

Discrete Grading Policy. 5 points for each: 2 points for trying, 3 points if partial answer, 5 point if correct.

1. Consider the following manipulator, list DH parameters and mark joint variables in the table, and derive the forward kinematic equations using DH convention.

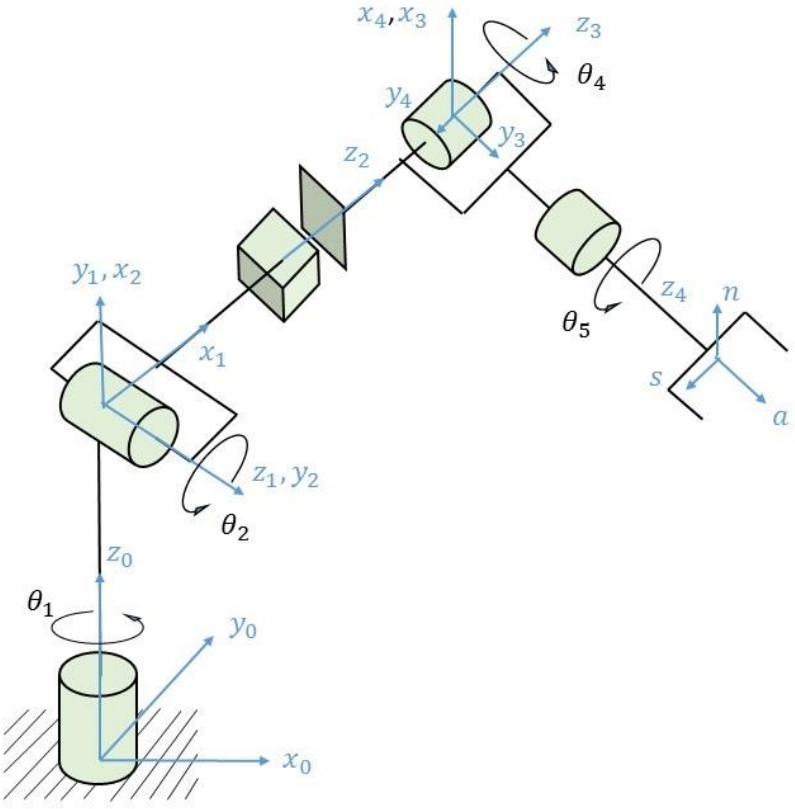

Figure 1.

Link	α_i	r_i	d_i	θ_i
1				
2				
3				
4				
5				

Table 1.

2. Consider the following manipulator, finish each coordinate frame in Figure 2, list DH parameters and mark joint variables in the table, and derive the forward kinematic equations using DH convention.

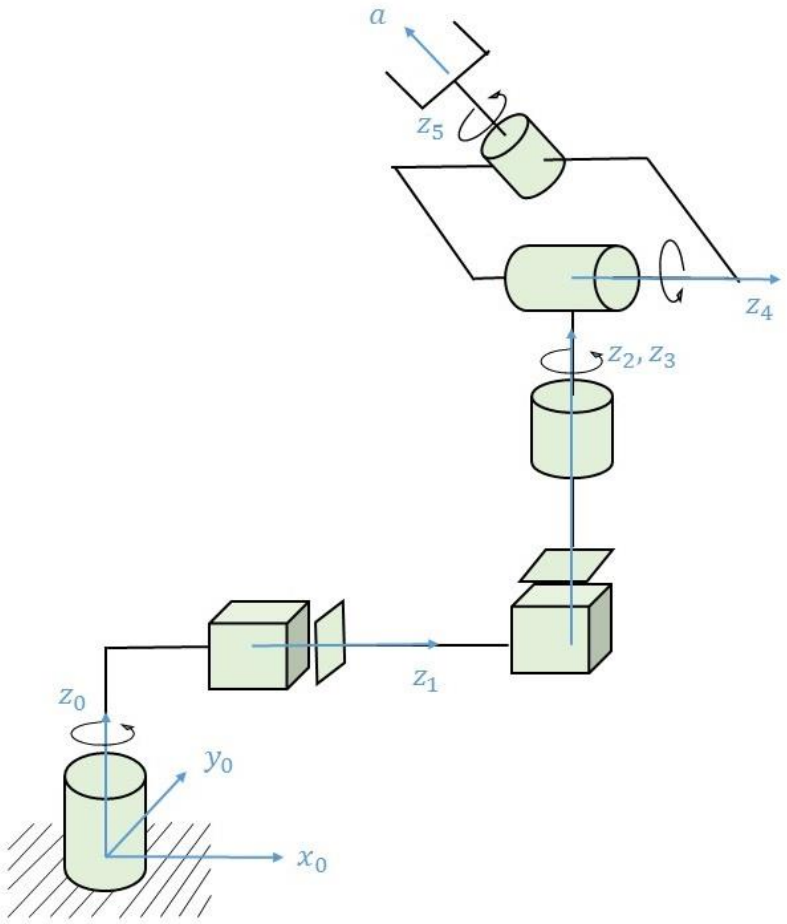

Figure 2.

Link	α_i	r_i	d_i	θ_i
1				
2				
3				
4				
5				
6				

Table 2.

3. Consider the following serial-parallel manipulator, and use the annotation in the figure to simply its structure by basic rotation and translation transformations. Set up coordinate frames in Figure 4, list DH parameters and mark joint variables in a table, and derive the forward kinematic equations using DH convention.

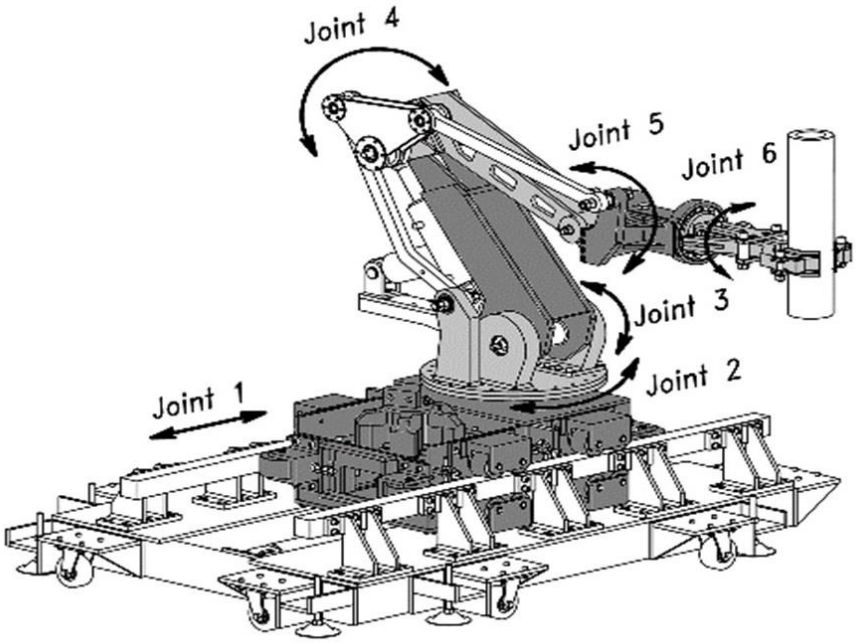

Figure 3. A serial-parallel manipulator transferring a billet (figure credit by Chu Anh My and Manukid Parnichkun)

Link	α_i	r_i	d_i	θ_i
1				
2				
3				
4				
5				
6				

Table 3.