#from mpmath import \*

import numpy as np

from math import atan2, cos, sin, acos, pi

def HomogeneousMatrix1(q1,q2,l1,l2,l3,l4,d3):

#homogeneous matrix for link1

R\_z1 = np.array([[np.cos(q1), -np.sin(q1), 0],

[np.sin(q1), np.cos(q1), 0],

[0, 0, 1],

])

pr0\_1=np.array([[1,0,0],

[0,0,-1],

[0,1,0]])

r0\_1=np.dot( R\_z1,pr0\_1,out=None)

tr=np.array([[l2\*np.cos(q1)],[l2\*np.sin(q1)],[l1]])

res=np.column\_stack((r0\_1,tr))

sca=([0,0,0,1])

result=np.vstack((res,sca))

#homogeneous matrix for link2

pr1\_2=np.array([[0,0,1],[0,1,0],[-1,0,0]])

r1\_2=np.dot(R\_z1,pr1\_2)

tr1=np.array([[l3\*np.cos(q2)],[l3\*np.sin(q2)],[0]])

res1=np.column\_stack((r1\_2,tr1))

sca=([0,0,0,1])

result1=np.vstack((res1,sca))

#homogeneous matrix for link3

R\_z2=np.identity(3,dtype=None)

tr2=np.array([[0],[0],[l4+d3]])

res2=np.column\_stack((R\_z2,tr2))

sca=([0,0,0,1])

result2=np.vstack((res2,sca))

#homogeneous matrix for end effector

H0\_3=result.dot(result1).dot(result2)

#position matrix of end effector(pos3= point in 3 frame, whose location is 2 feet in y direction)

pos3=np.array([[0],[2],[0],[1]])

end\_effector=np.dot(H0\_3,pos3)

print(end\_effector)

HomogeneousMatrix1(1.5,0.7853,1,2,2,2,2)