EE 451 Intro. to Robot Control
Bogazici University, Electric Electronic Eng.,

28.10.2023
Due date: 5.11.2023

The goal of this project is to understand forward and inverse kinematics. You will be given a RRR robot as shown in Fig. 1.

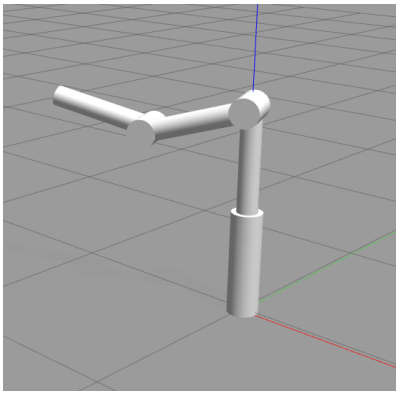

Figure 1: RRR robot

(a) Compute the DH parameters and setup the parameters table. Derive the kinematic map $A(\theta_1, \theta_2, \theta_3)$. What is the corresponding workspace? Write it mathematically.

(b) Manually set up the forward and inverse kinematics equations.

(c) Now develop ROS/C++ code to move your robot through all of its workspace continually by having it move through all of its configuration space. Using the forward kinematics equations from part (b), spawn a small sphere at sampled locations so that the workspace can be visually seen.

(d) Now suppose there are a set of N target points around the robot as given in Cartesian coordinates as visually shown by small spheres with red color. The tip of the robot needs to go and touch each point. Write a method that will go through each target point and touch each target sphere. Once it touches, the color of the target should change to green. Utilize the inverse kinematics equations you found in part (b).