National Yang Ming Chiao Tung University

Department of Electrical Engineering

Robotics: Homework 1

Due 10/20/22 Fall 2022

1. Draw the block diagram for the robot simulator shown in the class, and explain the function of each module. What are the main challenges in making a robot simulator approximate the real one ?

2. For a 3-D coordinate frame T, draw the resultant frame through an Euler transformation (Z-Y-Z). Please also draw the intermediate frames after each of the three rotations. You need to conduct the Euler transformation from the aspects of both the pre- and post-multiplications.

3. Please find the coordinate frame given by rotating the standard x-y-z coordinate frame about the vector $\underline{k}$ an angle θ, where $\underline{k}$ passes through the position (p_x, p_y, p_z).

4. Describe the procedure to coincide two coordinate frames A, (n_A, o_A, a_A, p_A), and B, (n_B, o_B, a_B, p_B). Formulate the resultant transformation using the basic transformations, such as translation, rotation, etc. In coinciding (n_A, o_A, a_A) with (n_B, o_B, a_B), please use two-angle rotation.