

CS422 Robotics and Automation

Assignment 3

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Due 25th Nov. Late submissions will not be accepted

Read Textbook Chapter 3 and answer the following questions¹:

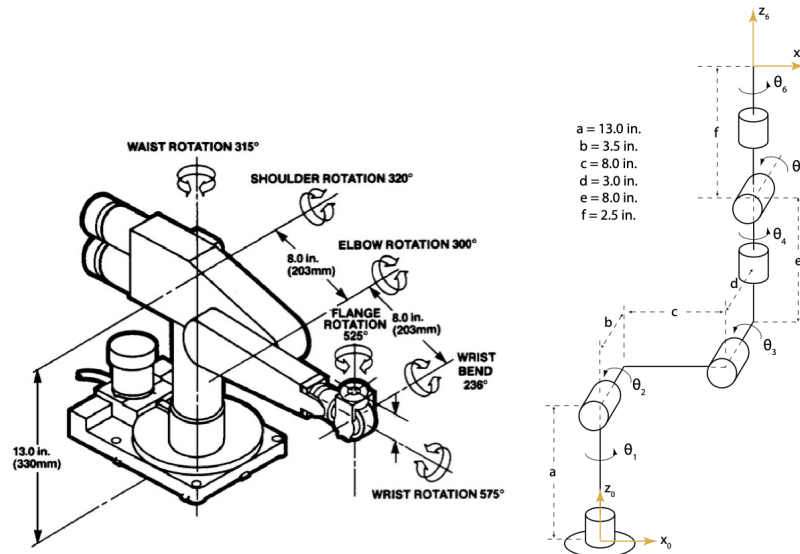


Figure 1: The schematic above on the right shows the zero configuration we have chosen for use in this class (a different pose from the drawing at the left). The joint angle arrows show the positive direction for each revolute joint (θ_1 to θ_6). All of the joints are shown at $\theta_i = 0$. The diagram also gives the measurements for the constant dimensions (a to f), all in inches.

The first two problems center on the forward kinematics of the PUMA 260. We will be using this robot for the manipulator virtual labs in this class. It is an articulated robot (RRR) with lateral offsets, plus a spherical wrist (RRR). The drawing in Fig 1. the left shows the robot and the arrangement of its joints.

¹Some of the assignment materials were adapted from the open materials used in MEAM520 at the University of Pennsylvania, created by Dr Katherine J. Kuchenbecker

1. **DH Parameters for the PUMA 260 (20pts):**

Annotate the full-page schematic of the PUMA (provided later in this document) with appropriately placed coordinate frames, and then write a table of the corresponding DH parameters; use degrees for the angles. Do this in pencil so that you can make corrections if needed. You may find it useful to follow the steps provided in SHV Section 3.4.

2. **Solve the Inverse Kinematics for the PUMA 260 (40 pts)**