Assignment 2

Due on 09/04/20, 23:00 IST.

This assignment is part of the coursework for MTEL 1. Please ensure you have not resubmitted this assignment.

1. Which value of the constant parameter is used for positioning of the objects in the simulation environment?

2. What is the difference between a robot and a manipulator?

3. What is the type of manipulation tasks that can be done in industrial robots?

4. Why is it necessary to have a manipulator?

5. What are the advantages and disadvantages of using a manipulator?

6. Which tasks can be performed by a manipulator as compared to a robot?

7. What are the objectives of studying manipulators in robotics?

8. How are manipulators classified in terms of their design and functionality?

9. What are the limitations of manipulators compared to robots?

10. What are the advantages of using manipulators in industrial applications?

11. What are the limitations of using manipulators in industrial applications?

12. What would be the value of J3 if the manipulator is to be used for grasping objects in the environment?

Diagram:

Consider the 3D manipulator with the following dimensions:

- Shoulder angle: \( \theta_1 \)
- Elbow angle: \( \theta_2 \)
- Wrist angle: \( \theta_3 \)

The distances are:

- \( l_b = 5 \text{ mm} \)
- \( l_e = 3 \text{ mm} \)
- \( l_w = 1 \text{ mm} \)

Mathematical model of the manipulator:

\[ \begin{align*}
\theta_1 &= \text{shoulder angle} \\
\theta_2 &= \text{elbow angle} \\
\theta_3 &= \text{wrist angle} \\
l_b &= 5 \text{ mm} \\
l_e &= 3 \text{ mm} \\
l_w &= 1 \text{ mm} 
\end{align*} \]