
SOLUTION

Inverse Kinematics

Simplified model

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Manipulations

Part 1: Implementation of the inverse kinematics

1.1

Parameter	Length (m)
l_1	0.2433
l_2	0.280
l_3	0.245
d_1	0.010
d_{we}	0.057
d_{wo}	0.235

TABLE 1: Gen3 lite Joint position limit

1.2

It allows for the spherical wrist approximation.

1.3

See related .m file

1.4-1.7

See related .m files. Impossible solutions rise when the point is out of reach or when there is a singularity.

1.8

Validate the implementation by sending an input outside the robot limits.

1.9

Validate the implementation by requesting a pose out of the reach of the robot.

Part 2: Validation on the robot

2.1

You may test the points selected by the students.

2.2

Either the robot will deviate from its linear motion between the two points due to the built-in singularity avoidance algorithm, or the configuration ('rd', 'lu', etc.) may not change. In some edge cases, the motion may block entirely because the robot would need to self-collide.

2.3

You may test the students' input using the associated .m file

2.4

We can tell that the algorithm is not too far off, but it still yields errors of a few centimeters if we input the angular values as commands to reach positions - which is usually considered too inaccurate for most real-life applications.

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