

Robot Manipulators and Automation

AUTO4507

Lab Assignment 3+4 – *Group* – Parallel Robot

Points: 10+10

Pre-Lab

Before you start the lab read the documentation and make yourself familiar with the safety instructions.

- Make sure that nobody is inside the robot cage when the robot is started.
- The cage door needs to be properly closed for the robot to start
- The robot will stop if the cage door is being opened or if the remote emergency button is being pressed.

Lab 3 – Convert the Matlab code to C or Python

Experiment 1 (8 points)

Convert the given MatLab code for NUWAR to C or Python.

Experiment 2 (2 points)

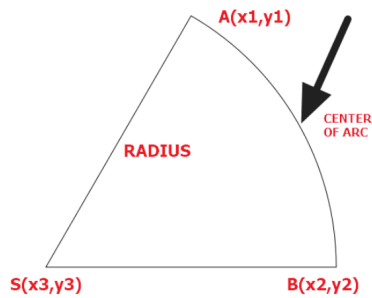
Write a program that moves the robot in a sequence to the 8 corner points of a **cube** of size 30cm. Let the robot stop for 1 second after reaching each position. (Using Matlab, C or Python)

Experiment 3 (optional)

Write a program that moves the robot along a circle of diameter 30cm.

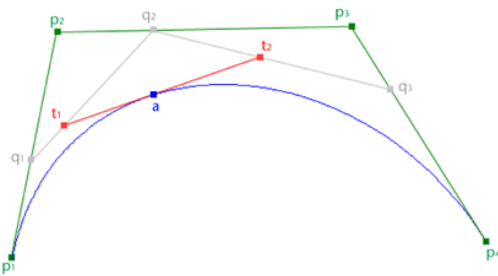
Lab 4 – Non-linear movement

Experiment 1 (4 points)



Write a function that moves the robot from point $A(x_1, y_1, z)$ to Point $B(x_2, y_2, z)$ in an arc with angle θ and radius R .

Experiment 2 (4 points)



Write a function that moves the robot from point $P1(x_1, y_1, z)$ to Point $P4(x_4, y_4, z)$ in Cubic Bezier curve with control points $P2(x_2, y_2, z)$ and $P3(x_3, y_3, z)$

Experiment 3 (2 points)

Attach a pen to the robot's end-effector and draw a bear icon using the previously programmed functions. You can also design your own icon, but you must combine both functions from experiments 1+2.

