

Robotics Experiment - 2

Point-to-Point Trajectory Planning in Joint Space for Denso VP6 Robot Arm

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1. Denso VP6 Robot Arm: 5th Order Joint Space Trajectory

1.1 Use MatLab to plan a 5th order 6DoF joint -space polynomial trajectory for Denso VP6 robot arm from home configuration to any arbitrary end configuration while satisfying following requirements. [30 marks]

1.1 Each joint has to be within its feasible limits (see Quenser QUARC specifications in Appendix)

1.2 Each joint has to move below its maximum speed

1.3 Each joint needs to start and stop with zero speed and acceleration

1.4 Home (Start) position of the robot is $(0^\circ, 0^\circ, -30^\circ, 0^\circ, 0^\circ, 0^\circ)$

Note: Determine the time duration for the trajectory so that all of the joints move from home to end configuration without exceeding maximum joint speed.

Appendix: Denso VP6242 Joint position and speed limits

Denso Specifications			
Joint	Position (deg)		Speed (deg/s)
	Min	Max	
J1	-160	+160	250
J2	-120	+120	187
J3	+019	+160	250
J4	-160	+160	300
J5	-120	+120	300
J6	-360	+360	300

Quenser QUARC Specifications			
Joint	Min limit	Max limit	Speed (deg/s)
1	-120	+120	60
2	-70	+90	50
3	-150	-30	60
4	-120	+120	75
5	-120	+120	75
6	-360	+360	75



Note: Use the joint angle and speed limits in Quenser QUARC Specifications for trajectory planning. The two tables are different due to the differences in sign convention in Quenser QUARC control platform and Denso robot manufacture convention.

Start the trajectory from home position $(0^\circ, 0^\circ, -30^\circ, 0^\circ, 0^\circ, 0^\circ)$