MTRN4230 Lab 07

1. Aim

The aim of this lab session is to understand the behaviour of polynomial and trapezoidal (LSPB) trajectories, including their pros and cons.

2. Pre-lab

- Watch the lecture from week 7 on Trajectory Planning. It goes through the theory behind polynomial and trapezoidal trajectories.

3. Lab Activities

Characteristics, advantages and disadvantages of the polynomial and trapezoidal trajectories were discussed during the lecture. This lab task will involve self-exploration to understand the behaviours behind the polynomial and trapezoidal trajectories. Using this understanding you will then work on completing part C from Project 1.

Comparison between polynomial and trapezoidal trajectories (using the rvc toolbox):

- The quintic polynomial is common in the field of robotics. It has 6 coefficients so we can set the position, velocity and acceleration at the start and end times. Create a 1D polynomial trajectory going from position 0 to 1 with 50 timesteps with the following (plot your results):

  [s,sd,sdd] = tpoly(0,1,50)

  Plot your results and play around with it a bit, set initial and final speed conditions.
- The trapezoidal (lspb) trajectory is an alternative to the polynomial trajectory. It aims to get to the maximum speed as fast as possible, stay there for as long as possible and then slow down at the very end. Create a 1D lspb trajectory going from position 0 to 1 with 50 timesteps with the following (plot your results):

  [s,sd,sdd] = lspb(0,1,50)

  Play around with it by altering the peak velocity of the linear segment.
- What observations and conclusions can you make about velocity, performance and completion time of each method?

Part C Project 1:

Spend the remainder of the lab working on completing Part C of Project 1.

4. post-lab

- Work on completing the remainder of Project-1. It is due Friday of week 8.