Contents

1 Notes for the project:

1.1 MPC Control:

I have a state space model for the mpc control used to control the opening of a valve Out variables should control $\text{last}_{\text{output velocity}}$, $\text{last}_{\text{output displacemnt}}$ How does MPC control work?

$$\dot{x}(t) = Ax(t) + Bu(t) \tag{1}$$

$$y(t) = Cx(t) + Du(t) \tag{2}$$

1.1.1 MPC Control

MPC is based on iterative, finite-horizon optimization of a plant model. At time t t the current plant state is sampled and a cost minimizing control strategy is computed (via a numerical minimization algorithm) for a relatively short time horizon in the future: [t , t + T] [t,t+T] Model predictive control is a multivariable control algorithm that uses:

- an internal dynamic model of the process
- a cost function J over the receding horizon
- an optimization algorithm minimizing the cost function J using the control input u

1. Equations:
   $n_x = 6, N = 1$
   $shape(x) = (6, 1)$ $shape(u) = (3, 1)$
   - Variables x, u
   - constraints:

- $x_{k+1} = A_d x_k + B_d u_k$
- $u_k >= -10$, $u_k < 0$

Controlup outputs the predicted control signal $u[:, 0]$

Adapt the control methods to provide the predicted state of the system to the DDPG framework

1.2 DDPG:

Reinforcement learning technique that strives to combine perception capabilities of Deep learning with Decision capabilities of conventional reinforcement learning.

- The perception step that gives information about the enviroment.
- The decision step that self actualices to get an appropiate response.

1. How to define agents
   - We need to deal with distinct and continous action spaces
   - State spaces:
     - controllerup: $[-10, 0]$
     - controllerdown: $[0, 1]$
     - controllerup: $[0, 250]$