

Lab 6: Distributed Platoon Control 1

Exercise 1. (*Distributed platoon control preparation*)

Your goal in this exercise is to prepare platooning using priority-based non-cooperative distributed model predictive control. Use the folder TEAMREPO/+dmPC for this exercise.

- a) Design and draw the coupling graph and the communication graph representing the agent interaction of the networked control system.
- b) Which agents may compute their control actions in parallel, which should compute their control actions in sequence?
- c) Find a suitable state-space representation of each agent in the platoon. Draw a sketch of the coordinate system(s) you are using.
- d) Define a message format to exchange the predicted output between the high-level controllers (HLCs) in the interface definition language (IDL). Remember that you can find examples in CPMLAB/cpm_lib/dds_idl. Save it as TEAMREPO/+cmmn/HlcPlan.idl. Convert the IDL file to a MATLAB class with `+cmmn/rtigen_matlab`.
- e) Create a test program with a data writer and a data reader to test your HLC communication (see the `CpmLab` class for an example of readers and writers).
- f) Configure the reader in your test program to only read messages with a specific vehicle ID. You can create filters in the data distribution service, so a data reader will only read messages with specific fields, e.g., a vehicle ID. Read more about data readers with filters in the [DDS Blockset Pilot Support Package documentation](#).

Checkpoint

Get a tutor to check your work. You should be able to

- explain the coupling graph you designed
- explain the state-space model you use
- explain the IDL file you defined
- demonstrate two HLCs communicating with the newly defined message type; one reader should output all messages sent, one reader should only output messages belonging to the vehicle with ID 5