

Control of Mobile Robots - Laboratory 6
Trajectory tracking controllers
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Exercise 1

Extend the ROS package representing a trajectory tracking controller for a unicycle robot, adding a trajectory tracking controller constituted by a proportional controller including velocity feedforward.

In the same node performing the control action include the generation of the reference trajectory for point P , using the 8-shaped trajectory already considered in the first laboratories.

Tune the gains of the trajectory tracking controller according to the model of the linearised system.

Verify the performance of the controller simulating the controller and the unicycle kinematic model, and checking the trajectory tracking error.

Exercise 2

Extend the ROS package representing a trajectory tracking controller for a bicycle robot, adding a trajectory tracking controller constituted by a proportional controller including velocity feedforward.

In the same node performing the control action include the generation of the reference trajectory for point P , using the 8-shaped trajectory already considered in the first laboratories.

Tune the gains of the trajectory tracking controller according to the model of the linearised system.

Verify the performance of the controller simulating the controller and the bicycle kinematic model, and checking the trajectory tracking error.

Exercise 3

Using the trajectory tracking controller developed in Exercise 2, compare the performance achieved by the controller applied to the bicycle kinematic model and to the single-track dynamic model.

In the analysis, consider the same trajectory performed at different velocities, and a linear or a Fiala tyre model.