Challenges

Mini challenge 1
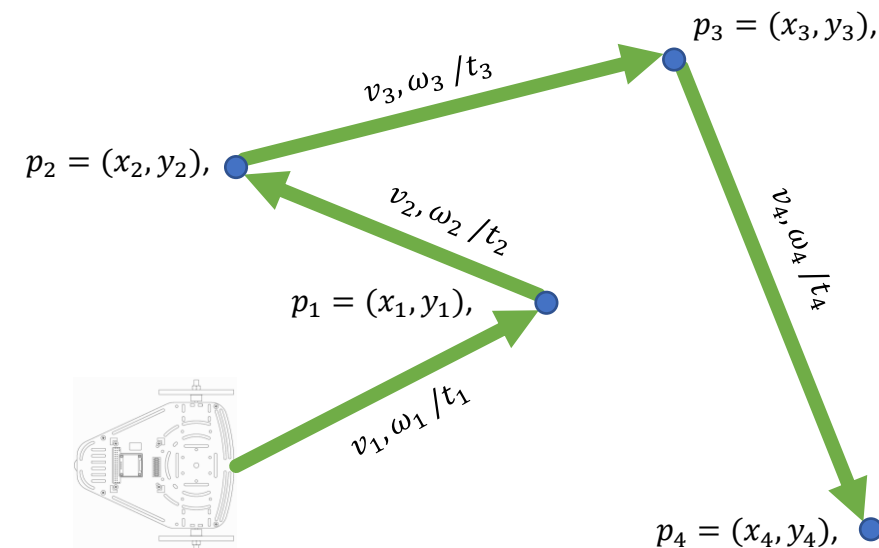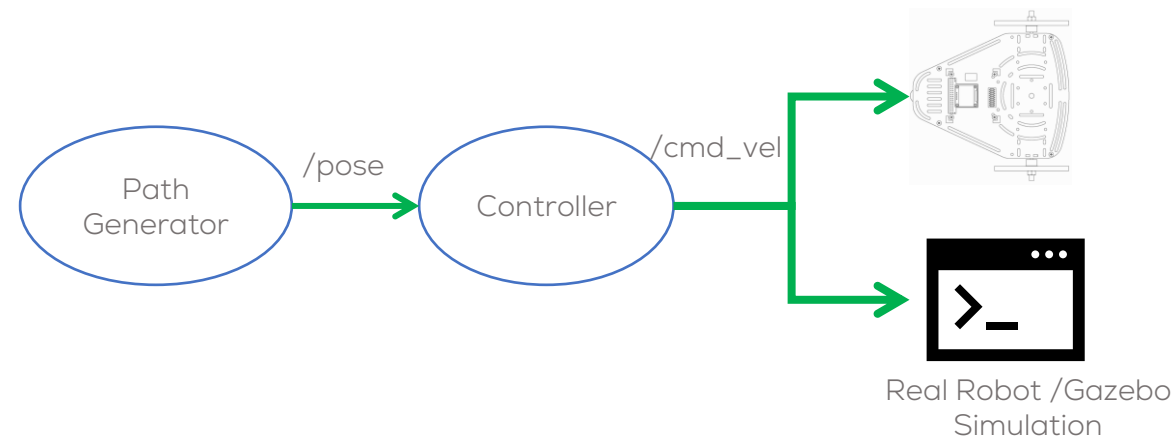
MCR²

Manchester **Robotics**

Mini challenge 1

This challenge is intended for the student to review the concepts introduced in this week.

- Create a node to drive the gazebo simulated robot in a square path of a side length 2 m.

- Use the same node to move the real robot in a square of side length 2 m.

- The open loop controller must be **robust.**

  - The student must define what is robustness and implement strategies to achieve it with the controller.

- The controller must be, auto-tunned

  - The user selects the speed or the time to finish the path (square figure) and the controller must estimate either the velocities, acceleration or time required.

- The controller must take into consideration, perturbation, nonlinearities and noise.

ROS Node

Controller

/cmd_vel

Real Robot /Gazebo Simulation
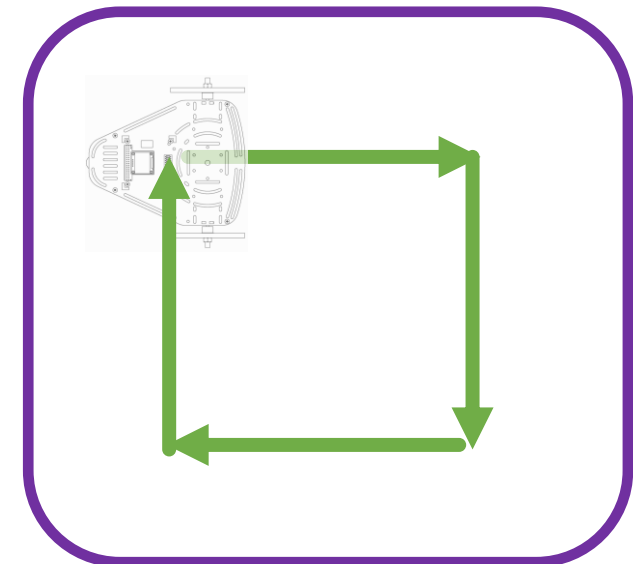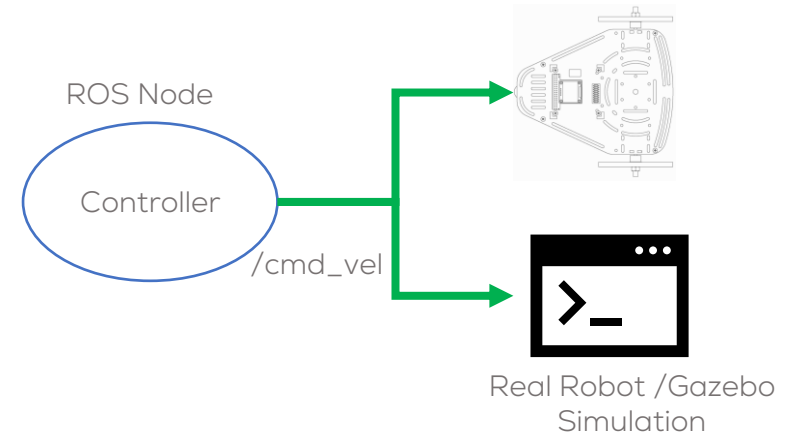
Mini challenge 1

- Create a node that generates different paths according to a user.

  - The path must be defined in the parameter files by the user.

  - The path must be defined by different points $p_k = (x_k, y_k)$, velocities of the robot, or a time $(v_1, \omega_1)/t$ (depend on the user).

    - For each point, the node must estimate the linear and rotational speeds in case a time is given by the user or estimate the time in case the velocities are provided.

  - The node must let the user know if the point is reachable according to the dynamical behaviour of the mobile robot and the parameters that were input by the user $(v_1, \omega_1)/t$.

  - The student must define what is robustness for this case, and the controller must take that into consideration.

Real Robot /Gazebo Simulation

$p_3 = (x_3, y_3)$,

$v_3, \omega_3 / t_3$

$p_2 = (x_2, y_2)$,

$v_2, \omega_2 / t_2$

$v_4, \omega_4 / t_4$

$p_1 = (x_1, y_1)$,

$v_1, \omega_1 / t_1$

$p_4 = (x_4, y_4)$,

Rules

- This is challenge **not** a class. The students are encouraged to research, improve tune explain their algorithms by themselves.

- MCR2(Manchester Robotics) Reserves the right to answer a question if it is determined that the questions contains partially or totally an answer.

- The students are welcomed to ask only about the theoretical aspect of the classed.

- No remote control or any other form of human interaction with the simulator or ROS is allowed (except at the start when launching the files).

- It is **forbidden** to use any other internet libraires with the exception of standard libraires or NumPy.

- If in doubt about libraires please ask any teaching assistant.

- Improvements to the algorithms are encouraged and may be used as long as the students provide the reasons and a detailed explanation on the improvements.

- All the students must be respectful towards each other and abide by the previously defined rules.

- Manchester robotics reserves the right to provide any form of grading. Grading and grading methodology are done by the professor in charge of the unit.