

*{Learn, Create, Innovate};*

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## Challenges

*Mini challenge 1*

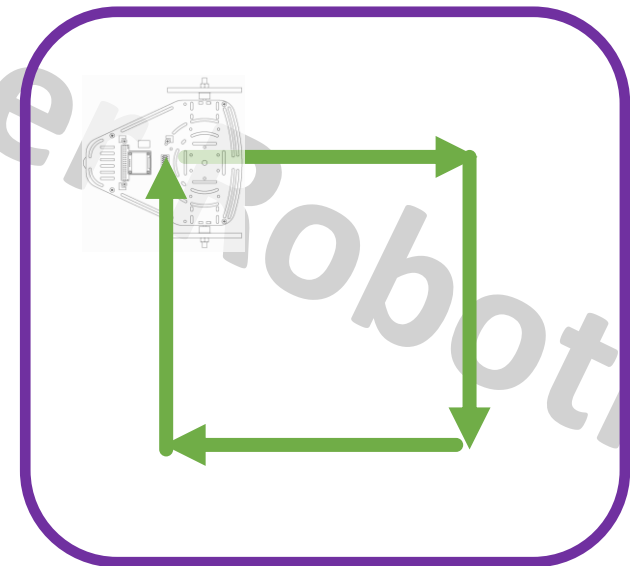
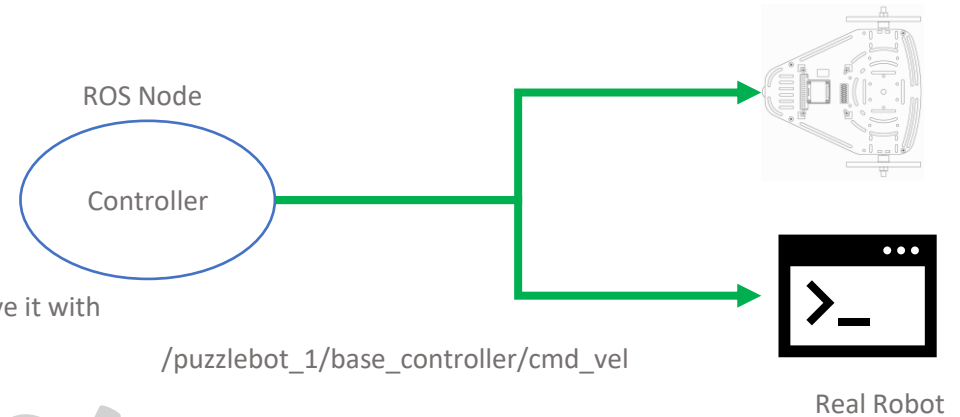
The logo for Manchester Robotics (MCR²) is displayed within a large black circle. The letters 'MCR' are in white, and the superscript '²' is in blue. To the right of the text, there is a small network diagram consisting of three blue squares connected by lines, forming a triangle. The entire logo is set against a black background.

MCR<sup>2</sup>

Manchester **Robotics**

# Mini challenge 1

- Create a node to drive robot in a square path of a side length 1m.
- 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-tuned
  - 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.

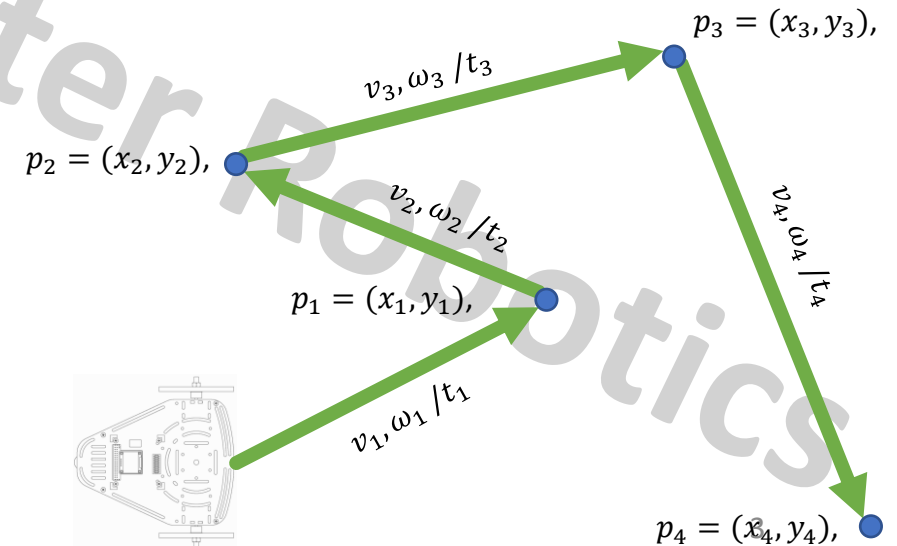
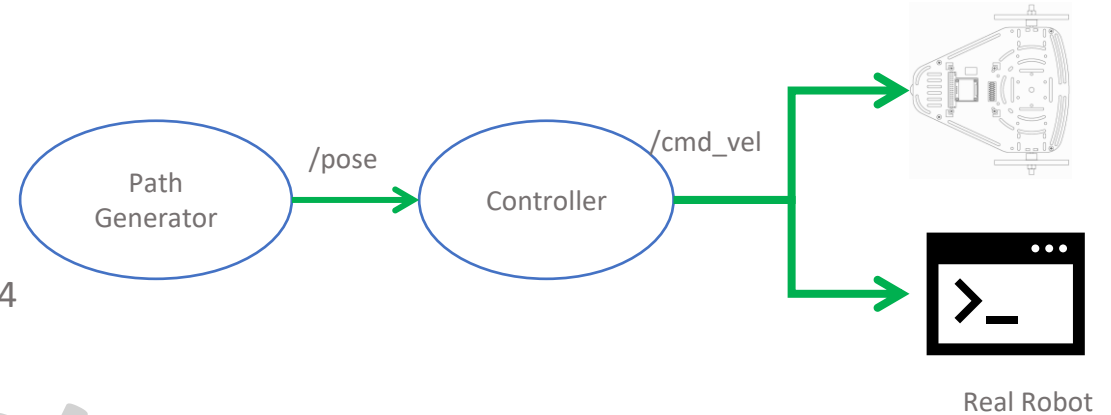




# Mini challenge 1



- Create a node that generates different paths according to a user.
- The path must be defined in the parameter files by the user. (3 or 4 are enough)
- 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.





# Rules

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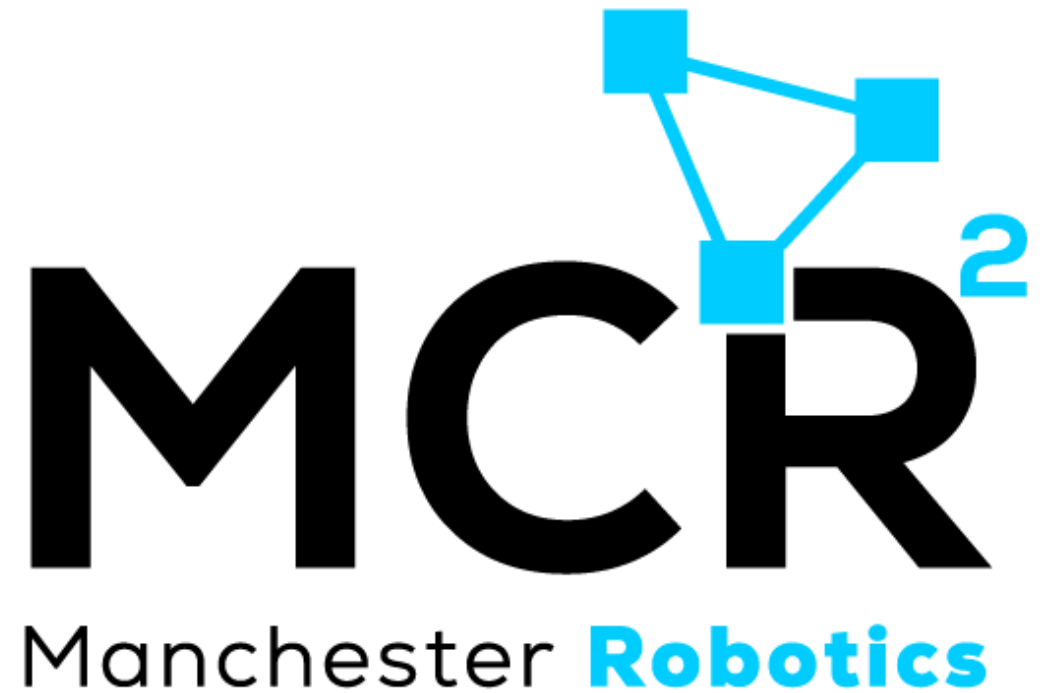


- This is challenge **not** a class. The students are encouraged to research, improve tune explain their algorithms by themselves.
- MCR2(Manchester Robotics) Reserves the right to answer a question if it is determined that the questions contains partially or totally an answer.
- The students are welcomed 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.

# Thank You

*Robotics For Everyone*

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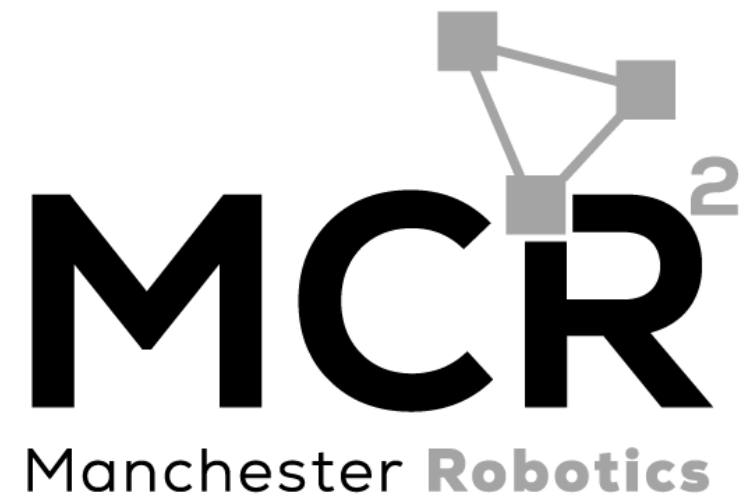




# T&C

*Terms and conditions*

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