

*{Learn, Create,  
Innovate};*

# Challenges

*Mini challenge*



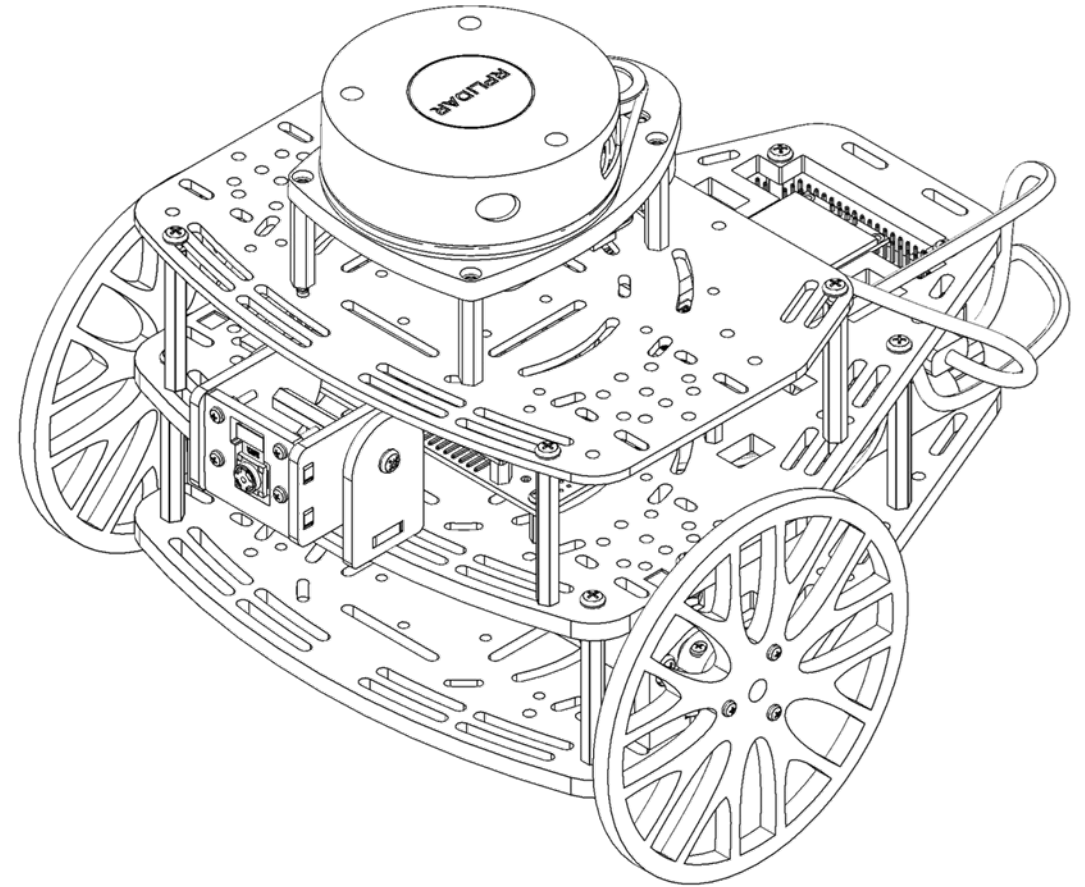


# Mini Challenge: Line Following

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- This challenge is intended for the student to review the concepts introduced in this week.
- This challenge aims to show the behaviour of vision systems in mobile robotics.
- This challenge will be divided in different sections.

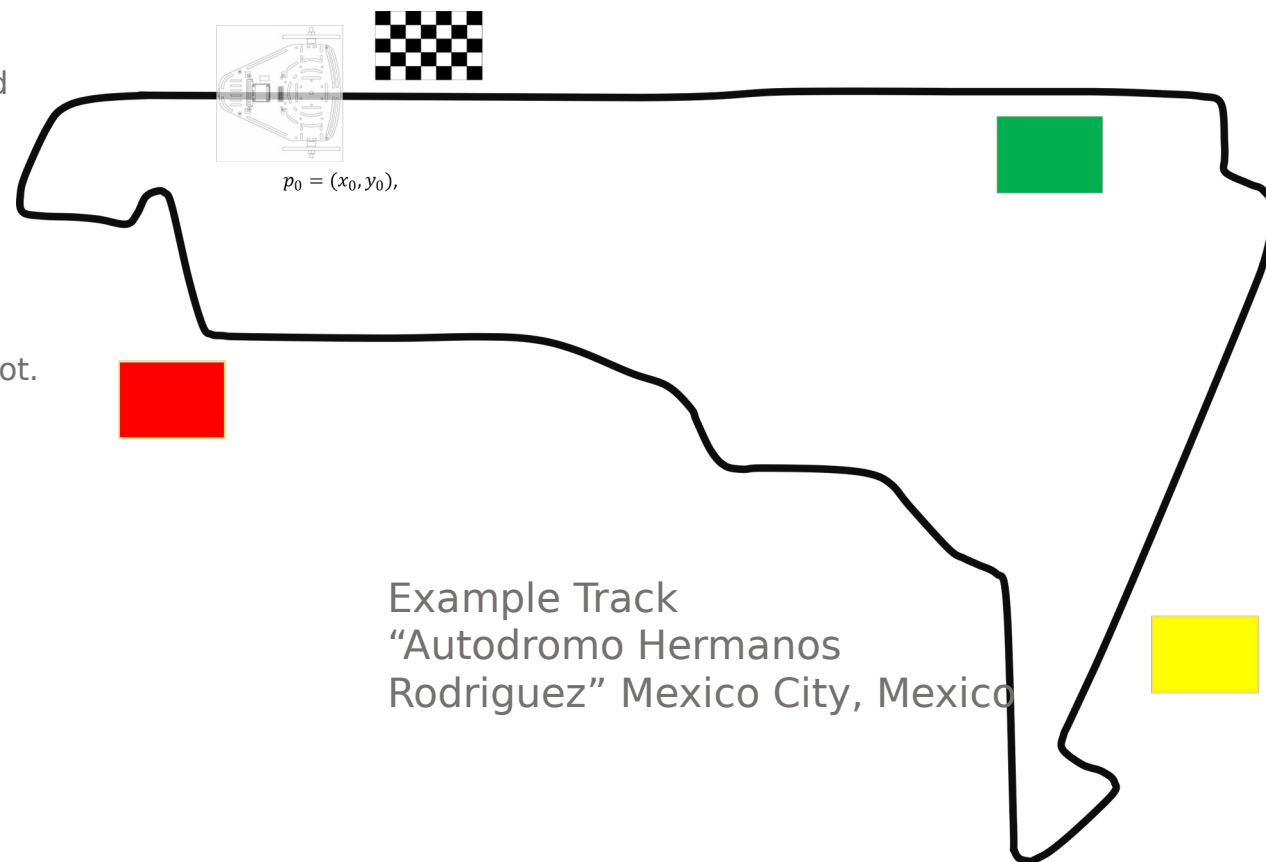


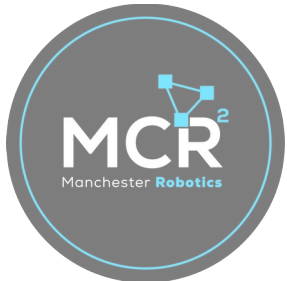


# Mini Challenge



- In this challenge, the student must use and combine the knowledge developed in previous activities.
- Add a line following layer to your previously developed decision layer and point-to-point navigation algorithm, to follow a line using the Puzzlebot camera.
- The expected behaviour is:
  - Make a robust algorithm to follow a line using the camera of the robot.
  - The track must be comprised of 3 lines with certain measurements (measurements in the following slides).
  - The line tracks must be designed by the students.
  - The behaviour of the algorithm must take into consideration the previous challenge of the traffic light.
    - Red Flag (Stop): Stop until you see a green light.
    - Yellow Flag (Caution): Drive slowly, until you see a Red Light to stop.
    - Green Flag (Go): Continue with your Path.

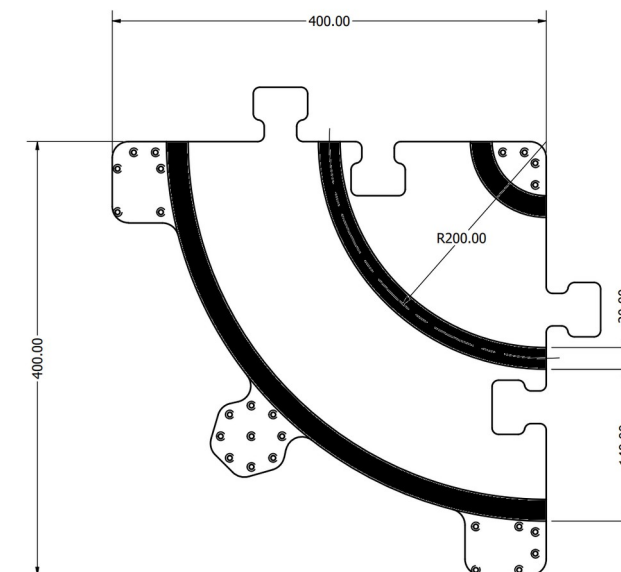
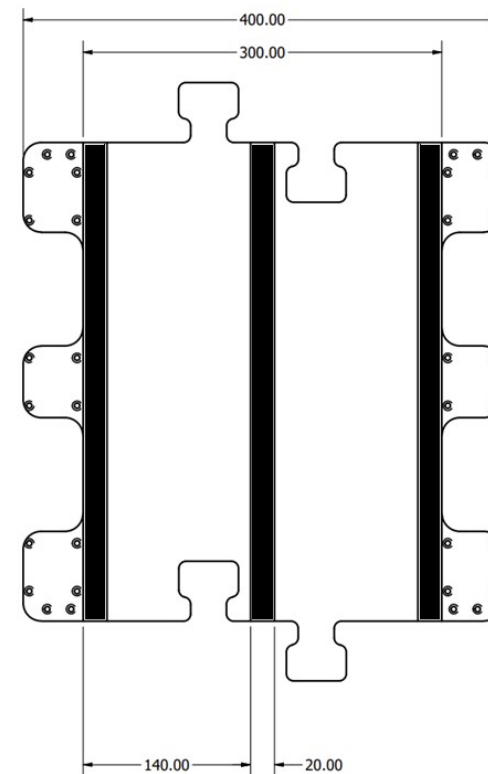




# Mini Challenge



- The line following vision algorithm and closed-loop controller must be **robust**.
  - The student must define what robustness is, and implement strategies to achieve it with the controller.
- The vision algorithms, line following algorithms and the controller must be tuned properly.
- It is encouraged but not mandatory to recognise the Checkered flag to finish the course.
- The controller must take into consideration, changes in light, perturbation, nonlinearities and noise.
- It is encouraged, but not required, for the student to use a config file or a parameter in the launch file to establish the goal targets such that they can be changed outside the code (not hardcoded).



Track  
Measurements



# 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.

