TE3001B Robotics Foundation
Half-Term Challenge Report Rubric

The grade consists of two parts:

- Video = 20%
- Individual Written Report = 80%

Deadline: Sunday 10 September 2023.

This is a team challenge, with an individual report.

Teams:

- The students must form teams for this mini-challenge.
- The teams will be the same as in other classes of this concentration.
- The teams must be multidisciplinary.
- The students must respectfully help each other to understand all the topics.
- The team must manage the project, using a project management methodology, and present it in the report.
- The methodology selected can be simple, E.g., Waterfall, Agile, Kanban, etc.

1. Video (20%)

- Duration: Under 3 min. (If longer, increase speed)
- Show the team, names. Only one team member can speak at a time (not necessary for the whole team to speak in the video).
- Video on YouTube (Unlisted)
- Include the video link on the first page of the report.
- Video English (preferable) / Spanish (accepted).

Task
Brief introduction (problem to be solved, solution strategy, team tasks, etc.)
Explain how the program works (launch files, libraries made, the structure of the project, etc.)
Show the results of the (motor moving at different speeds with different inputs), and the methodology followed to solve it.
A brief set of conclusions from the task.

2. Report (80%)
    - Language: English / Spanish.
    - Maximum Pages: 4 (not including front page)
    - Min Font size: 11 pt. and Min. Line spacing: 1
    - Front page: Your name, team names and id's
    - Appendix: No
    - Report design: Single-column or double-column
    - Format: PDF
    - Details:
        i. Each exercise and task in a different section
        ii. Results in the form of diagrams, figures, tables, etc.
        iii. Include discussion, reflections, conclusions, and recommendations for each result.
        iv. Include references to books or publications in peer-reviewed journals (IEEE format)
    - Results, tables, figures, etc., without detailed explanation/information, will be penalised.

Task
Introduction • Problem statement and its importance in a real-world scenario
• Explain the project management strategy selected (use diagrams, flow chart) - The student must show diagrams explaining how the project management strategy was implemented. - The student must describe concretely, why this strategy was selected and how were the task divided.
Explanation of the control strategy implemented in ROS. • The student must show pseudocode/flowcharts explaining how the control strategy was implemented (no code). • If custom messages were implemented, parameter files or namespaces implemented, how were they implemented, and why were they required? • The student must explain concretely the algorithms developed. • The student must explain the selection of the sampling time.
Explain and show the tunning parameter methodology and the advantages and disadvantages of the selected controller. (Test performed to tune the parameters. Fine tuning? Hardware/software restrictions? Acceptability criteria? Comparison with other methodologies? etc.) • The student must show the methodology for parameter tunning e.g., if done by trial and error, the student must demonstrate the algorithm followed, restrictions (Hardware, software, ROS), acceptance criteria, etc. • Advantages and disadvantages of the controller and its implementation in ROS.
Plots used to verify and analyse the behaviour of the control algorithms • Show the ROS plots used to calibrate and debug the behaviour of the nodes.
Reflections on the performance of the Controller implemented in ROS • The student must show a series of reflections about the problems presented during the implementation of the motor control in ROS (Hardware and software), and its relationship with the theoretical foundations. • Reflect and compare with the simulated system (Mini challenge 2)
Propose different approaches to improve the performance of the control in ROS (What would make the performance better? According to the robotics paradigm and ROS, where should the low-level controllers be placed? (Discussions and comparisons) • The student must propose different improvements to the Controller implemented in the final challenge, to make it more efficient or robust.

• What ROS tools can be used to make this possible? **And how to implement them?**
References
Presentation, clarity