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Opened: Tuesday, 1 April 2025, 8:00 AM
Due: Monday, 28 April 2025, 11:59 PM

CoppeliaSim RoboMaster Assignment

Form a group of up to 2 students before **April 15 at 23:59**. If you wish to work alone, you still need to enroll as a one-person group to submit.

Main Tasks Description

1. **Open-Loop Controller - Standard 1 (1pt)**
Write an open-loop controller that moves the RoboMaster robot to follow an "8" trajectory. Test this controller in the default empty scene.
2. **Wall Detection and Alignment - Standard 2 (3pt)**
In the `src/robomaster_example/scenes/robomaster-random-wall-scene.ttt` scene, write a controller to move the Robomaster straight ahead. The scene randomly rotates the wall each time it is reset. The assumption is that the robot heads toward a wall in front of it, but the wall is not necessarily orthogonal to the robot's original direction.
 - The controller should make the RoboMaster move straight until it is near the wall (without hitting it).
 - The robot should then turn in place to face the wall as accurately as possible (i.e., the robot's x-axis should be orthogonal to the wall).
 - To detect the wall orientation, use the distance sensors and define a suitable distance threshold for stopping.**Note:** as this task uses the distance sensors, you need to start the ROS driver with the `ep_tof.launch` launch file. Check the slides for reference.
3. **Wall Avoidance and Positioning - Standard 3 (4pt)**
Extend the controller from point 3 so that once the RoboMaster is near the wall, it should:
 - Turn to face the opposite direction of the wall.
 - Move to a point that is as close as possible to being 2 meters away from the wall.
 - Since proximity sensors don't cover such a long range, you will need to rely on odometry.
4. **Robot Roomba - Advanced Task (2pt)**
 - Write a controller that randomly explores an environment, avoiding obstacles (similar to a Roomba).
 - Deploy the robot in the `src/robomaster_example/scenes/robomaster-room-scene.ttt` scene for Coppelia.
 - Submit a link to a video demonstrating the robot's behavior (accelerated 10x to show 100 simulated seconds in 10 seconds).

Submission Instructions

Please submit an archive of the package folder to iCorsi by **April 28 before 23:59** (fully graded) or **April 29 before 08:50** (~20% of the assignment grade).

Name the submitted file as: `firstname.lastname.zip`.

You should include a short `README` file with instructions and exact commands to launch your controller node.

The submission should include:

- Full code implementation (package folder).
- A brief `README` with:
 - Instructions to run and test the code.
- For each task:
 - Indicate if the task was implemented.
 - Mention any doubts/questions or issues encountered.

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- Provide additional comments or notes, including extra work or experiments.
- Links to videos or screenshots if applicable.

Standard Task

The package should contain a launch file named `standard.launch` which starts the simulation and executes the last standard task you managed to implement (e.g., if you implemented tasks 1, 2, and 3, your file must launch task 3).

Record a video of the task launched by the `standard.launch` file. If the simulation is too heavy for screen capture, use your smartphone to record it. Include a link to the video (e.g., OneDrive, Google Drive) in the `README` of your submission.

Advanced Task

Provide an `advanced.launch` which launches the advanced task and add outline the steps needed to accomplish that in the `README`. Please do similarly to the Standard Task and provide a quick video of the simulation.

Submission status

This assignment requires submission in groups. You are not a member of any group, so you cannot create a submission. Please contact your teacher to be added to a group.

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Group	Not a member of any group
Submission status	Nothing has been submitted for this assignment
Grading status	Not graded
Time remaining	14 days 7 hours remaining
Last modified	-

◀ Homework 2 Groups

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