A ■ Lunar Scout: Task 2B Balancing & Yaw Control

Oct 2023

Aim:

We hope that before starting this task, you have already completed Task 2A and built a CoppeliaSim model of Lunar Scout Bike!

In this task, you will have to import the bike model(*.ttm file) you have created and balance the bike at single point using PID or LQR control algorithm. You have already derived the mathematical model and learnt how to apply and tune control logic in previous tasks.

Few things new in this task:

YAW control: which means, that during the simulation our evaluator will provide you different setpoint for yaw, which you have to rotate and balance the bike upright at that point - ofcourse without moving - only rotation/turning allowed from front motor joint.

Any kind of additional script is not allowed inside our outside the coppelia scene

- Reference Frame: You must have observed that there is a non-respondable object "reference_frame" in the hierarchy as parent of your model, as suggested in Task 2A. You have to get the orientation of bike with respect to this frame. Setpoint will be provided accordingly.
- You are allowed to correct your bike model if it was wrong, but it should still satisfy Task 2A criteria - before you use it for this task.

Downloadables

The boilerplate **Task2B.zip** contains a folder Task2B which will have the following files:

Skip to main content

Task 2B.ttt (scene without the bike)

The Evaluator will be in a separate ZIP here as *Task2B_Evaluators.zip* (UPDATED). It will consist of the following:

- linux
 - task2b (evaluator for Linux)
- mac
 - task2b (evaluator for MacOs)
- windows
 - task2b.exe (evaluator for Windows)

Understanding RUN:

Open the scene **Task_2B.ttt** \rightarrow then import the bike model by dragging & dropping it from model browser \rightarrow Position the model base object(reference_frame) on top of the origin on the floor (x,y)=(0,0)

Add a PYTHON child script to front_motor.
 GET the setpoint broadcasted from evaluator as a FLOAT signal with name as
 "yaw_setpoint".
 Use the following to get yaw setpoint broadcasted by evaluator in
 sysCall_sensing():

yaw_setpoint = sim.getFloatSignal("yav

- Add your control logic similar to Task1B
- Modify your mathematical model for the bike model. You can find the mass, dimensions and moment of inertia in required units from properties menu → by double clicking objects.

The evaluator/grader will start the simulation → Evaluator will keep broadcasting "yaw_setpoint" FLOAT signal with the setpoint value in RADIANS. There will be 3 setpoints, where first one will be at initial yaw pose when the model loads.

- → Each setpoint will be broadcasted for few seconds. After that setpoint(*the "yaw_setpoint" signal*) will be changed and the bike has to rotate(without sliding/moving) to achieve that setpoint.
- → Evaluator will Stop simulation after timeout and generate result & comments.

Skip to main content

- Topics
- My Posts
- More
- Categories
- Lunar Scout (LS)
 Guidelines
 - **ChatbotDocs**
- **All categories**
- Tags
- **●** task-0
- task-1
- task-2
- other
- task-4
- **≡** All tags

→ It will generate task2b_output.txt on successful run.

NOTE: You are allowed to use only **front_motor** JOINT *velocity* to complete this task.

ALL OTHER WAYS USED TO PASS THE TASK - will make submission considered **as INVALID SUBMISSION**

and

Team will be not considered any further in the competition !!!

Submission Instructions:

- Once you have the solution ready, open the solution scene Task_2B.ttt, which should have the bike model.
- (ADD childscript content in same folder as task2b_solution.py after copying solution code inside)
- Activate the conda environment with the following command:

conda activate LS_<team_id>

 Run the evaluator file task2b or task2b.exe by running following command
 For Linux and MacOS:

./task2b

For Windows:

task2b.exe

- If success, it will generate the task2b_output.txt
- Compress the workspace folder Task2B as Task2B.zip which should contain the following
 - Task2B (folder)
 - Task_2B.ttt (With bike and the solution)
 - task2b solution.py (solution code)
 - task2b_output.txt

Skip to main content

- Click on this link: https://portal.eyantra.org/task_task2. In the Task 2 Upload section, click on Task 2B bullet and select Choose file button to upload the Task2B.zip file. From the dialogue box, select the file and click Open.
- You shall see the file name in text-box besides the Choose file button. Click on Upload Task button to submit the file.

Superb!! Way to go for next task \rightarrow \rightarrow



- **ℰ** [Announcement] Task 2B Evaluator!
- **𝚱** Lunar Scout: Task 2
- **𝚱** [Announcement] Task 2B Evaluator UPDATED
- **𝚱** [URGENT] Task2B Evaluator UPDATED

Closed on Oct 10, 2023

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≜ Lunar Scout: Task-4	1	969	Nov 2023
☑ Doubt in Task 2A LS_3083 task-2	1	76	Oct 2023

Skip to main content

Topic	Replies	Views	Activity
Task2B doubt in yaw point LS_3083 task-2	2	107	Oct 2023