Version 2024.1

Assignment (Make-Up)

Mathematics for Robotics

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This assignment is part of the *Fall 2024* offering of *ROB310: Mathematics for Robotics* at the University of Toronto. Please review the information below carefully. Submissions that do not adhere to the guidelines below may lose marks.

Release Date: ..... November 15, 2024 - 00:01
Due Date: ..... December 03, 2024 - 23:59
Weight: ..... 15% or 0%
Late Penalties: ..... Late submissions not accepted

Submission Information:

- Typeset your paper using LaTeXor other typesetting software (such as Microsoft Word or Google Docs).
- Submit your paper on Crowdmark titled `lastname-firstname-rob310f24-afin.pdf`.

Outline:

The goal of this assignment is to have you design a project that future students of this course could undertake. Your project should involve concepts taught in this course, including robot modeling, simulation, optimization, and tracking. While the project does not need to include all course concepts, it should strike a balance between incorporating multiple relevant topics and ensuring it is relatively easy to complete. The project's primary purpose is to enhance understanding and provide an instructive experience, not to act as a challenging evaluation. A small programming and/or simulation component is required to ensure that students can apply theoretical knowledge practically. A small programming and/or simulation component is required to ensure that students can apply theoretical knowledge practically. The code must be written in `Python` and executable in a Google Colab environment. The emphasis is NOT on the complexity of the problem, but rather the quality of the explanation of its solution. Do not make your problem overly complex or write too much code. We are looking for quality, not quantity. You should be able to complete this assignment in a weekend.

Deliverables:

As part of this assignment, you must provide:

1. a (maximum) two-page report (including references)
2. a link to a Google Colab document that includes any simulation code

Report:

The report should include the following:

- a high-level description of the problem being solved
- a motivation
- a mathematical formulation of the problem
- a description of the solution approach
- results from any simulations
- a discussion of the results
- any relevant references

The report should not exceed two pages (including references). For those of you who wish to use LaTeX, we have provided a template.

Code:

The code must be written in `Python` and executable in a Google Colab environment. The code should not be significantly more complex than the examples provided in this course.

Evaluation Criteria:

Your submission will be assessed based on the following:

- Creativity and Depth: Is your problem unique and does it engage students with course concepts?
- Clarity and Accessibility: Is the problem description easy to understand, and is the solution achievable by future students?
- Correctness of Solution: Does your solution demonstrate mastery of the concepts and attention to detail?
- Report Quality: Is the report clear, concise, and visually informative?