EN.530.626: Trajectory Generation for Space Systems
Homework 4
Due Nov 4th 11:59PM

The code for this assignment can once again be found on GitHub at this link and can be downloaded by running `git clone https://github.com/JHU-ACEL/trajdesign_hw.git` from a terminal window. Due to a change in the `Dockerfile` to support a mixed-integer programming solver, you will have to rebuild your `Docker` image. Homework submissions and grading will be managed through Canvas.

Introduction

This homework will focus on the following technical concepts:

1. The combinatorial complexity of solving associated with solving motion planning problems that commonly arise.
2. Learning about globally optimal and approximate techniques to subsequently solve such challenging planning problems.

To accomplish this, the software development learning goals include,

- Gaining familiarity with implementing a tree-search based sampling-based motion planning problem.

Problem 1: Mixed-Integer Linear Programming

In this problem, we will be implementing a mixed-integer linear program (MILP) solver for the problem of avoiding axis-aligned rectangular obstacles.

Problem 2: Geometric RRT

In this problem, we will be implementing the geometric variant of the rapidly-exploring random trees (RRTs) [1].

Submission Instruction

- Download the marimo notebook for each problem and join them together into a single PDF or HTML file named `hw3.pdf`.
- Compress the `hw4` folder containing your python files. Name this file “hw4.zip”.
- Upload both the PDF/HTML file and the zip folder into the canvas assignment “`Homework 4`”.

References

[1] S. M. LaValle and J. J. Kuffner, “Randomized kinodynamic planning,” *Int. Journal of Robotics Research*, vol. 20, no. 5, pp. 378–400, 2001.