

# Project 2: Implementation of a Path Planner

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For this assignment you will have to implement a Path Planner algorithm for a robotic base. You can pick your preferred path planner: Artificial Potential Field, PRM, RRT, etc.

## 1 Working with Colab

Colab is a tool that allows you to run python code from your browser and we will use it to give you premade code which will help you understand how to use some libraries and that you can use to create your path planner.

To use colab, we recommend that you

1. Go to <https://colab.research.google.com/notebooks/intro.ipynb>
2. Upload the .ipynb file attached to this project

The attached file has comment along the code to help you understand what we are doing

## 2 Collision checking and Graphs

To create the path planner we need to be able to check for collision. To do this, we will be using the Flexible Collision Library (fcl) to create basic objects and check for collisions. You can learn more about the library at <https://github.com/BerkeleyAutomation/python-fcl>.

Similarly, when creating a path it is good to create a graph with nodes and edges to keep track of what we are doing. For this we are using the library Networkx and examples on how to use it are also included on the colab file.

## 3 Design your own path planner

The goal of this project is for you to implement the path planner of your choice.

The environment is defined in the colab file, as a square with bottom left corner at  $[-0.5, -0.5]$  and top right corner at  $[8.5, 8.5]$ . There are 7 object (4 cubes and 3 cylinders) placed around this space. The goal is for the robot to start at the origin  $[0, 0]$  and get to the desired position  $[8, 8]$ .

## 4 Deliverables

You should submit a report explaining the algorithm that you implemented and talk about the major challenges that you encountered. You should also include:

- An image of the final graph produced and highlighting the final path. If you have a method that is not graph base like potential fields, discretize the final trajectory, show the plot of the trajectory.
- The code written.