Path Planning using Python

Aim

To implement and test path planning algorithms like RRT(Rapidly exploring Random Trees), PRM(Probabilistic Road Map), Potential Field using python and matplotlib.

Prerequisites

- Basic knowledge of python recommended but not required.

Logistics

- Mentors: Suhrudh, Archit, Sushant
- Tentative team size: 2-3
- Weekly meetings to discuss updates and any problems people may be having

Timeline

Week	Topic	Goals
1	Basics of path planning, and matplotlib	• Understanding the basic need of path planners. • Brushing up basics of python • Learning how to plot graphs using matplotlib.
2-3	Understanding RRT and implementing it.	• Understanding RRT thoroughly. • Implementing RRT using python • Visualizing the algorithm using matplotlib
4-5.5	Understanding and implementing PRM	• Understanding PRM thoroughly. • Implementing PRM using python • Visualizing the algorithm using matplotlib
5.5-6	Understanding and implementing Potential Field Algorithm	• Understanding Potential Field Algorithm thoroughly. • Implementing Potential Field Algorithm using python • Visualizing the algorithm using matplotlib

Further ahead

Path planning algorithms do not have an end. Each algorithm has its own variations and thus making it a very vast field. The above algorithms are one of the most basic path planners. The obvious next step that an interested individual would take is to go through the variations of the above path planning algorithms like RRT*, PRM* etc. There are in fact variations of RRT* algorithms as well.
Path planning is a vast area of research, and once you have implemented a few algorithms, you would be more comfortable in going through path planning papers. Maybe then, one day you may even write your own algorithm!

Resources (*Work in progress*)

- Basic understanding of path planning algorithms : (YouTube Link)
- Guide to matplotlib python plotting library (YouTube Link)
- Introduction to sampling based algorithms (YouTube Link)
- RRT algorithm : (Medium Article)
- PRM algorithm : (Medium Article)
- Potential Field Algorithm : (Medium Article)
- Potential Field Paper (PDF)