Kratos – Autonomous Subsystem QSTP-2021

Week 2

In this assignment you will be introduced to robotics research through the field of motion planning.

Algorithm Review

Many different algorithms have been developed for robot motion planning and more are being developed every year. This task is designed to give you a taste of this very active area of research.

Your task is to prepare a short document reviewing the below algorithms used for Path Planning.
1.Djikstra
2. A*
3. Slam

Your review should at least cover the basics of each method, and must be at least 500 words in length. You can go into whatever level of detail you feel comfortable with and are more than welcome to write much more than 500

Don’t worry if you haven't heard of these algorithms before . We are providing a bunch of resources where you can learn more at the end of this document. Also feel free to search on google, wikis, youtube etc..
If you find an interesting resource that we missed out, please share them on the group.

Bonus

For bonus marks you can try to implement either of the given algorithms. One simple framework you could try out is displaying your results with matplotlib with the obstacles as shapes in the figure and your path shown as a line between them. Here your obstacles would be represented by simple lists of points.

Submission

The submission for task 1 should be either a pdf document or a markdown file added as a readme to a week4 directory within the github repo. You can add the link to your repo as the submission in google classroom. For the bonus, you can upload the code as well as an example of the path planning.

Resources:

https://www.youtube.com/watch?v=aC4LQuB4Cic&list=PLggLP4f-rq01Q3clJrnWFPRt pUwSlr4mG (Videos series on the basics)

https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-410-principles-of-autonomy-and-decision-making-fall-2010/lecture-notes/MIT16_410F10_lec15.pdf (Sildeshow)

http://correll.cs.colorado.edu/?p=965 (Webpage)

http://www.kostasalexis.com/uploads/5/8/4/4/58449511/5_2_samplingbasedplanning. pdf (Slideshow on RRG)

http://www.cs.columbia.edu/~allen/F15/NOTES/Probabilisticpath.pdf (Notes)

https://www.youtube.com/watch?v=hFGhaSRV1zY

https://www.youtube.com/watch?v=VzLWV3eHK3I&list=PL_onPhFCkVQhuPiUxUW2lFHB39QsavEEA&index=62 (Videos on PRM)

https://www.youtube.com/watch?v=hFGhaSRV1zY&list=PL_onPhFCkVQhuPiUxUW2lFHB39QsavEEA&index=61 (Video on RRT)

https://demonstrations.wolfram.com/RapidlyExploringRandomTreeRRTAndRRT/ (RRT* demo)

https://medium.com/@theclassytim/robotic-path-planning-prm-prm-b4c64b1f5acb (Blog post on PRM)

http://ais.informatik.uni-freiburg.de/teaching/ss11/robotics/slides/18-robot-motion-pla nning.pdf (Slideshow)

http://roboticsproceedings.org/rss06/p34.pdf (Research Paper)

http://lavalle.pl/planning/ (Textbook)

https://qiao.github.io/PathFinding.js/visual/ (A visualizer to visualize path planning algorithms)

(Credits to ERC BITS Goa for the assignment)