

11. Assignment, Introduction to Robotics WS17/18 - Ver. 0.99

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Submission: online until Tuesday, 30 Jan 2018, 11:55 a.m.

Please summarize your results (images and descriptions) in a pdf-document and name it, e.g., "RO-11-<surnames of the students - group name>.pdf".

Only one member of the group must submit the necessary files.

Do not copy solutions to other groups.

Every group must contain two people, unless granted differently.

Only submissions via KVV will be accepted.

1 - Rapidly Exploring Random Trees (5 points)

Imagine, you had sampled the following 5 points:

$P_1(3,4)$; $P_2(2,1)$; $P_3(5,4)$; $P_4(2,2)$; $P_5(8,1)$.

- a) (3 Points) Create an RRT - draw the graph with its vertices and edges. The maximum step length shall be 2 . The starting configuration shall be at $(0,0)$.
- b) (2 Points) Draw the voronoi diagram w.r.t. vertices in the RRT.

2 - Dubins curves (5 points)

Imagine, you had a starting configuration of $(x_1=2, y_1=3, \theta_1 = \pi/2)$ and a final configuration of $((x_2=8, y_2=4, \theta_2 = 0))$. The turning radius for the vehicle is 4 .

Calculate the distance between start and end configuration (as a distance on the dubins curves, if no such path exists, explain why) for:

LSL, RSL, LRL.

Say, how far you traveled in each of the three subparts, e.g.: LSL = 10, with $L_1 = 2$, $S_2 = 5$, $L_3 = 3$.

Also draw the path which the vehicle would follow to reach the final position. You can use your sketch as a help for your calculations.