AA 274: Principles of Robotic Autonomy
Problem Set 4

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Problem 1

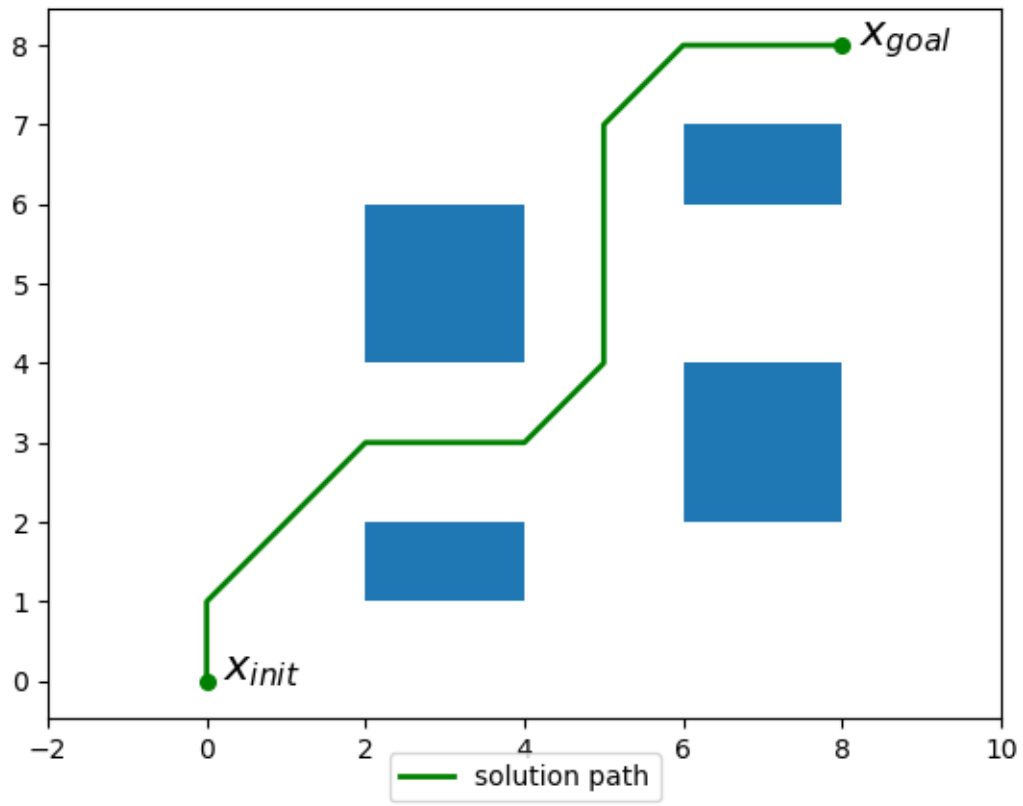(i) No need for writeup

(ii) Following are the plots:
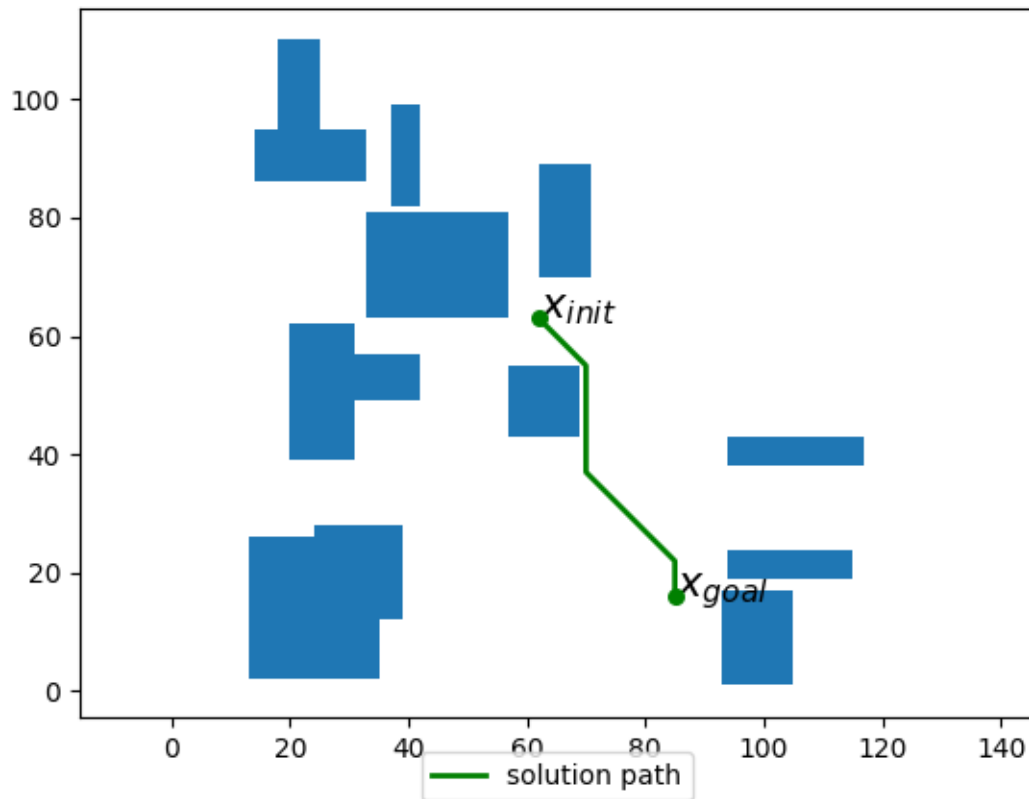

Figure 1: A* implementation for a simple example

Figure 2: A* implementation for a large random example

Problem 2

(i) No need for writeup

(ii) No need for writeup
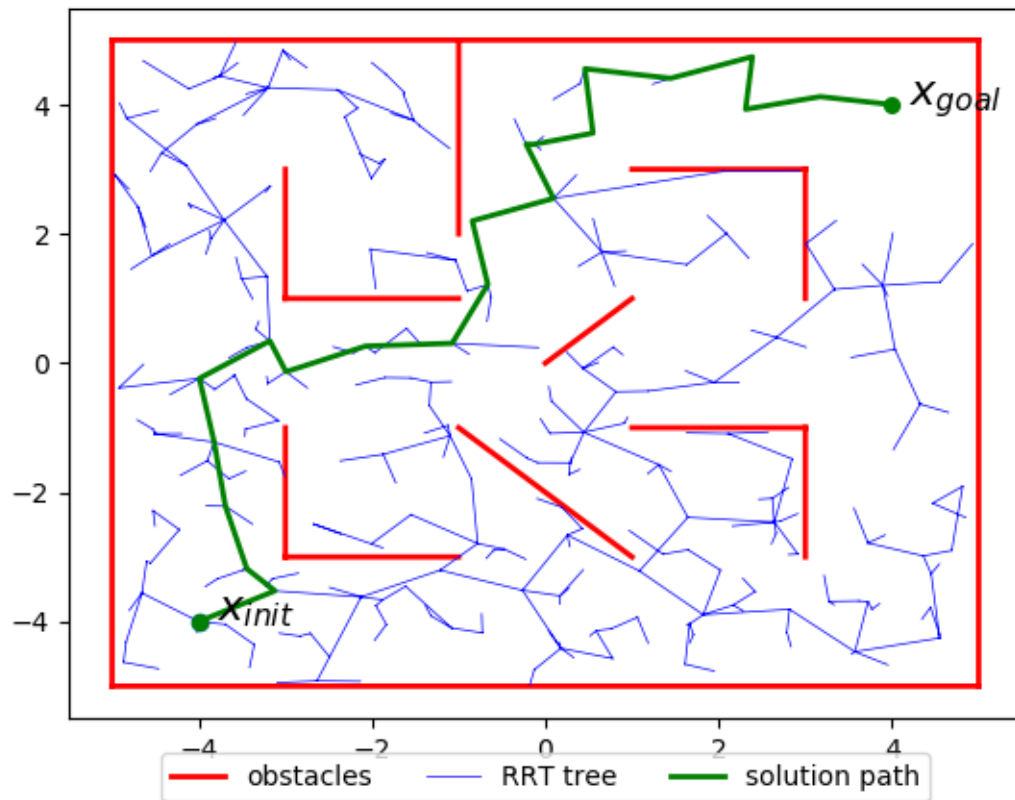
(iii) Following are the plots:

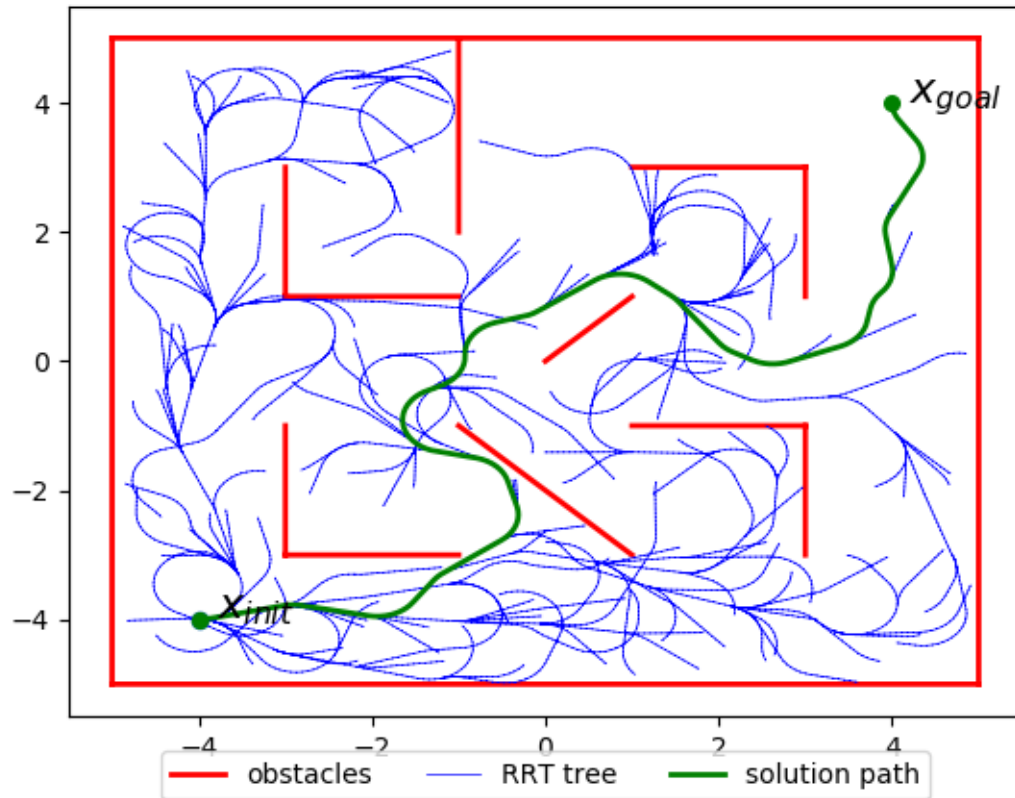Figure 3: RRT implementation for 2D geometric planning problems

Figure 4: RRT implementation for Dubins car planning problems

Problem 3

(i) We are using navigator.py for motion planning.

(ii) navigator.py subscribes to the topics **\map, \metadata and \cmd_nav**

- For the topic **\map** the callback function is **map_callback**, which is used to set the occupancy grid for the map.
- For the topic **\map_metadata** the callback function is **map_md_callback**, which is used to set the origin and decide the width, height and resolution of the map.
- For the topic **\cmd_nav** the callback function is **cmd_nav_callback**, which is used to set the goal position for navigation.

(iii) navigator.py publishes to the topics **\cmd_path, \cmd_pose, \cmd_path_sp and \cmd_vel**

- For the topic **\cmd_path** the message is **Path**, which is used to publish a path plan for visualisation.
- For the topic **\cmd_pose** the message is **Pose2D**, which is used to get close to the nav goal using the pose controller once we are close to the goal.

- For the topic **cmd_path_sp** the message is **Pose_Stamped**, which is used to publish desired x and y coordinates for visualization.

- For the topic **cmd_vel** the message is **Twist**, which is used to align with the path plan, if we are stationary.

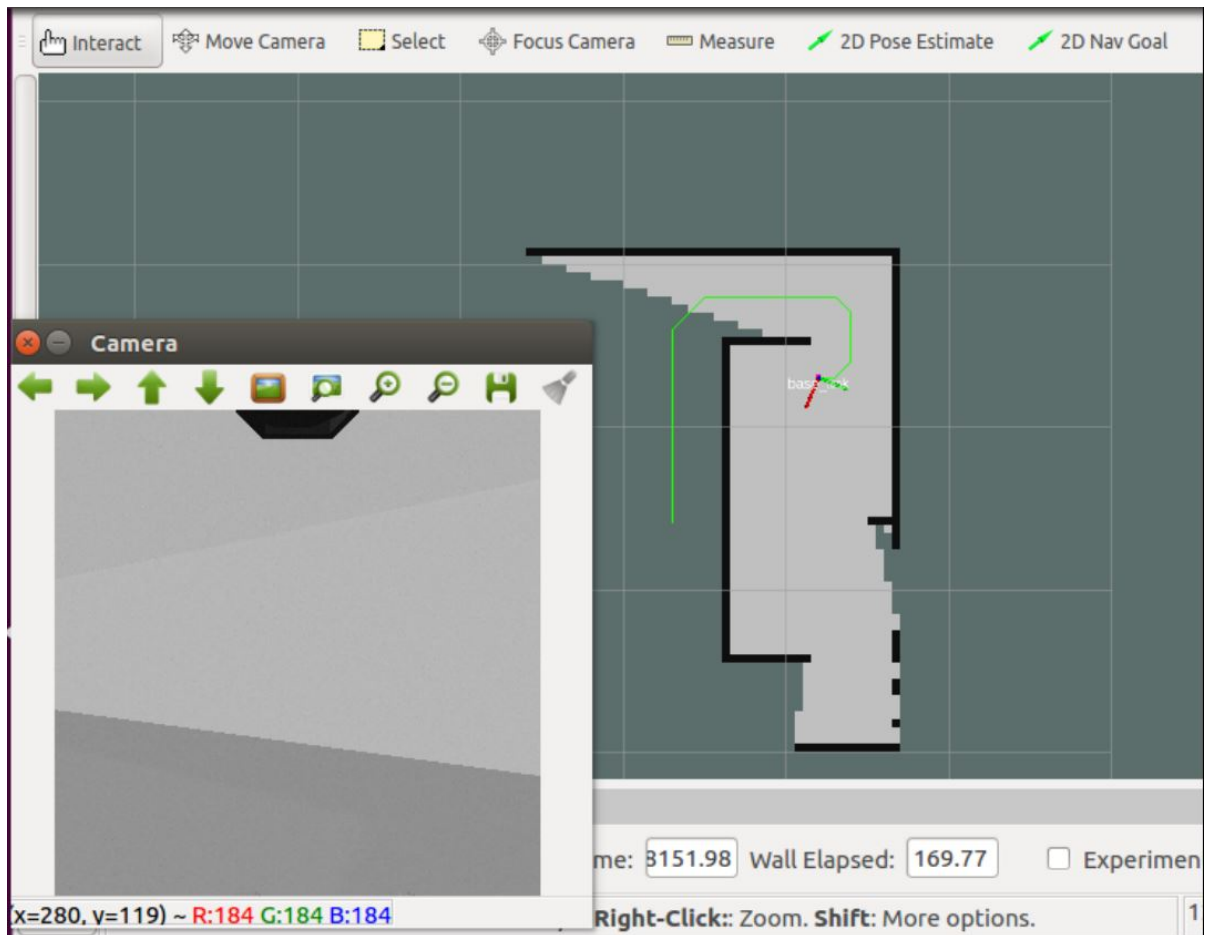(iv) A screenshot of Rviz is attached below:

Figure 5: Screenshot of nav.rviz when running turtlebot3_nav_sim.launch.