

Lab Assignment 3.

Team 16.

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Q5

Here is the path previously we have got.

Path waypoints:

```
[[[-1.5      3.22      1.23      -2.19      1.8      1.2      ]  
[-1.66120364 3.36553493 1.16407034 -2.24708011 1.84643123 1.27464751]  
[-1.72406054 3.53474787 1.06664176 -2.15889114 1.95589638 1.30041085]  
[-1.80789302 3.50115124 1.2610341 -2.1563178 2.08380806 1.2867368 ]  
[-1.8930764 3.54297972 1.31299887 -2.20848974 2.03625024 1.50076992]  
[-1.94021355 3.71321265 1.39765924 -2.10530159 2.14669705 1.53661918]  
[-2.08478427 3.84629937 1.31659023 -2.00570618 2.14352841 1.62255962]  
[-2.17106476 3.94435407 1.21857635 -2.12629788 2.09371614 1.75971141]  
[-2.17933586 4.06015931 1.39610032 -2.22267105 2.15656326 1.82504463]  
[-2.0887359 4.18748195 1.51160204 -2.19767072 2.25055904 1.70143346]  
[-1.72      4.44      2.02      -2.04      2.66      1.39      ]]]
```

Then, the following is the path that uses `_get_random_sample_near_goal` method with 0.2 goal precision.

Path waypoints:

```
[[[-1.5      3.22      1.23      -2.19      1.8      1.2      ]  
[-1.53724943 3.39540482 1.33779584 -2.1643001 1.93048836 1.23221786]  
[-1.70824448 3.40649689 1.3181642 -2.12437642 1.98960081 1.39854308]  
[-1.70847165 3.5927638 1.4432079 -2.10811981 2.0984733 1.40569607]  
[-1.83133384 3.73165706 1.52330233 -2.03699813 2.22450997 1.43317135]  
[-1.72      4.44      2.02      -2.04      2.66      1.39      ]]]
```

As we can observe, even though the final accuracy is more accurate due to smaller goal precision, using the sample near the goal, we can actually find the path within the smaller number of iteration leading to the smaller amount of computation.

Q6

See the figures we attached below. Sampling any random point only around the goal state, the area where new node would extend will be bounded within certain space. So in figure 2, we have a path to the goal. However, in figure 3, there is an obstacle which spans across space where the tree grows. So after adding a few nodes, the next node will always be in a collision and the RRT will not return a solution. Path.

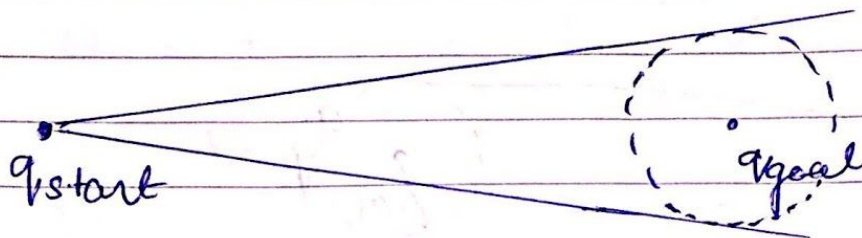


Fig 1

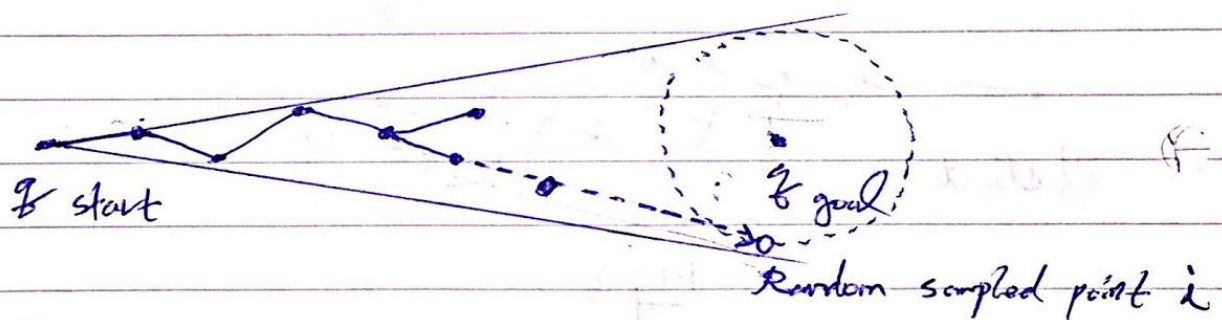


Fig 2

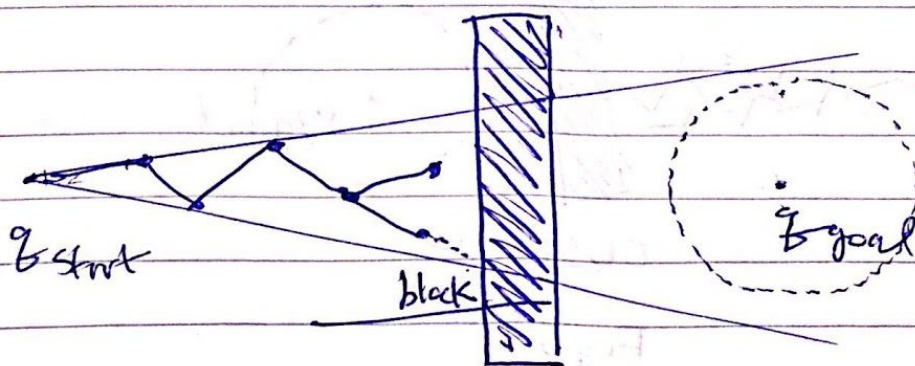


Fig 3