RRT Sampling-Based Motion Planning

In [1]:
```
# The autoreload extension will automatically load in new code as you edit file
# so you don't need to restart the kernel every time
%load_ext autoreload
%autoreload 2

import numpy as np
import matplotlib.pyplot as plt
from P2_rrt import *

plt.rcParams['figure.figsize'] = [8, 8] # Change default figure size
```

Set up workspace

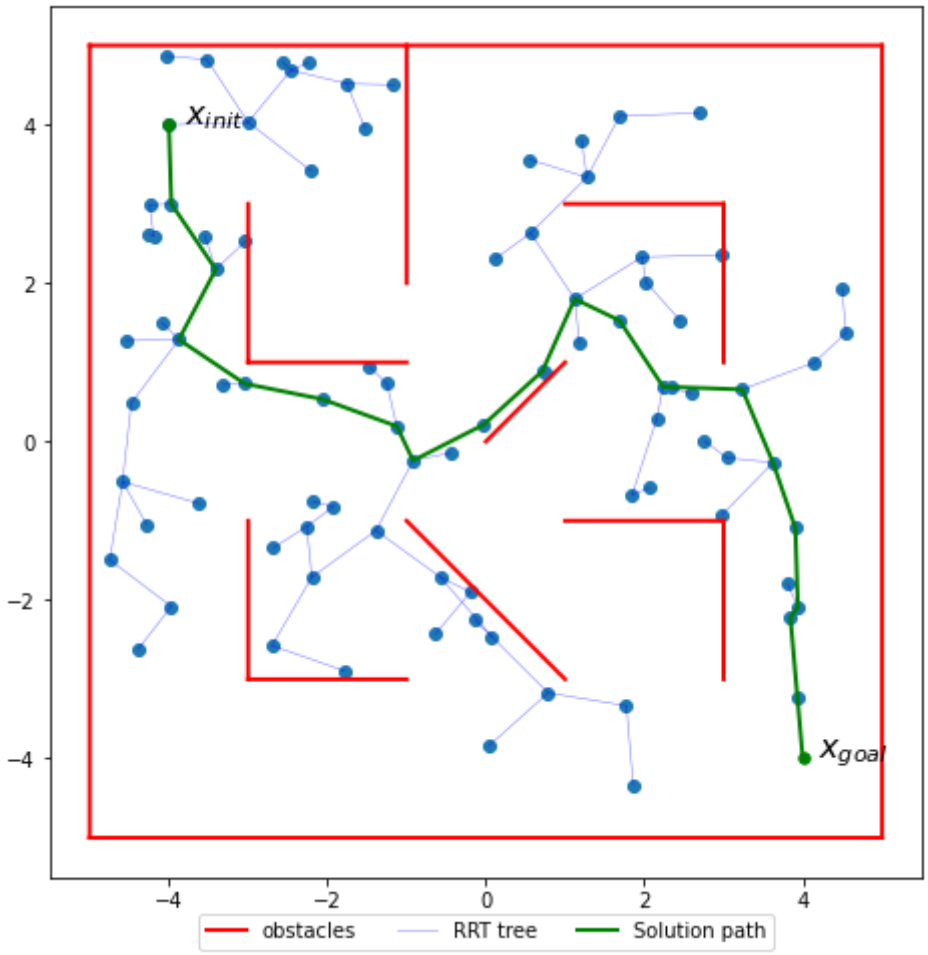
In [2]:
```
MAZE = np.array([
    (( 5, 5), (-5, 5)),
    ((-5, 5), (-5,-5)),
    ((-5,-5), ( 5,-5)),
    (( 5,-5), ( 5, 5)),
    ((-3,-3), (-3,-1)),
    ((-3,-3), (-1,-3)),
    (( 3, 3), ( 3, 1)),
    (( 3, 3), ( 1, 3)),
    (( 1,-1), ( 3,-1)),
    (( 3,-1), ( 3,-3)),
    ((-1, 1), (-3, 1)),
    ((-3, 1), (-3, 3)),
    ((-1,-1), ( 1,-3)),
    ((-1, 5), (-1, 2)),
    (( 0, 0), ( 1, 1))
])

# try changing these!
x_init = [-4,4] # reset to [-4,4] when saving results for submission
x_goal = [4,-4] # reset to [4,-4] when saving results for submission
```

Geometric Planning

In [3]:
```
grrt = GeometricRRT([-5,-5], [5,5], x_init, x_goal, MAZE)
grrt.solve(1.0, 2000)
```

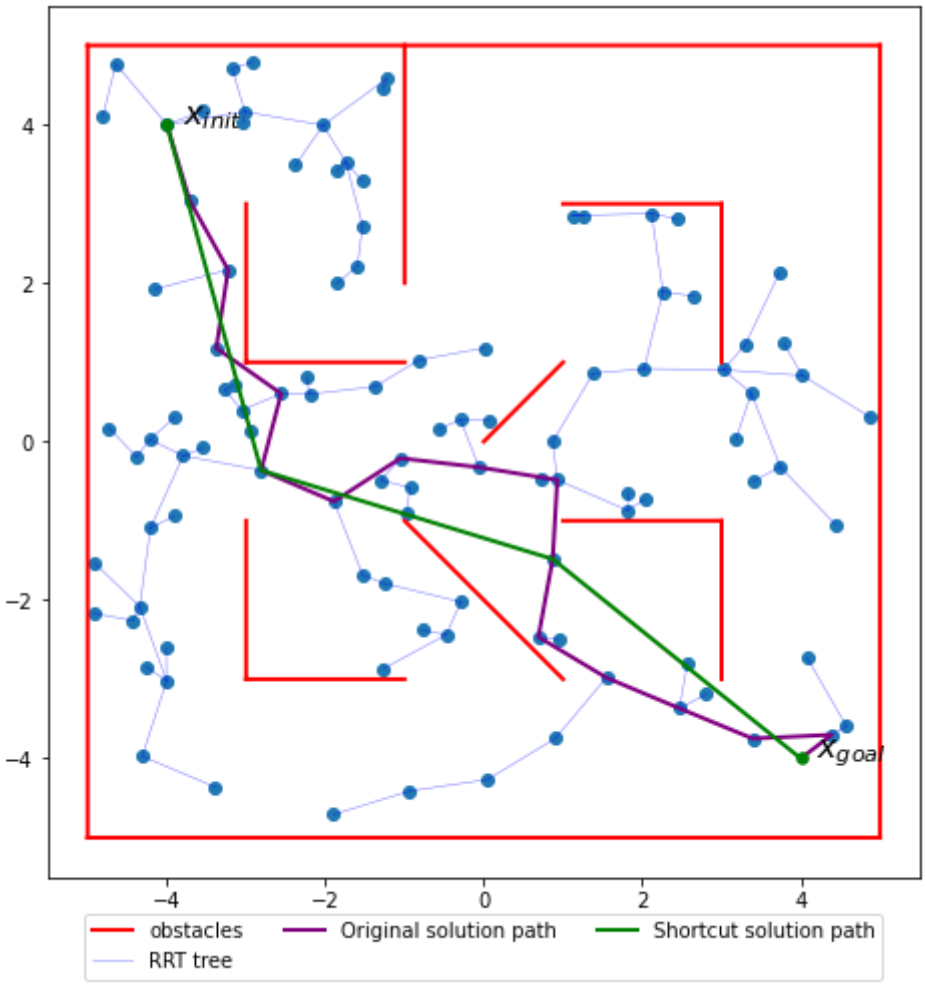
Out[3]:
```
True
```



Adding shortcutting

In [4]:
```
grrt.solve(1.0, 2000, shortcut=True)
```

Out[4]:
```
True
```

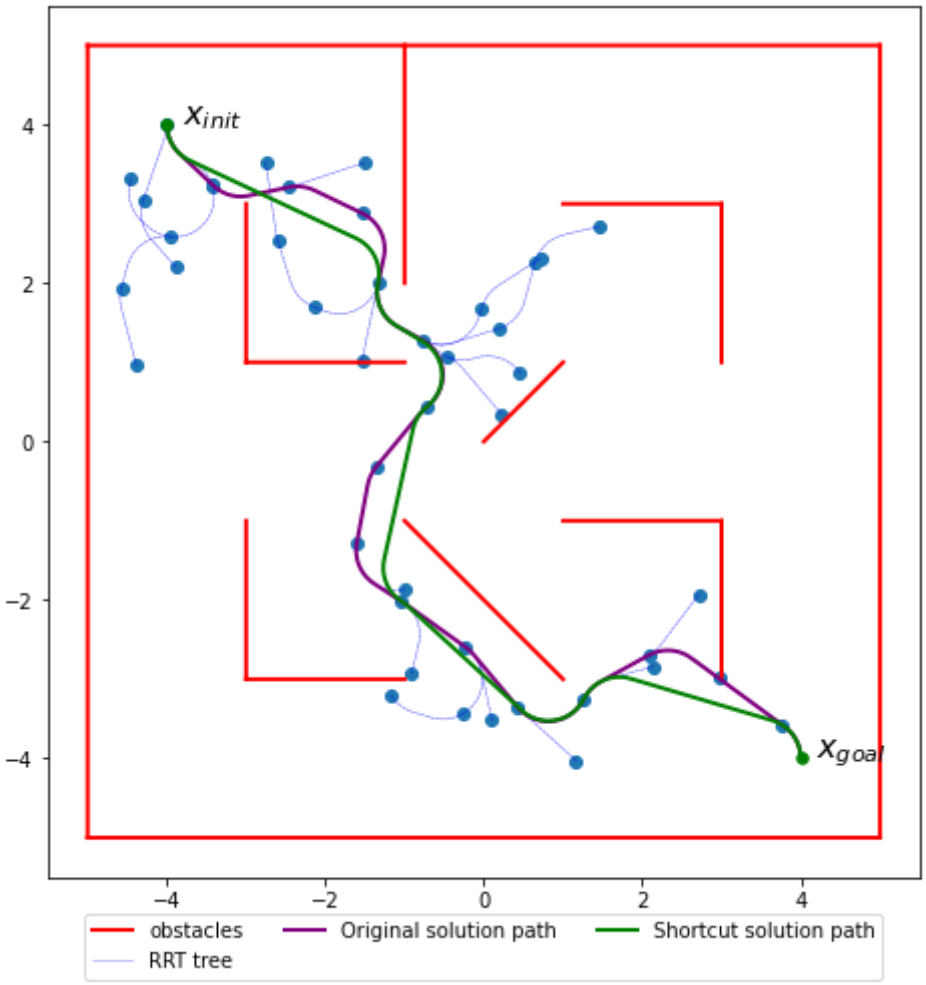


Dubins Car Planning

In [25]:
```
x_init = [-4,4, 3*np.pi/2]
x_goal = [4,-4, 3*np.pi/2]

drrt = DubinsRRT([-5,-5,0], [5,5,2*np.pi], x_init, x_goal, MAZE, .5)
drrt.solve(1.0, 1000, shortcut=True)
```

Out[25]:
```
True
```


x_{init}
x_{goal}
4
2
0
−2
−4
−4
−2
0
2
4
obstacles
Original solution path
Shortcut solution path
RRT tree

In [ ]:

In [ ]:

In [ ]:

In [ ]: