Robot Autonomy – Homework 2

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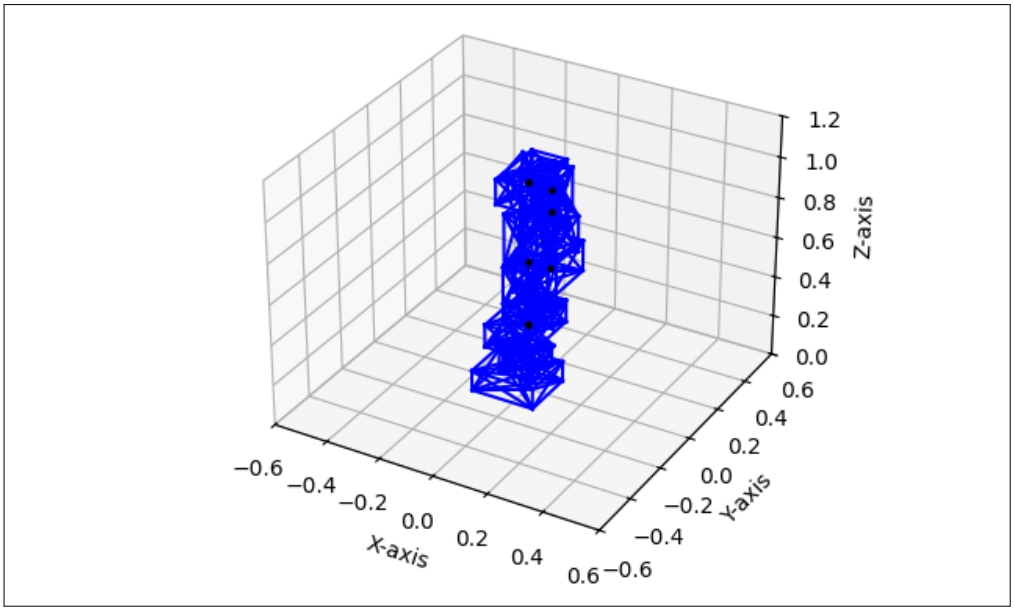
Cuboid Collision Detection

Test Case	Origin (m)	Orientation (rad)	Dimensions (m)	Result
1	(0,1,0)	(0,0,0)	(0.8,0.8,0.8)	False
2	(1.5,-1.5,0)	(1,0,1.5)	(1,3,3)	False
3	(0,0,-1)	(0,0,0)	(2,3,1)	True
4	(3,0,0)	(0,0,0)	(3,1,1)	True
5	(-1,0,-2)	(0.5,0,0.4)	(2,0.7,2)	True
6	(1.8,0.5,1.5)	(-0.2,0.5,0)	(1,3,1)	False
7	(0,-1.2,0.4)	(0,0.785,0.785)	(1,1,1)	True
8	(-0.8,0,-0.5)	(0,0,0.2)	(1,0.5,0.5)	True

```
Collision between block 0 and given test block:  False
Collision between block 1 and given test block:  False
Collision between block 2 and given test block:  True
Collision between block 3 and given test block:  True
Collision between block 4 and given test block:  True
Collision between block 5 and given test block:  False
Collision between block 6 and given test block:  True
Collision between block 7 and given test block:  True
```

Bounding Boxes



RRT Motion Planning

RRT Connect with Goal Bias

goal_bias = 0.1

step_size = 0.3

Number of Steps without Shortening = 31

Number of Steps with Shortening = 3

Outputs:

Without Path Shortening: https://youtu.be/c2BA_O1wWkw

With Path Shortening: https://youtu.be/0emJ8ssZack

PRM Motion Planning

Vertices = 1500

Neighbours defined as L2 Norm < 2 radians.

Time taken to generate PRM: 122.94546556472778

Plan Found = Plan: [1333, 31, 1293, 1166]

Executed Output: https://youtu.be/gqURleVxb4U