AERIAL ROBOTICS KHARAGPUR - TASK 2

ABSTRACT

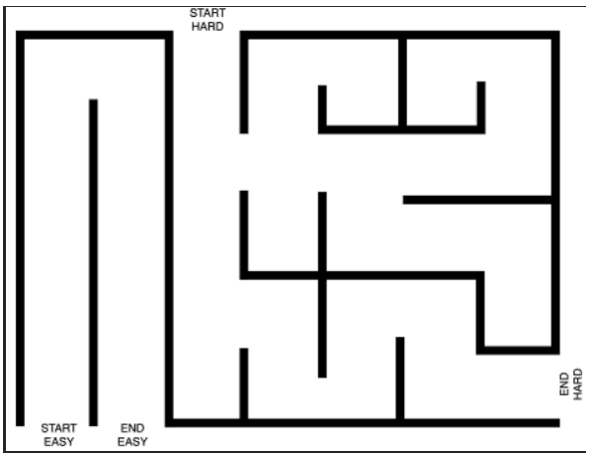
Implementation of path planning Using Probabilistic RoadMap To find a route from the starting Point to ending point in the given Maze. Using the PRM technique, we Generate random nodes and iteratively We check whether it lies in config Space or obstacle space. Depending On that we update the node space/list. There are wide applications of PRM Which includes providing a routemap To the robotics.

I . INTRODUCTION

The problem Statement is to come up With solution to the maze provided. It is based on the technique of Maze Solving using Path Planning algorithm

II. PROBLEM STATEMENT

To develop a path from the starting point to ending point with the help of PRM algorithm. The given maze image is given as input to the program which identifies the obstacles and creates rnd points and then form lines .Which eventually forms path



We need to find two paths for Easy and hard as defined in the maze image.

III. RELATED WORK

There are plenty ways of solving Maze using different algorithms Like RRT,RRT*, A* etc. These Algorithm have a advantage of Reducing the number of iteration And reaching the goal faster.

IV. INITIAL ATTEMPTS

Initially had a different approach Using the matrices of binary type Where 1 stands for free space and 0 stands for obstacles. But realised Approaching the PS through Coordinate will be a more general One.

V. FINAL APPROACH

(TASK-A)

Configuration Space :

The set of all configurations or positions that a robot can attain. We also refer to it as c-space

Configuration Space Obstacles :

It is the region in which either the Robot collides with the physical obstacles

Let's look at the steps involved in the process :-

a) A random node is generated in the configuration space

b) The system checks whether this node lies in free space or not

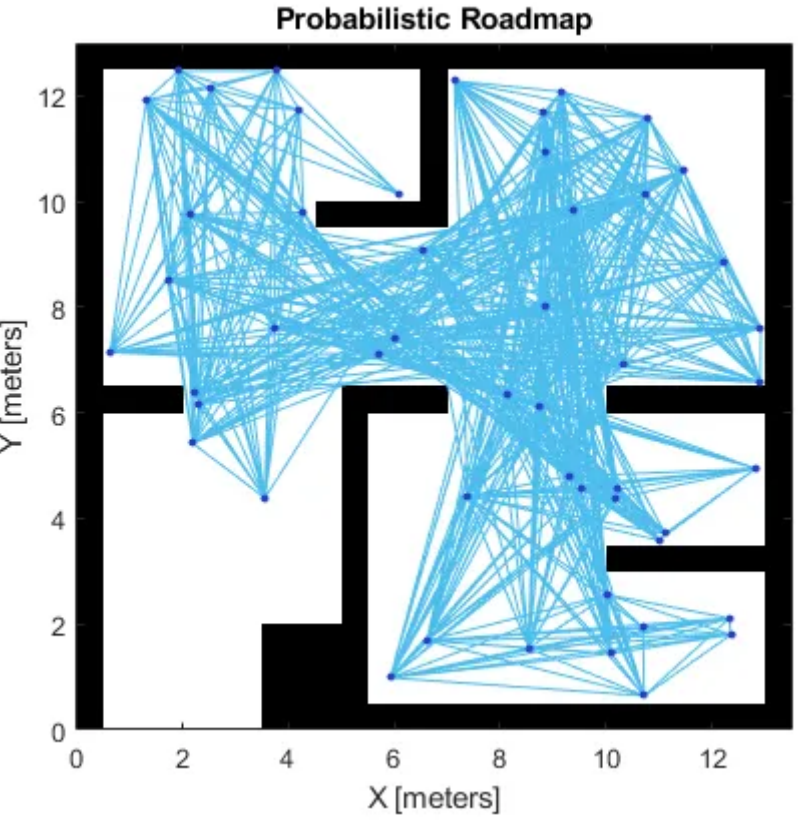
c) If the node is in free space, it is added to the graph.

d) This newly generated node is then connected to the closest nodes through a straight line.

e) The system then checks if the connection between two nodes lies in free space or not.

f) If it lies in free space, the connection is added to the graph. Let's refer to these connections as edges

In this way iteratively we find the path from The start to the goal point.



VI. RESULTS AND OBSERVATIONS

Drawback of this Algorithm ➖

This algorithm is very useful but it does not give the optimal solution every time. Consider a configuration space with a large number of obstacles situated very close to each other. Assume he gap between two Obstacles is very small. Recall that our system generates nodes Randomly. Due to this probability Of generating node in between is Very less. As a result the path might Not be found though there exist a path.

VII. FUTURE WORK

In this algorithm we will achieve the Final path but not in a quick manner. To improve this in the future we can Try using RRT* or A* which are Time efficient algorithms.

VIII. CONCLUSION

Overall it was a great experience with the task. Got a hands on experience

With the projects involving many concepts

Related to Robotics. Initially tasks were felt

As Mammoth but once got into the process

Of learning could feel the joy.

REFERENCES

- Probabilistic Roadmap (PRM) for Path Planning in Robotics | by Arushi Khokhar | ACM JUIT | Medium
- Python's Path Through Mazes: A Journey of Creation and Solution | by Michael Gold | Medium