

Potential-field guided sampling-based obstacle avoidance

Aim:

To plan a path from a given source to a given goal. The given space may contain some obstacles and our aim is to find a smooth path.

Previous Work:

The RRT* algorithm finds a path from the source to the destination by generating a random set of nodes and adding an edge from the tree to the nearest node, thereby growing the tree network. In the potential field algorithm, the destination and the obstacles generate opposite potential fields and the robot tries to follow a path which has minimum potential. Thus the resultant path is smooth.

Approach:

We will like to implement RRT* algorithm along with the idea of potential field. RRT algorithm gives the path which contains many sharp corners, on the other hand the potential method is very smooth but suffers from the problem of local minima. We will combine both the algorithms to generate a model that contains a smooth path from the source to the destination.

Papers:

- RRT-Connect: An Efficient Approach to Single-Query Path Planning – James J. Kuffner, Steven M. LaValle
- Potential Guided Directional-RRT* for Accelerated Motion Planning in Cluttered Environments - Ahmed Hussain Qureshi, Khawaja Fahad Iqbal, Syeda Madiha Qamar, Fahad Islam, Yasar Ayaz, Naveed Muhammad
- Sampling-based algorithms for optimal motion planning - Sertac Karaman and Emilio Frazzoli
- Rapidly Exploring Random Trees: A New Tool for Path Planning - Steven M. LaValle
- Efficient Local Sampling for Motion Planning of a Robotic Manipulator - Byrne, S and Naeem, W and Ferguson, RS

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