Cs 404 Assignment 3

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Motion Planning

a) What is motion planning?

Motion planning solves the problem of going from a starting point to a goal target without any collisions with obstacles while respecting all robotic constraints.

b) How is motion planning different from task planning?

Discrete reasoning is being used for task planning while continuous reasoning of the environment is being used for motion planning. In task planning, algorithms such as heuristic graph search, constraint satisfaction, formal methods are applied. For motion planning sampling and optimization based, graph search algorithms are prefered.

- c) Describe three sample real-world applications of motion planning mentioned in the talks.
- 1)Cargo Transfer Bag Retrieval at NASA: The tasks such as removing bag, holding bag and takin the bag to its destination in zero gravity have to be completed by the robot by applying task and motion planning.

2)Online Multilayered Motion Planning with Dynamic Constraints for Autonomous Underwater Vehicles:

The problem to be solved is start to goal motion. Autonomous Underwater Vehicles (AUVs) move through an unknown environment. Considering the non-linear dynamics, safety and motion constraints of AUVs, motion planning is experimented and applied by using multilayered structure to reach the goal point. It is seen that robot follows a similar path to the planned path in the experiments.

3)SPIKE Proteins: SPIKE protein molecules change their shape to bind to the receptors. These molecules may be thought of as robots to apply motion planning imitate their actions for necessary experiments to create immune resistance against cancer cells.