HERB Task Planning

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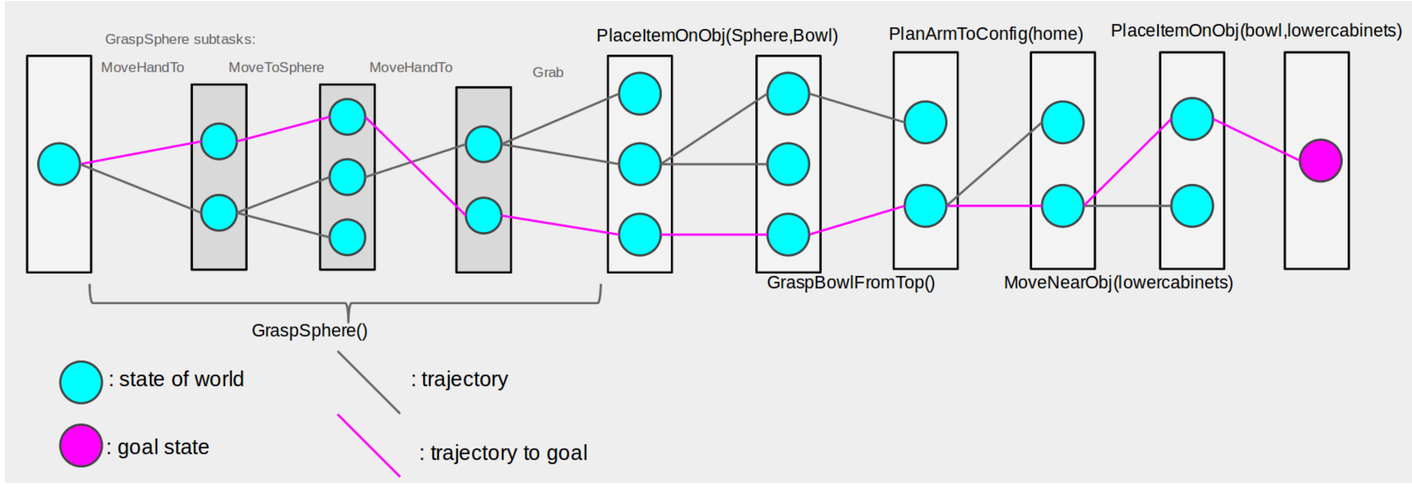
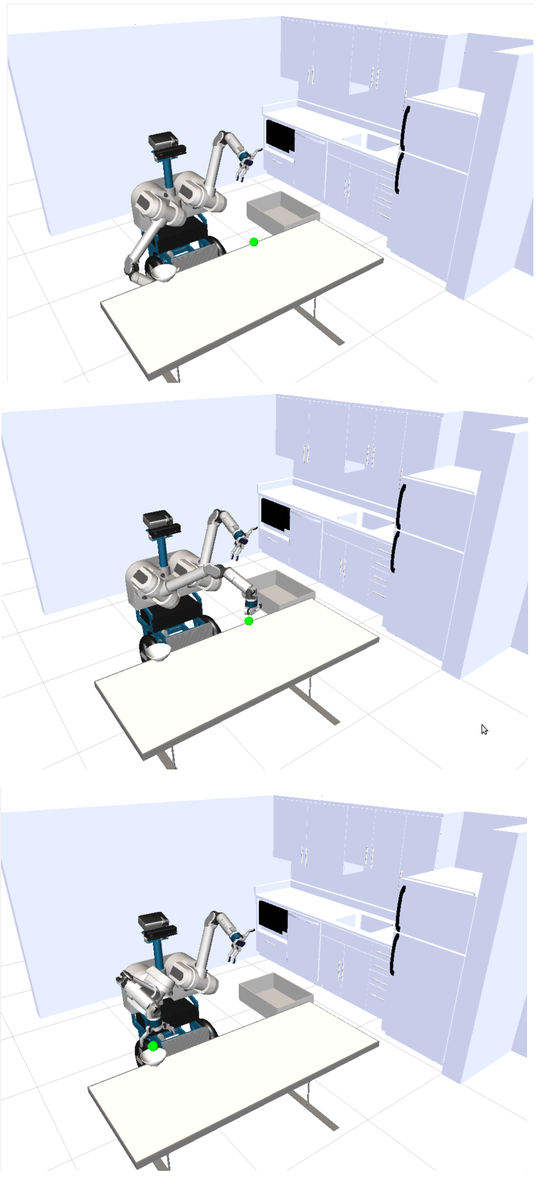
Abstract

. I created high level tasks for the robot HERB to accomplish. Simple tasks such as moving an arm and grabbing a specified about were composed to create more complex tasks. In particular, the complex kitchen task was composed of moving a ball into a bowl over a table and then transporting the bowl over to the kitchen cabinets. This resulted in a task planner that could plan between pairs of states.

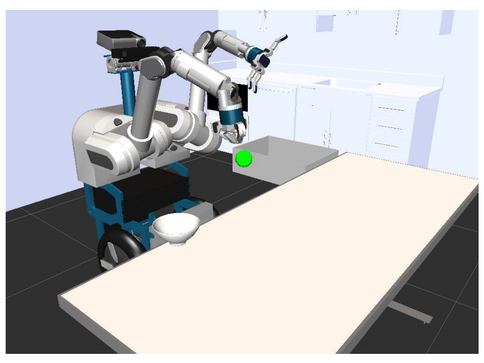
Finding a Trajectory

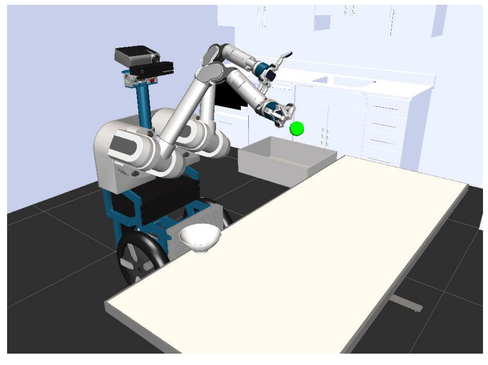


Simulation



Searching for Trajectory





Algorithm 1 An Algorithm for Task Planning

```
1:  while(trajectory == None):
2:      trajectory = chooseAction(randomAction())
3:  fun chooseAction(action):
4:      if primitive(action):
5:          (start, goal) = sample(action) # via task planner
6:          trajectory = planTrajectory(start, goal) # via motion planner
7:      else:
8:          subaction = randomSubaction(action)
9:          trajectory = chooseAction(subaction)
10:     return trajectory
```

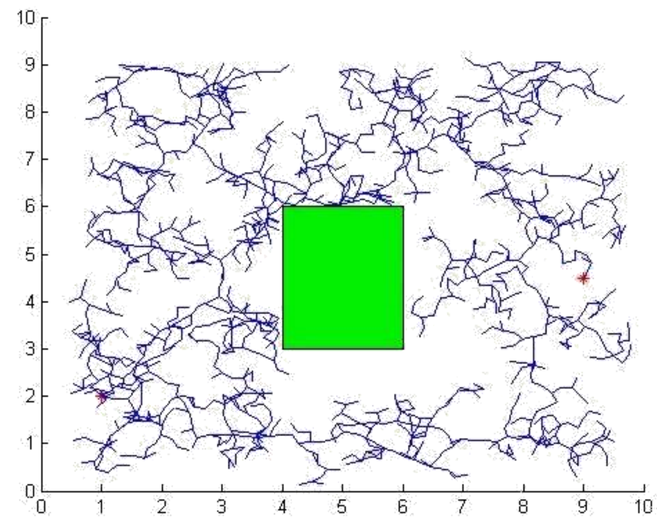
$$\text{orientation}(B,\theta) = BR_z(\theta)R_y(\pi)R_z(\tfrac{\pi}{2})$$

Equation 1: Determines next orientation of hand.

$$\text{position}(\vec{b},\theta,r) = \vec{b} + R_z(\theta)\cdot(0,r,0.01)^T + \text{orientation}(\theta)\cdot(0,0,\delta - r/2)^T$$

Equation 2: Determines next position of hand.

RRT Planner



REFERENCES

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Supervised by Evan Shapiro and Siddhartha Srinivasa