Behavior and Task Planning Assignment

1. Autonomous System Architecture
   I suggest to use the hybrid systems as the architecture for modelling our system.

   i. Reactive Systems
   Advantages: simple to program
   Disadvantages: no learning, no reasoning, can not achieve our task

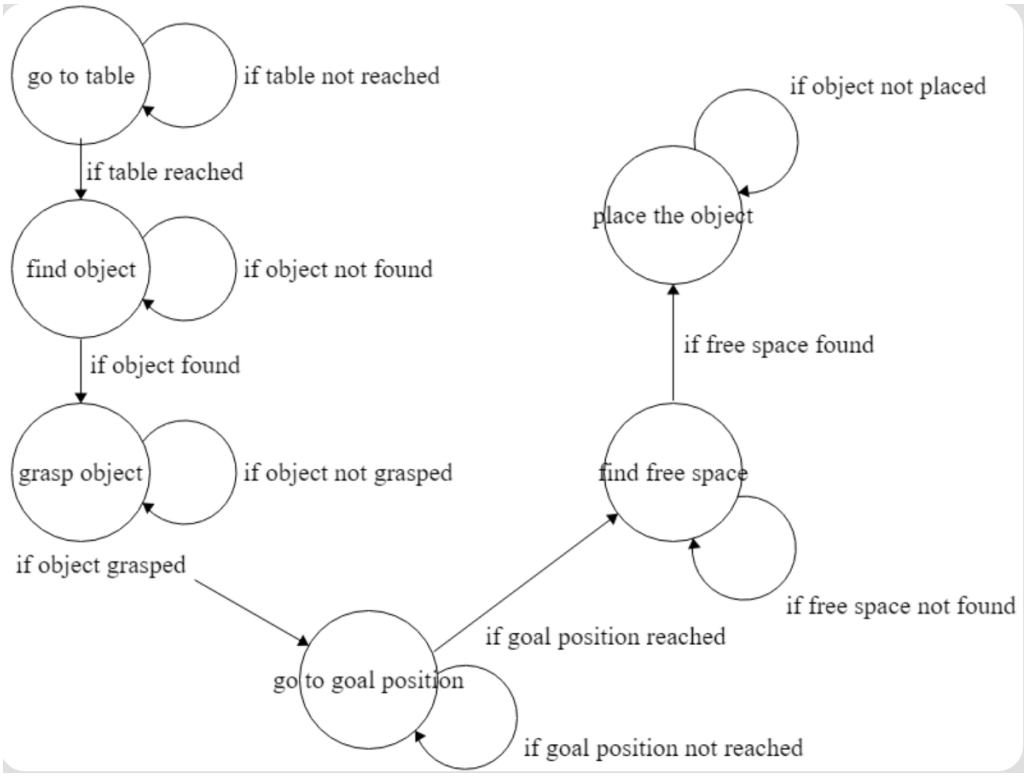
   ii. Deliberate Systems
   Advantages: can achieve our task
   Disadvantages: environment need to be fully modeled and controlled, planning takes a long time, can not adapt to changes

   iii. Behavior-based Systems
   Advantages: fast adaptability to dynamic changes
   Disadvantages: hard to find the needed set of behaviors, action-selection is difficult to tune, lack of efficiency and analyzability

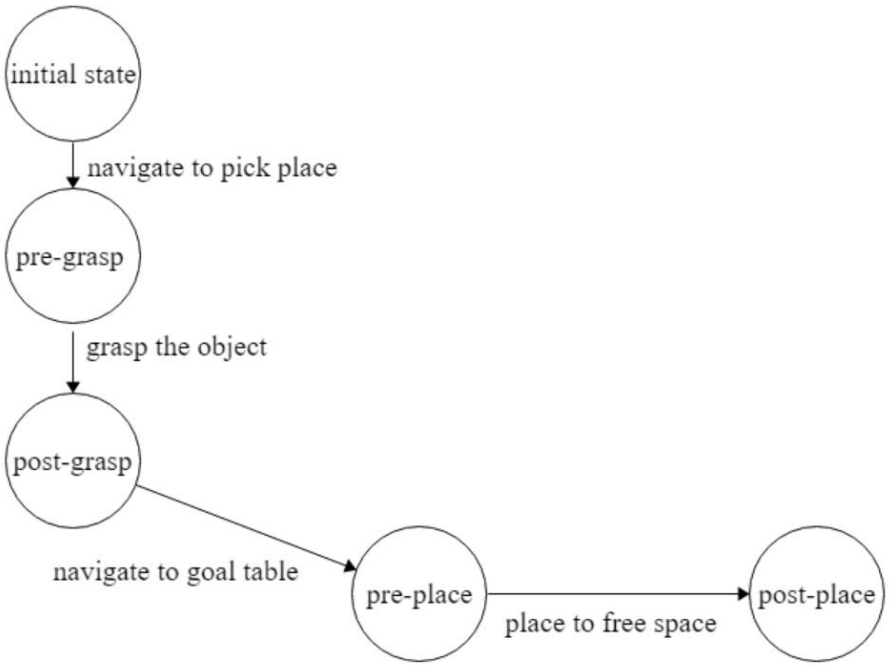
   iv. Hybrid Systems
   Advantages: Think and Act Concurrently, allows on-line generation and adaption of skills and actions
   Disadvantages: hard to generate world model

As I listed the disadvantages of Reactive Systems and Deliberate Systems, they are not able to achieve our task so excluded. For behavior-based systems, it is suitable for dynamic environment but too inefficient for our task.
Hybrid systems are suitable because in our task we have some very clear goals which can be planned by the decision layer and then skills and actions primitives be executed by execution layer. So this three layer architecture is better for our project.

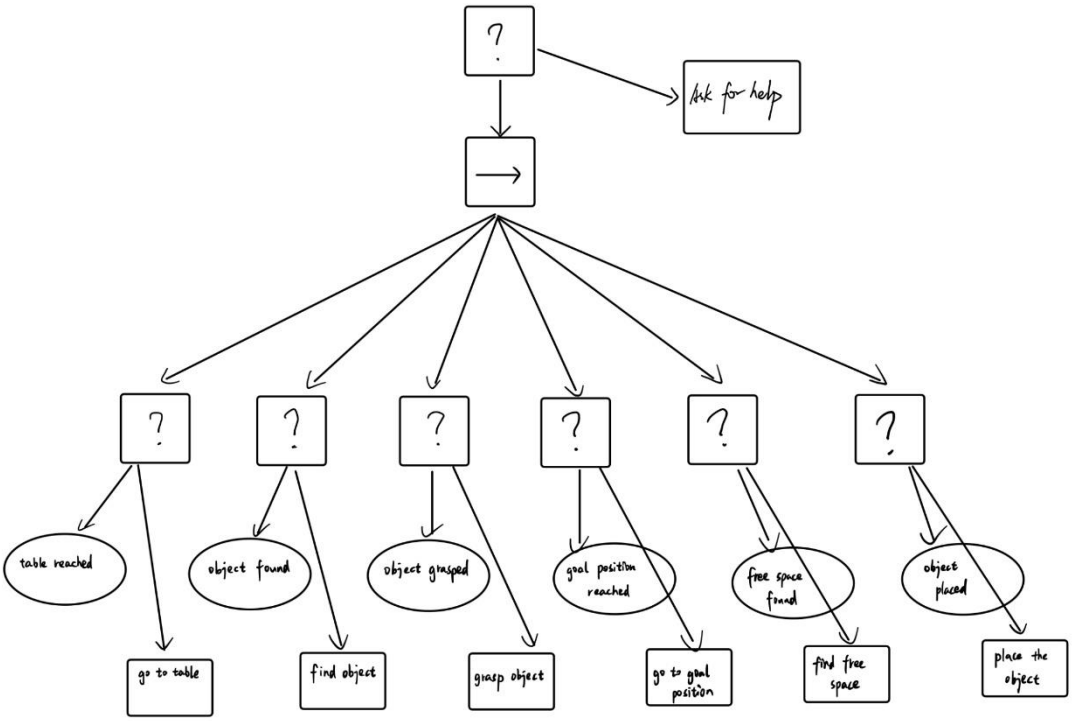
2. Model with a Finite State Machine
   Action-centric view:



State-centric view:



3. Model with a Behavior Tree


?
ask for help
→
?
?
?
?
?
?
table reached
go to table
object found
find object
object grasped
grasp object
goal position reached
go to goal position
free space found
find free space
object placed
place the object