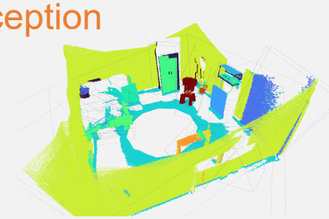
Active Exploration and Reasoning

Explorer

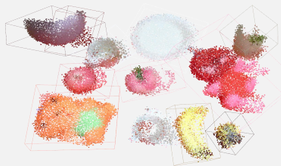
Global-level perception

Reason: I need to perform a **global exploration** to identify a table.
Code:
```
global_object_map =
robot.explore_global()
```



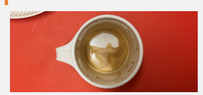
Local-level perception

Reason: I will **navigate to** the first table to start a **local search** for cups and plate.
Code:
```
robot.navigate_to(table_0)
table_0_object_map =
robot.explore_local()
```



Object-level perception

Reason: The table contains two cups. I will **observe** both cups to confirm which is suitable.
Code:
```
robot.report_observation(cup_0)
robot.report_observation(cup_1)
```

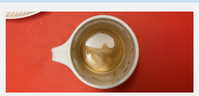

Full cup_0


Empty cup_1

Reasoner

Situated Reasoning

Reason: Only `cup_1` is **empty and suitable** for the given task. I will grasp cup_1.
Code:
```
robot.grasp(cup_1)
robot.report_observation('stay')
```


cup_0 ×


cup_1 √

I am thirsty. Put a cup into the plate, I will pour water into it.

Planner

Vision Language Model

Prompt

Robot Execution

Failure Detection and Recovery

Detector

Failure Detection

Reason: The image shows the cup is not in the robot's gripper, so **grasp is failed**. I need to execute failure recovery.


Grasp failed

Restorer

Object-level Recovery

Reason: The grasp pose is not correct, so I need to **try a new grasp**.
Code:
```
robot.grasp(cup_1, regenerate_pose=True)
robot.report_observation('stay')
```

Local-level Recovery

Reason: The cup's position has been changed, so I need to **update the local map** before grasping.
Code:
```
table_object_map = robot.explore_local()
```

Global-level Recovery

Reason: The cup is not in table_0, it may be moved by someone, so I need to **search for it in table_1**.
Code:
```
robot.navigate_to(table_1)
table_1_object_map = robot.explore_local()
```