Assignment 3: Aruco, Knowrob and Navigation

1 ROS working space introduction

In the MyAssignment3_ws/src, there are three packages:

- myknowrob
- myservice
- tiago_service

1.1 Build

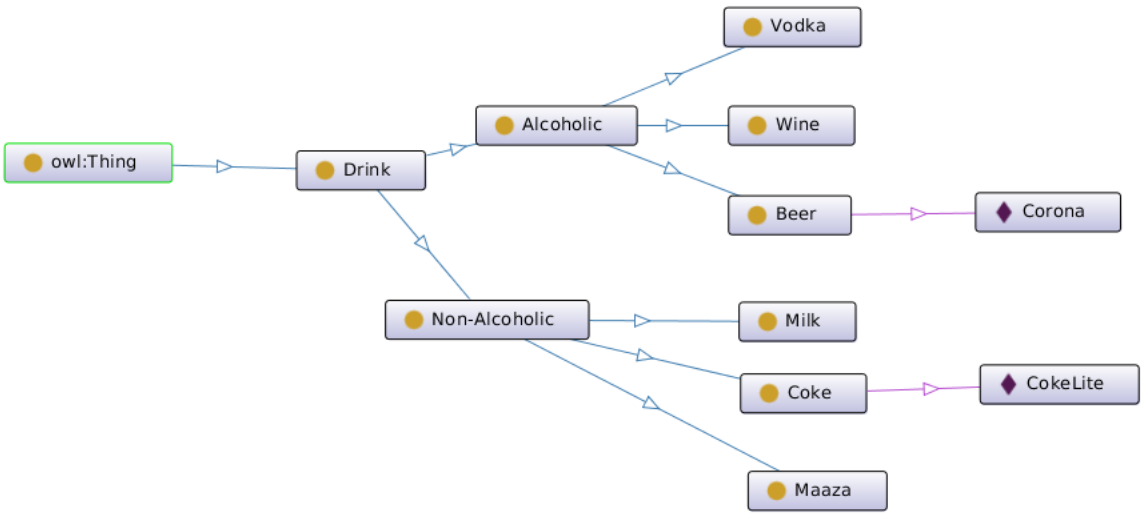
I use catkin_make to build the packages. If you prefer catkin build, the delete the devel/ and build/ first.

1.2 myknowrob

Package myknowrob is not important.

1.3 myservice

Package myservice holds the drink.owl file, init.pl and instance_utils.pl. These are the modified for using self-created ontology database.
The design of the ontology is shown as follows



Corona has ID 0, and CokeLite has ID 1.

Two new queries are implemented in the instance_utils.pl.

- getID(Class, ID)
- getDirectClass(Class, DirectClass)

1.4 tiago_service

Package tiago_service provides several executables.

- move_to_destination
  Move Tiago towards the shelf.
- Tiago_move_arm
  Move the joint by default parameters.
- Tiago_move_cartesian
  Provid it with 6 parameters, (x, y, z and RPY angles) to make the actuator point that point.
- move_head
  Provide it with two parameters e.g. 0.0 -0.8 to move the head.
- Tiago_integration_demo
  Starting a service that read the class of drink and command Tiago to go and fetch the drink.

Also, a launch file, fetch_drink.launch is provided for easily bringing up everything.

- tiago_2dnav_gazebo tiago_navigation.launch
- aruco_ros marker_publisher
- look_to_point
- rviz
- Tiago_integration_demo

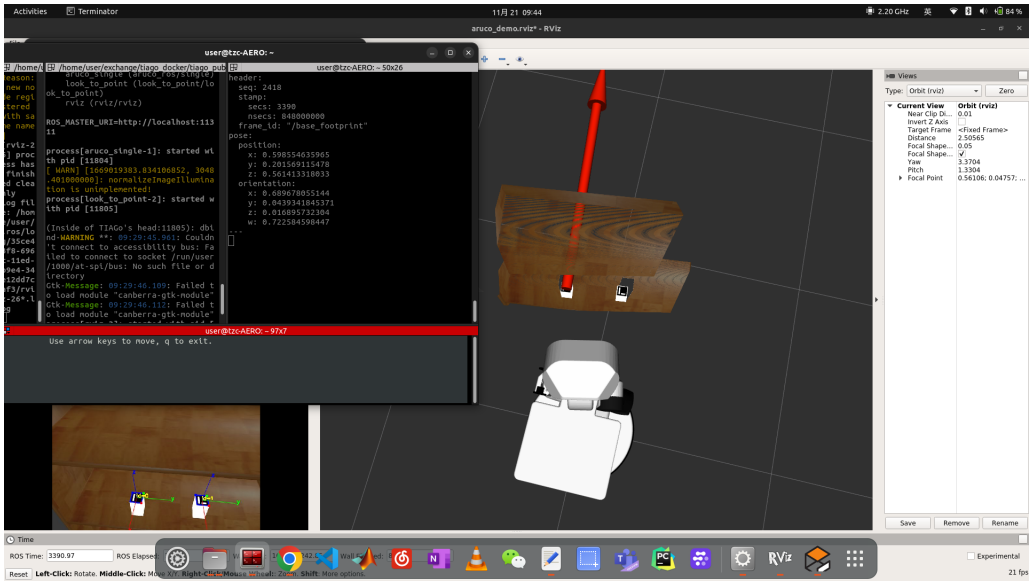
Other useful launch files are listed below:

- multi_detector.launch
  Launch the node to detector all the markers.
- tune.launch Launch the gazebo, rviz and aruco without Tiago_integration_demo.

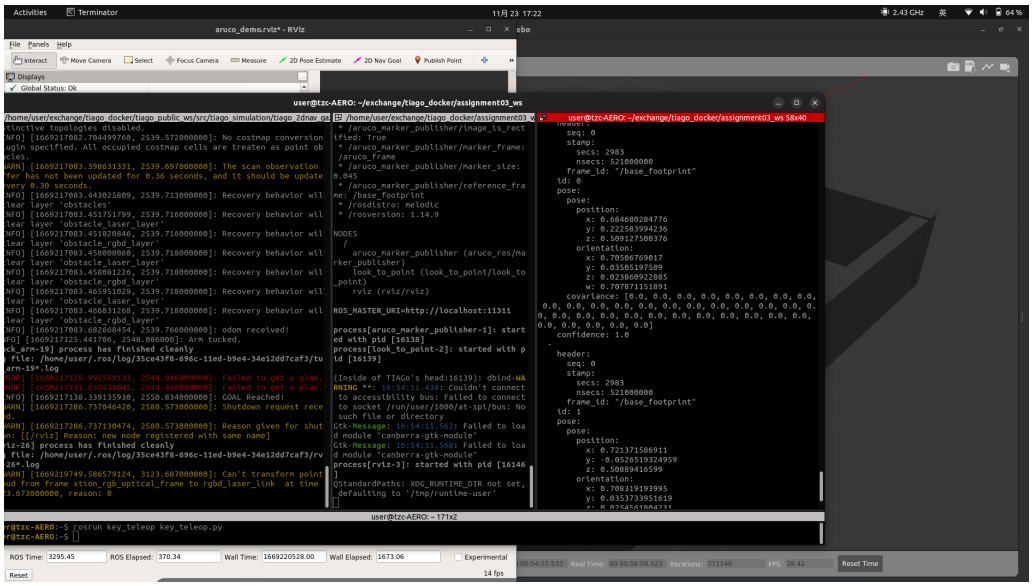
2 Assignments

2.1 Aruco

Screenshot of the output of the /aruco_simple/pose



Screenshot of the output of the /aruco_marker_publisher/markers

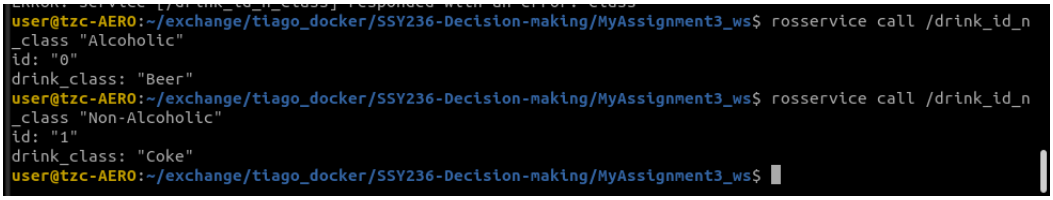


Instruction how to retrieve the resutls above

```
roslaunch tiago_aruco_demo detector.launch markerId:=0 markerSize
    :=0.045
roslaunch tiago_aruco_demo detector.launch markerId:=1 markerSize
    :=0.045
roslaunch tiago_service multi_detector.launch markerSize:=0.045
```

2.2 Knowrob

The new srv is called drink.srv locates in myservice package. Screenshot of the result.



Instruction how to retrieve the resutls above

```
# bringup the server
rosrun myservice drink_server
# Send request
rosservice call /drink_id_n_class "Alcoholic"
rosservice call /drink_id_n_class "Non-Alcoholic"
```

2.3 Navigation

Instruction:

```
roslaunch tiago_service tune.launch
rosrun tiago_service move_to_destination
```

Video is in "video" folder.

2.4 Integration

Instruction:

```
roslaunch tiago_service fetch drink.launch
# wait until everything is ready
rosservice call /Tiago_fetch_drink "Alcoholic"
rosservice call /Tiago_fetch_drink "Non-Alcoholic"
```