Advanced Software Development for Autonomous Mobile Robots

Final Project: Navigation and Manipulation with Tiago Robot

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Content

- Scenario overview
- Task explanation
- Problems and solutions
- Future work
- References

Scenario Overview

- Scenario includes disposing of empty coke cans placed on different locations in the environment.
- Waste bins are placed next to each table for disposal of waste.
- For this AR markers are placed above each coke can and waste bin for robot to detect the position of objects.

Task:

- Map of environment should be generated using gmapping package.
- Localization of robot is done in rviz by AMCL package.
- Goals points are obtained and stored to navigate to that location for further tasks.
- Program is initiated and robot starts navigating to that position.
- After reaching the goal robot scans for AR Markers and initiate manipulation tasks.
- After picking the coke can robot is moved to another goal position where trash bin is placed and coke can is placedd in it and it continues to next goal

Problems and solutions

- End effector movement of Tiago is not accurate to AR Markers so objects are kept with tolerences.
- Sometimes robot is getting stuck and head link is turning away from AR Markers. Program needs to be stopped and started again to overcome this issue.
- Robot position at gazebo and rviz is different and reference frames need to be changed after restarting.
- Couldn't able to manipulate robot to pick and place an object.

Future work

- End effector movement could be performed accurately relative to AR markers.

- Collision avoidance could be managed properly.

References

- https://www.youtube.com/watch?v=9l5HxFF4PZc
- http://wiki.ros.org/move_base
- https://docs.ros.org/en/diamondback/api/actionlib/html/classactionlib_1_1simple__action__client_1_1SimpleActionClient.html
- https://fbe-gitlab.hs-weingarten.de/stud-amr/2021-ss-master/vh-183378_tier4

Thank you