RoboCup@Home Education 2021

Dalian NO.8 Senior High School, China

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I. Introduction

In 2018 and 2019 Dalian No.8 Senior High School has taken part in RoboCup@Home Education on open platform challenge, and this year we are looking forward to doing better.
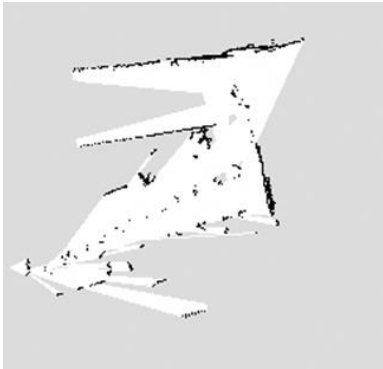
II. Speech Recognition

For speech recognition we use a grammar based on lm, we do change the library of it according to our need, we also correct our code, so we can get high quality results even in some complex commands and avoid the interference between speakers and the microphones allowing it to connect smoothly with Follow me and other programs.

III. Navigation (in Carry My Luggage)

On the carry my luggage mission, we tried to follow and build the image at the same time. We had both cameras use depth at the same time. We were able to ask the engineers and finally changed follower to follower1, which can follow down. From society but we found in the following figure, the vertical because ahead operator cause to appear the obstacle point on the circle, form like the barrier effect, serious impression the operation of the robot, the robot in the process of operation, continuously from the front "disorder", finally in the corner, because there is a lot of the barriers around and walls and stuck. To solve this problem, we have rotated the camera 180 degrees so that the lower camera responsible for creating the image faces forward and the follower faces backward. We have adjusted the follower again so that it can
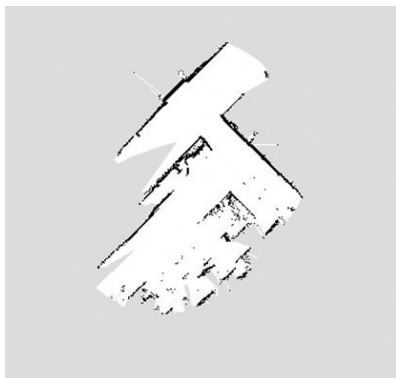
follow backwards and conducted an experiment.

However, in the experiment, we found that because one of the cameras responsible for following reversed, the robot could not follow normally when it was following. It often retreated quickly when it was close, followed normally when it was very close, and flipped its turning direction. For this reason, we have made a lot of attempts to adjust the camera in the launch file of followers, or to change the launch file of chassis so that it can achieve the effect of turning over when moving. But many experiments have ended in failure.

Depth camera follow+ Depth camera mapping

After all our attempts failed, we resorted to replacing the hardware. We bought the LIDAR and put it on the robot. Through the 360-degree scanning and high precision features of LIDAR, the accuracy of robot mapping is greatly improved, and the mapping range is increased. At the same time, it can ignore the obstacles caused by the operator's position, eliminating a lot of obstacles caused by the operator's footprint. However, due to the program error in operation, the robot will mistake the previously built map for the newly built map and insert the navigation. To this end, we modified the instructions for saving the map in the Test-carry1 file to distinguish the new map from the old map, to clarify the environment of the robot. However, we couldn't figure out how to make the robot set its own position as the starting point, so we had to manually set the initial position and direction to remedy this problem, which we are still trying. After the

Depth camera follow+ LIDAR mapping

initial point is set, the robot can return to the (0,0) coordinate of the starting point and avoid obstacles smoothly on the route to return to the starting point.

IV. Visual Module

We use Robot IO successfully solve the problem on Face Recognition. But we do not have enough time to put it into the code of our whole project. So, in the video we do not manage do it.

The same thing happened on the RGB recognition, because of the time we cannot put it into the code so it is regretful for us cannot do it successfully (including Find My Mates and Receptionist).

V. Mechanical Arm

And the other problem that we had during the mission was the linkage of our manipulator. During the task, the USB port of the manipulator often transposition, resulting in the USB port does not correspond to the launch file. In this case, we often report an error when starting the terminal, telling

us that the port of the manipulator is wrong and conflicts with other parts. For this reason, after a lot of tests, we found the corresponding port of the manipulator, and adjusted the port number of TYUSB in the arm.launch.

Meanwhile, to make the robot be able to put down the object after grasping it, we will adjust the state of the three joints of the robot hand, hand, elbow, and wrist in an array. After a lot of experimentation and tweaking,

We determined the parameters of the three joints and wrote them into an array so that the manipulator, after grabbing them, could slide the bag itself through it. And because the steering gear link is always disconnected from time to time, so often need to restart the terminal, we have repeatedly studied and tried, but did not find anything, and did not find the link instability problem.

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