UTBot@Home:
Using the Pioneer LX e Pioneer P3-AT robots in the domestic environment

UTFPR
PPGCA Programa de Pós-Graduação em Computação Aplicada
LASER Laboratório Avançado de Sistemas Embarcados e Robótica

Felipe Pierre Conter (felipeconter.cc@gmail.com),
Piatan Sfair Palar (kpiatan@gmail.com),
Marlon de Oliveira Vaz (marlon.vaz@ifpr.edu.br),
João Alberto Fabro (fabro@utfpr.edu.br),
André Schneider de Oliveira (andreoliveira@utfpr.edu.br)

UTFPR – Federal University of Technology – Paraná – Curitiba, Brasil – www.utfpr.edu.br
LASER – Advanced Laboratory of Embedded Systems and Robotics – www.laser.dainf.ct.utfpr.edu.br

LARC/CBR 2019

Introduction

The Pioneer LX and Pioneer P3-AT robots were prepared for the competition. Working with **ROS(*Robot Operating System*)[1]**, they were configured for deployment in some of the tasks presented in **Robocup@Home** [2]:

1 – Navigation: the robots are compatible with ROS package RosAria, making the bridge between ROS and the specific robot drivers;

2 – Voice synthesis and recognition: Human-robot interation is possible via voice commands. The robot converts voice inputs to text, classifying it into known commands/questions. This may trigger an action by the robot, including voice responses.

To the left, the Pioneer P3-AT and to the right, Pioneer LX.

Hardware

The Pioneer LX has an embedded PC, which runs linux and ROS. It has a laser-scanner sensor, as well as a maniputation arm.

The Pioneer P3-AT is connected to a notebook running linux and ROS through a usb connection. It's manipulator arm is still under development and not functional at the time. A laser-scanner sensor (YDLIDAR X4) was added to provide information about it's surroundings.

Both robots have a tablet (used for human-robot interaction, shows the robot's "face"), and a kinect sensor, which obtain pointcloud data that can be used for identifying humans on the scene, or 3D mapping of the environment, for example.

ROS Packages and Software Solutions

Different elements work together and compose the ROS software suite for the robots:

1 – rosaria: it is a ROS package responsible for making the robot's topics available to ROS, dealing with the specific drivers transparently.

2 – ydlidar: provides the lidar scan in a topic, making the device driver and specifics transparent to ROS.

3 – espeak_ros: its a ROS package that enables acess to the espeak text-to-speech library, enabling the robot to "talk".

4 – ROS Voice Message: android app responsible for the voice recognition task, making the spoken sentence available in a ROS topic in the ROS master. We filter the sentences and feed them to a classifier, responsible for determining which behaviour this sentence will trigger, if any.

5 – ros_display_emotions: responsible for publishing the robot's "face" in a image topic, that is then displayed by the tablet. Several actions may trigger a change in the emotion shown by the robot.

Conclusions

A variety of ROS packages and nodes work on both robots, allowing them to perform human-robot interaction and navigation, which are necessary skills for many of the tests in Robocup@Home.

Referências

[1]. About ROS – Página Oficial: http://www.ros.org/about-ros/.
[2]. Site oficial Robocup@Home. Disponível em: http://www.robocupathome.org/.