

Project log - Robotica

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1 Setup

OS	Ubuntu 18.04 Ubuntu 20.04
ROS version	melodic noetic
Webots	R2020b revision 1
Target hardware	Raspberry Pi 4B Raspberry Pi 3B+

2 Name

Our team has chosen the name **Change**, which resembles **Chang’e 4** [2], the spacecraft mission part of the second phase of the Chinese Lunar Exploration Program, which achieved humanity’s first soft landing on the far side of the moon.

3 Libraries and environment

We have used the **webots_ros** [3] package in order to gain deeper understanding of how to interface ROS nodes with the standard ROS controller for Webots. We have also studied the ROS documentation [4] in order to install and configure the ROS environment and also to understand fundamental ROS concepts related to nodes and topics. Moreover, we set-up the ROS interface in Webots following the cyberbotics documentation [4].

4 Task

Our robot will be deployed in a room (such as the one showed in our demo) and its aim is to identify humans and estimate their relative positions. If the distance between said humans is less than a specified value, the robot will go towards them and invite them to respect social distancing (with both visual and audio output).

5 Tiago Iron

The robot selected for the given task is the **TIAGo Iron**.

PAL Robotics TIAGo Iron[1] is a two-wheeled human-like robot with a torso and a head but no articulated arm. The model is a modular mobile platform that allows human-robot interaction. In order to achieve our goal, it was deemed necessary to add the following devices in the extension slot:

1. compass;
2. gyro;
3. accelerometer;

6 Movement primitives

7 Clustering

We decided to lower the dimensionality of our data. We used cilindric coordinates and the feature vector is 2 dimensional. We used the Density-Based Scan with a threshold. The entities not belonging to the cluster are discarded.

8 ROS

References

- [1] <https://cyberbotics.com/doc/guide/tiago-iron>.
Webots TIAGo Iron documentation.
- [2] <https://www.theguardian.com/science/2019/jan/03/china-probe-change-4-land-far-side-moon-basin-crater>.
The Guardian, 3 January 2019.
- [3] https://github.com/cyberbotics/webots_ros.
Github page for the `webots_ros` package from *cyberbotics*.
- [4] <https://wiki.ros.org/ROS/Tutorials>.
ROS documentation from ROS.org.
- [5] <https://www.cyberbotics.com/doc/guide/tutorial-8-using-ros>.
Cyberbotics documentation.
- [6] https://pal-robotics.com/wp-content/uploads/2019/07/Datasheet_TIAGo_Complete.pdf.
Tiago IRON datasheet.