Low level BlueROV2 Automation and Gazebo simulation for two autonomous BlueROV navigating synchronous

January 11, 2020

Author: Levy Hoffmann

Contents

1 ROS and Gazebo

This part is abour some requirements to use this repository and how to set up your ROS and Gazebo environment.

1.1 Installation of required Software

1.1.1 ROS

For non ubuntu Users and if any problems occur during Installation this link might help you:

- http://wiki.ros.org/melodic/Installation

To install ROS melodic on Ubuntu:

```
sudo apt install ros-melodic-desktop-full
```

Before you can use ROS, you will need to initialize rosdep.

```
sudo rosdep init
rosdep update
```

And finally:

```
source /opt/ros/melodic/setup.bash
```

1.1.2 Gazebo

For non ubuntu Users and if any problems occur during Installation this link might help you:

- http://gazebosim.org/tutorials?cat=install

To install Gazebo on Ubuntu:

```
curl -sSL http://get.gazebosim.org | sh
```

1.1.3 Creating your workspace

To use the Stack you will need to have a workspace containing the code. So if you don't have a workspace, heres how to create one:

```
mkdir -p ~/catkin_ws/src
cd ~/catkin_ws
catkin init
```

Now you need to clone this project to your directory:

```
cd ~/catkin_ws/src
git clone https://github.com/bluerovautomation
cd ~/catkin_ws
catkin build
source devel/setup.bash
```

1.2 Dependent Packages

Following packages are all included in this stack but seperatly listed here if you want to have a look at them separately.

To get access to position Information from the Waterlinked system the following package is used:

- https://github.com/mkran/waterlinked_ros_driver

To fuse inertial data of the ROV and the position data of the SBL system an EKF from this package is used:

- https://github.com/cra-ros-pkg/robot_localization

To control the BlueROV itself this package is used:

- https://github.com/patrickelectric/bluerov_ros_playground

For simulating the BlueROV in Gazebo this package is needed:

- https://github.com/freefloating-gazebo/freefloating_gazebo

2 Using the repository

2.1 Required Hardware

This Stack is built using a BlueROV 2 Heavy Configuration from “Blue Robotics Inc.” as its mobile Platform and the Underwater GPS System from “Waterlinked AS” with locator A1 as its localisation System. To control the ROV you can use the Logitech Gamepad F310.

2.2 Functinality of different .launch -Files

The modified or developed scripts are all located insinde bluerov_ros_playground. You’ll find several .launch -Files there aswell.

You start the nodes by typing:

```
roslaunch bluerov_ros_playground filename.launch
```

- user_mav
  - starts user example, reading data from mavlink, interacting with joystick over rc commands and showing ROV video stream
- gazebo_teleop
  - opens a window with the camera stream and Gazebo, a joystick can be used to control the ROV
  - to change the default joystick input (/dev/input/js0), it’s possible add the parameter joy_dev:=/dev/input/jsX when launching the simulation
- bluerov2
  - starts up nodes needed for autonomus ROV navigation, interacting with joystic over rc commands or autonomous by typing in target coordinates

  - opens up video stream and a window to define target coordinates

- gazebo_control
  - simulation of a single ROV
  - opens a window with Gazebo and a window for typing in target coordinates

- gazebo_control_II
  - simulation of two synchronous navigation ROVs
  - opens a window with Gazebo and a window for typing in target coordinates

3 Versions

Here are the versions of the software I used to make this Work

- Ubuntu 18.04.3 LTS
- ROS melodic
- Gazebo 9.11.0

If you have any questions, you can contact me at this email address : levy.hoffmann@posteo.de