ROS for devices and robots

Some general theory and real examples

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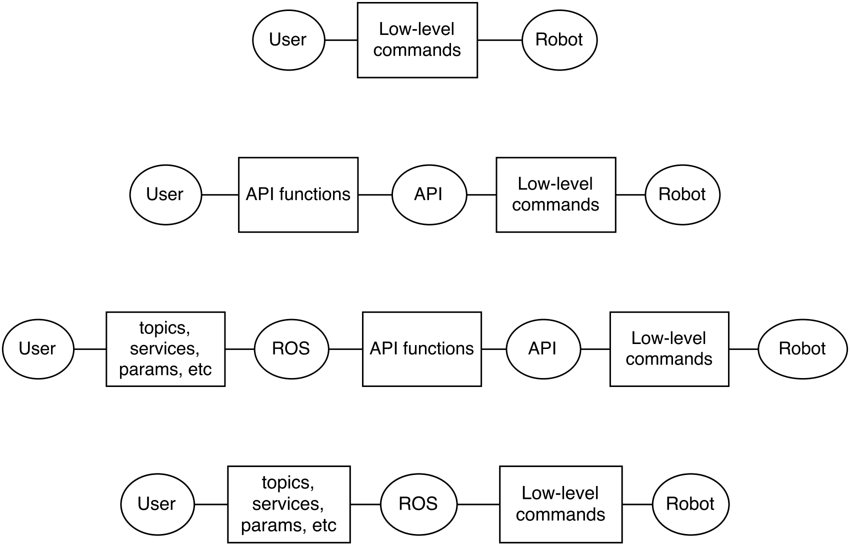
Different schemes of user–robot interaction



Some simple examples

joy and *teleop_twist_joy* packages

joy package:

- joy package allows to work with standard joysticks.
- Installation—building from sources or by command

```
$ sudo apt-get install ros-"distro"-joy
```

teleop_twist_joy package:

- teleop_twist_joy package contains a node which translates commands from joystick into velocity commands.
- Installation—building from sources or by command

```
$ sudo apt-get install ros-"distro"-teleop-twist-joy
```

Example of their using:

- Look at this launch file.

Some simple examples

usb_cam package

- usb_cam package allows to work with standard webcams.
- Installation—
  - for indigo and jade:

    ```
    $ sudo apt-get install ros-"distro"-usb-cam
    ```

    or just like for kinetic
  - for kinetic:

    ```
    $ cd PATH_TO_YOUR_WORKSPACE/src
    $ git clone https://github.com/bosch-ros-pkg/usb_cam.git
    $ cd ..
    $ catkin_make --pkg usb_cam
    ```
- For trying this package in work use its own launch:

  ```
  $ roslaunch usb_cam usb_cam-test.launch
  ```

Some simple examples

image_view package

- Last mentioned launch file also runs an image_view node from image_view package.
- The latter is used for showing webcam's image in a separate window.
- Its instalation—building from sources or by command

```
$ sudo apt-get install ros-"distro"-image-view
```

Robots' 3D models

urdf package

- The urdf package creates a robot's 3D model based on its URDF description (Unified Robot Description Format).
- It is highly recommended to read[1]
    - this package's description
    - its tutorials
    - *xacro* package's description

[1] Don't panic due to these materials' complexity!

Robots' 3D models

robot_state_publisher package

- The robot_state_publisher allows to publish the state of a robot to *tf* using robot's URDF description and a special topic which must be provided by robot's driver.
- It is highly recommended to read
  - this package's description
  - its tutorials

Robots' 3D models

joint_state_publisher package

- The joint_state_publisher allows to publish fake data for robot joints' states using robot's URDF description.
- It is highly recommended to read
  - this package's description

Robotino

Related resources

- Its wiki page (it is not very necessary to read).
- Its manual in which you can find information about charging of the robot and places of its I/O ports.
- A document about connection of the gripper.
- New Robotino's manual. Refer to it for rules about connection of optical and inductive sensors.
- A description of some of *robotino_node* topics and parameters.

Robotino

Installation of required software

- install robot's standard library (method 1):
  - add debprepository for robot's standard library as it is described here
  - install robot's standard library:

    ```
    $ sudo apt-get update
    $ sudo apt-get install robotino-api2
    ```

- install robot's standard library (method 2, alternative):
  - build it from source almost as described here (XX = 32 or 64):

    ```
    $ cd ANY_DIR
    $ svn co svn://svn.rec.de/openrobotino/api2/trunk source/api2
    $ find source/api2/external -wholename "*/bin/*"\
      -exec chmod +x {} \;
    $ mkdir -p build/api2
    $ cd build/api2
    $ cmake ../../source/api2
    $ make install
    $ echo "ROBOTINOAPI2_XX_DIR=/home/robot/build/install\
      /usr/local/robotino/api2/" >> ~/.bashrc
    $ source ~/.bashrc
    $ ./create_package.sh
    $ sudo dpkg -i robotino-api*.deb
    ```

Robotino

Installation of required software

- copy packages *robotino_description*, *robotino_msgs* and *robotino_node* from here into your workspace
- build them:

```
$ cd PATH_TO_YOUR_WORKSPACE
$ catkin_make --pkg robotino_msgs
$ catkin_make
```

Robotino

Launching

1. If Robotino is connected to public network (CSI-Robotics), then go to step 2. In other case connect your PC to Robotino's network (e.g. Robotino2).

2. launch an appropriate file from *robotino_node* package (don't forget specify robot's IP in it):
   - *only_robotino_node.launch*—for launch Robotino without webcams, lidar[2] and odometry
   - *robotino_simple_node.launch*—for launch Robotino without webcams and lidar
   - *robotino_node.launch*—for launch Robotino with webcams, lidar and odometry

[2] It must be connected to the robot using all three ends of its Y-USB cable.

KUKA Youbot

- Its wiki page (it is well writen and must be read before using the robot).

- It is controlled by internal[3] or external PC on which you have installed ROS and these packages: *youbot_description*, *youbot_driver* and *youbot_driver_ros_interface*.

[3] It is managed by Ubuntu 14.04 and ROS Indigo Igloo.

KUKA Youbot

Installation of required software

- For Indigo:
  - install youbot_description package:

    ```
    $ sudo apt-get install ros-indigo-youbot-description
    ```

  - install brics_actuator package (if it is not installed):

    ```
    $ sudo apt-get install ros-indigo-brics-actuator
    ```

- For Jade and Kinetic:
  - install *youbot_description* package:

    ```
    $ cd PATH_TO_YOUR_WORKSPACE/src
    $ git clone https://github.com/youbot/youbot_description.git
    $ cd youbot_description
    $ git checkout -b jade-devel origin/jade-devel
    $ cd ../..
    $ catkin_make --pkg youbot_description
    ```

  - install *brics_actuator* package (if it is not installed):

    ```
    $ cd PATH_TO_YOUR_WORKSPACE/src
    $ git clone https://github.com/wnowak/brics_actuator.git
    $ cd ..
    $ catkin_make --pkg brics_actuator
    ```

KUKA Youbot

Installation of required software

- Common final steps:
  - install pr2_msgs package (if it is not installed):

    ```
    $ sudo apt-get install ros-"distro"-pr2-msgs
    ```

  - install *youbot_driver* and *youbot_driver_ros_interface* packages as it is described in this document

Parrot AR.Drone 2.0[4]

- Its driver package can be installed by command:

  ```
  $ sudo apt-get install ros-"distro"-ardrone-autonomy
  ```

  or by building from its sources.
- Package's documentation lives on a separate site.
- For your first fly
  - connect your computer to drone's wifi
  - specify drone's IPv4 in ardrone.launch:

    ```
    $ rosed ardrone_autonomy ardrone.launch
    ```
  - launch the latter:

    ```
    $ roslaunch ardrone_autonomy ardrone.launch
    ```

[4] Be careful with this robot due to small employees' experience of using it.

Thank you for attention!
And sorry for possible mistakes!