rossumo

Description

"rossumo" is a driver to use the Jumping Sumo robot, built by Parrot, in ROS. It relies on ARDroneSDK3, the official Parrot SDK. It is written in C++.

This version is compatible with ARDroneSDK3 version 3.1.0.13 (it can be checked in `"packages/libARCommands/Includes/libARCommands/ARCOMMANDS_Version.h"`.

Unfortunately, Parrot developers change many files at each release of ARDroneSDK3, most notably `"libARController/ARCONTROLLER_Dictionary.h"`. For this reason, it cannot be ensured that `rossumo` is compatible with later versions of ARDroneSDK3.

Supported hardware

The library was developed for the original Parrot Jumping Sumo, as shown in the picture. However, it should work seamlessly with the newer versions (Jumping Race Drones and Jumping Night Drones).

Supported firmware: v1.99.0. The list and changelog of firmwares is available here.

Licence

LGPL v3 (GNU Lesser General Public License version 3). See LICENCE.

Installation

It is made of three steps:

1. Dependencies included in Ubuntu repos ;
2. The official SDK (`ARDroneSDK3`) by Parrot ;
3. This package that allows to use the SDK within ROS.

A summary of the instructions comes below.

1. Dependencies included in Ubuntu repos

```
Ubuntu 14.04:
$ sudo apt-get install phablet-tools autoconf libavahi-client-dev libavcodec-dev libavformat-dev libswscale-dev
Ubuntu 16.04:
$ sudo apt install repo autoconf libavahi-client-dev libavcodec-dev libavformat-dev libswscale-dev
```

FFMPEG for Ubuntu 14.04: you need the latest version of `ffmpeg`. Use the official PPA:

```
$ sudo add-apt-repository ppa:mc3man/trusty-media
```

```
$ sudo apt-get update
$ sudo apt-get dist-upgrade
```

2a. Download ARDroneSDK3

In this example, we install the ARDroneSDK3 in `~/src/sumo` : Following the instructions from Parrot:

```
$ mkdir --parents ~/src/sumo
$ cd ~/src/sumo
$ repo init -u https://github.com/Parrot-Developers/arsdk_manifests.git
$ repo sync --force-sync
```

2b. Build ARDroneSDK3

The `-j 3` means three compiling threads simultaneously and is well adapted to a dual-core CPU. You can increase it if you have more cores.

```
$ ./build.sh -p arsdk-native -t build-sdk -j 3
```

2c. Build ARDroneSDK3 samples (optional)

This paragraph is optional and only useful if you want to poke at the samples included in the `ARDroneSDK3` samples.

```
$ git clone https://github.com/Parrot-Developers/Samples.git
```

New version - `build.sh`-based

```
$ ./build.sh -p arsdk-native -t build-sample
```

Old version - Makefile-based

Change the lines in the Makefile:

```
$ cd Samples/Unix/JumpingSumoPiloting
$ geany Makefile
SDK_DIR=~/src/sumo/out/Unix-base/staging/usr
CFLAGS=-I$(IDIR) -I $(SDK_DIR)/include/
LDIR = $(SDK_DIR)/lib/
<check the different -L flags>
<add json to libs>
```

```
$ make
$ LD_LIBRARY_PATH=$LD_LIBRARY_PATH:~/src/sumo/out/Unix-base/staging/usr/lib ./Ju
mpingSumoPiloting
$ sudo sh -c 'LD_LIBRARY_PATH=$LD_LIBRARY_PATH:~/src/sumo/out/Unix-base/staging/
usr/lib  ./JumpingSumoPiloting'
```

3. Install this package: `rossumo`

In this example, we suppose your ROS workspace is located in `~/catkin_ws`.

If you have no ROS workspace yet, create a new workspace. If you are not familiar with ROS workspaces, check their tutorial.

Once the workspace is correctly configured, you can CD to it:

```
$ roscd
$ pwd
~/catkin_ws # for example
```

Clone the repo within `src` folder

```
$ git clone https://github.com/arnaud-ramey/rossumo src
```

Build Rossumo specifying the path to the ARDroneSDK3 'usr' folder

```
$ catkin_make --only-pkg-with-deps rossumo -DARDRONESDK3_PATH=~/src/sumo/out/ars
dk-native/staging/usr
```

Now you are ready to launch the Sumo driver.

ROS driver node

To launch the Sumo driver:

```
$ roslaunch rossumo rossumo.launch
```

Note that the Sumo driver should always be running to use the other launch files. Keep it running and open another terminal to launch other launch files (e.g. `joy_teleop`).

Node parameters

- `max_vel_lin max_vel_ang` [int, default: 100]

The maximum linear/angular velocity sent by the driver to the robot. 100 is the max speed. Lower it to be kinder with the motors of the robot and hence increase their life expectancy.

- `camera_calibration_filename` [std::string, default: ""]

If not empty, the path to the calibration file of the camera. For instance, `$(find rossumo)/data/sumo_camera_parameters.yaml`

- `camera_calibration_camname` [std::string, default: "camname"]

Name of the camera in the calibration file of the camera. For instance, `$(find rossumo)/data/sumo_camera_parameters.yaml`

Subscriptions

- `cmd_vel` [geometry_msgs::Twist, (m/s, rad/s)]

The instantaneous speed order. Send it every 10 Hz to obtain continuous motion.

- `anim` [std_msgs::String]

Play one of the predefined animations, among `metronome`, `ondulation`, `slalom slowshake`, `spin`, `spinJump`, `spinToPosture`, `spiral`, `tap`.

- `set_posture` [std_msgs::String]

Play one of the predefined postures, among `standing`, `kicker`, `jumper`.

- `sharp_turn` [std_msgs::Float32, radians]

Make a on-the-spot turn. Positive angles generate CCW turns.

- `high_jump` [std_msgs::Empty]

Perform a high jump (about 80 cm high).

- `long_jump` [std_msgs::Empty]

Perform a long jump (about 80 cm long).

Publications

- `camera/image_raw` [sensor_msgs::Image]

The 640x480 raw image, encoded as `bgr8`. The framerate is roughly 15 fps. The image comes from the MJPEG video stream of the robot. If there is no subscriber to the topic, the streaming is stopped from the robot, which saves battery.

- `camera/camera_info` [sensor_msgs::CameraInfo]

The camera_info read from a calibration file.

- `battery_percentage` [std_msgs::Int16, 0~100]

The percentage of remaining battery.

- `posture` [std_msgs::String]

The current predefined posture among `unknown`, `standing`, `kicker`, `jumper`.

- `link_quality` [std_msgs::Int16, 0~5]

Quality of the Wifi connection, between 0 (very bad) and 5 (very good).

- `alert` [std_msgs::String]

The alerts emitted by the robot. Current they only concern the battery level, among `unkwnown`, `none`, `low_battery`, `critical_battery`

- `outdoor` [std_msgs::Int16]

TODO

Camera view

To display the camera feed in a window:

```
$ roslaunch rossumo camview.launch
```

Keyboard remote control

To launch remote control of the Sumo thanks to keyboard:

```
$ roslaunch rossumo joy_teleop.launch
```

The script is from `teleop_twist_keyboard`, but copied in the package because the Kinetic version in the Ubuntu repos does not allow setting max speeds with parameters

Joystick remote control

To launch remote control of the Sumo thanks to a USB joystick:

```
$ roslaunch rossumo joy_teleop.launch
```

It is based on the joy package.

Wiimote remote control

To launch remote control of the Sumo thanks to a Nintendo Wiimote, you need two launchers, one for the Wiimote driver, the other for the teleop node.

```
$ roslaunch rossumo wiimote_node.launch
$ roslaunch rossumo wiimote_teleop.launch
```

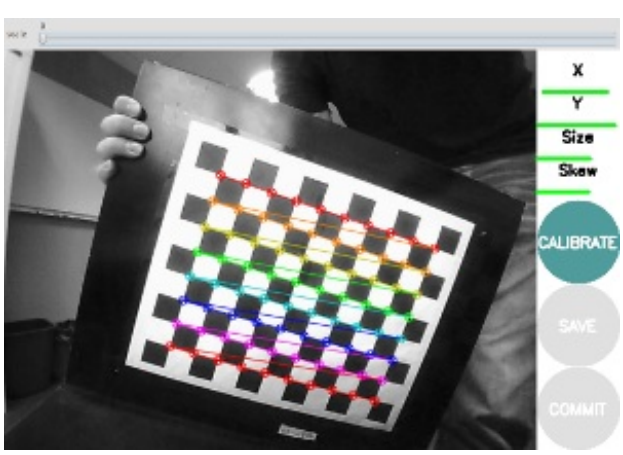
It is based on the wiimote package.

Camera calibration

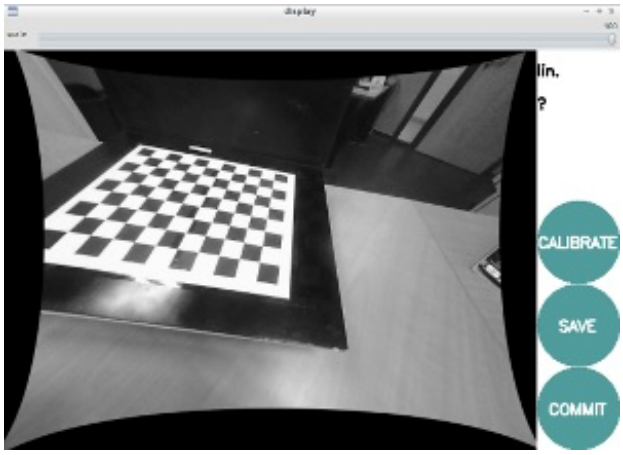
Following the instructions of camera_calibration wiki page and tutorial :

```
$ roscd ;  cd src
$ git clone https://github.com/OTL/cv_camera
$ catkin_make --only-pkg-with-deps rossumo cv_camera
$ rosrun cv_camera  cv_camera_node _device_id:=1 _image_width:=1280 _image_heigh
:=720
$ rosrun camera_calibration cameracalibrator.py --size 7x5 --square 0.030 image:
=/cv_camera/image_raw camera:=/camera --no-service-check

$ rosrun camera_calibration cameracalibrator.py --size 8x10 --square 0.0298 imag
e:=/rossumo1/rgb camera:=/camera
```


X
Y
Size
Skew
CALIBRATE
SAVE
COMMIT

-->


lin.
?
CALIBRATE
SAVE
COMMIT