

SDK 软件包 20.04 升级操作说明

摘要

本 SDK 软件包，适用于 ubuntu 20.04 对应的 ROS melodic 版本

下载路径：

<http://www.cothinkrobotics.com/zlxz-C62-P1.html>

前置条件：

Ubuntu 20.04 安装完毕
ROS noetic 安装完毕

一、创建工作空间

1. 1 创建工作空间

```
$ mkdir -p ~/ros_ws/src
```

1. 2 Source

```
$ source /opt/ros/noetic/setup.bash
```

1. 3 编译工作空间

```
$ cd ~/ros_ws
$ catkin_make
$ catkin_make install
```

```
yangmelodic@yangmelodic-ThinkPad-T450: ~/ros_ws
File Edit View Search Terminal Help
catkin_init_workspace      catkin_test_results
catkin_make                  catkin_topological_order
yangmelodic@yangmelodic-ThinkPad-T450:~/ros_ws$ catkin_make
Base path: /home/yangmelodic/ros_ws
Source space: /home/yangmelodic/ros_ws/src
Build space: /home/yangmelodic/ros_ws/build
Devel space: /home/yangmelodic/ros_ws/devel
Install space: /home/yangmelodic/ros_ws/install
#####
##### Running command: "make cmake_check_build_system" in "/home/yangmelodic/ros_ws/build"
#####
-- Using CATKIN_DEVEL_PREFIX: /home/yangmelodic/ros_ws/devel
-- Using CMAKE_PREFIX_PATH: /opt/ros/melodic
-- This workspace overlays: /opt/ros/melodic
-- Found PythonInterp: /usr/bin/python2 (found suitable version "2.7.17", minimum required is "2")
-- Using PYTHON_EXECUTABLE: /usr/bin/python2
-- Using Debian Python package layout
-- Using empyp: /usr/bin/empyp
-- Using CATKIN_ENABLE_TESTING: ON
-- Call enable_testing()
-- Using CATKIN_TEST_RESULTS_DIR: /home/yangmelodic/ros_ws/build/test_results
-- Found qtest sources under '/usr/src/qooqletest': qtests will be built
```

1. 4 修改 .bashrc 文件

```
source ~/ros_ws/devel/setup.bash
source /opt/ros/noetic/setup.bash
```

将以上指令写入.bashrc 脚本的末行

```
yangmelodic@yangmelodic-ThinkPad-T450: ~
File Edit View Search Terminal Help
yangmelodic@yangmelodic-ThinkPad-T450:~$ ls -al
total 67596
drwxr-xr-x 20 yangmelodic yangmelodic 4096 4月 8 14:46 .
drwxr-xr-x 4 root      root      4096 4月 8 11:31 ..
-rw----- 1 yangmelodic yangmelodic 5796 4月 8 14:46 .bash_history
-rw-r--r-- 1 yangmelodic yangmelodic 220 4月 7 10:29 .bash_logout
-rw-r--r-- 1 yangmelodic yangmelodic 3807 4月 8 14:46 .bashrc
drwx----- 20 yangmelodic yangmelodic 4096 4月 8 11:12 .cache
drwx----- 17 yangmelodic yangmelodic 4096 4月 8 14:26 .config
drwxr-xr-x  2 yangmelodic yangmelodic 4096 4月 8 14:43 Desktop
drwxr-xr-x  3 yangmelodic yangmelodic 4096 4月 7 18:48 Documents
drwxr-xr-x  3 yangmelodic yangmelodic 4096 4月 8 09:19 Downloads
-rw-rw-r--  1 yangmelodic yangmelodic 116466 1月 7 2016 .Downloads
-rw-r--r--  1 yangmelodic yangmelodic 8980 4月 7 10:29 examples.desktop
drwx-----  3 yangmelodic yangmelodic 4096 4月 7 18:48 .gnupg
-rw-----  1 yangmelodic yangmelodic 2758 4月 8 10:08 .ICEauthority
drwx-----  3 yangmelodic yangmelodic 4096 4月 7 10:41 .local
drwx-----  5 yangmelodic yangmelodic 4096 4月 7 13:21 .mozilla
drwxr-xr-x  2 yangmelodic yangmelodic 4096 4月 7 10:41 Music
drwxr-xr-x  2 yangmelodic yangmelodic 4096 4月 8 14:18 Pictures
```

```

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
    if [ -f /usr/share/bash-completion/bash_completion ]; then
        . /usr/share/bash-completion/bash_completion
    elif [ -f /etc/bash_completion ]; then
        . /etc/bash_completion
    fi
fi

source /opt/ros/melodic/setup.bash
source ~/ros_ws/devel/setup.bash

```

二、安装依赖

2. 1Baxter 机器人相关依赖安装

1) 安装依赖 ros-noetic-spacenav-node

```
$ sudo apt-get install ros-melodic-effort-controllers
```

```

cothink@ubuntu20:~$ sudo apt-get install ros-noetic-spacenav-node
正在读取软件包列表... 完成
正在分析软件包的依赖关系树
正在读取状态信息... 完成
将会同时安装下列软件：
  libspnav-dev
下列【新】软件包将被安装：
  libspnav-dev ros-noetic-spacenav-node
升级了 0 个软件包，新安装了 2 个软件包，要卸载 0 个软件包，有 28 个软件包未被升级。
需要下载 38.5 kB 的归档。
解压缩后会消耗 184 kB 的额外空间。
您希望继续执行吗？ [Y/n] y
获取:1 http://mirrors.ustc.edu.cn/ubuntu focal/universe amd64 libspnav-dev amd64 0.2.3-1 [13.9 kB]
获取:2 http://mirrors.ustc.edu.cn/ros/ubuntu focal/main amd64 ros-noetic-spacenav-node amd64 1.15.1-1focal.20220107.001953 [24.6 kB]
已下载 38.5 kB，耗时 1 秒 (67.7 kB/s)
正在选中未选择的软件包 libspnav-dev。
(正在读取数据库 ... 系统当前共安装有 289906 个文件和目录。)
准备解压 .../libspnav-dev_0.2.3-1_amd64.deb ...
正在解压 libspnav-dev (0.2.3-1) ...
正在选中未选择的软件包 ros-noetic-spacenav-node。
准备解压 .../ros-noetic-spacenav-node_1.15.1-1focal.20220107.001953_amd64.deb ...
正在解压 ros-noetic-spacenav-node (1.15.1-1focal.20220107.001953) ...
正在设置 libspnav-dev (0.2.3-1) ...
正在设置 ros-noetic-spacenav-node (1.15.1-1focal.20220107.001953) ...
cothink@ubuntu20:~$ 

```

2) 安装依赖 ros-noetic-effort-controllers

```
$ sudo apt-get install ros-noetic-effort-controllers
```

```

cothink@ubuntu20:~$ sudo apt-get install ros-noetic-effort-controllers
正在读取软件包列表... 完成
正在分析软件包的依赖关系树
正在读取状态信息... 完成
下列【新】软件包将被安装：
  ros-noetic-effort-controllers
升级了 0 个软件包，新安装了 1 个软件包，要卸载 0 个软件包，有 28 个软件包未被升级。
需要下载 84.1 kB 的归档。
解压缩后会消耗 366 kB 的额外空间。
获取:1 http://mirrors.ustc.edu.cn/ros/ubuntu focal/main amd64 ros-noetic-effort-controllers amd64 0.19.0-1focal.20220221.104843 [84.1 kB]
已下载 84.1 kB，耗时 0 秒 (344 kB/s)
正在选中未选择的软件包 ros-noetic_effort_controllers。
(正在读取数据库 ... 系统当前共安装有 289828 个文件和目录。)
准备解压 .../ros-noetic-effort-controllers_0.19.0-1focal.20220221.104843_amd64.deb ...
正在解压 ros-noetic-effort-controllers (0.19.0-1focal.20220221.104843) ...
正在设置 ros-noetic-effort-controllers (0.19.0-1focal.20220221.104843) ...
cothink@ubuntu20:~$ 

```

3) 安装 python 相关依赖

```
$ sudo apt-get install git-core python3-wstool python3-vcstools python3-rosdep  
ros-noetic-control-msgs
```

4) 安装 ROS 工具及仿真相关依赖

```
sudo apt-get install gazebo11 ros-noetic-gazebo-ros-control ros-noetic-gazebo-ros-pkgs  
ros-noetic-ros-control ros-noetic-control-toolbox ros-noetic-realtime-tools ros-noetic-ros-controllers  
ros-noetic-xacro python3-wstool ros-noetic-tf-conversions ros-noetic-kdl-parser
```

```
正在设置 rake (13.0.1-4) ...
正在设置 libruby2.7:amd64 (2.7.0-5ubuntu1.6) ...
正在设置 ignition-tools:amd64 (1.4.1-1-focal) ...
正在设置 libignition-tools-dev:amd64 (1.4.1-1-focal) ...
正在设置 ruby2.7 (2.7.0-5ubuntu1.6) ...
正在设置 libbsdfORMAT9-dev:amd64 (9.7.0-1-focal) ...
正在设置 libignition-transport8-core-dev:amd64 (8.2.1-1-focal) ...
正在设置 libignition-transport8-log-dev:amd64 (8.2.1-1-focal) ...
正在设置 libignition-transport8-dev:amd64 (8.2.1-1-focal) ...
正在处理用于 install-info (6.7.0,dfsg,2-5) 的触发器 ...
正在处理用于 fontconfig (2.13.1-2ubuntu3) 的触发器 ...
正在处理用于 desktop-file-utils (0.24-1ubuntu3) 的触发器 ...
正在处理用于 mime-support (3.64ubuntu1) 的触发器 ...
正在处理用于 hicolor-icon-theme (0.17-2) 的触发器 ...
正在处理用于 gnome-menus (3.36.0-1ubuntu1) 的触发器 ...
正在处理用于 libglitz0.0:amd64 (2.64.6-1-ubuntu20.64.4) 的触发器 ...
正在处理用于 libglbz2.0-0:amd64 (2.31-1ubuntu9.7) 的触发器 ...
正在处理用于 libc-bin (2.31-1ubuntu9.7) 的触发器 ...
正在处理用于 man-db (2.9.1-1) 的触发器 ...
正在设置 libgbts-dev:amd64 (0.7.6+darcs121138-4) ...
正在设置 libignition-common3-graphics-dev:amd64 (3.14.0-1-focal) ...
正在设置 libignition-common3-dev:amd64 (3.14.0-1-focal) ...
正在设置 libgazebo11-dev:amd64 (11.9.0-1-focal) ...
正在设置 ros-noetic-gazebo (2.9.2-1focal.20210423.224909) ...
正在设置 ros-noetic-gazebo-ros (2.9.2-1focal.20220221.101636) ...
正在设置 ros-noetic-gazebo-ros-control (2.9.2-1focal.20220221.104846) ...
正在设置 ros-noetic-gazebo-plUGINS (2.9.2-1focal.20220221.10102) ...
正在设置 ros-noetic-gazebo-ros-pkgs (2.9.2-1focal.20220221.112951) ...
```

2. 2 Sawyer 机器人相关依赖安装

1) 安装依赖: ros-noetic-spacenav-node

```
sudo apt-get install ros-noetic-spacenav-node
```

```
cothink@ubuntu20:~$ sudo apt-get install ros-noetic-spacenav-node
正在读取软件包列表... 完成
正在分析软件包的依赖关系树
正在读取状态信息... 完成
将会同时安装下列软件:
  libspnav-dev
下列【新】软件包将被安装:
  libspnav-dev ros-noetic-spacenav-node
升级了 0 个软件包，新安装了 2 个软件包，要卸载 0 个软件包，有 3 个软件包未被升级。
需要下载 0 B/38.5 kB 的归档。
解压缩后会消耗 184 kB 的额外空间。
您希望继续执行吗? [Y/n] y
正在选中未选择的软件包 libspnav-dev。
(正在读取数据库 ... 系统当前共安装有 266745 个文件和目录。)
准备解压 .../libspnav-dev_0.2.3-1_amd64.deb ...
正在解压 libspnav-dev (0.2.3-1) ...
正在选中未选择的软件包 ros-noetic-spacenav-node。
准备解压 .../ros-noetic-spacenav-node_1.15.1-1focal.20220107.001953_amd64.deb ...
正在解压 ros-noetic-spacenav-node (1.15.1-1focal.20220107.001953) ...
正在设置 libspnav-dev (0.2.3-1) ...
正在设置 ros-noetic-spacenav-node (1.15.1-1focal.20220107.001953) ...
cothink@ubuntu20:~$
```

2) 安装依赖: ros-noetic-effort-controllers

```
sudo apt-get install ros-noetic-effort-controllers
```

```
cothink@ubuntu20:~$ sudo apt-get install ros-noetic-effort-controllers
正在读取软件包列表... 完成
正在分析软件包的依赖关系树
正在读取状态信息... 完成
将会同时安装下列软件:
  ros-noetic-forward-command-controller
下列【新】软件包将被安装:
  ros-noetic-effort-controllers ros-noetic-forward-command-controller
升级了 0 个软件包，新安装了 2 个软件包，要卸载 0 个软件包，有 3 个软件包未被升级。
需要下载 0 B/92.6 kB 的归档。
解压缩后会消耗 407 kB 的额外空间。
您希望继续执行吗? [Y/n] y
正在选中未选择的软件包 ros-noetic-forward-command-controller。
(正在读取数据库 ... 系统当前共安装有 266606 个文件和目录。)
准备解压 .../ros-noetic-forward-command-controller_0.19.0-1focal.20220107.000123_amd64.deb ...
正在解压 ros-noetic-forward-command-controller (0.19.0-1focal.20220107.000123) ...
正在选中未选择的软件包 ros-noetic-effort-controllers。
准备解压 .../ros-noetic-effort-controllers_0.19.0-1focal.20220221.104843_amd64.deb ...
正在解压 ros-noetic-effort-controllers (0.19.0-1focal.20220221.104843) ...
正在设置 ros-noetic-forward-command-controller (0.19.0-1focal.20220107.000123) ...
正在设置 ros-noetic_effort-controllers (0.19.0-1focal.20220221.104843) ...
```

3) 安装配套 ROS 工具使用的相关依赖

```
sudo apt-get install git-core python3-wstool python3-vcstools python3-rosdep ros-noetic-control-msgs  
ros-noetic-xacro ros-noetic-tf2-ros ros-noetic-rviz ros-noetic-cv-bridge ros-noetic-actionlib  
ros-noetic-actionlib-msgs ros-noetic-dynamic-reconfigure ros-noetic-trajectory-msgs  
ros-noetic-rospy-message-converter
```

4) 安装仿真工具的相关依赖

```
sudo apt-get install gazebo11 ros-noetic-gazebo-ros  ros-noetic-gazebo-ros-control  
ros-noetic-gazebo-ros-pkgs ros-noetic-ros-control ros-noetic-control-toolbox ros-noetic-realtime-tools  
ros-noetic-ros-controllers ros-noetic-xacro python3-wstool ros-noetic-tf-conversions  
ros-noetic-kdl-parser
```

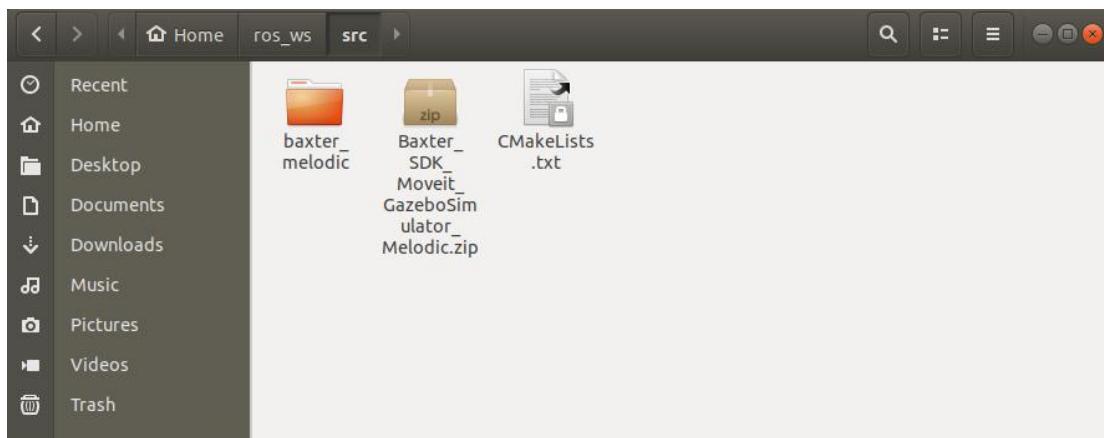
```
正在设置 ruby (1:2.7+1) ...
正在设置 rake (13.0.1-4) ...
正在设置 libruby2.7:amd64 (2.7.0-5ubuntu1.6) ...
正在设置 ignition-tools:amd64 (1.4.1-1~focal) ...
正在设置 libignition-tools-dev:amd64 (1.4.1-1~focal) ...
正在设置 ruby2.7 (2.7.0-5ubuntu1.6) ...
正在设置 libsdFormat9-dev:amd64 (9.7.0-1~focal) ...
正在设置 libignition-transport8-core-dev:amd64 (8.2.1-1~focal) ...
正在设置 libignition-transport8-log-dev:amd64 (8.2.1-1~focal) ...
正在设置 libignition-transport8-dev:amd64 (8.2.1-1~focal) ...
正在处理用于 install-info (6.7.0.dfsg.2-5) 的触发器 ...
正在处理用于 fontconfig (2.13.1-2ubuntu3) 的触发器 ...
正在处理用于 libglib2.0-0:amd64 (2.64.6-1~ubuntu20.04.4) 的触发器 ...
正在处理用于 libc-bin (2.31-0ubuntu9.7) 的触发器 ...
正在处理用于 man-db (2.9.1-1) 的触发器 ...
正在设置 libgts-dev:amd64 (0.7.6+darcs121130-4) ...
正在设置 libignition-common3-graphics-dev:amd64 (3.14.0-1~focal) ...
正在设置 libignition-common3-dev:amd64 (3.14.0-1~focal) ...
正在设置 libgazebo11-dev:amd64 (11.9.0-1~focal) ...
正在设置 ros-noetic-gazebo-dev (2.9.2-1focal.20210423.224909) ...
正在设置 ros-noetic-gazebo-ros (2.9.2-1focal.20220221.101636) ...
正在设置 ros-noetic-gazebo-ros-control (2.9.2-1focal.20220221.104846) ...
正在设置 ros-noetic-gazebo-plugins (2.9.2-1focal.20220221.110102) ...
正在设置 ros-noetic-gazebo-ros-pkgs (2.9.2-1focal.20220221.112951) ...
cothink@ubuntu20:~$
```

三、下载 Baxter SDK 或 Sawyer SDK 软件包并安装

3. 1 下载

待定

3. 2 解压软件包到 ros_ws 工作空间 src 目录



3. 3catkin_make 编译

```
yangmelodic@yangmelodic-ThinkPad-T450: ~/ros_ws
File Edit View Search Terminal Help
catkin_init_workspace      catkin_test_results
catkin_make                 catkin_topological_order
yangmelodic@yangmelodic-ThinkPad-T450:~/ros_ws$ catkin_make
Base path: /home/yangmelodic/ros_ws
Source space: /home/yangmelodic/ros_ws/src
Build space: /home/yangmelodic/ros_ws/build
Devel space: /home/yangmelodic/ros_ws/devel
Install space: /home/yangmelodic/ros_ws/install
#####
##### Running command: "make cmake_check_build_system" in "/home/yangmelodic/ros_ws/build"
#####
-- Using CATKIN_DEVEL_PREFIX: /home/yangmelodic/ros_ws/devel
-- Using CMAKE_PREFIX_PATH: /opt/ros/melodic
-- This workspace overlays: /opt/ros/melodic
-- Found PythonInterp: /usr/bin/python2 (found suitable version "2.7.17", minimum required is "2")
-- Using PYTHON_EXECUTABLE: /usr/bin/python2
-- Using Debian Python package layout
-- Using empy: /usr/bin/empy
-- Using CATKIN_ENABLE_TESTING: ON
-- Call enable_testing()
-- Using CATKIN_TEST_RESULTS_DIR: /home/yangmelodic/ros_ws/build/test_results
-- Found gtest sources under '/usr/src/googletest': gtests will be built
yangmelodic@yangmelodic-ThinkPad-T450: ~/ros_ws
File Edit View Search Terminal Help
MakeFiles/baxter_emulator.dir/src/baxter_emulator.cpp.o
[ 95%] Building CXX object baxter_melodic/baxter_simulator/baxter_sim_io/CMakeFiles/baxter_sim_io.dir/include/baxter_sim_io/moc_qnode.cpp.o
[ 95%] Building CXX object baxter_melodic/baxter_simulator/baxter_sim_controller/CMakeFiles/baxter_sim_controllers.dir/src/baxter_effort_controller.cpp.o
[ 95%] Building CXX object baxter_melodic/baxter_simulator/baxter_sim_io/CMakeFiles/baxter_sim_io.dir/baxter_sim_io_autogen/mocs_compilation.cpp.o
[ 96%] Linking CXX executable /home/yangmelodic/ros_ws/devel/lib/baxter_sim_io/baxter_sim_io
[ 96%] Built target baxter_sim_io
[ 97%] Building CXX object baxter_melodic/baxter_simulator/baxter_sim_controller/CMakeFiles/baxter_sim_controllers.dir/src/baxter_head_controller.cpp.o
[ 98%] Linking CXX executable /home/yangmelodic/ros_ws/devel/lib/baxter_sim_kinematics/kinematics
[ 98%] Built target kinematics
[ 98%] Building CXX object baxter_melodic/baxter_simulator/baxter_sim_controller/CMakeFiles/baxter_sim_controllers.dir/src/baxter_gripper_controller.cpp.o
[100%] Linking CXX executable /home/yangmelodic/ros_ws/devel/lib/baxter_sim_hardware/baxter_emulator
[100%] Linking CXX shared library /home/yangmelodic/ros_ws/devel/lib/libbaxter_sim_controllers.so
[100%] Built target baxter_emulator
[100%] Built target baxter_sim_controllers
yangmelodic@yangmelodic-ThinkPad-T450:~/ros_ws$
```

3. 4 将 baxter.sh/intera.sh 脚本文件提取到工作空间目录

```
yangmelodic@yangmelodic-ThinkPad-T450:~/ros_ws$ cp /home/yangmelodic/ros_ws/src/baxter_melodic/baxter/baxter-master/baxter.sh .
yangmelodic@yangmelodic-ThinkPad-T450:~/ros_ws$ ls
baxter.sh  build  devel  install  src
yangmelodic@yangmelodic-ThinkPad-T450:~/ros_ws$
```

四、连接

4. 1 修改 baxter.sh/intera.sh 脚本文件里的设备信息

备注： Baxter---baxter.sh

Sawyer---intera.sh 本文以 baxter 为例

```
-----#
#           USER CONFIGURABLE ROS ENVIRONMENT VARIABLES      #
#-----#
# Note: If ROS_MASTER_URI, ROS_IP, or ROS_HOSTNAME environment variables were
# previously set (typically in your .bashrc or .bash_profile), those settings
# will be overwritten by any variables set here.

# Specify Baxter's hostname
baxter_hostname="011512p0025.local"

# Set *Either* your computers ip address or hostname. Please note if using
# your_hostname that this must be resolvable to Baxter.
#your_ip="192.168.XXX.XXX"
your_hostname="yangmelodic-ThinkPad-T450.local"

# Specify ROS distribution (e.g. indigo, hydro, etc.)
ros_version="melodic"
#-----#
```

4. 2 运行 baxter.sh/intera.sh 脚本文件并使能机器人

```
[baxter - http://011512p0025.local:11311] yangmelodic@yangmelodic-ThinkPad-T450:
~/ros_ws$ . baxter.sh
[baxter - http://011512p0025.local:11311] yangmelodic@yangmelodic-ThinkPad-T450:
~/ros_ws$ rosrun baxter_tools enable_robot.py -e
[INFO] [1649407755.144870]: Robot Enabled
[baxter - http://011512p0025.local:11311] yangmelodic@yangmelodic-ThinkPad-T450:
~/ros_ws$
```

五、调用机器人官方案例进行测试

```
[baxter - http://011512p0025.local:11311] yangmelodic@yangmelodic-ThinkPad-T450:
~/ros_ws$ rosrun baxter_examples joint_position_keyboard.py
Initializing node...
Getting robot state...
Enabling robot...
[INFO] [1649408850.048293]: Robot Enabled
Controlling joints. Press ? for help, Esc to quit.
```