

安装 GNU Radio

此安装教程在 Ubuntu 系统下进行。

1. 更新软件包列表，更新系统软件 ()

建议更换源为阿里云或清华云

```
sudo apt-get update
```

```
sudo apt-get upgrade
```

2. 安装依赖包

使用以下命令将安装所有的依赖包，。

在 **Ubuntu 20.04**环境下所需依赖包：

```
sudo apt-get -y install autoconf automake build-essential ccache cmake  
cpufrequtils doxygen ethtool fort77 g++ gir1.2-gtk-3.0 git gobject-introspection gpsd  
gpsd-clients inetutils-tools libasound2-dev libboost-all-dev libcomedi-dev libcppunit-  
dev libfftw3-bin libfftw3-dev libfftw3-doc libfontconfig1-dev libgmp-dev libgps-dev  
libgsl-dev liblog4cpp5-dev libncurses5 libncurses5-dev libpulse-dev libqt5opengl5-  
dev libqwt-qt5-dev libsdl1.2-dev libtool libudev-dev libusb-1.0-0 libusb-1.0-0-dev  
libusb-dev libxi-dev libxrender-dev libzmq3-dev libzmq5 ncurses-bin python3-  
cheetah python3-click python3-click-plugins python3-click-threading python3-dev  
python3-docutils python3-gi python3-gi-cairo python3-gps python3-lxml python3-  
mako python3-numpy python3-numpy-dbg python3-opengl python3-pyqt5 python3-  
requests python3-scipy python3-setuptools python3-six python3-sphinx python3-  
yaml python3-zmq python3-ruamel.yaml swig wget
```

在 **Ubuntu 18.10**环境下所需依赖包：

```
sudo apt-get -y install git swig cmake doxygen build-essential libboost-all-dev
libtool libusb-1.0-0 libusb-1.0-0-dev libudev-dev libncurses5-dev libfftw3-bin libfftw3-
dev libfftw3-doc libcppunit-1.14-0 libcppunit-dev libcppunit-doc ncurses-bin
cpufrequtils python-numpy python-numpy-doc python-numpy-dbg python-scipy
python-docutils qt4-bin-dbg qt4-default qt4-doc libqt4-dev libqt4-dev-bin python-
qt4 python-qt4-dbg python-qt4-dev python-qt4-doc python-qt4-doc libqwt6abi1
libfftw3-bin libfftw3-dev libfftw3-doc ncurses-bin libncurses5 libncurses5-dev
libncurses6-dbg libfontconfig1-dev libxrender-dev libpulse-dev swig g++ automake
autoconf libtool python-dev libfftw3-dev libcppunit-dev libboost-all-dev libusb-dev
libusb-1.0-0-dev fort77 libsdl1.2-dev python-wxgtk3.0 git libqt4-dev python-numpy
ccache python-opengl libgsl-dev python-cheetah python-mako python-lxml doxygen
qt4-default qt4-dev-tools libusb-1.0-0-dev libqwtplot3d-qt5-dev pyqt4-dev-tools
python-qwt5-qt4 cmake git wget libxi-dev gtk2-engines-pixbuf r-base-dev python-tk
liborc-0.4-0 liborc-0.4-dev libasound2-dev python-gtk2 libzmq3-dev libzmq5 python-
requests python-sphinx libcomedi-dev python-zmq libqwt-dev libqwt6abi1 python-six
libgps-dev libgps23 gpsd gpsd-clients python-gps python-setuptools
```

在 **Ubuntu 18.04**环境下所需依赖包：

```
sudo apt-get -y install git swig cmake doxygen build-essential libboost-all-dev
libtool libusb-1.0-0 libusb-1.0-0-dev libudev-dev libncurses5-dev libfftw3-bin libfftw3-
dev libfftw3-doc libcppunit-1.14-0 libcppunit-dev libcppunit-doc ncurses-bin
cpufrequtils python-numpy python-numpy-doc python-numpy-dbg python-scipy
python-docutils qt4-bin-dbg qt4-default qt4-doc libqt4-dev libqt4-dev-bin python-
qt4 python-qt4-dbg python-qt4-dev python-qt4-doc python-qt4-doc libqwt6abi1
libfftw3-bin libfftw3-dev libfftw3-doc ncurses-bin libncurses5 libncurses5-dev
libncurses5-dbg libfontconfig1-dev libxrender-dev libpulse-dev swig g++ automake
autoconf libtool python-dev libfftw3-dev libcppunit-dev libboost-all-dev libusb-dev
libusb-1.0-0-dev fort77 libsdl1.2-dev python-wxgtk3.0 git libqt4-dev python-numpy
ccache python-opengl libgsl-dev python-cheetah python-mako python-lxml doxygen
```

```
qt4-default qt4-dev-tools libusb-1.0-0-dev libqwtplot3d-qt5-dev pyqt4-dev-tools  
python-qwt5-qt4 cmake git wget libxi-dev gtk2-engines-pixbuf r-base-dev python-tk  
liborc-0.4-0 liborc-0.4-dev libasound2-dev python-gtk2 libzmq3-dev libzmq5 python-  
requests python-sphinx libcomedi-dev python-zmq libqwt-dev libqwt6abi1 python-six  
libgps-dev libgps23 gpsd gpsd-clients python-gps python-setuptools
```

在 **Ubuntu 17.04**环境下所需依赖包：

```
sudo apt-get -y install git swig cmake doxygen build-essential libboost-all-dev  
libtool libusb-1.0-0 libusb-1.0-0-dev libudev-dev libncurses5-dev libfftw3-bin libfftw3-  
dev libfftw3-doc libcppunit-1.13-0v5 libcppunit-dev libcppunit-doc ncurses-bin  
cpufrequtils python-numpy python-numpy-doc python-numpy-dbg python-scipy  
python-docutils qt4-bin-dbg qt4-default qt4-doc libqt4-dev libqt4-dev-bin python-  
qt4 python-qt4-dbg python-qt4-dev python-qt4-doc python-qt4-doc libqwt6abi1  
libfftw3-bin libfftw3-dev libfftw3-doc ncurses-bin libncurses5 libncurses5-dev  
libncurses5-dbg libfontconfig1-dev libxrender-dev libpulse-dev swig g++ automake  
autoconf libtool python-dev libfftw3-dev libcppunit-dev libboost-all-dev libusb-dev  
libusb-1.0-0-dev fort77 libsdl1.2-dev python-wxgtk3.0 git-core libqt4-dev python-  
numpy ccache python-opengl libgsl-dev python-cheetah python-mako python-lxml  
doxygen qt4-default qt4-dev-tools libusb-1.0-0-dev libqwt5-qt4-dev libqwtplot3d-  
qt4-dev pyqt4-dev-tools python-qwt5-qt4 cmake git-core wget libxi-dev gtk2-  
engines-pixbuf r-base-dev python-tk liborc-0.4-0 liborc-0.4-dev libasound2-dev  
python-gtk2 libzmq3-dev libzmq5 python-requests python-sphinx libcomedi-dev  
python-zmq python-setuptools
```

在 **Ubuntu 16.04**环境下所需依赖包：

```
sudo apt-get -y install git swig cmake doxygen build-essential libboost-all-dev  
libtool libusb-1.0-0 libusb-1.0-0-dev libudev-dev libncurses5-dev libfftw3-bin libfftw3-  
dev libfftw3-doc libcppunit-1.13-0v5 libcppunit-dev libcppunit-doc ncurses-bin  
cpufrequtils python-numpy python-numpy-doc python-numpy-dbg python-scipy  
python-docutils qt4-bin-dbg qt4-default qt4-doc libqt4-dev libqt4-dev-bin python-  
qt4 python-qt4-dbg python-qt4-dev python-qt4-doc python-qt4-doc libqwt6abi1  
libfftw3-bin libfftw3-dev libfftw3-doc ncurses-bin libncurses5 libncurses5-dev  
libncurses5-dbg libfontconfig1-dev libxrender-dev libpulse-dev swig g++ automake  
autoconf libtool python-dev libfftw3-dev libcppunit-dev libboost-all-dev libusb-dev  
libusb-1.0-0-dev fort77 libsdl1.2-dev python-wxgtk3.0 git-core libqt4-dev python-  
numpy ccache python-opengl libgsl-dev python-cheetah python-mako python-lxml  
doxygen qt4-default qt4-dev-tools libusb-1.0-0-dev libqwt5-qt4-dev libqwtplot3d-  
qt4-dev pyqt4-dev-tools python-qwt5-qt4 cmake git-core wget libxi-dev gtk2-  
engines-pixbuf r-base-dev python-tk liborc-0.4-0 liborc-0.4-dev libasound2-dev
```

```
python-gtk2 libzmq-dev libzmq1 python-requests python-sphinx libcomedi-dev  
python-zmq python-setuptools
```

在 **Ubuntu 15.04或15.10**环境下所需依赖包:

```
sudo apt-get -y install git swig cmake doxygen build-essential libboost-all-dev  
libtool libusb-1.0-0 libusb-1.0-0-dev libudev-dev libncurses5-dev libfftw3-bin libfftw3-  
dev libfftw3-doc libcppunit-dev libcppunit-doc ncurses-bin cpufrequtils python-  
numpy python-numpy-doc python-numpy-dbg python-scipy python-docutils qt4-  
bin-dbg qt4-default qt4-doc libqt4-dev libqt4-dev-bin python-qt4 python-qt4-dbg  
python-qt4-dev python-qt4-doc python-qt4-doc libqwt6 libfftw3-bin libfftw3-dev  
libfftw3-doc ncurses-bin libncurses5 libncurses5-dev libncurses5-dbg libfontconfig1-  
dev libxrender-dev libpulse-dev swig g++ automake autoconf libtool python-dev  
libfftw3-dev libcppunit-1.13-0v5 libboost-all-dev libusb-dev libusb-1.0-0-dev fort77  
libsdl1.2-dev python-wxgtk2.8 git-core libqt4-dev python-numpy ccache python-  
opengl libgl0-dev python-cheetah python-mako python-lxml doxygen qt4-default  
qt4-dev-tools libusb-1.0-0-dev libqwt5-qt4-dev libqwtplot3d-qt4-dev pyqt4-dev-tools  
python-qwt5-qt4 cmake git-core wget libxi-dev gtk2-engines-pixbuf r-base-dev  
python-tk liborc-0.4-0 liborc-0.4-dev libasound2-dev python-gtk2 libzmq-dev libzmq1  
python-requests python-sphinx libcomedi-dev python-zmq python-setuptools
```

在 **Ubuntu 14.04或14.10**环境下所需依赖包:

```
sudo apt-get -y install git swig cmake doxygen build-essential libboost-all-dev  
libtool libusb-1.0-0 libusb-1.0-0-dev libudev-dev libncurses5-dev libfftw3-bin libfftw3-  
dev libfftw3-doc libcppunit-1.13-0 libcppunit-dev libcppunit-doc ncurses-bin  
cpufrequtils python-numpy python-numpy-doc python-numpy-dbg python-scipy  
python-docutils qt4-bin-dbg qt4-default qt4-doc libqt4-dev libqt4-dev-bin python-  
qt4 python-qt4-dbg python-qt4-dev python-qt4-doc python-qt4-doc libfftw3-bin  
libfftw3-dev libfftw3-doc ncurses-bin libncurses5 libncurses5-dev libncurses5-dbg  
libfontconfig1-dev libxrender-dev libpulse-dev swig g++ automake autoconf libtool  
python-dev libfftw3-dev libcppunit-dev libboost-all-dev libusb-dev libusb-1.0-0-dev  
fort77 libsdl1.2-dev python-wxgtk2.8 git-core libqt4-dev python-numpy ccache  
python-opengl libgl0-dev python-cheetah python-mako python-lxml doxygen qt4-  
default qt4-dev-tools libusb-1.0-0-dev libqwt5-qt4-dev libqwtplot3d-qt4-dev pyqt4-  
dev-tools python-qwt5-qt4 cmake git-core wget libxi-dev gtk2-engines-pixbuf r-base-  
dev python-tk liborc-0.4-0 liborc-0.4-dev libasound2-dev python-gtk2 libzmq1  
libzmq-dev python-requests python-sphinx libcomedi-dev python-setuptools
```

注: 先安装 UHD 再安装 GNU Radio, 否则安装的 GNU Radio 中会没有 UHD 模块。

3. 下载 UHD 源文件并编译安装

- a) 回到 home 下创建一个新的文件夹用来安装 UHD，进入刚刚创建的文件夹：

```
cd $home  
mkdir workarea-uhd  
cd workarea-uhd
```

- b) 创建uhd目录，解压uhd-4-0-luowave.7z到uhd目录

```
cd uhd
```

- c) 创建 build 文件夹

```
cd host  
mkdir build  
cd build
```

- d) 调用 cmake 来创建 makefiles。

```
cmake ../
```

- e) 运行 make UHD

```
make
```

- f) 你可以运行一些基础的测试来验证生成的过程是否完整

```
make test
```

- g) 接下来，使用默认安装前缀安装 uhd，该前缀将在 `/usr/local/lib` 文件夹下安

装 uhd。由于对该文件夹的权限，您需要以 root 用户身份运行此操作。

```
sudo make install
```

h) 接下来，更新系统的共享库缓存。

```
sudo ldconfig
```

i) 最后，确保定义了 `LD_LIBRARY_PATH` 环境变量并包含安装 UHD 的文件夹。
最常见的情况是，您可以将下面的行添加到 `$home/.bashrc` 文件的末尾：

```
export LD_LIBRARY_PATH=/usr/local/lib
```

j) 配置USB权限

```
1. 打开终端，输入 sudo cp ~/uhd/host/utils/uhd-usrp.rules  
   /etc/udev/rules.d/  
2. sudo udevadm control --reload-rules  
3. sudo udevadm trigger
```

k) 要使此更改生效，您需要关闭当前终端窗口，然后打开一个新终端。

l) 此时，应安装 UHD 并准备使用。你可以通过运行 `uhd_find_devices`，在不连接 usrp 设备的情况下快速测试。

```
whlg@whlg-ubuntu:~$ uhd_find_devices  
[INFO] [UHD] linux; GNU C++ version 7.4.0; Boost_106501; UHD_3.14.1.HEAD-0-gbfb9c1c7  
No UHD Devices Found
```

m) 下载 UHD 镜像文件：

```
sudo uhd_images_downloader  
sudo cp ~/uhd/host/images/* /usr/local/share/uhd/images/
```

4. 下载 GNU Radio 源文件并编译安装

a) 回到 home 下创建一个新的文件夹用来安装gnuradio，进入刚刚创建的文件夹

```
cd $home  
mkdir workarea-gnuradio  
cd workarea-gnuradio
```

b) 克隆 gnuradio 文件到刚刚创建的文件夹中

```
git clone --recursive https://github.com/gnuradio/gnuradio
```

c) 接下来，进入存储库并查看所需的 gnu radio 版本。

```
cd gnuradio
```

d) 要 checkout v3.8.2分支

这里以3.8.2为例

```
git checkout v3.8.2
```

e) 然后，更新子模块

```
git submodule update --init --recursive
```

f) 创建 build 文件夹

```
mkdir build  
cd build
```

g) 调用 cmake 来创建 makefiles。

```
cmake ../
```

h) 运行 make 来生成 GNU Radio

```
make
```

- i) 你可以运行一些基础的测试来验证生成的过程是否完整

```
make test
```

- j) 接下来，使用默认安装前缀安装 uhd，该前缀将在/usr/local/lib 文件夹下安装 uhd。由于对该文件夹的权限，您需要以根用户身份运行此操作。

```
sudo make install
```

- k) 接下来，更新系统的共享库缓存。

```
sudo ldconfig
```

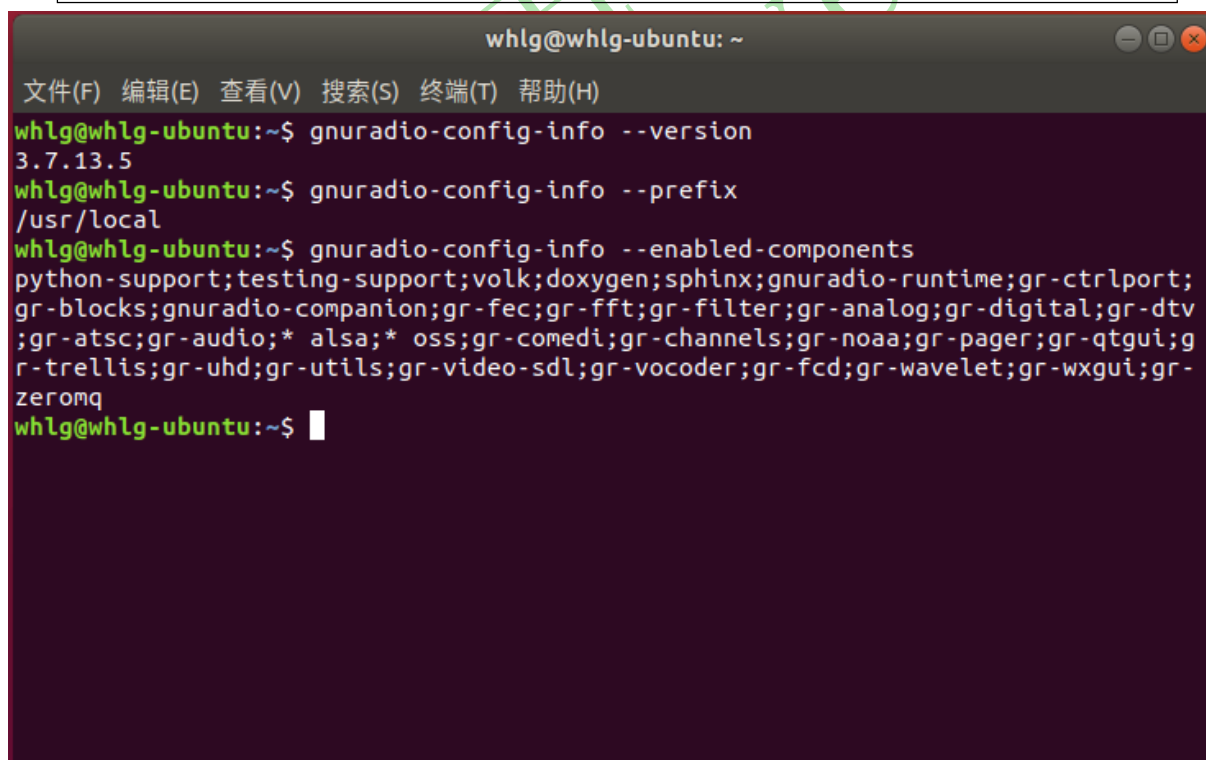
```
sudo cp -r /usr/local/lib/python3/dist-packages/* /usr/lib/python3/dist-packages/
```

- l) 此时，GNU Radio 应该已经安装好并可以使用了。通过运行以下快速测试，您可以在不连接 usrp 设备的情况下快速测试此功能。

```
gnuradio-config-info --version
```

```
gnuradio-config-info --prefix
```

```
gnuradio-config-info --enabled-components
```



```
whlg@whlg-ubuntu: ~  
文件(F) 编辑(E) 查看(V) 搜索(S) 终端(T) 帮助(H)  
whlg@whlg-ubuntu:~$ gnuradio-config-info --version  
3.7.13.5  
whlg@whlg-ubuntu:~$ gnuradio-config-info --prefix  
/usr/local  
whlg@whlg-ubuntu:~$ gnuradio-config-info --enabled-components  
python-support;testing-support;volk;doxygen;sphinx;gnuradio-runtime;gr-ctrlport;  
gr-blocks;gnuradio-companion;gr-fec;gr-fft;gr-filter;gr-analog;gr-digital;gr-dtv  
;gr-atsc;gr-audio;* alsa;* oss;gr-comedi;gr-channels;gr-noaa;gr-pager;gr-qgui;g  
r-trellis;gr-uhd;gr-utils;gr-video-sdl;gr-vocoder;gr-fcd;gr-wavelet;gr-wxgui;gr-  
zeromq  
whlg@whlg-ubuntu:~$
```