

AN24-00 DemoRad

GNU/Linux System Setup

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1 GNU/Linux System Setup

This application note explains the steps needed to prepare a GNU/Linux operating system to work with the DemoRad Python application notes. The Python application notes access the DemoRad via USB using the pyusb module (<https://github.com/pyusb/pyusb>), which utilizes libusb 1.0. Regarding the usage of a Raspberry Pi we are assuming that you have already created an SD-card and have already logged into the system. This note was created and tested using Raspbian 9 (<https://www.raspbian.org/>) and Debian 9 (<https://www.debian.org/>). This guide also works on different GNU/Linux variants, but you have to select the equivalent packages this distributions provide.

The aim of the tutorial is to:

- Install Python 3 and it's package manager pip,
- install modules necessary for running the appnotes,
- check if the system has detected the board,
- setting up a udev rule to acces the DemoRad board without superuser permissions.

For completeness every step is described in this document. With this application note, there is also a script provided which automates the whole setup process.

Copy the demorad-setup.sh script on your Raspberry Pi/machine and make the script executable.

```
chmod +x demorad-setup.sh
```

Then run the script.

```
./demorad-setup.sh
```

The script may prompt you for sudo-enabled user password.

Content of the Script

```
#!/bin/bash

SUDO="sudo"
APT="apt"
PIP="pip3"
UDEV="udevadm"

APT_PACKAGES="python3 python3-pip python3-pyqtgraph python3-numpy
  libusb-1.0.0 usbutils"
PIP_PACKAGES="pyusb"

UDEV_PATH="/lib/udev/rules.d/90-demorad.rules"
```

```
# This is the setup script to run the DemoRad board on Linux

# Update the package repository
$SUDO $APT update

# Install necessary packages
$SUDO $APT --assume-yes install $APT_PACKAGES

# Install pyusb via pip
$SUDO $PIP install $PIP_PACKAGES

# Create a udev rule for the DemoRad board
$SUDO echo 'ACTION=="add", SUBSYSTEMS=="usb", ATTRS{idVendor}=="064b", \
  ATTRS{idProduct}=="7823", MODE="660", GROUP="plugdev"' > $UDEV_PATH

# Restart udev
$SUDO $UDEV control --reload && $SUDO $UDEV trigger

echo "The system is now set up for the DemoRad board."
```

Setting up the system

In the first step we update the package repository by running:

```
sudo apt update
```

After the command has finished updating we install Python, pip, libusb 1.0 and some Python modules necessary for operating the DemoRad.

```
sudo apt install python3 python3-pip python3-pyqtgraph \
  python3-numpy libusb-1.0.0 usbutils
```

Accept to install the selected packages with Y. This can take some time. When installing via apt has completed, the next step is to install pyusb via pip (the Python package manager). Run the following command to install pyusb:

```
sudo pip3 install pyusb
```

Thereafter, connect the DemoRad board via USB to your Raspberry Pi, and connect the power supply. Then run lsusb to see if it was recognized:

```
lsusb
Bus 001 Device 004: ID 064b:7823 Analog Devices, Inc. (White Mountain DSP) <-DemoRad
Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp. SMSC9512/9514
Bus 001 Device 002: ID 0424:9514 Standard Microsystems Corp. SMC9514 Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

In the first line you can observe that the board was recognized. The last step is to write the udev rule, to be able to use the USB device as a normal user (which has to be part of the group plugdev).

```
echo 'ACTION=="add", SUBSYSTEMS=="usb", ATTRS{idVendor}=="064b", \
    ATTRS{idProduct}=="7823", MODE="660", \
    GROUP="plugdev"' > /lib/udev/rules.d/90-demorad.rules
```

Then restart udev:

```
sudo udevadm control --reload && sudo udevadm trigger
```

After restarting udev unplug and replug the device. The system is now set up to communicate with the board.