COMPREHENSIVE GUIDE: HOW TO INSTALL AIS_TX MODULE

THIS STEP-BY-STEP GUIDE WILL WALK YOU THROUGH THE INSTALLATION PROCESS FOR SETTING UP AN AIS TRANSMITTER (AIS_TX) ON UBUNTU 18.04.6 LTS USING GNU RADIO AND THE AIS MODULE. THIS GUIDE IS DESIGNED TO BE SIMPLE AND EASY TO FOLLOW, MAKING IT SUITABLE FOR INDIVIDUALS WITH LITTLE EXPERIENCE IN WORKING WITH UBUNTU, SDRS, GNURADIO, AND AIS.

STEP 1: PREPARE UBUNTU 18.04.6 LTS

1. OBTAIN UBUNTU 18.04.6 LTS (BIONIC BEAVER) FROM THE OFFICIAL WEBSITE.

2. IF YOU ARE RUNNING UBUNTU IN A VIRTUAL MACHINE, INSTALL "GUEST ADDITIONS CD IMAGE" TO STREAMLINE THE PROCESS.

3. OPTIONALLY, ADD YOUR USER TO THE SUDOERS FILE IF NECESSARY:

su -

usermod -a -G sudo <your user>

STEP 2: INSTALL UHD MODULE

1. OPEN A TERMINAL AND RUN THE FOLLOWING COMMAND TO INSTALL DEPENDENCIES:

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

sudo apt install git-all

2. CHANGE TO YOUR HOME DIRECTORY AND CREATE A WORKSPACE:

```
cd $HOME
mkdir workarea
cd workarea
```

3. CLONE AND INSTALL THE UHD MODULE:

```
git clone https://github.com/EttusResearch/uhd
cd uhd
cd host
mkdir build
cd build
cmake ..
make
make test
sudo make install
export LD_LIBRARY_PATH=/usr/local/lib
```

STEP 3: INSTALL GNU RADIO

1. RUN THE FOLLOWING COMMAND LINES TO INSTALL GNU RADIO:

```
sudo apt update
sudo apt upgrade
sudo apt install python3-pip
sudo apt install git cmake g++ libboost-all-dev libgmp-dev swig python3-numpy python3-mako python3-sphinx python3-lxml doxygen libfftw3-dev libsdl1.2-dev libgsl-dev libqwt-qt5-dev libqt5opengl5-dev python3-pyqt5 liblog4cpp5-dev libzmq3-dev python3-yaml python3-click python3-click-plugins python3-zmq python3-scipy python3-pip python3-gi-cairo
pip3 install git+https://github.com/pyqtgraph/pyqtgraph@develop
pip3 install numpy scipy
echo 'export PYTHONPATH=/usr/local/lib/python3/dist-packages:usr/local/lib/python2.7/site-packages:$PYTHONPATH' >> ~/.bashrc
```

```
echo 'export LD_LIBRARY_PATH=/usr/local/lib:$LD_LIBRARY_PATH' >> ~/.bashrc
echo 'export PYTHONPATH=/usr/local/lib/python3/dist-packages:usr/local/lib/python2.7/site-packages:$PYTHONPATH' >> ~/.profile
echo 'export LD_LIBRARY_PATH=/usr/local/lib:$LD_LIBRARY_PATH' >> ~/.profile
cd ~/
git clone --recursive https://github.com/gnuradio/gnuradio
cd gnuradio
git checkout maint-3.8
mkdir build
cd build
git pull --recurse-submodules=on
git submodule update --init
make -j3
sudo make install
sudo ldconfig
```

STEP 4: INSTALL AIS MODULE (AIS_TX)

1. CHANGE TO YOUR WORKSPACE DIRECTORY AND CLONE THE AIS MODULE REPOSITORY:

```
cd workarea
git clone https://github.com/zwh2/aistx.git
cd aistx
```

2. BUILD AND INSTALL AIS MODULE:

```
mkdir build
cd build
cmake ..
make
sudo make install
```

STEP 5: FINAL CONFIGURATIONS

1. OPEN A TERMINAL AND RUN THE FOLLOWING COMMAND TO MODIFY THE .BASHRC FILE:

sudo nano $HOME/.bashrc

2. ADD THE FOLLOWING TWO LINES AT THE END OF THE FILE:

export LD_LIBRARY_PATH=/usr/local/lib/:$LD_LIBRARY_PATH

export PYTHONPATH=/usr/local/lib/python3/dist-packages:/usr/local/lib/python2/site-packages:/usr/local/lib/python3/dist-packages/AISTX/:$PYTHONPATH

3. REBOOT YOUR COMPUTER TO APPLY ALL THE CHANGES.

STEP 6: LAUNCH GNU RADIO

1. OPEN A TERMINAL AND TYPE THE FOLLOWING COMMAND TO LAUNCH GNU RADIO:

gnuradio-companion

2. IF YOU ENCOUNTER AN ERROR RELATED TO THE AIS_SWIG, OPEN A NEW TERMINAL WINDOW AND RUN:

sudo nano $HOME/.bashrc

3. ENSURE THAT THE FOLLOWING TWO LINES ARE PRESENT AT THE END OF THE FILE:

export LD_LIBRARY_PATH=/usr/local/lib/:$LD_LIBRARY_PATH

export PYTHONPATH=/usr/local/lib/python3/dist-packages:/usr/local/lib/python2/site-packages:/usr/local/lib/python3/dist-packages/AISTX/:$PYTHONPATH

4. REBOOT YOUR COMPUTER AGAIN TO APPLY ALL THE CHANGES.

CONGRATULATIONS! YOU SHOULD NOW HAVE SUCCESSFULLY INSTALLED THE AIS_TX MODULE, AND GNU RADIO SHOULD BE READY TO USE. GOOD LUCK WITH YOUR AIS TRANSMISSIONS!