

The Workshop

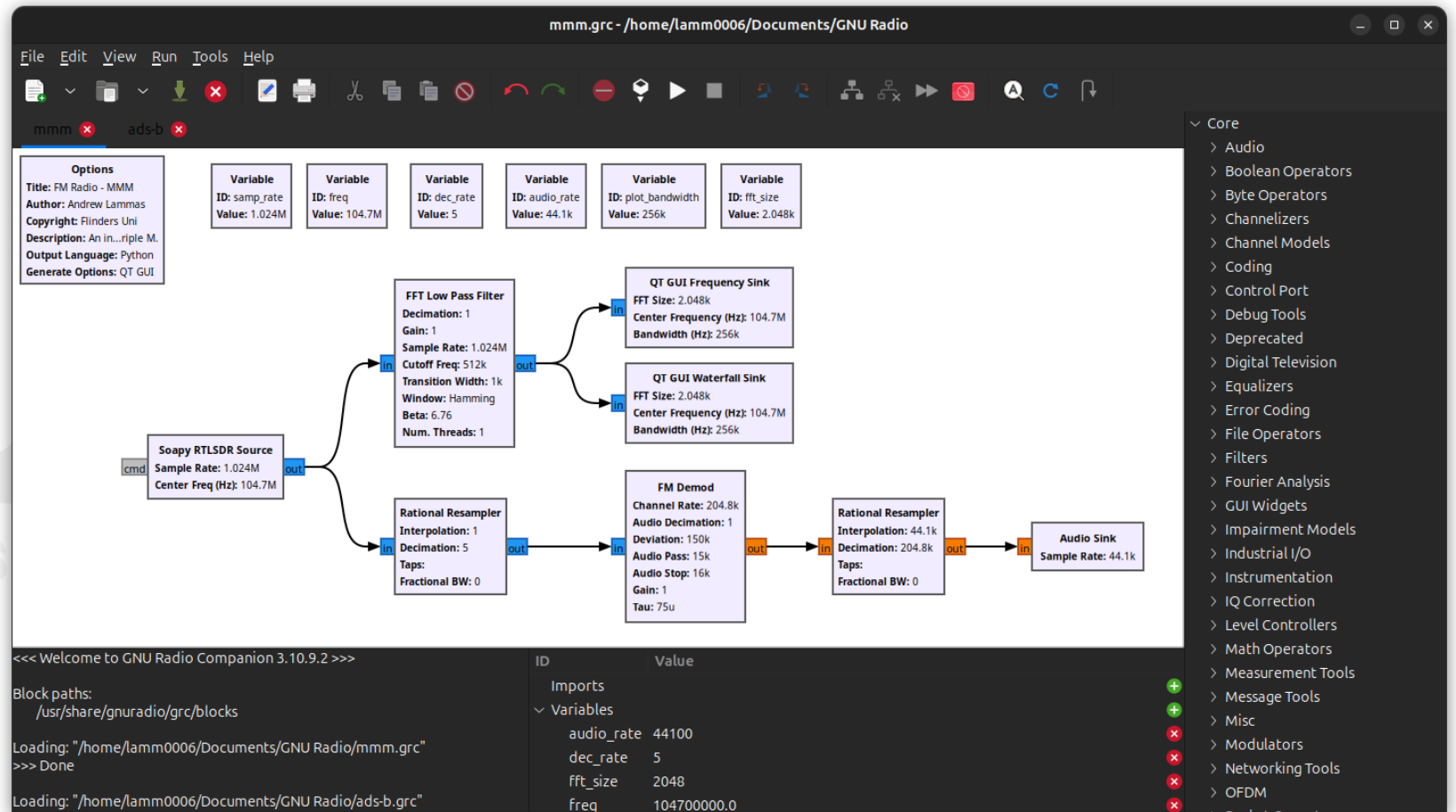
GNU Radio for SDR Developers

Exploring the Open-Source DSP Framework
Andrew Lammas, Flinders University



GNU Radio Companion

- Listen to MMM



Install GNU Radio

- Ubuntu $\geq$ 22.04 / Debian 12
 - `sudo apt-get install gnuradio`
- Fedora $\geq$ 39
 - `sudo dnf install gnuradio`
- Other Linux Distros
 - <https://repology.org/project/gnuradio/badges>
- Drivers
 - RTL-SDR – Packages included with install above

Install GNU Radio

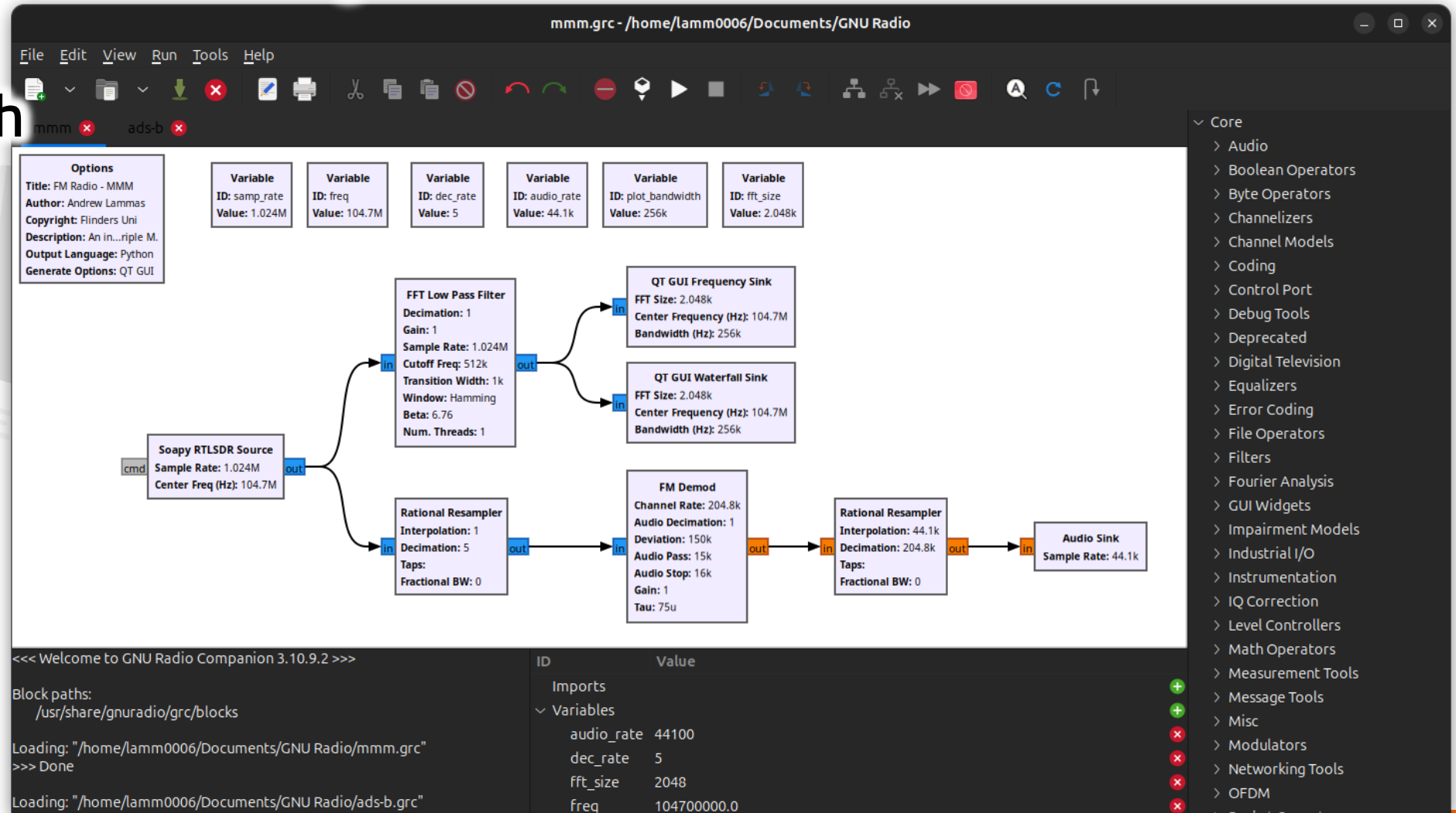
- Windows (Using Radioconda)
 - <https://github.com/radioconda/radioconda-installer>
- Drivers
 - RTL-SDR - <https://github.com/radioconda/radioconda-installer?tab=readme-ov-file#installing-the-winusb-driver-with-zadig>
 - Device must be plugged in to install driver

Install GNU Radio

- Mac OS (Using Radioconda)
 - <https://github.com/radioconda/radioconda-installer>
- Drivers (Intel)
 - `brew install rtl-sdr`
- Driver (Apple Silicon)
 - RTL-SDR – Packages included with Radioconda install

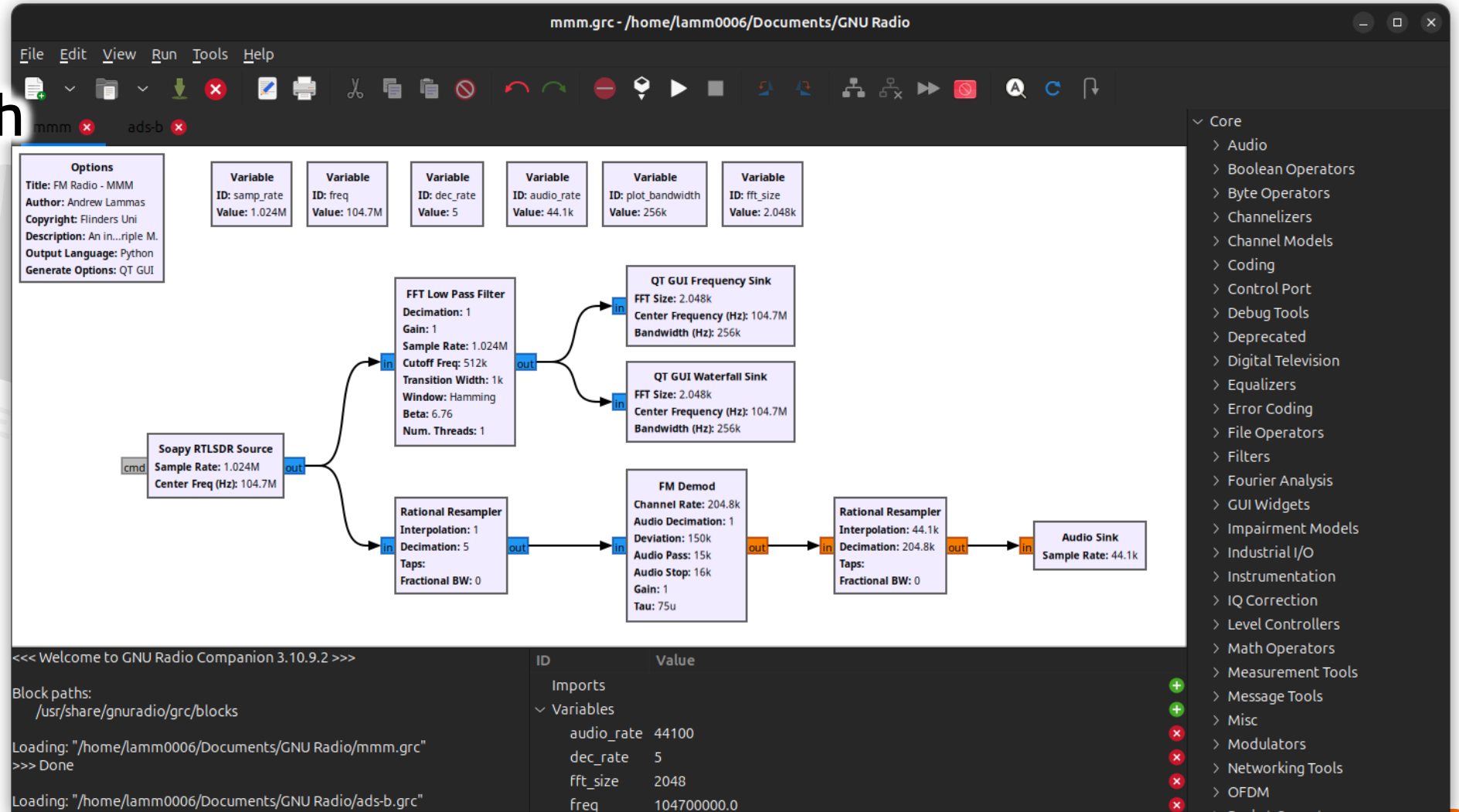
GNU Radio Companion

• Flowgraph



FM Radio

• Flowgraph



FM Radio

- Options

Options

Title: FM Radio - MMM

Author: Andrew Lammas

Copyright: Flinders Uni

Description: An in...riple M.

Output Language: Python

Generate Options: QT GUI

FM Radio

- Variables

Variable
ID: samp_rate
Value: 1.024M

Variable
ID: freq
Value: 104.7M

Variable
ID: dec_rate
Value: 5

Variable
ID: audio_rate
Value: 44.1k

Variable
ID: plot_bandwidth
Value: 256k

Variable
ID: fft_size
Value: 2.048k

FM Radio

- Source

Soapy RTLSDR Source
Sample Rate: 1.024M
Center Freq (Hz): 104.7M

out

File Source

File: mmm.bin
Repeat: Yes
Add begin tag: ()
Offset: 0
Length: 0

out

- Source link
[mmm.bin](#)

Properties: File Source

General Advanced Documentation

File mmm.bin ...

Output Type complex ▾

Repeat Yes ▾

Vector Length 1 [int]

Add begin tag pmt.PMT_NIL

Offset 0 [int]

Length 0 [int]

OK Cancel Apply

Properties: Soapy RTLSDR Source

General Advanced RF Options Documentation

Output Type Complex Float32 ▾

Device arguments [string]

Sample Rate samp_rate [float]

Bias Tee Power False [bool]

USB Buffer Size 16384 [int]

OK Cancel Apply

FM Radio

- Visualisations

Properties: FFT Low Pass Filter

General Advanced Documentation

Type Complex->Complex (Complex Taps) ▾

Decimation 1 [int]

Gain 1 [real]

Sample Rate samp_rate [real]

Cutoff Freq 2*plot_bandwidth [real]

Transition Width 1000 [real]

Window Hamming ▾

Beta 6.76 [real]

Num. Threads 1 [int]

OK Cancel Apply

Properties: QT GUI Waterfall Sink

General Advanced Config Documentation

Type Complex ▾

Name "" [string]

FFT Size fft_size ▾ [int]

Window Type Hamming ▾

Center Frequency (Hz) freq [real]

Bandwidth (Hz) plot_bandwidth [real]

Intensity Min -100 [float]

Intensity Max -60 [float]

Grid No ▾

OK Cancel Apply

Properties: QT GUI Frequency Sink

General Advanced Trigger Config Documentation

Type Complex ▾

Name "" [string]

FFT Size fft_size ▾ [int]

Window Type Hamming ▾

Normalize Window Power False ▾

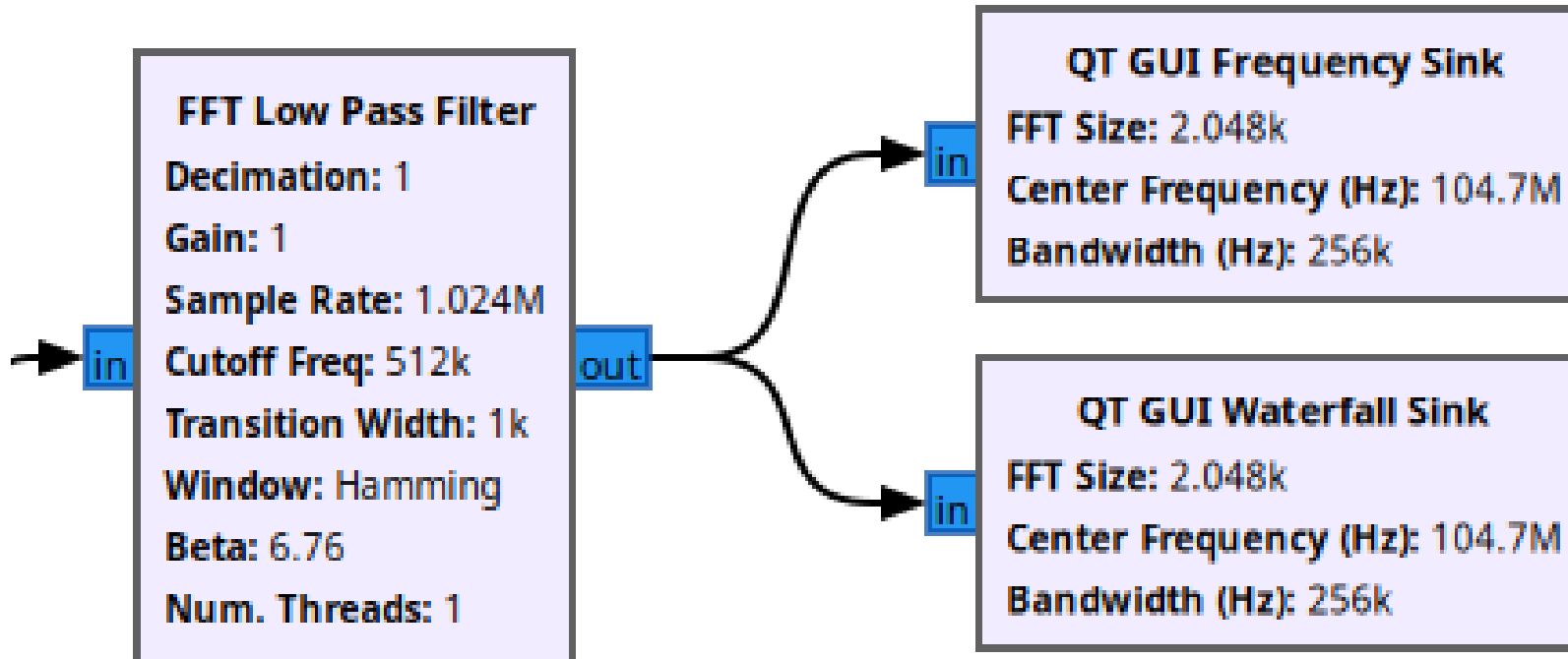
Center Frequency (Hz) freq [real]

Bandwidth (Hz) plot_bandwidth [real]

Grid No ▾

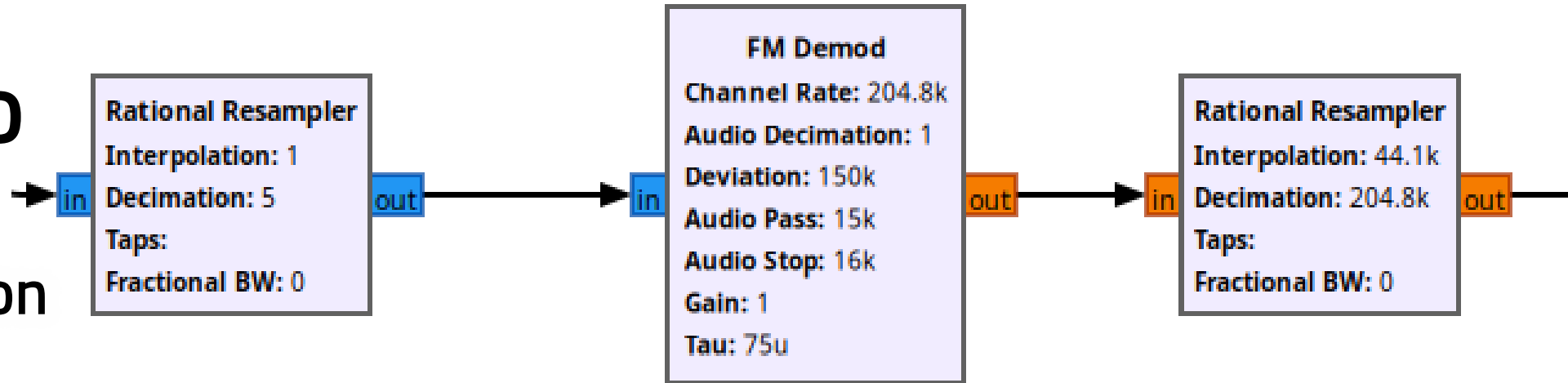
Autoscale No ▾

OK Cancel Apply



FM Radio

- Demodulation



Properties: Rational Resampler

General Advanced Documentation

Type: Complex->Complex (Complex Taps) ▾

Interpolation: 1 [int]

Decimation: dec_rate [int]

Taps: [] [complex_vector]

Fractional BW: 0 [real]

OK Cancel Apply

Properties: FM Demod

General Advanced Documentation

Channel Rate: int(samp_rate/dec_rate) [real]

Audio Decimation: 1 [int]

Deviation: 150000 [real]

Audio Pass: 15000 [real]

Audio Stop: 16000 [real]

Gain: 1.0 [real]

Tau: 75e-6 [real]

OK Cancel Apply

Properties: Rational Resampler

General Advanced Documentation

Type: Float->Float (Real Taps) ▾

Interpolation: audio_rate [int]

Decimation: int(samp_rate/dec_rate) [int]

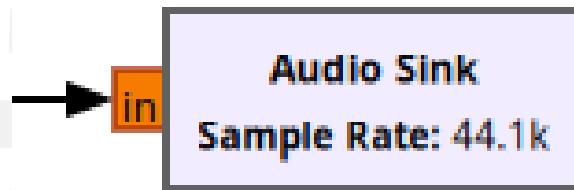
Taps: [] [real_vector]

Fractional BW: 0 [real]

OK Cancel Apply

FM Radio

- Sink



Properties: Audio Sink

General Advanced Documentation

Sample Rate [int]

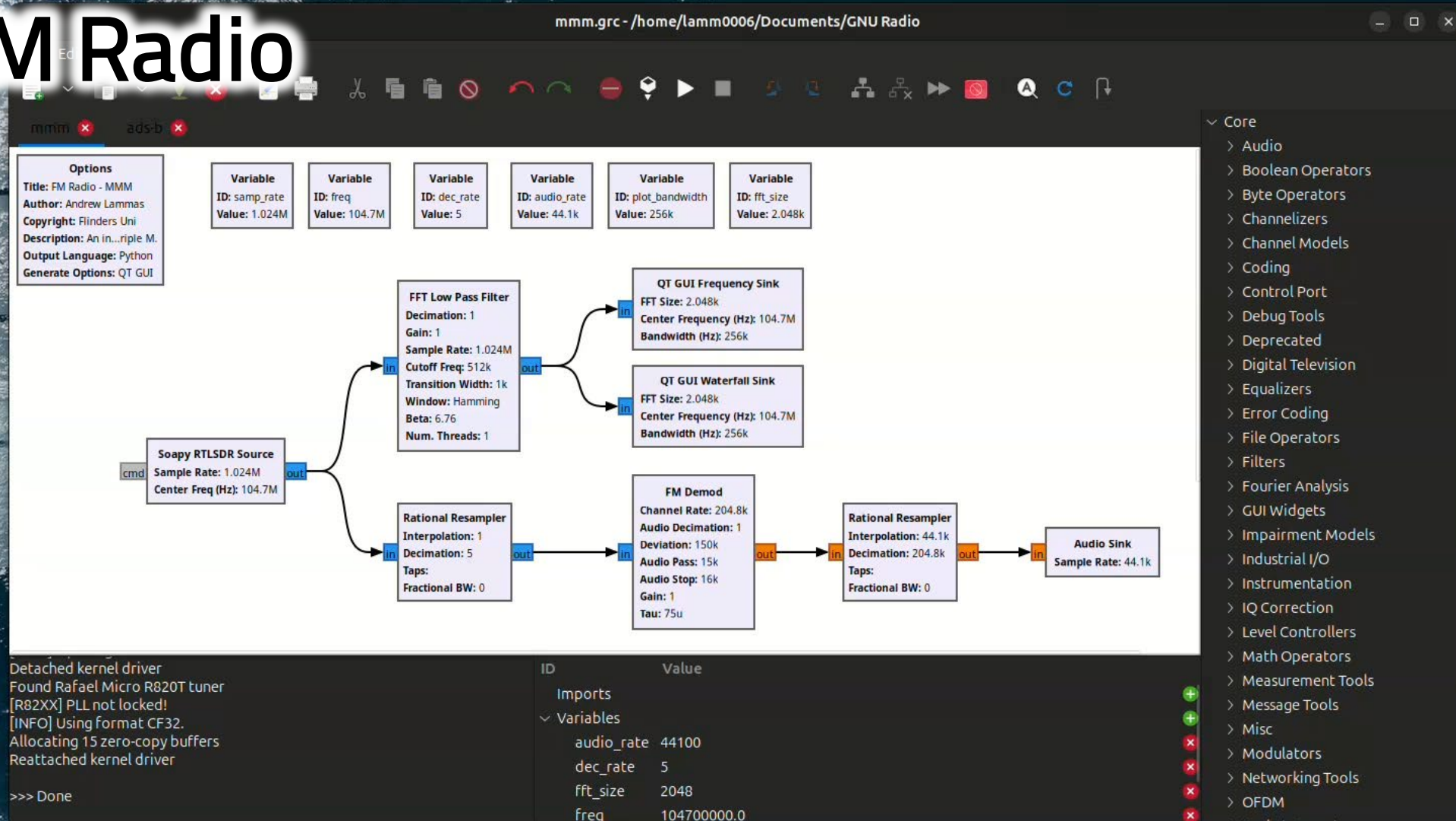
Device Name [string]

OK to Block Yes ▾

Num Inputs [int]

- ***PRESS PLAY***

FM Radio



Questions

