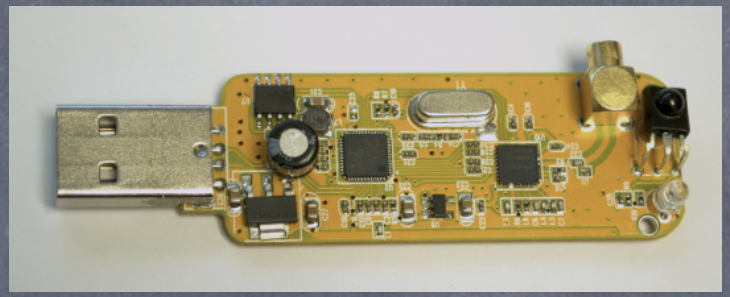
RTL-SDR og Gnu Radio

OZ3EDR, Torsdag d. 10 April 2014

OZ1LQO, Søren Kjærsgaard

Indhold



- RTL-SDR, en ny måde at lege med radio på
  - Hvad er RTL-SDR
  - Pris, Hvor kan man købe den
  - Hvordan bruger man den som radioamatør

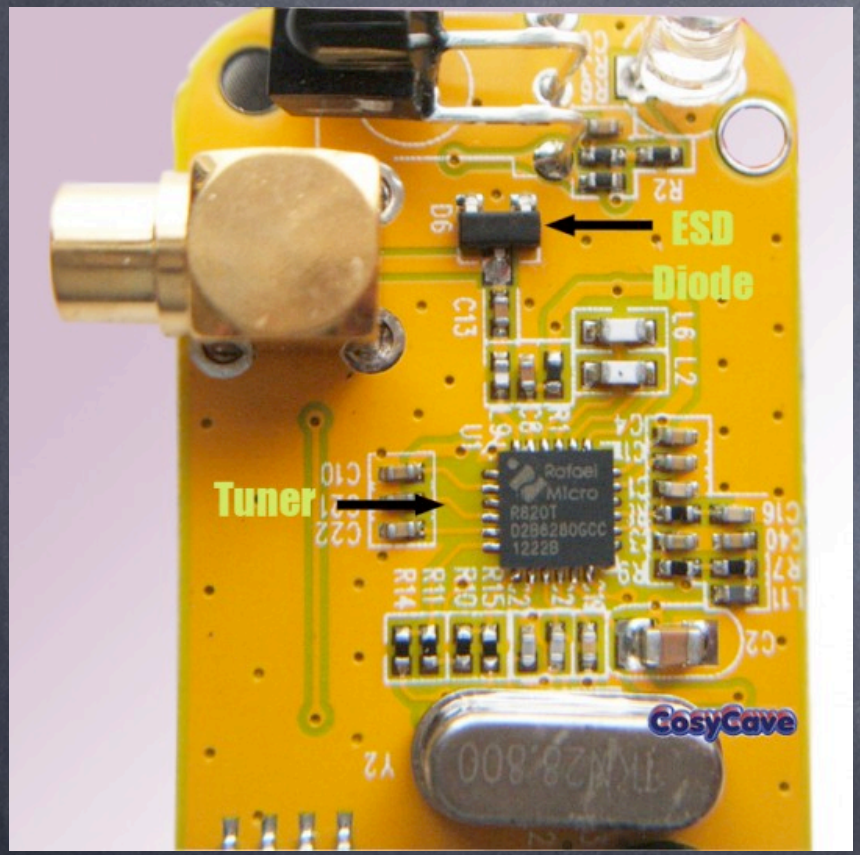
Indhold

- Gnu Radio: et realtime radio 'simulerings' værktøj
  - Hj.Side, support, wiki, fora
  - Installation
  - Demo!

RTL - SDR

- Artikler i 'OZ': April, August 2013
- En DVB-T USB dongle, der kan bruges til meget andet end TV!
- Køb den på Ebay, 18$ (søg efter Nooelec)
- Virker med TV, men er lavet til amatør brug (diode sikring i indgangen)

RTL - SDR



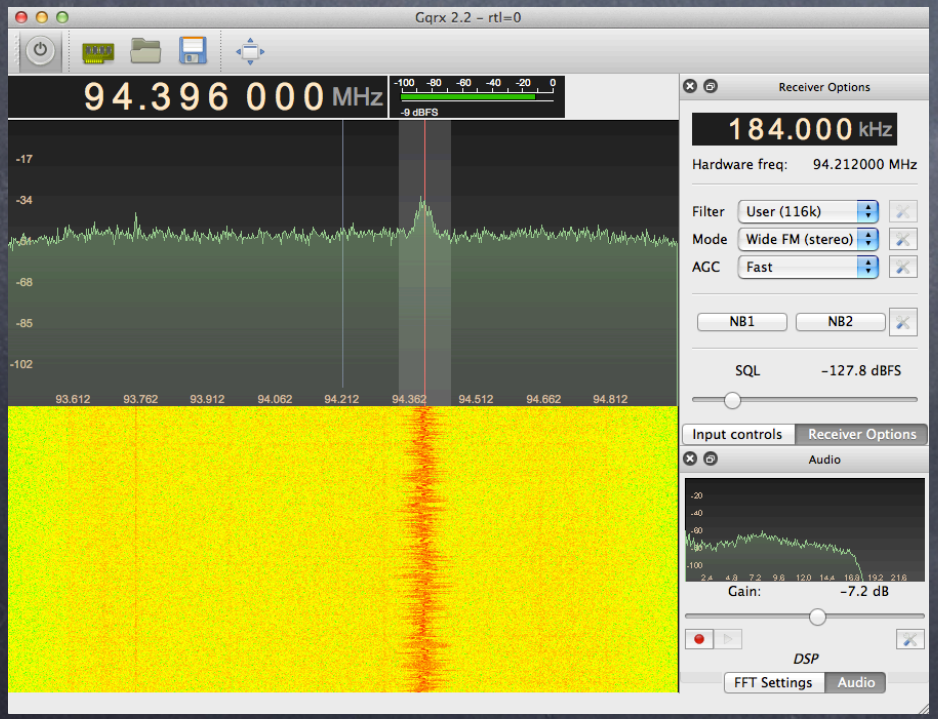
Tuner Chips:

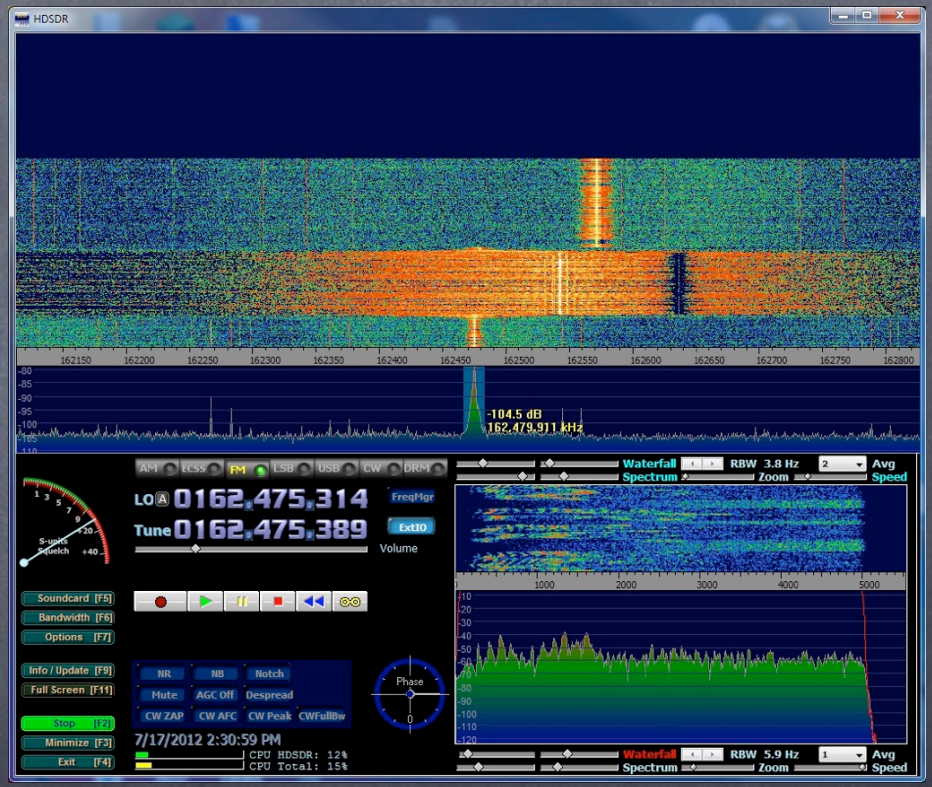
E4000, 52 - 2200 MHz
Første generation. Stort range, men lavere følsomhed på høje frekvenser.

R820T, 24 - 1766 MHz
Lavere minimum frekvens, bedre følsomhed på høje frekvenser

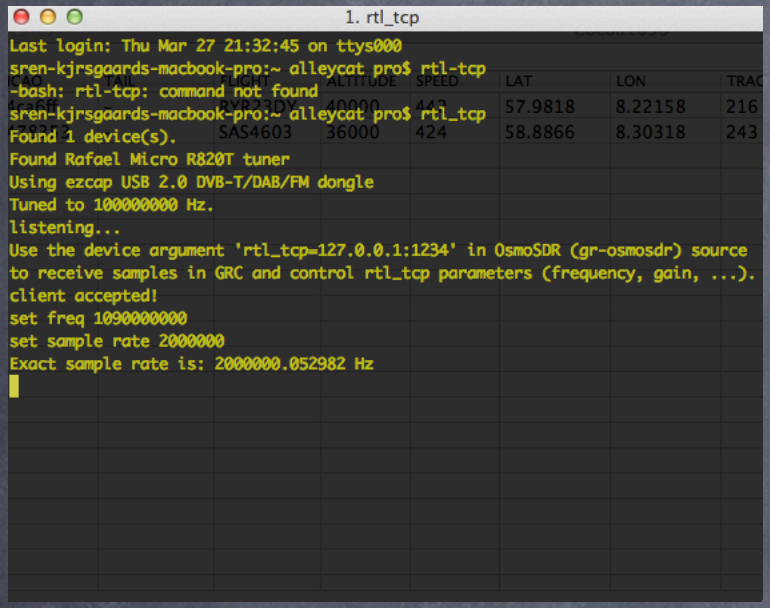
Software

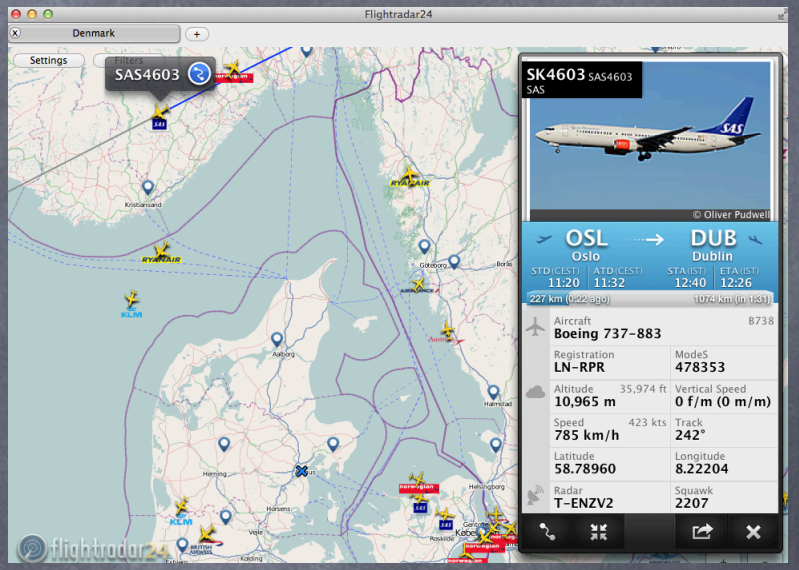
- PC: HDSDR (drivere)
- Mac: Gqrx (plug-n-play)

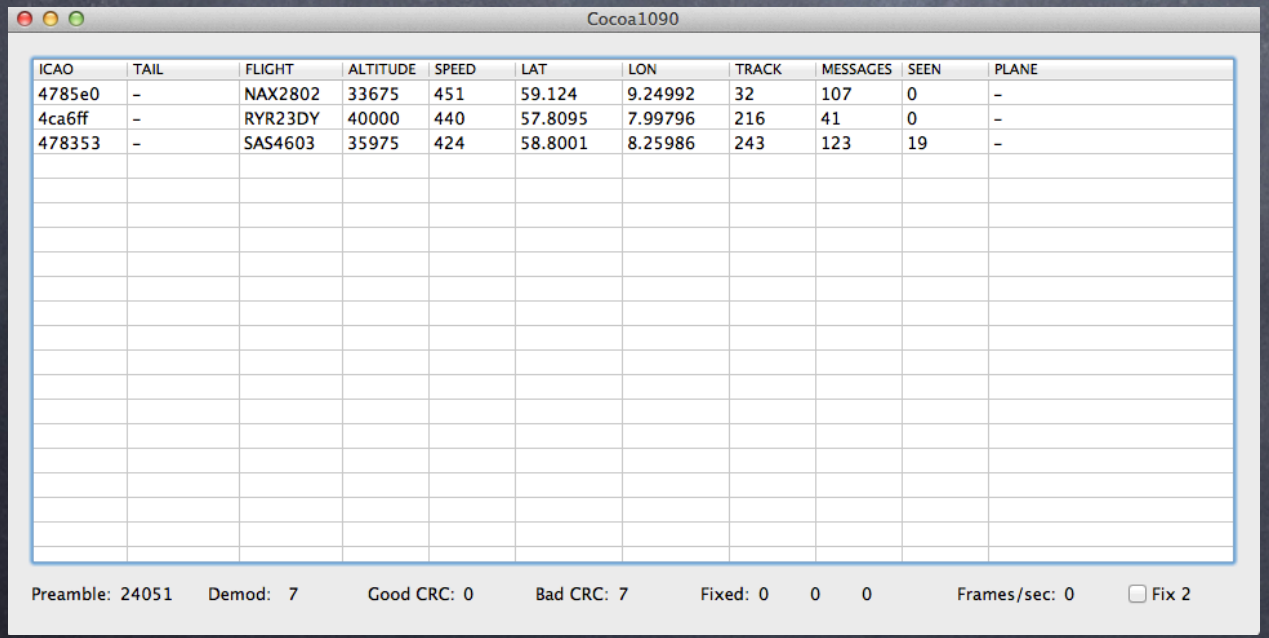




Cocoa 1090

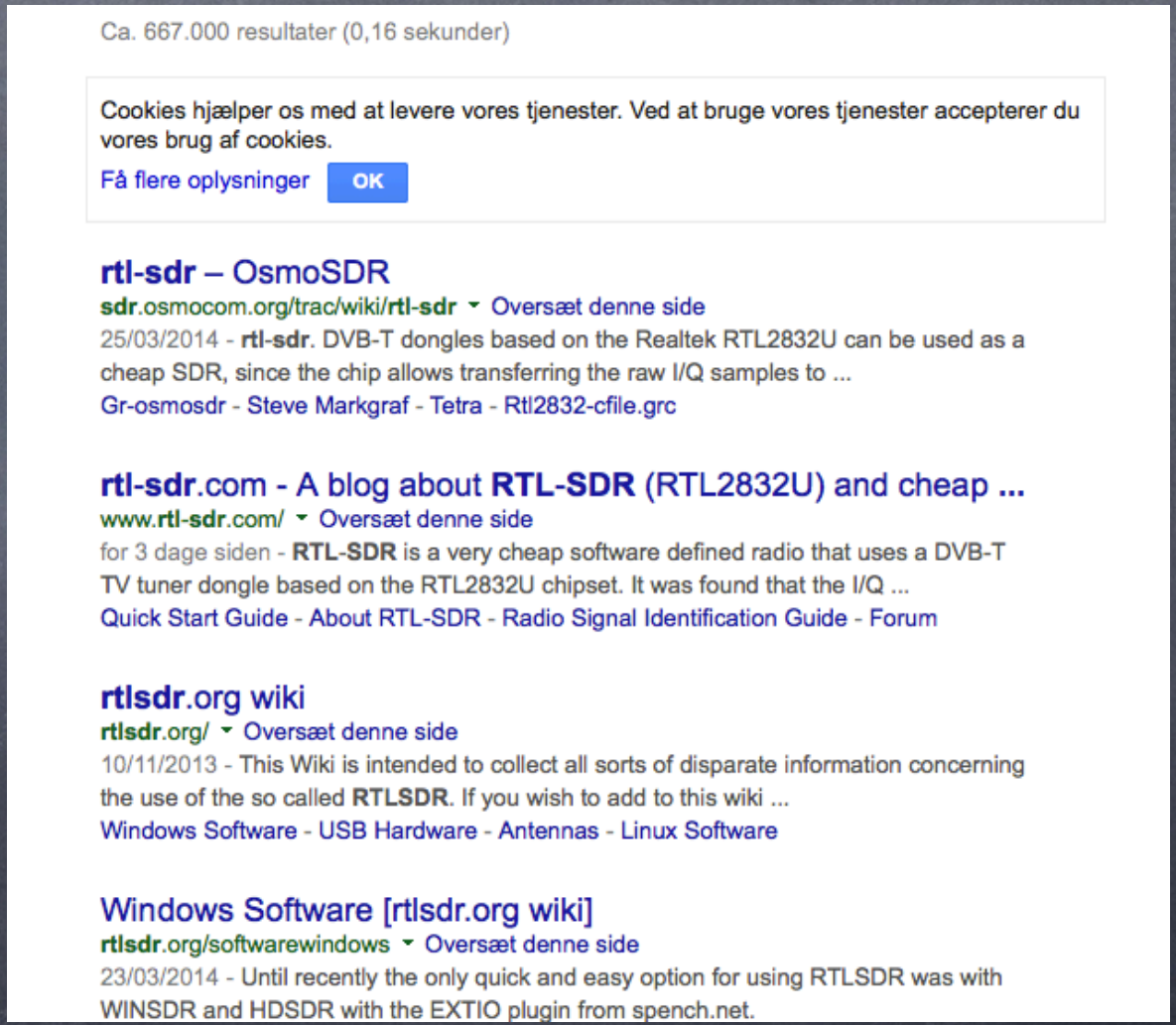

1. rtl_tcp
Last login: Thu Mar 27 21:32:45 on ttys000
sren-kjrsgaards-macbook-pro:~ alleycat pro$ rtl-tcp
-bash: rtl-tcp: command not found
sren-kjrsgaards-macbook-pro:~ alleycat pro$ rtl_tcp
Found 1 device(s):
Found Rafael Micro R820T tuner
Using ezcap USB 2.0 DVB-T/DAB/FM dongle
Tuned to 100000000 Hz.
listening...
Use the device argument 'rtl_tcp=127.0.0.1:1234' in OsmoSDR (gr-osmosdr) source
to receive samples in GRC and control rtl_tcp parameters (frequency, gain, ...).
client accepted!
set freq 1090000000
set sample rate 2000000
Exact sample rate is: 2000000.052982 Hz


Flightradar24
Denmark
Settings
Filters
SAS4603
SK4603 SAS4603
SAS
© Oliver Pudwell
OSL
Oslo
DUB
Dublin
STD (CEST) 11:20
ATD (CEST) 11:32
STA (IST) 12:40
ETA (IST) 12:26
227 km (0:22 ago)
1074 km (in 1:31)
Aircraft
Boeing 737-883
B738
Registration
LN-RPR
ModeS
478353
Altitude
10,965 m
35,974 ft
Vertical Speed
0 f/m (0 m/m)
Speed
785 km/h
423 kts
Track
242°
Latitude
58.78960
Longitude
8.22204
Radar
T-ENZV2
Squawk
2207
flightradar24


Cocoa1090
ICAO TAIL FLIGHT ALTITUDE SPEED LAT LON TRACK MESSAGES SEEN PLANE
4785e0 - NAX2802 33675 451 59.124 9.24992 32 107 0 -
4ca6ff - RYR23DY 40000 440 57.8095 7.99796 216 41 0 -
478353 - SAS4603 35975 424 58.8001 8.25986 243 123 19 -
Preamble: 24051 Demod: 7 Good CRC: 0 Bad CRC: 7 Fixed: 0 0 0 Frames/sec: 0
Fix 2

Masser af info online

- Google RTL-SDR!



Ca. 667.000 resultater (0,16 sekunder)

Cookies hjælper os med at levere vores tjenester. Ved at bruge vores tjenester accepterer du vores brug af cookies.

Få flere oplysninger OK

rtl-sdr – OsmoSDR
sdr.osmocom.org/trac/wiki/rtl-sdr ▾ Oversæt denne side
25/03/2014 - **rtl-sdr**. DVB-T dongles based on the Realtek RTL2832U can be used as a cheap SDR, since the chip allows transferring the raw I/Q samples to ...
Gr-osmosdr - Steve Markgraf - Tetra - Rtl2832-cfile.grc

rtl-sdr.com - A blog about RTL-SDR (RTL2832U) and cheap ...
www.rtl-sdr.com/ ▾ Oversæt denne side
for 3 dage siden - **RTL-SDR** is a very cheap software defined radio that uses a DVB-T TV tuner dongle based on the RTL2832U chipset. It was found that the I/Q ...
Quick Start Guide - About RTL-SDR - Radio Signal Identification Guide - Forum

rtlsdr.org wiki
rtlsdr.org/ ▾ Oversæt denne side
10/11/2013 - This Wiki is intended to collect all sorts of disparate information concerning the use of the so called **RTLSDR**. If you wish to add to this wiki ...
Windows Software - USB Hardware - Antennas - Linux Software

Windows Software [rtlsdr.org wiki]
rtlsdr.org/softwarewindows ▾ Oversæt denne side
23/03/2014 - Until recently the only quick and easy option for using RTLSDR was with WINSDR and HDSDR with the EXTIO plugin from spench.net.

Pause ..
(spørgsmål?)

Gnu Radio: et real-tid radio 'simulerings' værktøj

GNU Radio er et gratis & open-source software toolkit, hvor man med signal processering 'blokke' kan bygge software radioer.

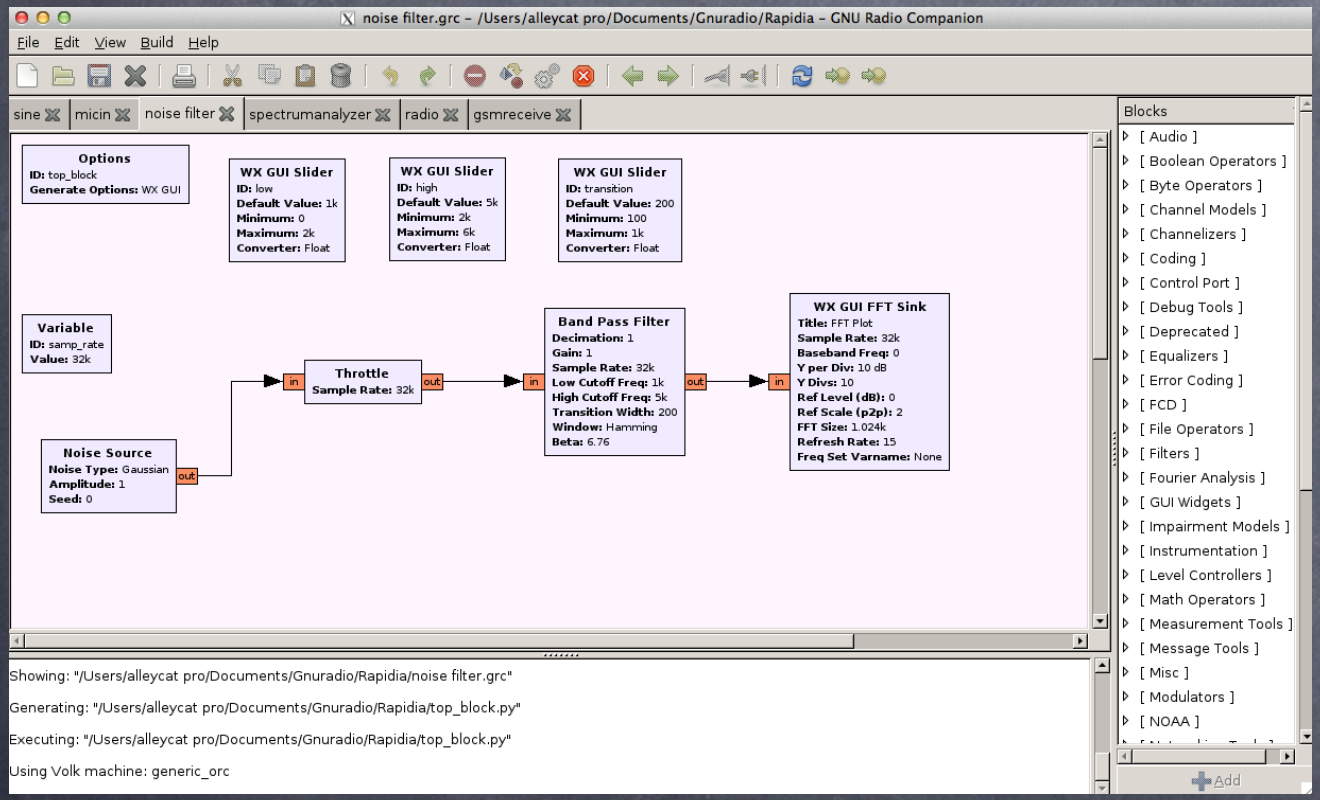
Det kan bruges sammen med eksternt hardware og man kan dermed bygge sin egen SDR (Software-Defined Radio), eller man kan bruge det som et simulerings miljø.

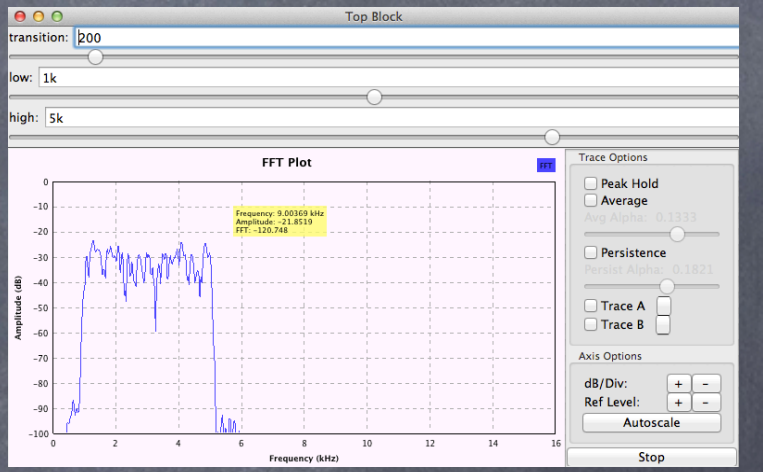
Gnu Radio bruges på hobby plan, men også akademisk eller professionelt til forskning og opbygning af rigtige radio systemer.

GNU Radio er licenseret under GNU General Public License (GPL) version 3.

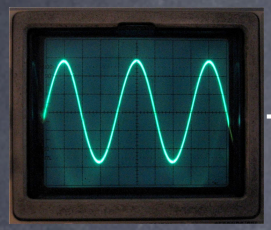
(copyright of the Free Software Foundation)

Gnu Radio


noise filter.grc – /Users/alleycat pro/Documents/Gnuradio/Rapidia – GNU Radio Companion
File Edit View Build Help
sine micin noise filter spectrumanalyzer radio gsmreceive
Options
ID: top_block
Generate Options: WX GUI
WX GUI Slider
ID: low
Default Value: 1k
Minimum: 0
Maximum: 2k
Converter: Float
WX GUI Slider
ID: high
Default Value: 5k
Minimum: 2k
Maximum: 6k
Converter: Float
WX GUI Slider
ID: transition
Default Value: 200
Minimum: 100
Maximum: 1k
Converter: Float
Variable
ID: samp_rate
Value: 32k
Throttle
Sample Rate: 32k
Band Pass Filter
Decimation: 1
Gain: 1
Sample Rate: 32k
Low Cutoff Freq: 1k
High Cutoff Freq: 5k
Transition Width: 200
Window: Hamming
Beta: 6.76
WX GUI FFT Sink
Title: FFT Plot
Sample Rate: 32k
Baseband Freq: 0
Y per Div: 10 dB
Y Divs: 10
Ref Level (dB): 0
Ref Scale (p2p): 2
FFT Size: 1.024k
Refresh Rate: 15
Freq Set Varname: None
Noise Source
Noise Type: Gaussian
Amplitude: 1
Seed: 0
Showing: "/Users/alleycat pro/Documents/Gnuradio/Rapidia/noise filter.grc"
Generating: "/Users/alleycat pro/Documents/Gnuradio/Rapidia/top_block.py"
Executing: "/Users/alleycat pro/Documents/Gnuradio/Rapidia/top_block.py"
Using Volk machine: generic_orc
Blocks
[Audio]
[Boolean Operators]
[Byte Operators]
[Channel Models]
[Channelizers]
[Coding]
[Control Port]
[Debug Tools]
[Deprecated]
[Equalizers]
[Error Coding]
[FCD]
[File Operators]
[Filters]
[Fourier Analysis]
[GUI Widgets]
[Impairment Models]
[Instrumentation]
[Level Controllers]
[Math Operators]
[Measurement Tools]
[Message Tools]
[Misc]
[Modulators]
[NOAA]
Add


Top Block
transition: 200
low: 1k
high: 5k
FFT Plot
Frequency (kHz)
Amplitude (dB)
Trace Options
Peak Hold
Average
Persistence
Trace A
Trace B
Axis Options
dB/Div:
Ref Level:
Autoscale
Stop

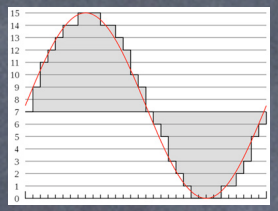
Digital Signalbehandling



Clk (Fs)

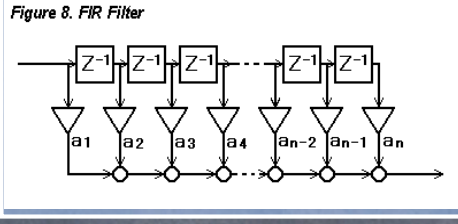
A/D

8bit: 0-255



Clk (Fs)

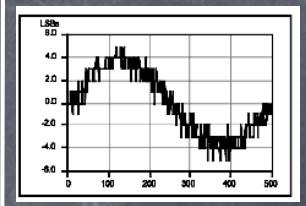
uP



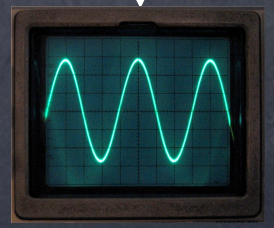
8bit

Clk (Fs)

D/A



Filter

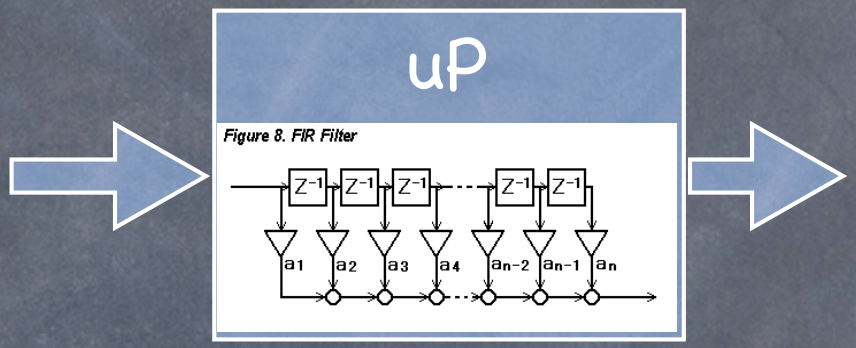


5V 8bit A/D:

20mV opløsning

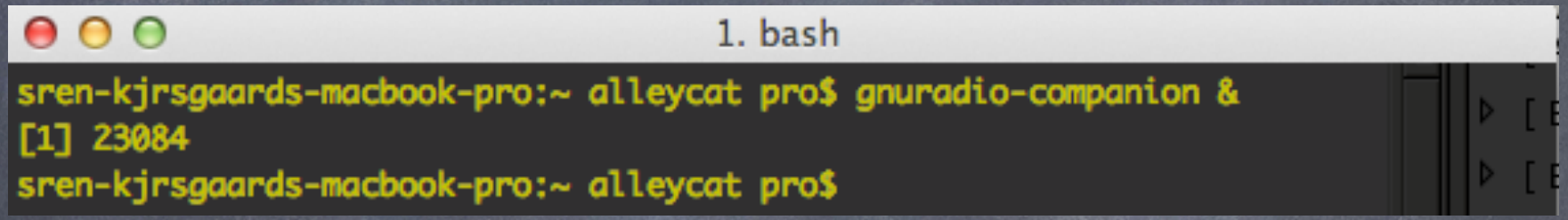
Fs >= 2 x Fmax

Gnu Radio arbejder på 'BaseBand'

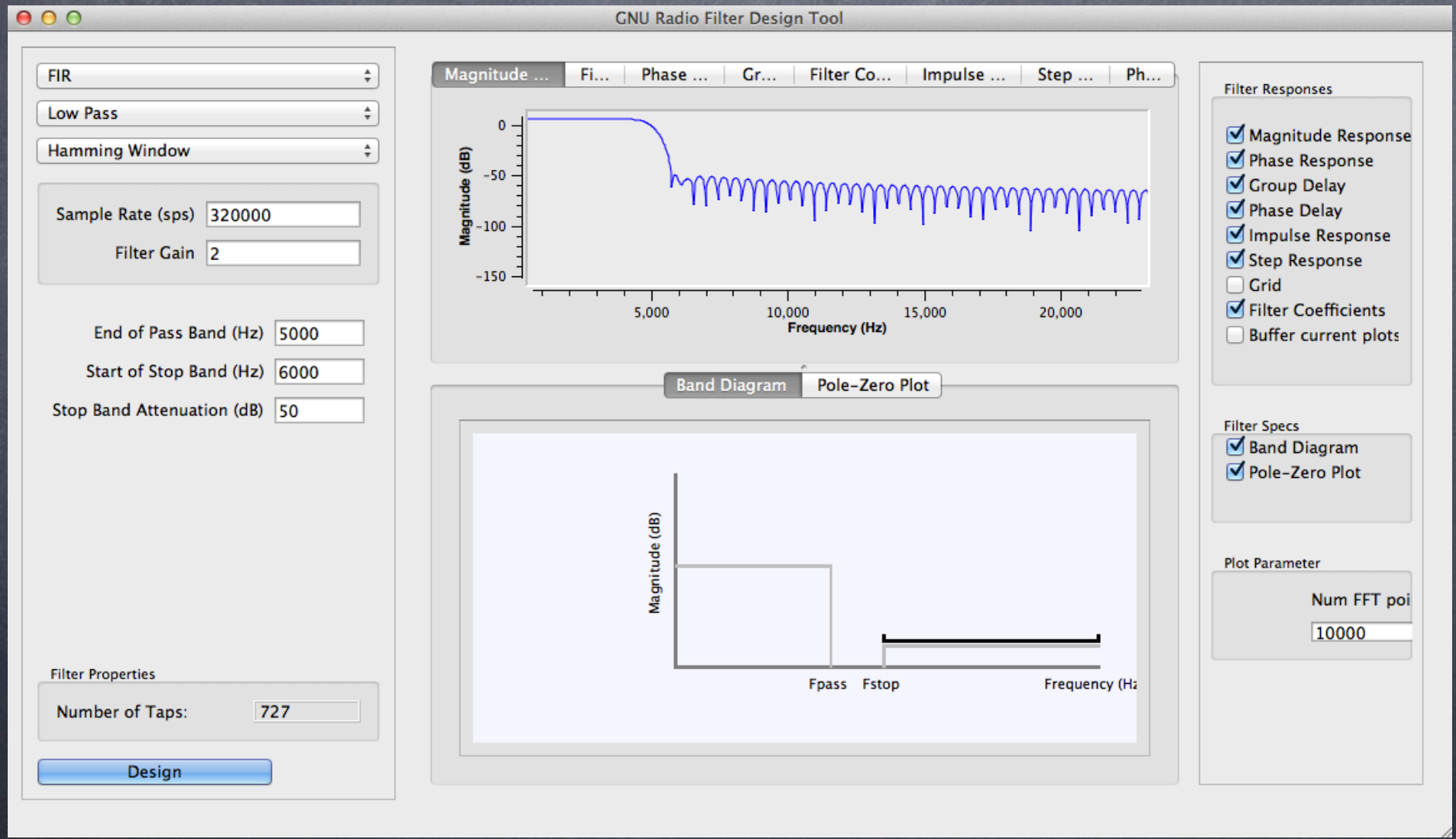


Filter
Generator
Demodulator
Forstærker
Oscilloskop
Spectrum Analyzer
Waterfall
..

Ikke mere snak..



gr_filter_design



Gnu Radio, Hj.Side og Wiki

- http://gnuradio.org/redmine/projects/gnuradio/wiki

I. Getting started

If you've never touched GNU Radio before, these pages will get you started with a running installation of GNU Radio and will show you how to take your first steps with this software radio tool.

- **What is GNU Radio and why do I want it?** - Read this if you really have no idea what this project is about.
- **Installing GNU Radio** - This will explain all the steps to get a working installation of GNU Radio.
- **How do I use GNU Radio?** - A short introduction to the possibilities you have as a GNU Radio user.
  - **Utilities and tools that come with GNU Radio**
- **Tutorials**
  - **How to write Python applications** - This includes a guide on how to read and use the Doxygen-generated API docs.
  - **A quick guide on doing simulations with GNU Radio**
  - **How to write an out-of-tree (OOT) module**
  - **Tutorial on how to configure OOT packages to find and link against GNU Radio**
- **Frequently Asked Questions** - Check this page before asking questions on the mailing list.

II. Documentation

GNU Radio has two manuals: one for the C++ API and another for the Python API. The majority of the documentation comes from using **Doxygen** markup comments in the public header files. These are the basis for both manuals. The Python documentation uses **Sphinx** to pull in both the Doxygen documentation as well as any formatted comments present in any Python files.

- **C++ Manual** - This includes a complete list of available blocks.
  - **Current Release**
  - **Latest Development Build**
  - **Documentation for older releases**

Gnu Radio, Installation

- Mac: Nogenlunde let, men der er visse afhængigheder (X11, mvd.)
- Windows, mere besværligt, men det kan lade sig gøre .. (Gnu Radio er lavet til linux)
- Linux: Let!
  - apt-get install gnuradio
  - yum install gnuradio

Gnu Radio, tværsummen

- Det er bedst hvis man ved noget om digital signalbehandling
- Man kommer langt med de indbyggede blokke
- Men man kan skrive sine egne, eller ændre / tilføje til de eksisterende
- C++ og Python

Tak for i aften

MathWorks® and NooElec™ have coordinated to bring MATLAB® support for our SDR receivers. The RTL-SDR radio support package enables you to design wireless receivers using real world signals. Using Communications System Toolbox™ in conjunction with an RTL-SDR USB radio, you can design and prototype systems that process real-time wireless signals in MATLAB® and Simulink®

Wireless engineers, students, and hobbyists can learn to receive and decode real-world radio signals using this low cost RTL-SDR hardware connected to your computer.