North Texas NTMS Microwave Society

GNUradio and other SDR clients

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Five SDR clients

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Program	Advantages	Disadvantages
SDR++	Very simple – easy to use	Limited list of demods Receive only.
Airspy SDR#	Very simple – easy to use	Limited list of demods Receive only.
SDR Console	Very easy multiple receiver setups. Can do transmit	Limited list of demods
SDR Angel	Many available plug-ins. Can do transmit	Requires more machine resources
GNURadio	Granular control. Medium to advanced learning tools. Can transmit. Jobs available!	Best run on Linux but other OS work, requires machine resources.

SDR++

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- Multi VFO
- Wide hardware support (both through SoapySDR and dedicated modules)
- SIMD accelerated DSP
- Cross-platform (Windows, Linux, MacOS and BSD)
- Full waterfall update when possible. Makes browsing signals easier and more pleasant
- Modular design (easily write your own plugins)

- This was our IF radio 3 years ago when we set a record DX contact on 122 GHz at 17 km. We wanted a waterfall and spectrum view at an IF of 144 MHz.

SDR++

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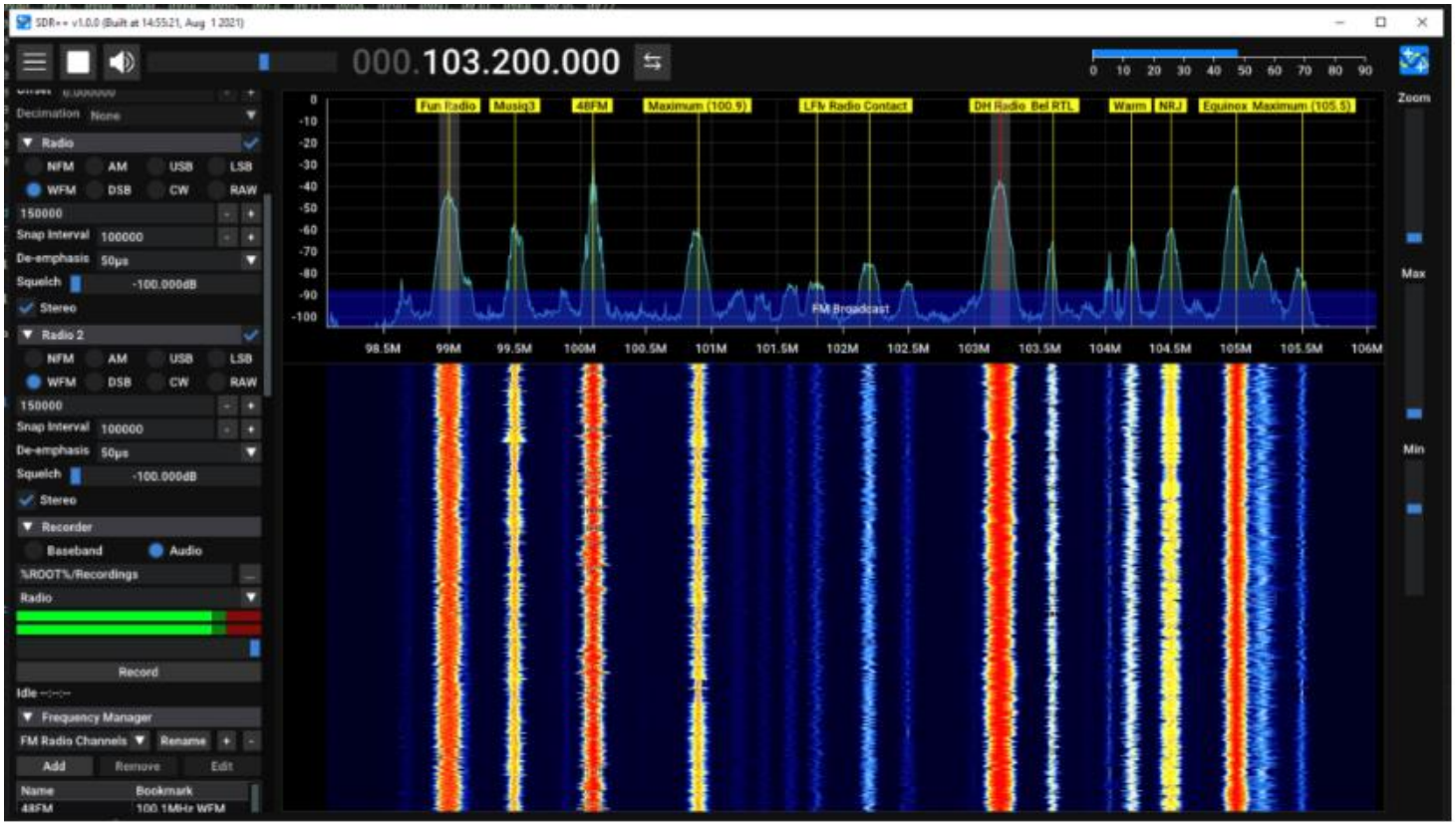

[Download SDR++]

Airspy SDR

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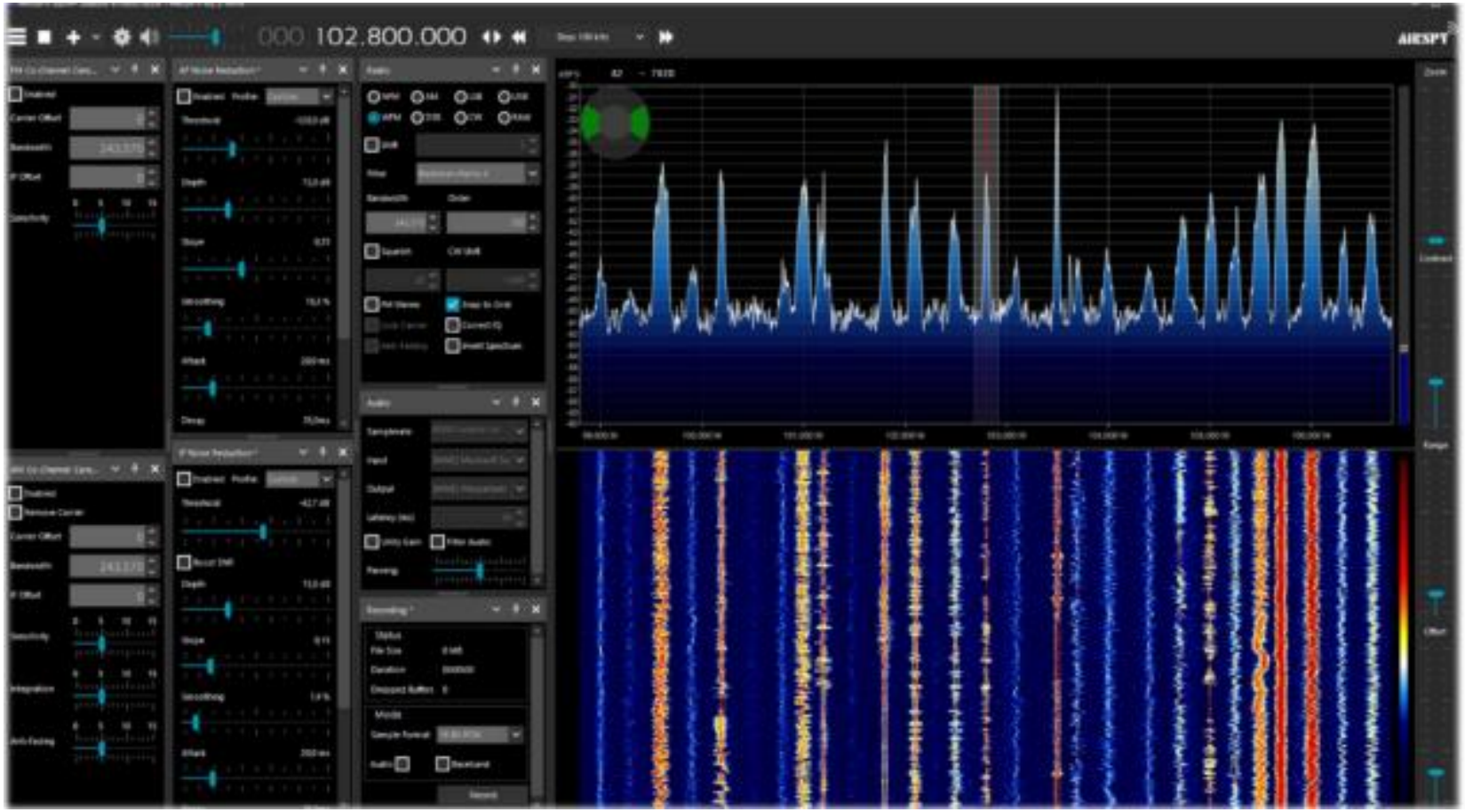

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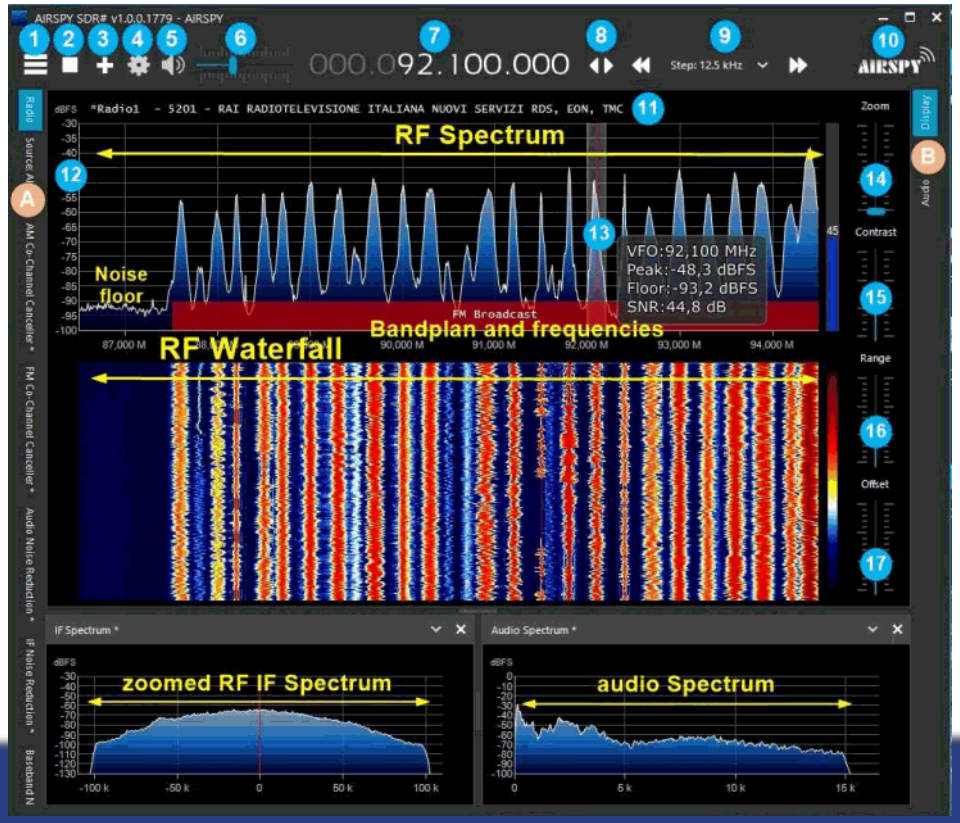
Airspy SDR

[Video of SDR# airband receiver]

[User guide and download instructions]



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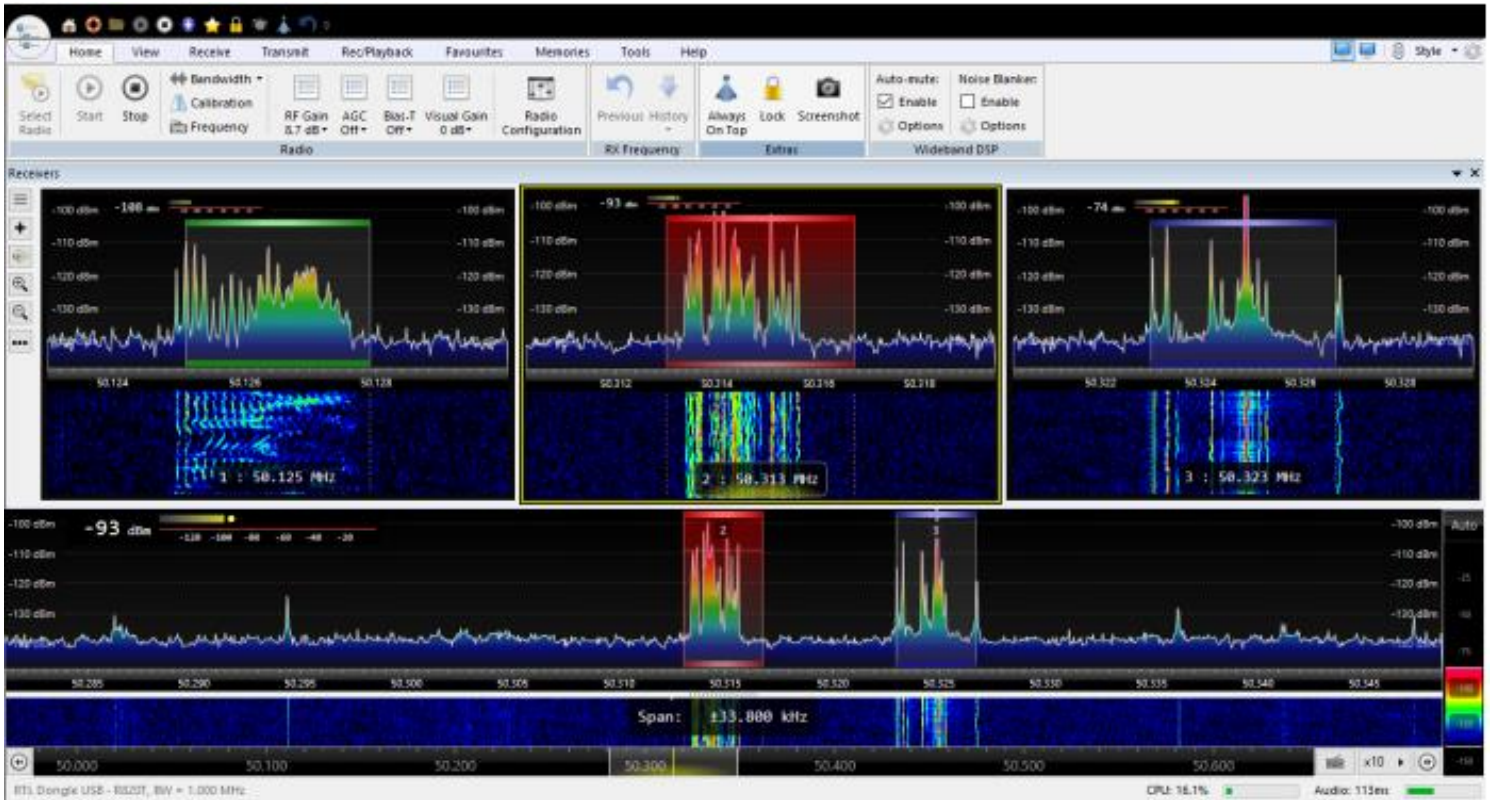
SDR Console

[K5ND monitoring 6 meters with 4 RX]



SDR Console

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[Download SDR Console]

[KM5PO 5 receiver demo]

SDR Angel

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- Many plug-ins

- ADS-B Decoder: **Decodes aircraft ADS-B data and plots aircraft positions on a map**
- NOAA APT Decoder: Decodes NOAA weather satellite images (in black and white only)
- DVB-S: Decodes and plays Digital TV DVB-S and DVB-S2 video
- AIS: Decodes marine AIS data and plots vessel positions on a map
- VOR: Decodes VOR aircraft navigational beacons, and plots bearing lines on a map, allowing you to determine your receivers position.
- DAB+: Decodes and plays DAB digital audio signals
- Radio Astronomy Hydrogen Line: With an appropriate radio telescope connected to the SDR, integrates and displays the Hydrogen Line FFT with various settings, and a map of the galaxy showing where your dish is pointing. Can also control a dish rotator.
- Radio Astronomy Solar Observations: Similar to the Hydrogen line app, allows you to make solar measurements.
- Broadcast FM: Decoding and playback. Includes RDS decoding.

SDR Angel

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- Noise Figure Measurements: Together with a noise source you can measure the noise figure of a SDR.
- Airband Voice: Receive multiple Airband channels simultaneously
- Radio Clocks: Receive and decode accurate time from radio clocks such as MSF, DCF77, TDF and WWVB.
- APRS: Decode APRS data, and plot APRS locations and moving APRS enabled vehicles on a map with speed plot.
- Pagers: Decode POCSAG pagers
- APRS/AX.25 Satellite: Decode APRS messages from the ISS and NO-84 satellites, via the built in decoder and satellite tracker.
- Channel Analyzer: Analyze signals in the frequency and time domains
- QSO Digital and Analog Voice: Decode digital and analog voice. Digital voice handled by the built in DSD demodulator, and includes DMR, dPMR and D-Star.
- Beacons: Monitor propagation via amateur radio beacons, and plot them on a map.

SDR Angel

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Download SDR Angel

- Video of KM5PO ADS-B implementation with SDR Angel

GNU Radio

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GNU Radio is a free & open-source software development toolkit that provides signal processing blocks to implement software radios.

It can be used with readily-available low-cost external RF hardware to create software-defined radios, or without hardware in a simulation-like environment.

It is widely used in research, industry, academia, government, and hobbyist environments to support both wireless communications research and real-world radio systems.

GNU Radio

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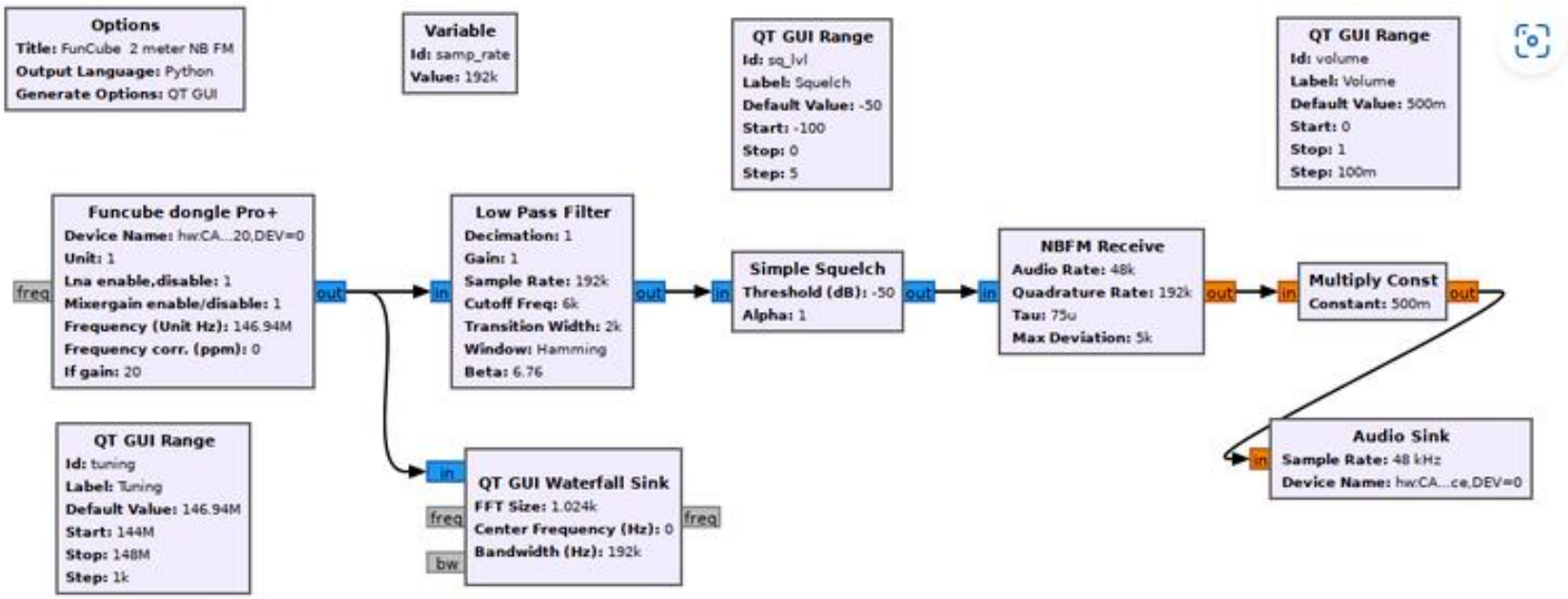
Flowgraph system of functional blocks



GNU Radio

Windows download.
Scroll down to "Assets" & make sure to click on the "Show all assets" hotspot to find the latest Windows installer

GNU Radio may be run from within Oracle virtualbox

GNU Radio may be run from a flash drive under embedded Ubunto OS on the flash drive (this is the method we will use for hamfest demos)

Help wanted

North Texas NTMS Microwave Society

- SDR or “Signal processing Engineers” are in demand

Software Defined Radio (SDR) Engineer

Caliola Engineering, LLC
Colorado Springs, CO

What we require:

- MS OR BS plus 2 years' experience in Electrical Engineering, Mathematics or Physics or a related professional technical
- Experience solving technical problems in the areas of wirel processing, and signals collection.
- Strong background in scientific programming using languages such as C, C++, Python.
- Experience developing communication system components for SDR frameworks like GNU Radio.
- Experience with standard RF lab equipment (e.g., oscilloscopes, spectrum analyzers, signal generators, etc.).
- Experience integrating SDR components with external systems and software.
- Experience with wireless digital communication systems, in particular modern digital modulation techniques and modem design.
- Proven track record of being resourceful and creative, and willing to contribute to a multidisciplinary and face-paced engineering environment.
- Awareness of relevant industry standards, regulations and best practices in RF design and safety.
- This position requires the ability to obtain and maintain a security clearance, which is issued by the U.S. Government. Security clearances may only be granted to U.S. citizens. In addition, applicants who accept a conditional offer of employment may be subject to government security investigation(s) and must meet eligibility requirements for access to classified information.

Software Defined Radio (SDR) Engineer
Caliola Engineering, LLC — Colorado Springs, CO
At Caliola, SDR engineers are problem solvers who enjoy solving hard technical problems quickly and creativity and applying innovative approaches to solve...
$90,788 - $177,158 a year Quick Apply

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Help wanted

KRATOS

Digital Signal Processing Engineer

Kratos Defense - 3.3

Colorado Springs, CO

Apply Now

Experience and Skills:

- Must be a self-starter and able to work closely in a fast paced, small engineering team which includes other software engineers, DSP engineers, hardware engineers, systems engineers, and test engineers
- Must have an active Top-Secret security clearance with the ability to obtain an SCI
- Education and/or background in digital signal processing and satellite communications specifically in modulation detection and characterization
- Team player and capable of working in a fast paced, team environment

Preferred Skills and Experience

- Satellite communications, geolocation, or other RF communications experience
- Familiarity and experience with Linux operating systems
- Familiarity with GNU Radio and Software Defined Radios (SDR)
- Software development experience with languages such as C or C++, or Python, or Cuda
- Familiarity with containerized environments such as Docker
- Experience with common engineering lab and test equipment such as oscilloscopes and spectrum analyzers
- Experience with Agile program execution methodologies

#LI-Onsite

Competitive salary based on experience and education

Salary Range: $130,000-$170,000

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Help wanted

Signal Processing Specialist - Geospatial Intelligence

Muon Space
Mountain View, CA

Apply Now

Qualifications

- Experience with digital signal processing techniques related to RF instruments
- Experience developing algorithms using data from RF instruments
- Exceptional skills in python-based development and analysis
- Ability to work with a distributed, interdisciplinary team (scientists, engineers, data support, all working at different locations)

Preferred Qualifications

- Experience with problems requiring precision timing
- Experience with geolocation of RF transmitters
- Experience with GNU Radio
- Experience developing retrieval algorithms from satellite Earth observations
- Understanding of the principles of scientific instruments
- Familiarity with cloud native systems (AWS, Flyte)

Salary

The salary range for this role is $95K- $195K and will depend on a candidate's skills, geographic location, qualifications, and experience as defined during the interview process.

About Muon Space

Founded in 2021, Muon Space is an end-to-end Space Systems Provider that designs, builds, and operates LEO satellite constellations delivering mission-critical data. Our

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Help wanted

Comcentric

SDR SW Engineer (GNU Radio)

Comcentric Inc. - 3.9 ★

Austin, TX

Quick Apply

Full Job Description

We are seeking a **SDR SW Engineer** for a long term remote contract - goal is to convert contractors to perm employees..

Looking for US Citizens.

Responsibilities

- Analyze and Design SDR systems
- Develop a real-time capable transceiver in GNU Radio + FPGA based hardware
- Work with a test engineer to validate the design
- Work with an application engineer to support customer demos and requested capabilities
- Support implementing and improving new algori
- Support IP development and packaging for futur

Qualifications

- BS in Computer Science or related field (MS or Ph
- Experience with Linux, C++, and Python
- Git experience, or equivalent source code manag
- Experience with modern software development practices and Continuous Integration/Continuous Development (CI/CD)
- Experience with open-source GNU Radio software and/or Software Defined Radio

SDR SW Engineer (GNU Radio)

Comcentric Inc. — Austin, TX 3.9 ★

BS in Computer Science or related field (MS or PhD highly preferred). Work with a test engineer to validate the design. Analyze and Design SDR systems.

Estimated: $108K - $137K a year Quick Apply

Pluto block diagram

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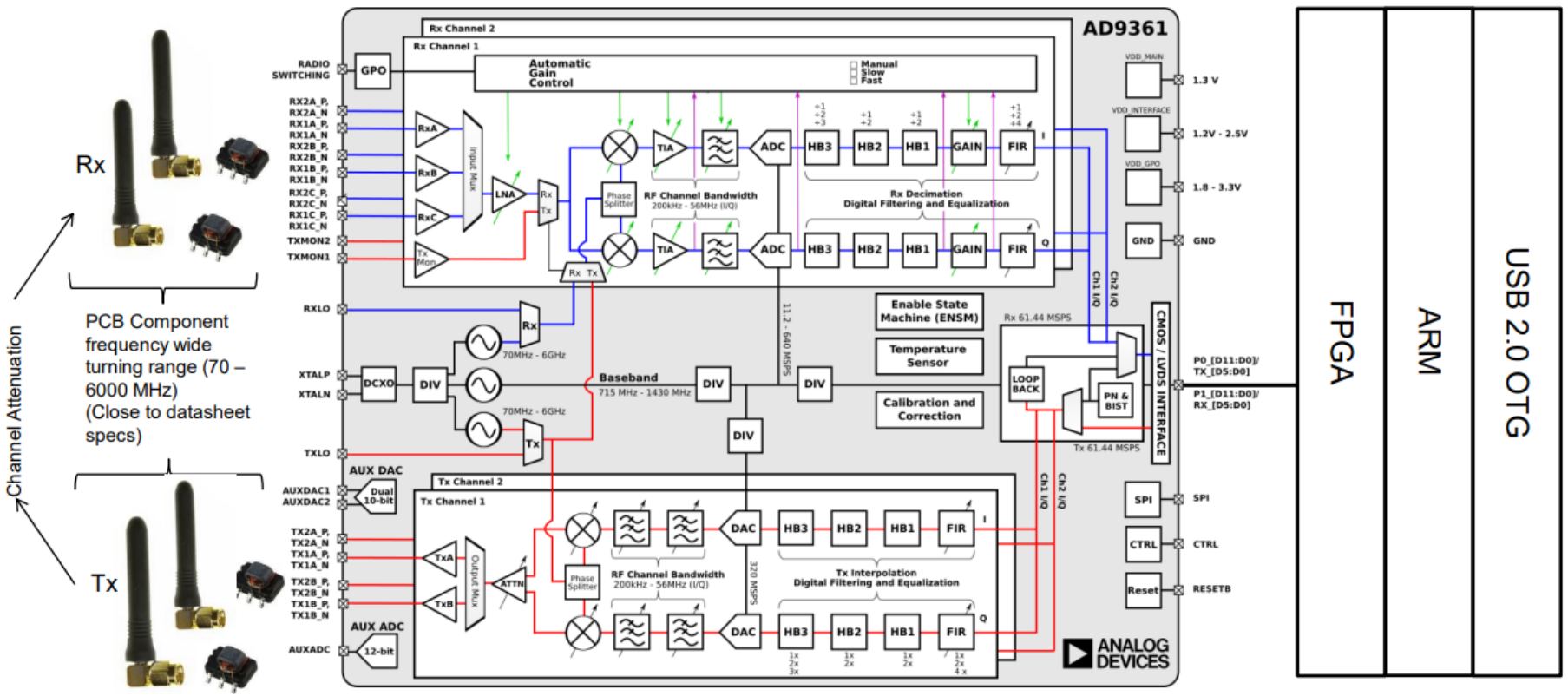

HackRF design

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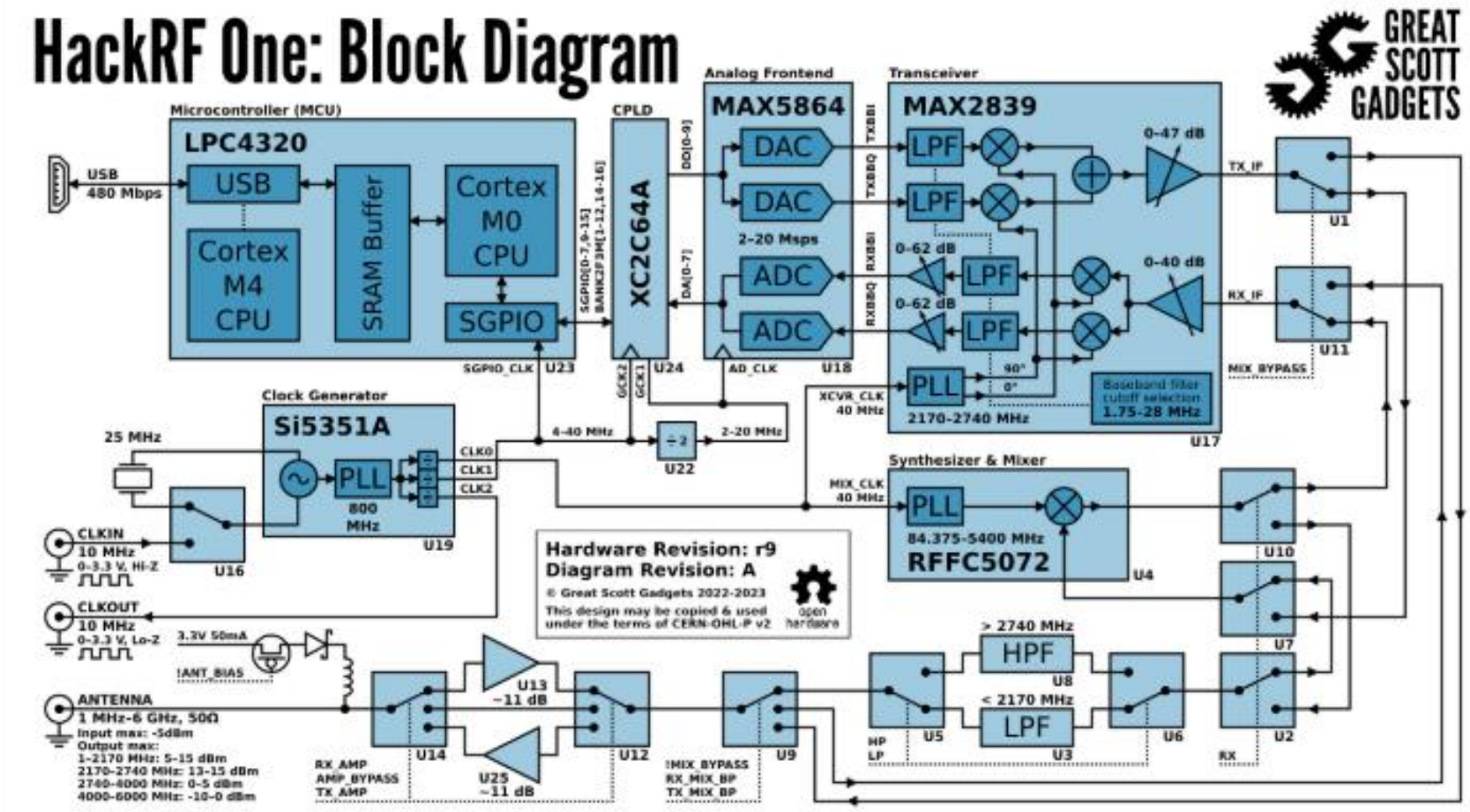
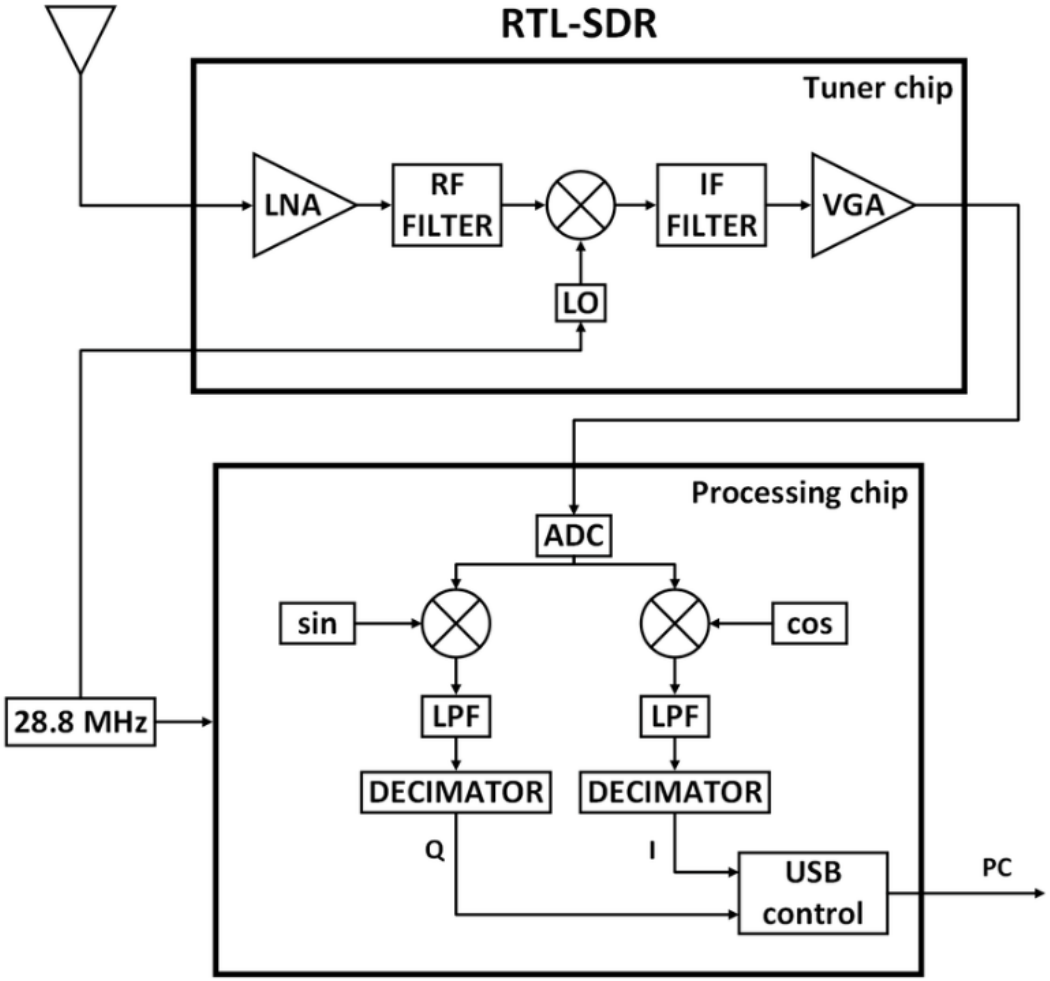


RTL-SDR


RTL-SDR
Tuner chip
LNA
RF FILTER
IF FILTER
VGA
LO
Processing chip
ADC
sin
cos
LPF
LPF
DECIMATOR
DECIMATOR
Q
I
USB control
PC
28.8 MHz

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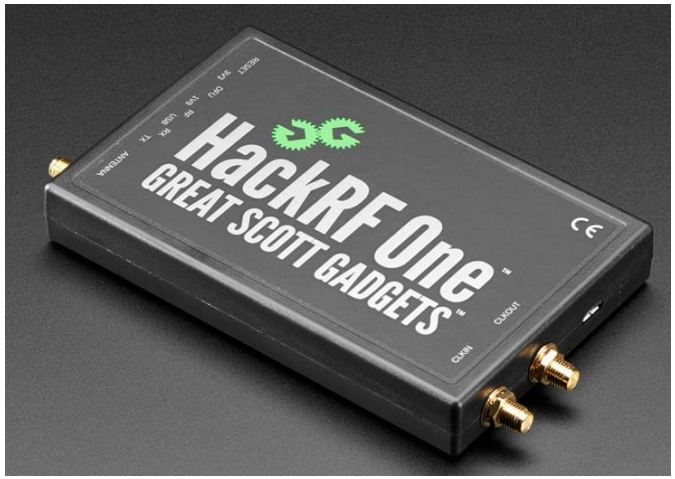
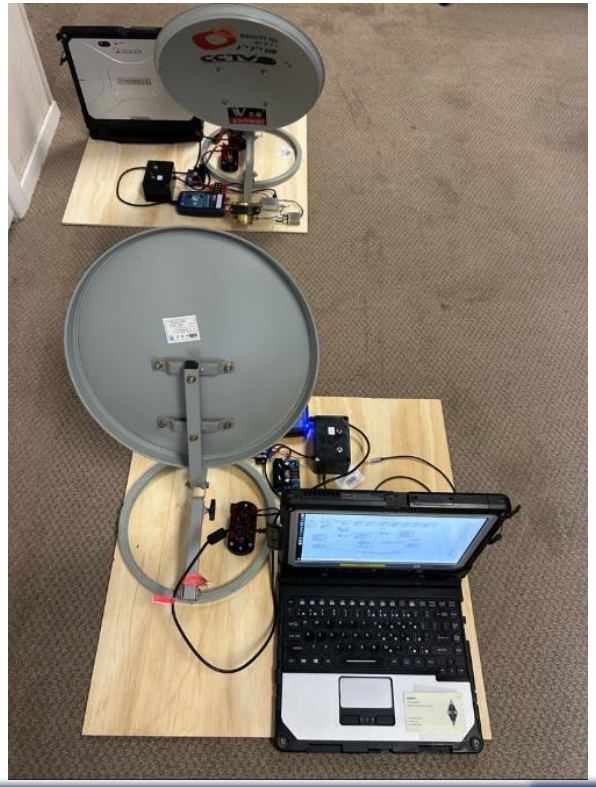
Hardware

- RTL-SDR: $39.95 on Amazon
- ADALM Pluto: $223.25 at Mouser
- HackRF One from Great Scott Gadgets: $339.95 from Adafruit



Demo

- Pluto – WX band and FM broadcast band
- Saturday 9 am. Multi-band microwave 2-way SSB comms



Unlicensed TX operation

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- Transmitting on-the-air with SDR
  - If you are not licensed then you may use the following frequencies

Type of band	Frequency range		Power	Usage	Range
Family Radio Service (FRS)	462-467 MHz	UHF	.5 to 2 watts	Short-range comms for families, hiking, campling, local comms	A few miles in open areas
Multi-Use Radio Service (MURS)	151-154 MHz	VHF	2 watts	Small business and personal comms, external antennas allowed. Driveway alarms, handheld radios, farm comms	A few miles in open areas
Citizen Band (CB) Radio	26.965-27.405 MHz	HF	4 watts AM, 12 watts SSB	Truckers/hobbyists	Several miles, E layer skip possible
Wireless Microphones/Intercoms	49 and 902-928 MHz	HF/VHF		Microphones, baby monitors and intercom	Close range
Industrial, Scientific and Medical (ISM) Band	902-928 MHz	UHF		Wi-Fi, Bluetooth and RFID	Close range
Industrial, Scientific and Medical (ISM) Band	2.4-2.5 GHz	uWave		Wi-Fi, Bluetooth and RFID	Close range
Industrial, Scientific and Medical (ISM) Band	5.725-5.875 GHz	uWave		Wi-Fi, Bluetooth and RFID	Close range

With a ham radio license

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- Transmitting on-the-air with SDR
  - As a “Technician” class licensee you have the following VHF/UHF/uWave privileges (plus some HF band usage)

Ham band	Main propagation	other propagation
6 meters (50 MHz – 54 MHz)	Groundwave & Ionospheric reflection	Moonbounce/meteor scatter
2 meters (144 MHz – 148 MHz)	Groundwave & Ionospheric reflection (rare)	Moonbounce/meteor scatter
1.25 meters (222 MHz – 225 MHz)	Groundwave & Ionospheric reflection (rare)	Moonbounce/meteor scatter
70 centimeters (420 MHz – 450 MHz)	Ground wave	Moonbounce
33 centimeters (902 MHz – 928 MHz)	Ground wave	Moonbounce
23 centimeters (1.24 GHz – 1.3 GHz)	Ground wave	Moonbounce
13 centimeters (2.3 GHz – 2.45 GHz)	Ground wave	Moonbounce/rain scatter
9 centimeters (3.3 GHz – 3.5 GHz)	Ground wave	Moonbounce/rain scatter
6 centimeters (5.65 GHz – 5.925 GHz)	Ground wave/tower & building scatter	Moonbounce/rain scatter
3 centimeters (10.00 GHz – 10.500 GHz)	Ground wave/tower & building scatter	Moonbounce/rain scatter
1.2 centimeters (24.00 GHz – 24.25 GHz)	Ground wave/tower & building scatter	Moonbounce/rain scatter
6 mm (47.0 GHz – 47.2 GHz)	Ground wave/tower & building scatter	Moonbounce/rain scatter

Obtaining a license

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- Cowtown Amateur Radio Club (K5COW) testing
  - Testing for ham radio licensing is conducted at the Cowtown ARC club house twice a month (2nd and 4th Thursday at 7pm).
  - Prefer pre-registration however walk-ins are welcome
  - K5COW - Cowtown Amateur Radio Club - Get Your License

Questions?

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