

## Projects and Presentations on INNOVATION ZONE IARU-R1 HAMRADIO2024

Organized by IARU-R1 TWG

<u>Projectname</u>	<u>Description</u>	<u>Name/Person</u>	<u>email/www</u>
Satdump	decode satellite signals with	Alan F4LAU	alan.antoine@satdump.org>
STS1 CubeSat	Cubesat project	OE1RIC Richard Dumser	<richard.dumser@gmail.com>
Spectrum24	open spectrum conference in Paris	Marc HB9SSB, HB9EYH	
Meshcom4.0	LoRa-Chat with DMR-like Talkgroups	OE1KBC, OE3YCB, OE3MZC	
ENAMS	Monitor EMC noise level	OE1MHZ Wolf Mahr	
M17	open digital voice protocol	Wojcek SP5WWP	
Charly25	open SDR HF-Transceiver	Edwin Richter	
TRX-Control	remote rig software	HB9SSB & HB9EYH	
Gnuradio	open SDR software	Marcus Müller	<a href="mailto:mmueller@gnuradio.org">mmueller@gnuradio.org</a>
SPINO Cubesat	open source satellite	Michel Nawrocki	<f1afw@yahoo.fr>

## Project Names and short abstract

# Satdump

presented by Alan Antoine, F4LAU, alan.antoine@satdump.org

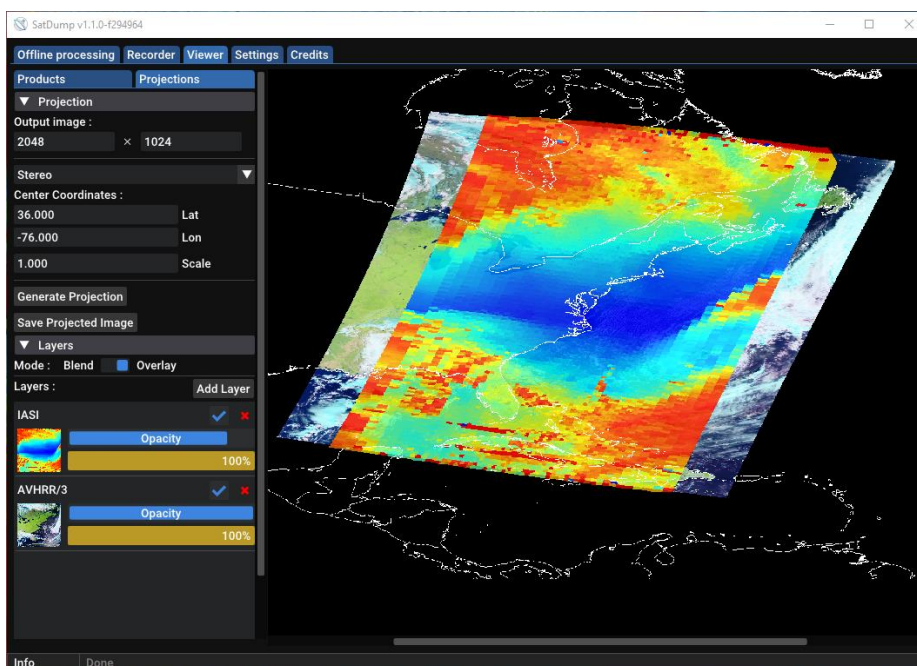
[www.satdump.org](http://www.satdump.org)

**SatDump** is a general purpose satellite data processing software. It is a one-stop-shop that provides all the necessary stages to get from the satellite transmission to actual products.

### Features

- Support of many SDRs such as RTL-SDR, Airspy, HackRF, BladeRF, LimeSDR, PlutoSDR, etc.
- Recording of radio basebands from your SDR
- Decoding and processing the data from over 90 different satellites and even space probes.
- Live decoding of supported satellite links such as APT, LRPT, HRPT, LRIT, HRIT and many more.
- Image and data decoding from satellites such as NOAA 15-18-19, Meteor-M, GOES, Elektro-L, Metop, FengYun, etc.
- Calibrated and georeferenced L1b products output on select satellites, such as Sea Surface Temperature, Microphysics, etc. ready to use for scientific applications such as numerical weather forecasts.
- Support for projecting the satellite imagery over a map, including layering with other instruments or satellites.
- Inmarsat Aero and STD-C EGC messages decoding.
- Scheduler and rotator control for automated satellite stations.
- Ingestor for automated geostationary weather satellites reception.

Satdump is Open Source and can be downloaded at Github



# spectrum24 conference

presented by [Marc Balmer HB9SSB <hb9ssb@spectrum-conference.org>](mailto:hb9ssb@spectrum-conference.org)

<https://spectrum-conference.org/>

„Making Waves“

The Conference for Creative Use of the Radio Spectrum in Open Systems

spectrum24 is the conference that brings users of the radio spectrum together.

For over a century, technology has made it possible to transfer more data, faster, further. Today, wireless technology is everywhere and commonplace. However, it remains a playground and a ground for innovation for many communities.

This conference is an opportunity to publicize your projects and allow the different communities that use the spectrum to meet over a weekend.

spectrum24 will take place september 14./15. at SmartCity Campus, an old radio factory in Rambouillet near Paris



# trx-control

presented by [Marc Balmer HB9SSB <hb9ssb@spectrum-conference.org>](mailto:hb9ssb@spectrum-conference.org)  
[and Vera hb9eyh@spectrum-conference.org](mailto:hb9eyh@spectrum-conference.org)

Extensible software to control amateur radio transceivers and related hardware like GPIO-pins etc. and to integrate clients with third-party software using application specific extensions.

trx-control consists of `trxd(8)`, a daemon to control the transceivers and other hardware, and, `trxctl(1)`, a command line utility to access `trxd(8)`.

Software that wants to make use of `trxd(8)` should implement the protocol and talk to `trxd(8)` directly over the network.

`trxd(8)` listens on port 14285 by default for incoming connections over plain sockets and can optionally listen for WebSocket connections. It supports both IPv4 and IPv6.

The actual transceiver control is done using Lua modules, this way new transceivers can easily be supported by supplying a corresponding Lua driver module for a specific transceiver model. See <https://lua.org> and <https://lua.msys.ch> for more information on Lua.

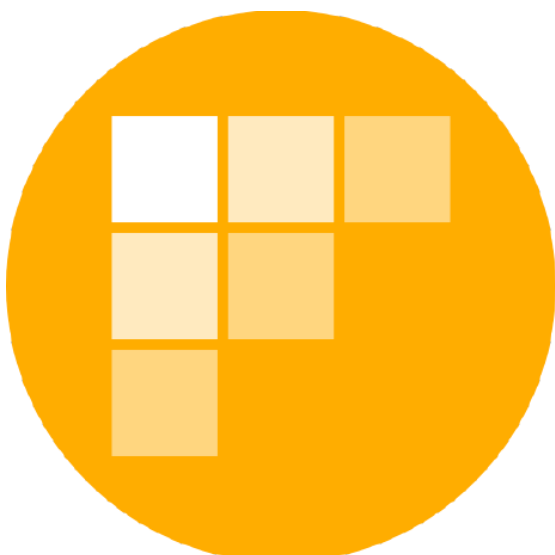
trx-control on Matrix:

There is a Matrix room `#trx-control:matrix.org` to discuss trx-control: <https://matrix.to/#/#trx-control:matrix.org>.

More information:

More information and the list of devices and extensions can be found on the trx-control website <https://trx-control.msys.ch>.

There is also a wiki at <https://github.com/hb9ssb/trx-control/wiki>



# Meshcom4.0 LoRa-Chat goes worldwide

Presented by Kurt, OE1KBC, [oe1kbc@icssw.org](mailto:oe1kbc@icssw.org) and Mike, [OE3MZC@icssw.org](mailto:OE3MZC@icssw.org)

[www.icssw.org/meshcom](http://www.icssw.org/meshcom)

MeshCom is a project of Institute of Citizen Science for Space & Wireless Communication to exchange text messages via LORA radio modules. The primary goal is to realize networked off-grid messaging with low power and low cost hardware.

The technical approach is based on the use of LORA radio modules which transmit messages, positions, measured values, telecontrol and much more with low transmission power over long distances on 433MHz Band. MeshCom modules can be combined to form a mesh network, but can also be connected to a message network via MeshCom gateways, which are ideally connected via HAMNET. This enables MeshCom radio networks, which are not connected to each other via radio, to communicate with each other. Meshcom4.0 is based on well-known APRS-protocol and Open Source. To select different regions or languages the usual DMR Group-Codes can be used.



# SpaceTeamSat1

<https://spaceteam.at/sts1/>

Presented by Richard Dumser OE1RCI and Jakob Riepler and Raphael Behrle Richard Dumser <richard.dumser@gmail.com>

**SpaceTeamSat1** (STS1) is the current **CubeSat mission of the TU Wien Space Team**, which was launched in August 2020. The aim is to develop a 1U CubeSat for educational purposes and to operate it in orbit. In addition, a separate ground station is to be operated for communication with the CubeSat. This is intended to give students the opportunity to run self-developed software on the satellite's education payload. The payload of the CubeSat "STS1" consists of a Raspberry Pi to which various sensors and cameras are connected. Students can then access these using Python and carry out or record measurements as well as images and videos. Since SatNOGS (<https://satnogs.org/>) forms the basis for the ground station and is also recommended to the participating schools during the mission.

## FACTS ABOUT THE CUBESAT MISSION "SPACETEAMSAT1"

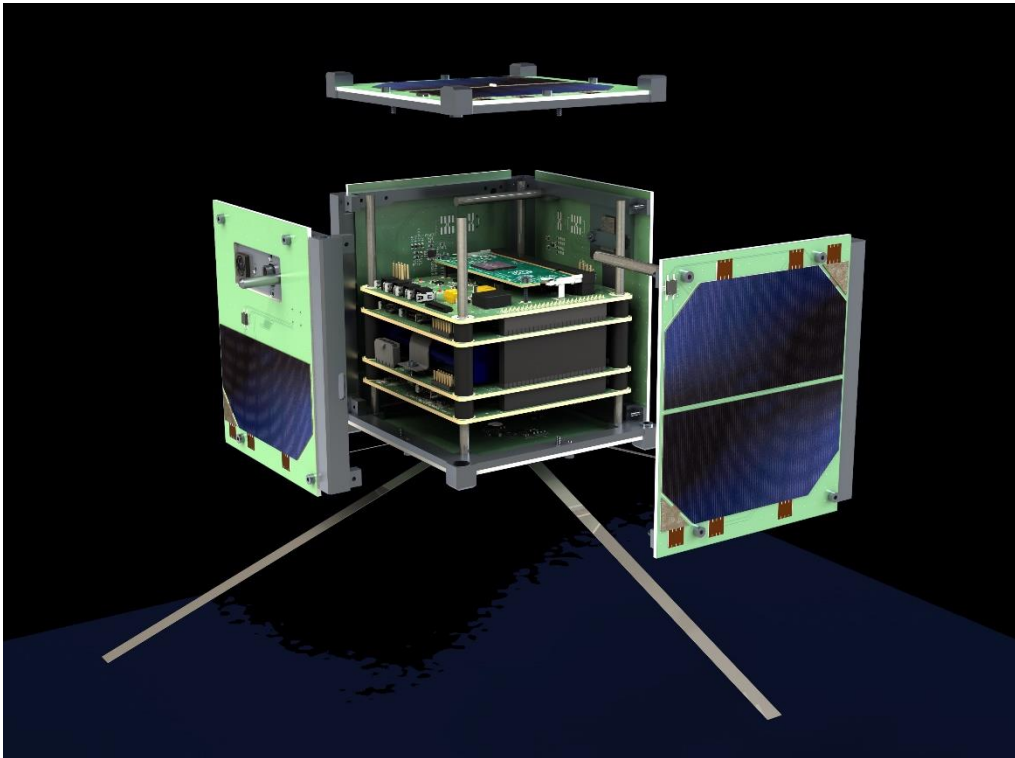
- 1U CubeSat platform (10 x 10 x 12 cm<sup>3</sup> and approx. 1.0 kg)
- STS1 will operate on a Low Earth Orbit (LEO ~ 350 km – 500 km)
- STS1 will be a live laboratory for AHS and BHS students
- STS1 will address the amateur radio community and bring the topic of "amateur radio" into the classroom. Schools will also have the opportunity to operate their own SatNOGS ground station.
- STS1 will be launched by launch provider Isar Aerospace

## EDUCATIONAL MISSION OBJECTIVES

- Student teams compete in a Space Software Experiment competition.
- Python code is executed on the Raspberry Pi-based Education Payload.
- Countless software projects are possible. Various sensors and cameras are available for this purpose.
- The measured values and images/videos are made available to the student teams for further processing.
- The student teams interpret and present their results and thereby learn important aspects of space technologies.

## THE EDUCATION PAYLOAD INCLUDES THE FOLLOWING SENSORS

- Temperature sensors at various locations in the CubeSat
- Acceleration sensor (accelerometer)
- gyroscope
- Magnetic field sensor
- UV sensor
- Current and voltage values of solar cells and batteries
- Radiation sensor and 2 cameras



# GNURADIO SDR Software

Presented by Marcus Müller [mmueller@gnuradio.org](mailto:mmueller@gnuradio.org)

<https://www.gnuradio.org>

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.

Announcing the 2024 European GNU Radio Days at FAIR, Darmstadt, Germany The 2024 edition of the European GNU Radio Days will be held at the international accelerator facility FAIR in Darmstadt, Germany's 'City of Science', from August 27 to 31, 2024. The conference aims at fostering collaboration between users and developers of the free and open-source GNU Radio framework by helping scientific, academic, industrial and hobbyist alike to discuss the latest developments.





## CHARLY25 SDR TRX

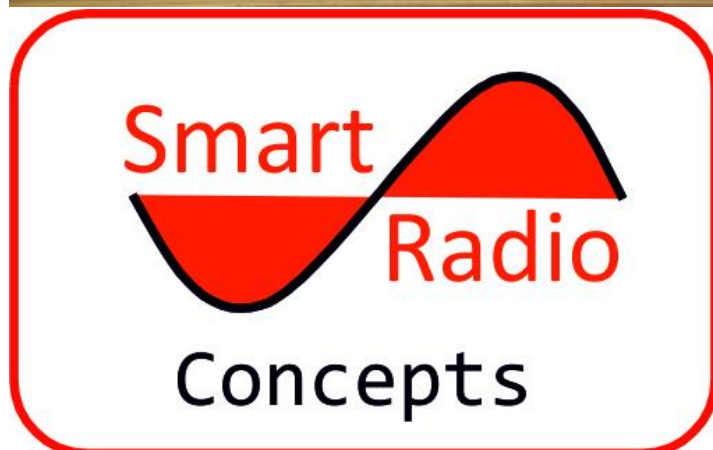
Presented by Edwin Richter DC9OE and TEAM (DG8MG, DL8GM, DL1FY)

Edwin Richter [edwin.richter@smartradioconcepts.de](mailto:edwin.richter@smartradioconcepts.de)

This TRX is a complete W10 PC with Intel Core I5 processor, 8GB memory and 480GB SSD. It can therefore easily be used for all typical PC applications and can replace the usual office PC. This saves space in the shack and simplifies the use of all current and future DIGI modes. The existing connection option for a second screen allows wireless activities and PC use to run in parallel.

### Components used in the Charly 25 project:

- Charly 25 motherboard
- Charly 25 CODEC Board
- STEMLab 16 (Red Pitaya)
- C25 Preselector assembly for RX1 integrated
- Front panel PCB incl. Arduino Micro and high-quality optical encoder
- **with solid VFO knob (solid brass natural or black powder coated)**
- Windows 10 PC Board (Core I5) 8GB Memory, 480GB SSD (C25 self-import / China)
- (W10 License Key must be obtained and registered by the user - we will also be happy to install your key for you)



# M17 project

Presented by Wojciech Kaczmarski SP5WWP [w.kaczmarski@teletra.pl](mailto:w.kaczmarski@teletra.pl)

<https://m17project.org>

an international group of amateurs and hackers developing a digital radio protocol for data and voice along with open-source hardware to support it.

The freedom to build, understand, and innovate is core to amateur radio, but has been missing from the commercially available digital voice modes. This is part of why amateur radio digital voice modes have largely stagnated since the 1990s and we're almost wholly dependent on commercial products that aren't well designed for amateur radio users. M17 ecosystem is about unlocking the capabilities that amateur radio hardware should already have. Led by Wojciech Kaczmarski (SP5WWP), M17 Project received two grants from ARDC and won the ARRL Technical Innovation Award in 2021.

The Team will showcase Remote Radio Unit (RRU) and Module17 devices. Additionally, handhelds running OpenRTX firmware will be presented to the audience. OpenRTX is a free and open source alternative firmware for ham radios.

Links, if you want to have clickable keywords:

- M17: <https://m17project.org>
- ARDC: <https://www.ardc.net>
- RRU: <https://github.com/M17-Project/rru-rf-hw>
- Module17: [https://github.com/M17-Project/Module\\_17](https://github.com/M17-Project/Module_17)
- OpenRTX: <https://openrtx.org>



# ENAMS HF-Noisefloor Measurements

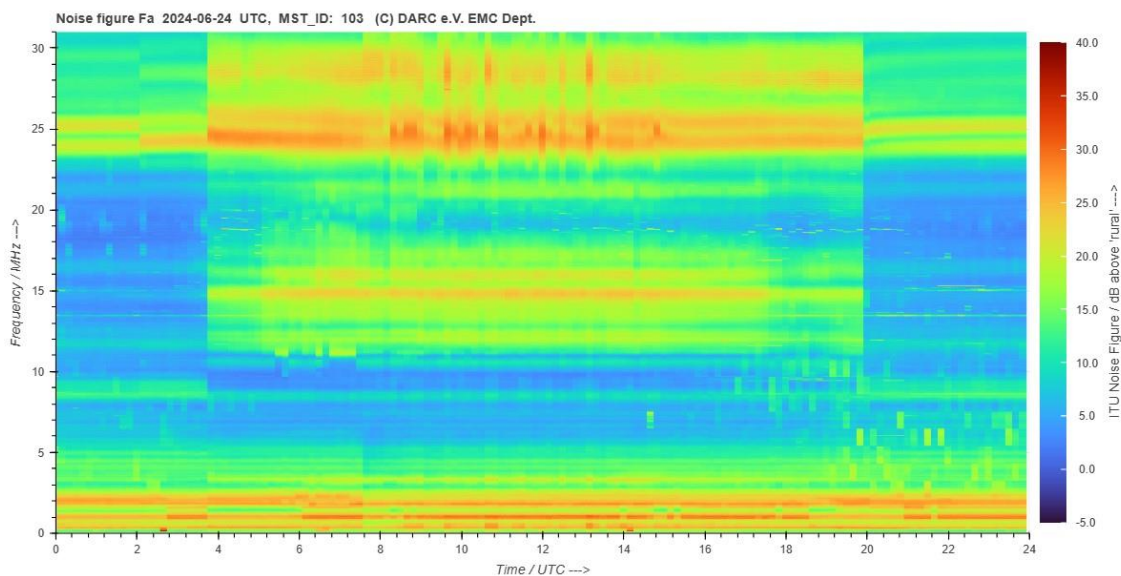
Presented by Wolf Mahr, OE1MHZ, [oe1mhz@oevsv.at](mailto:oe1mhz@oevsv.at) and Klaus Eichel, DL6SES

ENAMS stands for Electrical Noise Area Measurement System and is an automatic receiving system distributed throughout Germany for recording the noise level in the frequency range from 66 kHz to 31 MHz.

The ENAMS project was started by DARC eV because the general interference measurements were no longer carried out by the Federal Network Agency (BNetzA) after 2011 and therefore the increase in the general interference level in recent years due to the widespread use of interfering electronics in residential and commercial areas is no longer documented.

The ENAMS consists of more than 50 receivers that scan the entire frequency range from longwave (66 kHz) to shortwave (31 MHz).

Red Pitaya SDRs are used as receivers, with an amplifier (66 kHz - 7.5 MHz and 7.5 MHz - 31 MHz) at input.



# SPINO cubesat -- Open source satellite radio

Presented by Michel Nawrocki [f1afw@yahoo.fr](mailto:f1afw@yahoo.fr)

[https://code.electrolab.fr/spino/cubesat\\_cs](https://code.electrolab.fr/spino/cubesat_cs)

SPINO is a versatile telecommunication solution suitable for nanosatellites and Cubesats. Operating in UHF and VHF bands, it features tight integration with amateur radio service and the worldwide amateur radio community. The development of the SPINO SC board was initiated by enthusiasts involved in non-profit / educational space projects. Since 2019, the project is supported by the joint efforts of two non-profit organizations: AMSAT-Francophone ([site.amsat-f.org](http://site.amsat-f.org)) and the hackerspace Electrolab ([electrolab.fr](http://electrolab.fr)). Thanks to the support provided to "UVSQ-SAT" mission by the amateur radio community (data collection, ground segment support, spectrum coordination support...), LATMOS offered to integrate this experimental board into its new satellite "UVSQ-SAT+" as an additional payload. In this context, SPINO SC receives since 2021 the academic support of the LATMOS laboratory, and the industrial support of the Adrelys company. The SPINO SC board features functions dedicated to the spacecraft infrastructure :

- Receiver function for remote control commands from ground...
- Managed or Autonomous beacon (support for OBC failure)
- Data stream (uplink and downlink)
- Antenna deploy support And functions dedicated to the amateur radio community :
- a versatile digital transponder
- a digital mailbox service

The SPINO SC board will be a pre-validated open source brick available off the shelf for any nanosatellites mission.

By the way, the goal is to maximize compatibility (standardized interfaces with UART, I2C, SPI, CAN FD, and standardized PC-104 "like" form factor), and maximize reliability (wide supply voltage range, fail-safe on key points, low power consumption, especially in idle to face failure situations). SPINO SC operates in the Amateur Radio service bands, and features two full transceivers :

- VHF : TX (+30dBm) and RX 144-146MHz
- UHF : TX (+27dBm) and RX 430-440MHz