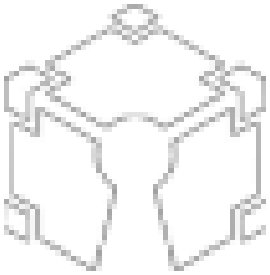

Contribution ID: **35** Type: **Talk**

SDR Makerspace: Exploit SDR technology for Space Communications

Monday, 14 October 2019 11:30 (20 minutes)

The SDR Makerspace is an initiative of European Space Agency (ESA), implemented by Libre Space Foundation (LSF). The goal of this program is to bring together makers, open-source hackers, radio amateurs, and a passionate community for dealing with challenges related with Software Defined Radios in space communications. This activity consists from several sub-activities, covering a wide range of applications. All sub-activities and results of the SDR Makerspace are available as open-source. Some of the activities that are part of the programme are presented below.

The gr-leo (https://gitlab.com/librespacefoundation/gr-leo) is a GNU Radio module that implements a channel simulator for Low Earth Orbit (LEO) satellites. It provides both uplink and downlink channel simulation introducing most of the impairments that such channels exhibit, such as path loss attenuation, Doppler frequency shift, atmospheric and rainfall path loss based on the ITU de facto models. In addition pointing and polarization losses are also taken into consideration by the simulator. This GNU Radio module can be a valuable tool for satellite mission planning and can be used for rapid prototyping and debugging. More information can be found on the wiki page of the project (https://gitlab.com/librespacefoundation/gr-leo/wikis/home).

The gr-ccsds activity (https://gitlab.com/librespacefoundation/gr-ccsds) is a GNu Radio module that provides all the processing blocks required for reception and transmission of frames that conform with the CCSDS standard for telecommand & telemetry. It supports most of the modulation and coding schemes of the standard, including Reed Solomon, convolutional coding, Turbo codes, while there is an undergoing activity to add support for LDPC too.

Another major activity is the gr-soapy (https://gitlab.com/librespacefoundation/gr-soapy). This GNU Radio module uses the SoapySDR API in order to provide a unified way for accessing various SDR hardware devices via GNU Radio in a unified and vendor free way. A unique feature of this module, is that it exposes RF specific parameters (e.g different gain stages, antenna setups, etc) based on the corresponding hardware used.
In addition, SDR Makerspace includes a series of radiation characterization and testing activities. Currently, an initial investigation has been completed regarding the radiation immunity of the components of eight commercial SDR devices. A follow up activity will perform actual radiation tests on these devices. The results are available on the repository of the sub-activity (https://gitlab.com/librespacefoundation/sdrmakerspace/radtest/wikis/home).

Several other activities (SDR hardware characterization, SDR devices radiation testing, satellite signal classification through machine learning) are undergoing and are expected to provide also their results.

Primary authors: SURLIGAS, Manolis; CSETE, Alexandru (AC Satcom)

Presenters: SURLIGAS, Manolis; CSETE, Alexandru (AC Satcom)

Session Classification: Talks

Track Classification: Software