Proposal of Scientific Project for validating Benke

Title :

GMS link detection for radio-protected area monitoring

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Laboratory : PRISME, Station radioastronomique de Nançay
Internship period : From February till May 2014

Abstract :

The Nançay Radio astronomy Observatory is a laboratory of The Observatoire de Paris. Its purpose is the observation of the sky using electromagnetic waves in the radio band for astronomy and astrophysics. We provide radio astronomy facilities (antennae, digital receivers,...) to radio astronomers so they can do research on the Universe, Solar system and terrestrial neighbourhood. However, the frequency bands that we use for observation are also dedicated to telecommunication. The presence of many visitors and external co-workers not knowledgeable about our activities sometimes imply the use cellular phones or wifi networks. Those telecommunication devices can be very harmful to some of our facilities, generating observation data losses that cannot be recovered. It is only during post-processing of data that the loss is detected, too late. Thus, radio emissions are not allowed in the Nançay Observatory facilities. In order to detect those harmful radio-emissions very early, we wish to deploy GSM detectors to remind people that their devices are still operating. Such detector would be set in the Visitor Center and the Administration entrance, where our visitors usually check-in.

In order to quickly develop such device, the company Ettus Research can provide modular RF and digital systems (https://www.ettus.com/product) where Software Defined Radio receivers can be implemented. We have available the USRP B100 digitizer connected to the analog frontend WBX 50-2200 MHz Rx/Tx. The work involved in this project consists in configurating the hardware to select frequency bands used by GSM operators and developping unusually strong emissions betraying the presence of nearby GSM handheld devices in the Nançay Observatory facilities. The Software Radio Defined algorithms will be implemented with the libraries provided by "GNU Radio" (gnuradio.org). The system will be autonomous and will warn users about the presence of unwanted emissions with a sound and/or light notification as well as an email report.

Required skill
– Signals and Systems
– Signal Processing
– Linux
– Python