Motivation

Today, the electromagnetic (EM) spectrum is heavily used, well structured and defined, but its actual usage often unknown and not well understood.

A comprehensive map of the EM spectrum usage over time would therefore be a highly desirable service, for several applications:

- Dynamic spectrum access, like cognitive radio.
- Locate regions with elevated electro smog.
- Anomaly detection like Advanced signal intelligence (SIGINT).

The goal of this project is to build a:

- Small and Low-cost sensor [1] (less than $100)
- Distributed sensor-network
- Smart-collaborative techniques between sensors

Wideband Spectrum monitoring system to collaboratively show the spectrum usage over time and frequency.

Sensor HW Components

- **RaspberryPi**: $25 Linux-based embedded computer, used to control RF receiving device.
- **DVB-T Dongle**: $12 RTL2832U-based USB dongle, used as cheap SDR. Frequency range is enabled between 24 - 1766 MHz
- **DVB-T Antenna**: omni-directional.

Sensor Architecture

We optimize the priority scheduling tasks of the system in presence of interfering tasks in the node.

Signal Correlation

Signal correlation between sensors using a car remote control that works in 433 Mhz frequency.

BigData Architecture


4.5 GB data per day and sensor

Conclusions

- We have proposed a collaborative wideband spectrum monitoring whose low-cost sensing nodes collect spectrum data in real-time.
- We have shown the high signal correlation between sensors in vicinity.
- We have presented a big-data architecture based on Lambda-Architecture.

References
