CREW

Cognitive Radio Experimentation World

SNE-ESHTER: A low-cost, compact receiver for advanced spectrum sensing in TV White Spaces

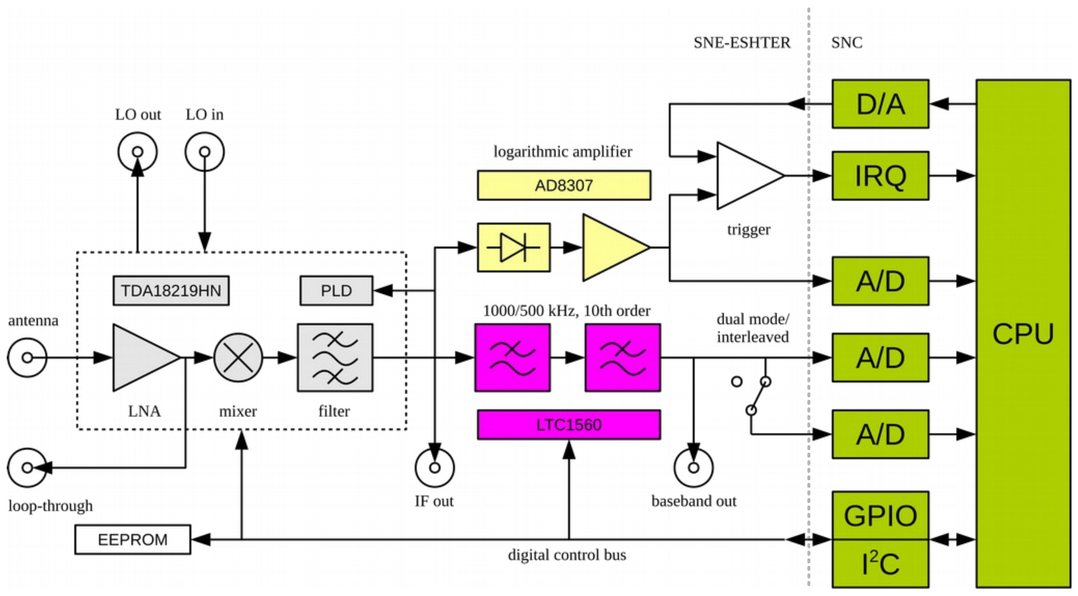
IJS

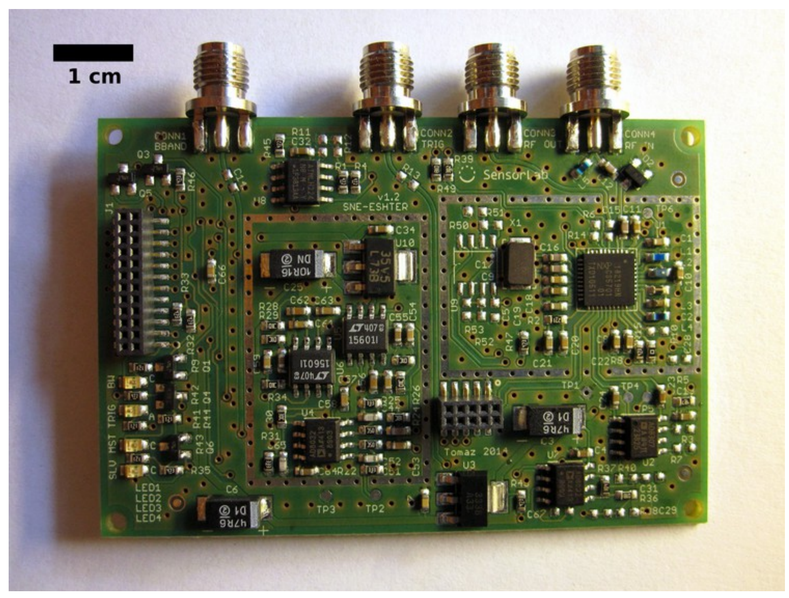
Advancing CREW Experimentation Facilities

Problem: How to enable experimentation with advanced spectrum sensing in TV White Spaces in diverse outdoor testbeds?
Outdoor testbeds favor robust, compact hardware. Distributed sensing favors low cost and a large number of sensors.

Solution: **Embedded Sensing Hardware for TVWS Experimental Radio (ESHTER)** sensor node expansion deployed in CREW.

- UHF signal reception covering the TV broadcast band (470 to 870 MHz), 5 ms channel settle time.
- Baseband sampling with 500 kHz or 1 MHz bandwidth. Log-response energy detection up to 8 MHz bandwidth.
- Simultaneous synchronous sensing on two channels and/or two antennas on a single sensor node.
- Programmable hardware trigger for low-latency applications (e.g. CS-MAC protocols)



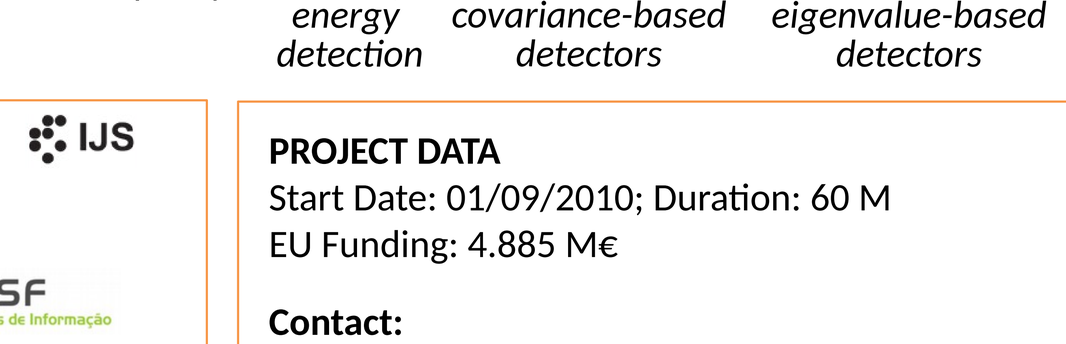


Deployment: Using SNE-ESHTER in a testbed

1. The receiver boards are mounted on VESNA sensor nodes and deployed individually or in large numbers in a testbed.
2. **Ethernet interface with POE** allows simple distributed deployment of individual sensors with Internet connectivity.
3. Embedded 72 MHz ARM CPU on the sensor node core allows for capture and processing of signal samples.
4. For **low-latency experiments**, native code can be uploaded directly to sensor nodes and use a C API to control receiver.
5. For **high-level or non-time-critical applications**, sensing data can be retrieved over a TCP socket. To simplify development, a Python library is available that includes the most common sensing functions.

Experiment: Channel occupancy decision

In this application the sensor makes a decision whether a RF channel is occupied by a wireless microphone or not. Test statistics based on various detection methods are calculated (energy, covariance-based and eigenvalue-based detectors). Channel occupancy percentage is shown based on individual detectors. Different detection methods can be compared for sensitivity to noise level changes and weakest detectable signal.



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 258301.

PROJECT DATA
Start Date: 01/09/2010; Duration: 60 M
EU Funding: 4.885 M€

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