# IRV360

360 Impulse Response Visualizer

Description

IRV360 is a desktop application tool for the diagnosis and investigation of rooms acoustics. With just a an ambisonic microphone recording one can calculate, plot and compare intensity vectors in three dimensions.

Features:

- Acoustic diagnosis by spatial and temporal visualization of impulse esponses.
- Segregation of direct sound and subsequent reflections of a room.
- Ease detection of acoustical problems.
- Useful for architectural acoustics, audio production and industrialnoise.
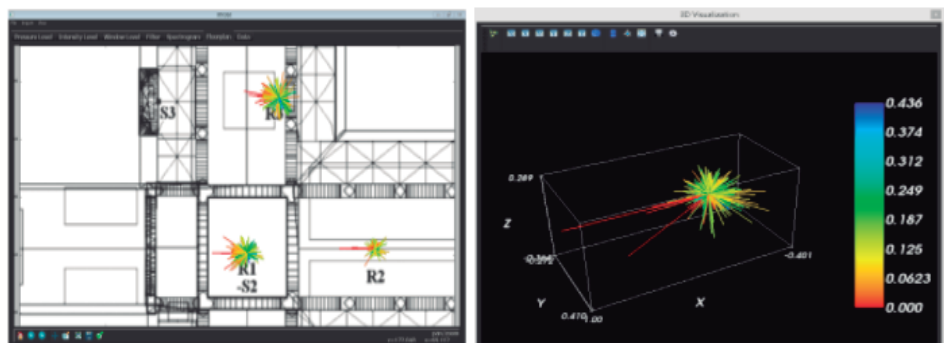
Graphics

The information are represented as sound vectors with the same origin and different direction. The vectors represents each of the time windows. Its magnitude is given by the energy sum the intensity vectors. The magnitudes are normalized based on the direct sound. The color symbolizes the temporal distance to the direct sound (red to blue).

Versions

Compiled versions of the software were developed in two common platforms Matlab and Python, for both engineers and researchers.
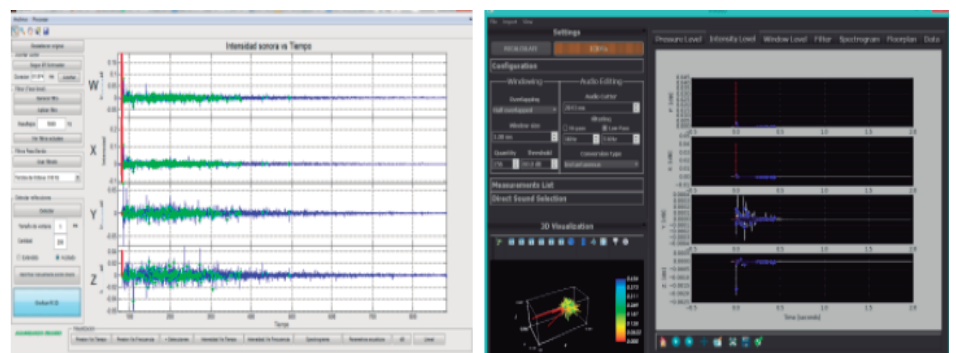
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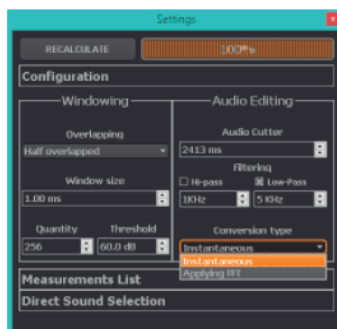
Settings

The user may choose several calculation options by setting:

- Window integration time.
- Low and high pass filter.
- Number of windows and viewing threshold.
- Direct calculation type and by FFT.
- Peaks selection.
- Overlapping windows percentag.

Applications

The acoustic environments are commonly evaluated accounting with omnidirectional impulse response measurement techniques. These techniques allow obtaining the time and amplitude of the signal, but can't bring information about arrival direction of each reflection. In this sense, the advantage in the comprehension and characterization of the acoustic behavior of a room gets improved with the 3D impulse response measurements. Obtaining the signal direction allows us to visualize the temporal distribution characteristics of the room reflections in space, observe the directional distribution of early and late energy, and identify areas that generate unwanted reflections. Moreover, the comparison of the spatial components of impulse responses of various rooms can contribute to identify differences and similarities in acoustic characteristics. This acoustical software provides a complete set of techniques for carrying out an assessment from different perspectives.

Accuaracy

Results from simulations show for arrival directions validation in degrees for all angles of incidences.
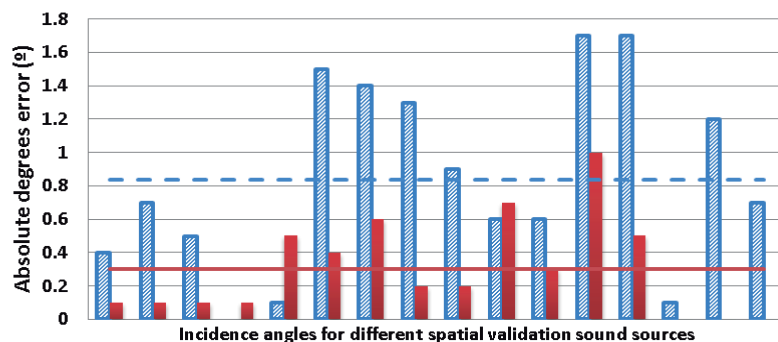
Azimuth (º)	0	-32	57	32	37	0	139	90	139	180	-37	-57	-141	-90	177	-139
Elevation (º)	0	0	0	0	24	54	0	0	24	54	24	0	25	0	0	0
Average Az (º)	0,84															
Average El (º)	0,3															