September 29

VIRTUAL ROOM ANALYSIS

* Mic: PCB piezoelectronics, omnidirectional microphone
* The sweep is been sent by each loudspeaker one after the other
* The sum of the single impulse responses is being computed

GOAL

* Find T20, clarity, definition

SET UPS

Same set of the morel compensation procedure.

Low pass 40 Hz, switch frequency between woofer and tweeter: 2500 Hz

First measure: the headrest has been removed in order to avoid sound absorptions or reflections, the mic has been placed in the driver position, at the height of the ears, pointing at the ceiling.

TO BE SOLVED

* Microphone calibration: the mic has been calibrated but the post gain not applied yet because of doubts about the procedure to do it for the reason that the IR is obtained throught convolution passages.

NEXT STEPS:

* Let all the loudspeakers play once all together to get the whole impulse response and compare with the sum of the single ones 
* Measure from different points

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October 19

Loudspeakers were simultaneously activated, and the two responses, this last one and the one obtained by summing the measurements taken on September 29th, were compared.

Is it possible to identify a similar trend in the two impulse responses, specifically noting a gap around 1600 Hz.

Discussion on the found parameters:

* T20 very low
* Clarity very high
* Definition not interesting because gives the same information given by the clarity
* Same results obtained with audition if the window is set as indicated in the matlab code, 5051 samples
* Use of the standard ISO 3382 to get the parameters
* Use of the Toolbox ITA

NEXT STEPS:

* Write details about the decay curve and the Schroeder’s integral and the extraction of the parameters 🡪 state of art 
* Add details on the ITA Toolbox procedure 

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ITA TOOLBOX

* Freq. Range: 20-5000
* 1/3 or 1 octave band
* Lunderby algorithm for noise detection
* Send to the function the signal properly cut, cutting the tail, 5001 samples

EDC:Early decay curve, or called Schroeder’s curve, obtained by calculating the reverse time integrated impulse response: Generate for each octave band the decay curve by a backward integration of the squared impulse response.

Lunderby algorithm in order to minimize the background noise, it gives a integration starting point value from which start the backward integration, as suggested by ISO 3381

The Schroeder Integral is a curve obtained by backwards integration of the squared impulse response, ideally starting from a point where the response falls into the noise and applying a correction (a starting value for the integral) which assumes the rate at which the Schroeder curve is falling continues for the whole response. It is used a procedure to estimate the best starting point for the integration, based on "Lundeby's Method" (from the paper by A. Lundeby, T. E. Vigran, H. Bietz, and M. Vorländer, “Uncertainties of Measurements in Room Acoustics,” Acustica, vol. 81, pp. 344–355 (1995))

C50 clarity factor for speech= 10log(D50/(1-D50)) dB

D50=(1-edc(0.05, :))\*100 e tende a 100 per alta clarity

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October 20

NEXT STEPS:

* Do measures mantaining a cental positioned mic and trying to cover/remove the tv, compare the results focusing on the 1600 Hz zone 
* Decide if remove the tv 
* Set up measurements using more microphone’s positions
* Sub compensation
* Sub positioning through real time measurements or other method to be defined

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23/10

SMOOTHING of the FFT signal’s plots

The function smoothSpectrum offered by the Matlab toolbox IoSR, containing functions and classes for various purpose as auditory modelling and signal processing was used to visualize a smoother spectrum, neglecting the swing trend. The used function applies 1/N-octave smoothing to the frequency spectrum using a Gaussian window whose centre frequency is f(i), and whose standard deviation is proportional to f(i)/N, where N is chosen to be equal to 5.

ANALYSIS OF THE IR WITH COVERED TV

An absorbing panel has been placed in front of the TV screen to analyze the spectrum of the impulse response under these altered conditions.

The microphone was placed at the listening position, using the same setup as on September 29, which also involved removing the headrest.

The behavior is analyzed individually for each loudspeaker response, for the sum of their responses, and for the impulse response obtained by activating all the loudspeakers simultaneously.

It has been observed that the trend in consistent in both configurations, hence the decay of amplitude in the spectrum around 1600 Hz persists. Consequently, it can be concluded that the TV screen is not the source of this disruptive reflection or absorption.

NEXT STEPS:

* Understand Lunderby method. 
* Gap around 250 Hz in LS L4-L3, shall we investigate on this?
* Gap around 200 Hz in LS L1-L2-L23, shall we investigate on this? In Ls1 the gap is less present with tv
* Possible solutions to try: cover with absorbing material the ribs on the ceiling, otherwise try different measurements positions, it could be the seat

The Lundeby-Algorithm is used for noise detection. The algorithm uses the last part of the RIR to estimate the noise level, the determination of integration limit and noise compensation of the impulse responses through an iterative procedure.