

A Library of Binaural Room Impulse Responses and Sound Scenes for Evaluation of Spatial Audio Systems

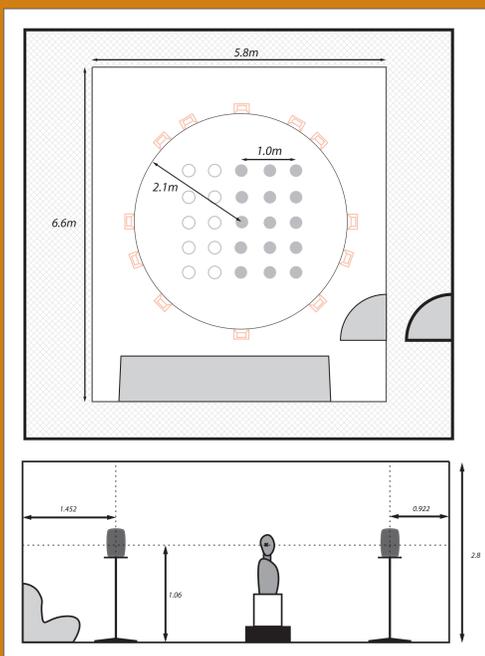
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Spatial Audio Quality Assessment Scenes (SAQAS)

To evaluate different spatial audio systems a set of spatial audio scenes has been created. The aim is to develop these towards a complete library of test scenes to evaluate reproduction systems, codecs and rendering systems. The scenes are stored using a novel extension of the broadcast wave format (BWF).

An initial set of files has been published. This includes different scenes in an object-based representation and their rendition into five channels. The library is open for further contributions of critical material. A software library for the use with the SoundScape Renderer is available as well.

Binaural Room Impulse Responses



A library of binaural room impulse responses (BRIR) was created using a B&K head and torso simulator. 15 listening positions have been measured in a 12 loudspeaker horizontal ring. The BRIR have been measured in 2 degree head-azimuth resolution on a regular grid.

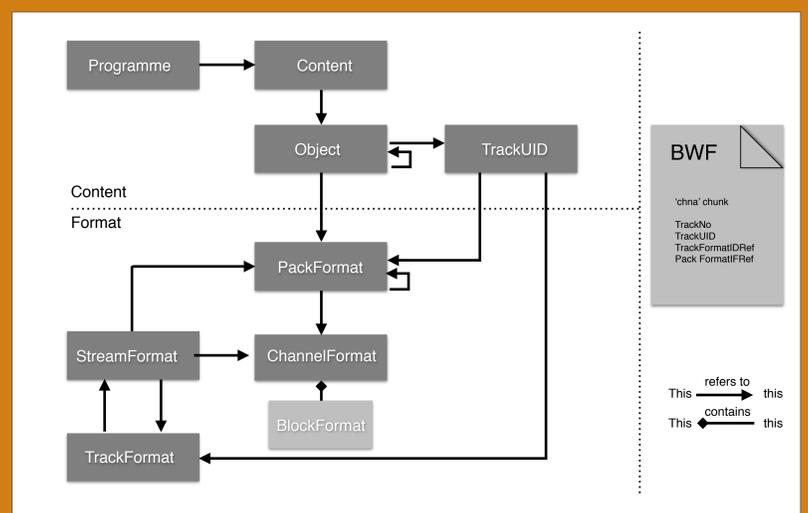
The room for the measurements was a ITU-R BS. 1116 [4] compliant listening room at the University of Salford, Manchester. The room has an average reverberation time of 0.27s and a background noise level of less than 6dBA. The room is equipped with Genelec 8030A loudspeakers.

The 64,800 BRIRs are available under the link below using the SOFA format [7].

<http://usir.salford.ac.uk/30868>

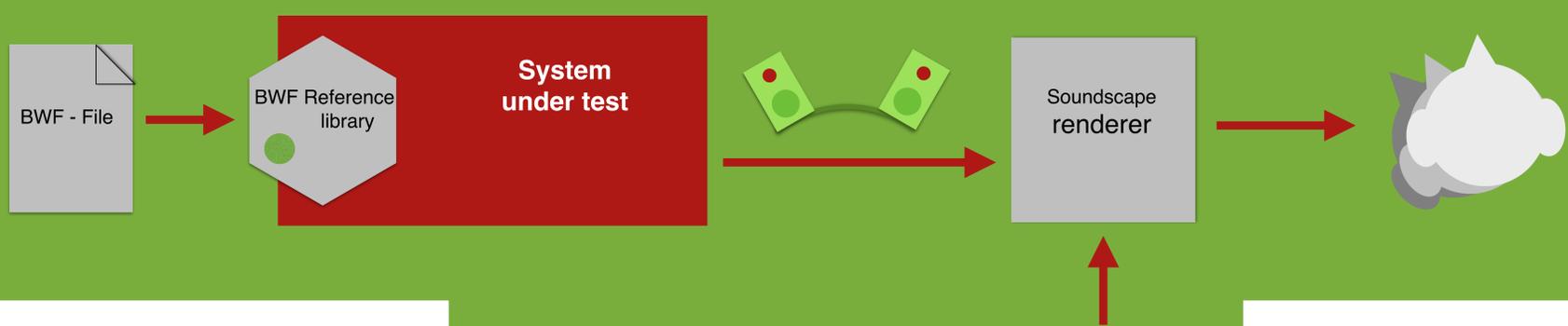
Audio Definition Model

The Audio Definition Model is a formalised way to describe object-based, channel-based and transformation-based audio content. The initial file format is Broadcast WAV [1]. It is part of the European Broadcast Union Core XML schema [2] and is described in [3] and available under the link below. The model is for general use and not restricted to the BWF format.



<https://tech.ebu.ch/docs/tech/tech3364.pdf>

Implementation Example



Sample Scenes

A number of scenes have been created to demonstrate the concept and give a starting point for quality evaluation experiments. Some have already been used in binaural listening experiments [5]. The test set includes:

- Moving broadband noise impulses with different trajectories
- Speech positioned half left and half right
- Atmosphere (Applause) 8 channels with height
- Object-based music example

A suite of software tools is provided. These include reference software to read and write the audio definition model extension as well as demonstrate the use of the scene with the freely available Soundscape Renderer [6]. The use case illustrated here shows the use of the sample scene with a spatial rendering system under test which has been extended to read BWF. The rendered speaker feeds are then reproduced over headphones for different listening positions using the BRIR database.

data.bbc.org.uk/saqas

References

- [1] EBU Tech 3285, "Specification of the Broadcast Wave Format," Geneva, May 2011.
- [2] EBU Tech 3293, "EBU Core Metadata," Geneva, January 2000.
- [3] EBU Tech 3364, "Audio Definition Model," Geneva, January 2014.
- [4] ITU, Methods For The Subjective Assessment Of Small Impairments In Audio Systems Including Multichannel Sound Systems (Rec. ITU-R BS.1116-1) 1997.
- [5] C. Pike and F. Melchior, "An assessment of virtual surround sound systems for headphone listening of 5.1 multichannel audio," presented at AES 134th convention, Rome, Italy, 2013.
- [6] J. Ahrens, M. Geier, S. Spors, "The SoundScape Renderer: A Unified Spatial Audio Reproduction Framework for Arbitrary Rendering Methods" presented at the 124th AES Convention, Amsterdam, The Netherlands, 2008.
- [7] P. Majdak et al. "Spatially Oriented Format for Acoustics: A Data Exchange Format Representing Head-Related Transfer Functions", presented at AES 134th convention, Rome, Italy, 2013.

