Public Domain Guitar-Recordings in Studio Quality

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Introduction

Our contribution presents free guitar samples, their score, and documentation. While the original idea is to provide ecologically valid testing material for virtual auditory environments (VAEs), the use of the guitar samples is not restricted to this application and also permits various other, free, academic and non-academic applications. In particular, the endeavor is part of a project of the German Acoustical Society (DEGA) and its TC on Virtual Acoustics that was launched in spring 2016. The project includes establishing suitable models of an extensible database of audio material. It considers public domain licenses, thinkable compensation of and contracts with musicians, and establishing best practice models for free, quotable, technically and musically well-documented, public domain audio content. More information about that project can be found in [1].

The public-domain guitar samples contribution we present here comprises two recording sessions of acoustic and electric guitar pieces. Both sessions were carried out in the same room, using the the same recording equipment. They include microphone and direct-input signals of short guitar miniatures with the musical score, transfer functions (impulse responses) from the guitar position to each microphone, room reverberation time and noise floor measurements and recordings, and a detailed description of the used recording equipment including sensitivity information and transfer factors of the microphones and digital-to-analog converters. A brief overview of the first session is given in the following. The full details can be found in the documentations of the recording sessions which can be found here: `https://opendata.iem.at/projects/dega_guitar_recordings/`.

Equipment

The two recorded guitars were a Hanika classical guitar (59PF) and a Taylor 12-fret western guitar (612ce), which is equipped with a piezo pickup behind the saddle. The guitars were recorded by two AKG C414 B/ULS at bridge and neck position, combined with two reference microphones (NTI M2230). The microphone placement is shown in Fig. 3. Another reference microphone was used in a distance of 3 m to capture the room signal. The pickup outlet was connected to a BSS AR133 DI-box. The resulting six signals were fed into an Andiamo.MC AD/DA converter for recording.

Room

The recording session took place in the CUBE room of the Institute of Electronic Music and Acoustics (IEM), Graz. Its dimensions are 10×11×4.5 m (L×W×H), with compound baffle absorbers attached to the side walls, broadband compact absorbers at the ceiling and perforated plate absorbers at the side and front walls. The reverberation time is 0.5 s, its particular frequency curve is shown in Fig. 1. The A-weighted noise floor is about 22 dBA. The floor plan is shown in Fig. 2.

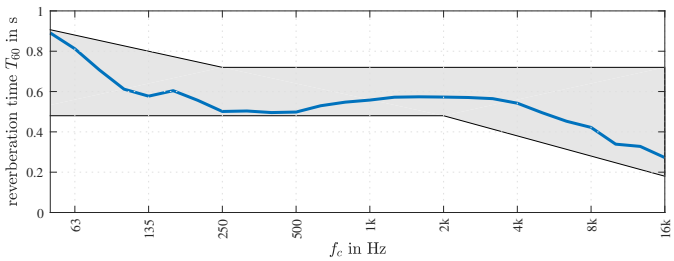

Figure 1: Reverberation time of the IEM CUBE over frequency. The target time for the tolerance bounds was set to 0.51 s.

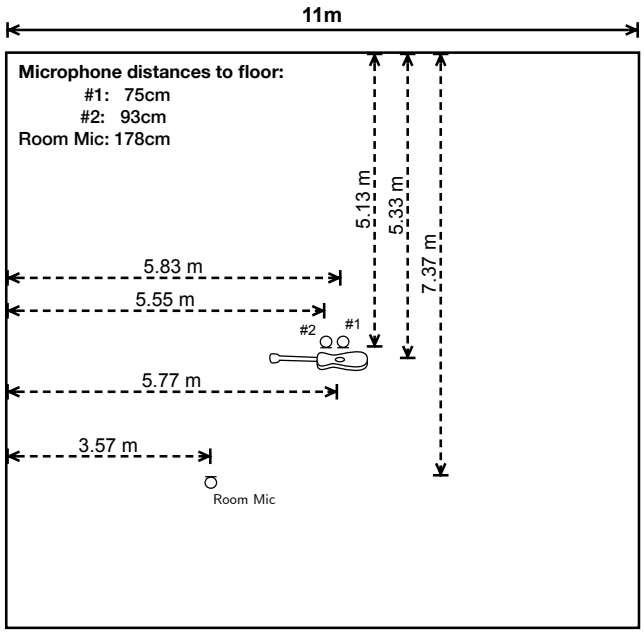

Figure 2: Floor plan of the IEM Cube with the positions of guitar and the microphones.

(a) Position of reference microphones (b) Microphone positions (c) Transfer function measurement

Figure 3: Pictures from the recording session: (a) shows the arrangement of the reference microphones directly above the AKG C414s; (b) microphones at bridge (left) and neck (right) position; (c) loudspeaker replacing the guitar for transfer function sweep measurements.

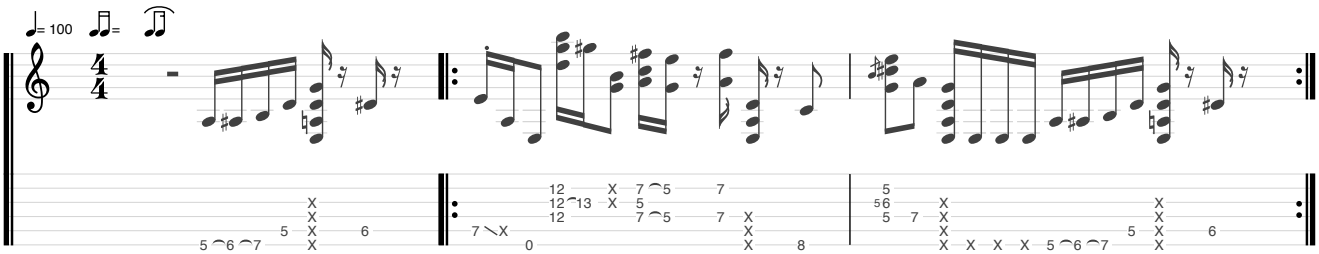

Figure 4: Musical score and guitar tablature of one of the miniatures ('Joyride').

Miniatures

The first recording session resulted in seven short guitar miniatures. A list of them is given in Table 1. As all of them are loop-able and of short duration without vast variability in timbre or style, the recordings are suitable for carrying out evaluations of different auralizations without the risk of position effects. In order to lay out tonal and harmonic structure as well as the used playing style, every piece also comes with a musical score, some of them even with guitar tablature to facilitate learning to play or re-perform the pieces. As an example, the score for the piece 'Joyride' is shown in Fig. 4.

Table 1: List of the recorded guitar miniatures.

Miniature	Duration	Instrument / Technique
Flageolett	2 s	Taylor / Plectrum
Jazzkadenz	10 s	Hanika / Finger Picking
Jazzkadenz	10 s	Taylor / Finger Picking
Kleiderschrank	5 s	Taylor / Plectrum
Sommerhit 1998	8 s	Taylor / Finger Picking
Sommerhit 2016	7 s	Taylor / Finger Picking
Joyride	5 s	Taylor / Plectrum

Full Contribution

As mentioned before, the contribution is composed of two recording sessions. They differ in the positioning of the guitars and microphones within in the same room. They also make use of the same recording equipment. Session 2 also comes with electric guitar recordings using a guitar amplifier, recorded with a Shure SM57 (dynamic microphone), an AKG C414, and a NTI M2230 as a reference microphone. In contrast, the guitar pieces of the second session are not loop-able, but are of longer durations. The full contribution can be found at the IEM's open-data archive: `https://opendata.iem.at/projects/dega_guitar_recordings/`.

References

[1] Leckschat, D., Epe, C., Spors, S., Weinziel, S., Zotter, F.: DEGA-Projekt "Aufbau einer Stimulus-Datenbank für Anwendungen in der Virtuellen Akustik". Fortschritte der Akustik - DAGA 2017, 2017