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Chronicle

15th International Symposium on Sound Engineering and Tonmeistering ISSET 2013

Cracow, Poland, June 27–29, 2013

The 15th International Symposium on Sound Engineering and Tonmeistering will be held on June 27–29 in Cracow. The Symposium is organised by the Department of Mechanics and Vibroacoustics, AGH University of Science and Technology, under the auspices of the Polish Section of the Audio Engineering Society. The Symposium is held biannually. The organisers invite representatives of the academic community, sound engineers, music producers and representatives of the audio industry.

The scope of the Symposium covers a broad range of topics related to sound engineering, from audio production through perception. Twenty five submissions have been accepted.

The programme of the Symposium includes lecture sessions and workshops, two student competitions, two meetings with founders of Polish companies which gained international success, and a unique theatre play.

Abstracts

Microphone Crosstalk Cancellation – the Comparison of Two Original Methods

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Two original algorithms for cancellation of microphone crosstalk are presented and compared. Both algorithms are based on time-frequency signal decomposition. The first method makes use of selective mixing of sounds. An utmost version of this technique is used, consisting in removal of any spectro-temporal overlap between sound sources. The other consists in filtering with the application of the wavelet transform. The latter method has been developed specifically for cancellation of crosstalk in the recording of percussive instruments. With this method, patterns of individual percussive instruments are generated and then the recorded signal is compared with the patterns. Both methods were applied to the same excerpt of drums recording. Subjective evaluation according to several criteria was carried out.

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Using Everyday Objects as Sound Sources in Live Electronics

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This paper presents the possibilities of using everyday objects as sound sources processed live in MAX/MSP environment. In electroacoustic music live electronics is usually regarded as processing of acoustic instruments sound or controlling synthesizers and samplers. It is proposed to replace them with properly selected objects, stimulated to vibrate traditionally (tapping, rubbing) or in a special way (rubbing with bow or super ball), amplified with contact microphones. Sound processing consist of granulation, spectral modeling, transposition and time stretching. The result is the creation of a new musical instrument, consisting of the physical part (object) and virtual part (DSP), with vast expression possibilities.

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The Objectives and Sound Engineering Measures at the Creation of the Acoustic Speech Balance of Acting in the Sonic Image of the Radio Play Script. Selected Issues

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One of the most important measures of expression in the radio play is the human voice. The voice sounds can also carry some further information necessary to materializing imagination about special relationships in the sonic image for the listeners.

Creation acoustic speech balance of acting during recording session with the actors is a very important means of sound engineering referring to specified images and associations in the imagination of the radio play listeners.

A different strategy of recording the actors voices determines picture in the audiovisual media work e.g. film. The real message from picture clearly organizes the spatial relationships between characters in the scene.

The paper is discussed a range of issues including the creation of the acoustic speech balance in the radio play with the use of sound engineering and acting techniques.

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Young People Hearing Losses Affected by Listening to the Music on Headphones

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The main aim of the work was to find an influence of type of headphones (closed, semi-open, open and in-ear) used by young people for hearing of music on the threshold of hearing. The results of hearing loss measurement provided for over that 80 young people (from 16 to 25 yers old). The greatest hearing losses were observed for the people who work as sound reinforcement engineers and, moreover, no influence of headphones type was found for them. It turned out that the use of in-ear headphones causes the greatest hearing losses for other people (thresholds shifted up to about 20 dB at 4 kHz). The daily time of a listening also affected hearing thresholds and it was found that for users of in-ear and close headphones, an average time of musical exposure was of three hours and it causes the hearing loss of 10–15 dB at higher frequencies. The use of open as well as semi-open headphones has no influence on hearing damage and it would be stated that these kinds are safety in use. Almost 15% of investigated young people have their thresholds shifted up at higher frequencies.

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Pitch Perception for Mixtures of Harmonic Complex Tones Before and After the Operation of Selective Summing

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Micheyl *et al.* (2010) measured pitch perception of spectrally overlapping harmonic complex tones (HCTs). One of the issues investigated in that study was the impact of a masker HCT on the pitch perception of another, target HCT. In this paper the experiment of Micheyl *et al.* was replicated in some of their conditions, but both of the HCTs were mixed using the operation of selective summing, consisting in the removal of any spectro-temporal overlap between sounds. During the tests the procedures by Micheyl et al. were repeated twice - with and without the operation of selective summing.

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An Approach for Automatic Audio Event Recognition Using SVM in Terms of Threat Detection

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Audio events analysis, processing and classification is an important part of modern surveillance and monitoring systems. The subject of this research is detection and classification of threatening sounds representing dangerous events that can occur in real-world, urban environment. These issues differ from speech-recognition systems mainly because of the signal frequency characteristic, duration, variety and noise content. In this paper we propose an algorithm based on the Support Vector Machine and Mel-Frequency Cepstral Coefficients with the decision-making system and show that it performs well in comparison to more computationally complex systems.

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Temporary Threshold Shift Phenomenon vs. Recording Activity

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For the efficient work in recording studios it is to necessary to avoid continuous exposure to loud sounds and thus take regular breaks. This is the key to keep fresh ears and a fresh perspective in created music. The main aim of this paper is to provide information and explanation of Temporary Threshold Shift phenomena to understand basic principles and to help understand how to work more effectively and efficiently in the recording studio. The paper presents results of TTS measurement provided over than 30 recording engineers.

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The paper concerns a very important issue of music recording history and aesthetics – cooperation of a famous composer with an ambitious recording producer at the beginning of the stereophonic era. Benjamin Britten and John Culshaw worked together on the recordings of War Requiem, The Burning Fiery Furnace and other Britten compositions. The recordings are brilliant examples of how the sound engineer can build a "theater" between the loudspeakers or even achieve some effects, which were impossible in a traditional opera house and how he finds the way from the techniques to the aesthetics.

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Time-Domain Analysis of Sigma-Delta Audio DAC

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Nowadays, sigma-delta ($\Sigma\Delta$) audio analog-to-digital and digital-to-analog converters (ADC and DAC) are commonly used in both consumer and professional audio equipment. The ADC and DAC conversion parameters depend mainly on features of digital $\Sigma\Delta$ modulators. While frequency-domain and statistical-domain analyses of $\Sigma\Delta$ modulators' parameters exist in literature there is a lack of rigorous analysis in time domain especially when input to the modulator is a real world audio signal. The paper introduces a new approach to time-domain analysis of non-stationary audio signals at the output of sigma-delta ($\Sigma\Delta$) audio DAC.

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Efficiency of Automatic Online Music Recognition on the Internet

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Performance of the SoundHound application, designed to identify songs by singing/humming melody (Query by Humming, QbH), has been examined in the experiments. Assessment

was conducted by recognition of 256 music samples representing 64 tracks of popular music. Tests measured the effects of selecting of male or female voice, detuning from the original key, interfering presence of background noise, and the duration of audio sample on the percent correct recognition. Results indicated that tested QbH application demonstrated the overall 80% correct music sample recognition, with little influence of voice type and detuning, which is sufficient for practical use by Internet users.

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Multi-Channel Auralization

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One of the main problems in both the interior acoustics and environmental acoustics is determination of the directions of approach of acoustic waves. That information might be used to locate the source of sound and to indicate the areas where the acoustic adaptation should be used. With the development of devices that allow recording of the spatial sound, it is also possible to reproduce it with use of multi-speaker systems and auditive analysis of the acoustic field performed in other time and place than the record. The article presents the comparison of currently used auralisation methods such as the binaural techniques, ambisonic and wave field synthesis. The methods were applied to define the accuracy of location of the sound source. The main aim of the performed research is development of the complete system for recording, processing and reproduction of the spatial sound.

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Perception of Irregularity in the Musical Rhythm

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The perception of musical rhythm is an issue that is relevant to the sound recordings. Because the rhythm is one of the main elements of a musical work, for the sound engineer important information is how much can be irregularity in the musical rhythm, that they are not perceived by the listener. This is particularly important for setting the parameters of automatic smoothing algorithms rhythm.

The paper presents a study of perception threshold of irregular changes in the musical rhythm. The analysis was performed using a soundtrack containing sounds with different spectrum. It was also examined the dependence of the threshold on the localization of change relative to the rhythmic structure.

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Linearization of Ear Transmission Characteristics with the Usage of Low Level Ultrasonic Noise Applied to Patients Suffering from Tinnitus

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In this work tinnitus, an otological problem, along with hypotheses of its causes as well as the methods used in its therapy are briefly reviewed.

Additionally, one of the theory referring to generation of tinnitus, based on mechanisms of signal quantization is recalled. A research study conducted with patients who suffer from tinnitus is shortly described. The linearization mechanism employing low levels ultrasonic noise is used while conducting the patients' examination. As a result of the study performed, it is concluded that utilizing ultrasonic noise can be beneficial for some patients to weaken the tinnitus felt. Also a detailed discussion on obtained results and conclusions are included.

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The Application of Sound Synthesis in Determining the Characteristics of Subjective Tinnitus

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In this paper the sound synthesizer dedicated to measurement of psychoacoustic parameters of tinnitus is described. First, definition of tinnitus, a set of procedures and tests, which are used to estimate it as well as the criteria of evaluating the tinnitus are described. Then, a synthesizer developed at the Multimedia Systems Department, Gdansk University of Technology is shortly presented along with an illustration of the user interface. In a study performed with patients suffering from tinnitus the effectiveness of the synthesizer is evaluated. A comparison between results related to duration of the conducted test and subjective evaluation of resemblance of patient's tinnitus sound pattern obtained utilizing the synthesizer and the clinical audiometer is given. Resulted from tests it is a conclusion that employing the synthesizer shortens the duration of tinnitus examination. Moreover the subjective evaluation of tinnitus sound type with the synthesizer is reported by patients as more similar to the tinnitus felt.

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Technical and Artistic Aspects of Bass Guitar Recordings

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An overview of past and present recording methods and ways of balancing bass tracks are discussed in context of a role of bass guitar in various music styles and basic techniques of playing. Experiments included listening tests of bass tracks recorded with the use of condenser and dynamic microphones of different directional patterns and listening tests of complete multitrack alignments obtained with the use of different mixing techniques, frequency equalization, and dynamic range compression. Outcomes of this work may be used in recording processes intended to achieve special artistic effects, and can be helpful in classes for students of sound engineering.

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Recognition of Harmonic Intervals

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The experiment was carried out to determine the influence of pitch register and sound duration on the recognition of musical intervals composed of two simultaneous pure tones. Sixteen musicians were asked to recognize 13 within-octave intervals in 18 conditions (3 registers × 6 tone durations). Results showed that recognition was much worse in the lowest than in the other pitch registers and decreased when the sounds were shortened in all registers. The differences in the accuracy of interval recognition correspond to the changes in the pitch strength.

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Audibility of Lossy Compression in Musical Recordings

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Audibility of lossy compression produced by four codecs, Ogg, WMA, Mp3 (Fraunhofer) and Mp3 (Lame), in samples of classical and popular music was studied on naive and experienced subjects in quiet and in the presence of noise. At bit rates of 32 and 48 kbps compressed signal was easily discriminable with significant intersubject differences. Compression became inaudible at bit rates of 80–96 kbps. Experienced subjects demonstrated higher ability to discriminate compressed music than naive subjects, by about 16 kbps. The presence of noise had limited influence on discrimination at signal-to-noise ratios within the range of +4 to +16 dB.

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Vowel-Like Quality of Formant Noise

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The purpose of the study was to determine the frequency ranges within which a single formant imposed over the spectrum of pink noise produces a quality of sound resembling Polish vowels. Fifteen subjects were required to assign a vowel category to noise bursts with a formant introduced in a band centered at one of 65 frequencies within a range of 198–8000 Hz. Results show that the vowel-like quality of sound produced by a single formant is most pronounced in the case of vowels /u/, /ɔ/, /a/ and /i/, whereas associations with vowels /ɛ/ and /ɨ/ are less distinct.

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Evaluation of Virtual Bass Performance in Mobile Device

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An experiment conducted to validate possibility of use virtual bass synthesis (VBS) algorithm in a portable computer is presented. The listening tests based on the procedure of pairwise comparison between VBS and standard bass boost technique are employed. The evaluation was carried out in two types of conditions: in a professional listening room and employing an ultrabook to play back the sounds. As is indicated by the results, the proposed technique proved the possibility of rendering bass-related components in audio signals in a better way than the standard bass boost technique.

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Live Electroacoustic Mix Based on "Combitaper" Application

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Combitaper is a software application inspired by classical tape delay. It was designed to allow simultaneous recording, mixing and reproduction of an acoustic signal. Software consists of two types of modules. First type – the buffer – is responsible for recording, optimization and storage of sound samples and short musical phrases (up to 4 seconds). The other one, called taper, deals with multiple repetitions of sounds and their processing. Such a system allows to perform live a musical composition consisting of sound samples which were prepared earlier or recorded during a performance. An advantage of Combitaper over other applications is the capability to work in the quadraphonic configuration. Four speakers placed on tops of the deltoid provide a highly realistic spatial sound, with the precision of localization in the horizontal plane of 7.5°. The Combitaper can be controlled from the PC keyboard or any MIDI controller.