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MODERN SOUND RECORDING TECHNOLOGIES

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analogue sound recording;
sound director

Abstract

The purpose of the article is to investigate modern sound recording technologies; analyze the structural components that affect the sound formation of audio-visual content. ***The research methodology*** consists in the application of the following methods: theoretical method (consideration and structure of sound recording equipment as a process of transforming sound from analogue to digital and vice versa); analysis and synthesis (to analyze the work of sound recording technologies in the modern media space); systematization (a generalization of the material in the conclusions). ***The scientific novelty*** lies in the differential approach associated with the stage of sound recording perception, from analogue-digital signal to digital-analogue one, as a means of influencing the increase of sound level at the final stage. ***Conclusions.*** Under the influence of the widespread use of audio-visual content, the study analyzed the components of the sound recording equipment aspects and sound reproduction in general. Structural components that are a component of factors influencing the formation of sound have been considered in detail.

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Problem statement

The claimed problem states that modern audio recording technologies are increasingly working with compressed formats. Most audio information is recorded in MP3, so the listener will not be able to fully experience a quality melody.

The use of modern technologies leads to the fact that the progress of the tech-

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nological process in the 21st century is moving faster than the development of sound engineers' professional qualities. Another problem is that professional recording studios in general with the latest equipment are high-value. For the last few years, people have been trying to save on recording and choosing cheaper studios, and they, of course, have outdated equipment and non-professional sound engineers. Therefore, the audio that everyone can hear does not always reproduce sound quality.

Recent research and publications analysis

During the writing of the scientific article, the works of artists who worked on a similar topic were used: V. Dyachenko (researched the origin and artistic technologies development in sound directing and described in his dissertation the creative activity of Ukrainian sound directors of the second half of the 20th – early 21st century); analyzed musical sound recording as an institute of social communication (Sineoky, 2013); described the historical aspects and sound technologies development of the late 19th – 20th centuries (Shukhardin, Laman and Fedorov, 1982), L. Ryazantsev (2009) (analyzed sound directing in the media space). Peculiarities in creating a sound image of modern compositions by a sound director were considered by a young scientist (Dyachenko, 2012). Unfortunately, there is not much literature and scientific achievements on this topic, so we used informational Internet sources and Wikipedia – a free encyclopedia.

The purpose of the article is to study modern technologies of sound recording in the media space.

Main research material

Sound is one of the important components of audio-visual art because it gives people the pleasure of listening to radio stations and watching television projects and movies. Sound art is evolving so fast that new recording standards are becoming more common and displacing old ones.

New technologies of preservation and reproduction of artworks cover almost all artistic spheres in the 21st century, as a result, modern music culture strengthens elements of the consumer perception aspect, which is connected with the mass-production industry and reproduction of musical works.

Working with modern technologies, it is impossible not to mention the historical aspect that gave rise to the development of a sound design. In 1877, Thomas Edison created the first sound recording, and a year later a phonogram appeared which he patented. It is 1878 that is considered to be the beginning of the era of sound recording. Thanks to Edison, modern sound directors use the means of sound reproduction and the ability to save voice and music on repetition (Shukhardin, Laman and Fedorov, 1982).

It should be noted that the article "History of sound, modern sound standards" (2019) provides a very relevant example of today, namely: DVD, which is used by sound directors in Ukraine, is no longer used in Europe. Recorded audio information on Blue Ray and HD-DVD is increasingly being stored around the world. They are considered to be 8 times more capacious than a regular DVD. Therefore, modern sound recording technologies are likely to soon have new and sophisticated standards.

So, the main element for creating and recording sound is the microphone. This is

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a special electronic device that can convert sound vibrations into current fluctuations (Microphone, 2020). It is used in any recording studio and is considered a mandatory element in working with sound. In general, the sound can be recorded not only with a microphone but also from any external device. Most computers have special inputs and outputs for them.

There are several types of modern sound recording (and not all of them are used in sound design):

- mechanical;
- photographic;
- magnetic;
- digital (Sineoky, 2013, p.334).

In the modern media space of audio art, analogue and digital sound recording are still more often used. Let's look at each of the species separately to understand how they differ.

It should be noted that the human ear perceives sounds with a wavelength of 20 Hz to 20 kHz, the sound with a microphone becomes a set of waves. Therefore, it is in the form of electric waves, not sound, it can be recorded and audio information can be stored. This is exactly what happens with analogue recording on a magnetic tape or gramophone record. It is not possible to process and store audio on a computer in this way, as this is a technique that only works with digital recording. The sequence of binary values during this operation varies from 0 or 1. So, if it is possible to convert an analogue audio signal into a sequence of numbers and it will greatly facilitate the work of modern technological recording. To do this, sound engineers use special analogue-to-digital converters. During recording, the number of bits used to encode data is called the bitrate resolution, and the frequency of sound measurements is called the sampling rate (Audio recording technology and digital path, 2012).

As for digital sound recording technology, it is clear for sound engineers that the higher the bitrate value and the higher the resolution, the better the sound will be recorded and sounds as a result. Sound with a higher bitrate takes up more space. Therefore, for such playback you need not only a powerful computer, microphone but also speakers and quality headphones (Sound recording technologies and digital path, 2012).

Sound conditions, which previously could be achieved only with the help of certain acoustics (temple, theatre, concert hall) and the specifics of performance, today are changing due to new technologies and skills of the sound engineer. The sound director, thanks to widely developed modern technologies that can be implemented in a recording studio, was able to create the sound of a work of art that cannot be created in natural conditions. This is, for example, widely used in modern pop music (Dyachenko, 2012, pp.2-3).

According to the scientist V. Dyachenko:

> "The sound director of the modern period works with the corresponding art technologies: fixing and extraction of sounds (sound recording, reproduction); the processing of sounds by means of software and hardware or use of acoustic conditions of the room or specific changes of sounds of acoustic radiators; use of human technological resources and technologies of subjective and objective analysis of sounds; developed musical, balanced, frequency-relative hearing; knowledge of modern technologies for recording and playing music and sounds; knowledge in the field of natural sciences and art". (Dyachenko, 2012, pp.2-3)

In the course of our research, it should be noted that the creative process of re-

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cording is incredibly complex and requires responsibility. The sound director must have technical knowledge, skills and abilities and be familiar with several types of art, especially the one he works with more often (Dyachenko, 2018, p.116-117).

There are so many audio formats in the world that when you come across them, you realize that sound technology is not standing still. They are considered to be the most famous among sound directors:

- mono sound is one of the world's first music audio formats;
- stereo sound is a two-channel mono audio format, which appeared with the advent of CDs;
- MP3 is a format that is now used by almost everyone, it is considered the most popular in the world;
- MP3 Pro is an improved version of regular MP3 that takes up less disk space;
- VQF is a format often compared to MP3, but considered to be better, newer and for more sensory sounds;
- Super Audio CD (Sony project) is a format better known now as Multi-Channel and its music is multi-channel (Sound Technology, 2019).

Modern cinema, television and radio broadcasting are not possible without quality sound. The picture is interesting, but from a psychological point of view, the viewer and listener first react to the sound. Therefore, the ratings of, for example, radio stations, depend largely on this.

Podcasts that record on the radio (or for Internet resources) are the most popular free project. There is a desire to describe such situations in the example of Ukraine. Radio presenters or announcers work with a microphone more often than anyone involved in audiovisual art: recordings of commercials, programs, jingles, songs, weather forecasts and news. That is why sound directors on radio stations very quickly capture information and work with it. But there are downsides and outdated equipment at most stations. If television and film production try to update the equipment at least once every few years, then the radio is updated once a decade. As a result, sound quality and delivery are not always high quality.

Thus, in Europe and America in recording studios, the professional skills of a sound engineer are treated with great responsibility. Almost everyone has the necessary education. In Ukraine, most of them have learned to work with recording equipment through video lessons or, as they say, "self-taught".

Sound recording technology is also widely used in cinemas. The most famous sound standards are considered:

- Dolby Surround Sound is the first 3D format for cinemas;
- Dolby Surround Pro Logic is updated Dolby Surround Sound format;
- Dolby Digital (AC-3), due to the advent of DVD;
- DTS (Digital Theater System) – appeared thanks to Steven Spielberg's film "Jurassic Park";
- THX. Director George Lucas did not like the soundtracks to "Star Wars" during the premiere. And together with his studio, he developed his own sound recording technology;
- Dolby Digital EX, DTS-ES Matrix 6.1 and THX Surround EX;
- Dolby Atmos is a modern technology that was created for sound in cinema (Sound Technology, 2019).

Sound director and teacher L. Ryazantsev (2009) points out in his manual that "the essence of sound in cinema and television and methods of its synthesis with the image, the music functions and noise in cinema, sound plans have a sound perspective".

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Conclusions

Analyzing modern sound recording technologies, we can conclude that they are developing faster than the professional knowledge of sound engineers. Such active development is most likely due to the fact that science, technology and humanity strive to change something for the better every day. Therefore, such modern changes can be considered a two-way process: both sound recording and reproduction technologies are being developed and the professional training of sound directors is being improved.

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СУЧАСНІ ТЕХНОЛОГІЇ ЗАПИСУ ЗВУКУ

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Анотація

Мета дослідження – дослідити сучасні технології запису звуку; проаналізувати структурні компоненти, які впливають на формування звуку аудіовізуального контенту. ***Методологія дослідження*** полягає у застосуванні таких методів: теоретичного (розгляд та структура звукозаписувального обладнання як процесу трансформування звуку від аналогового сигналу до цифрового та навпаки); аналізу та синтезу (аналіз роботи технологій запису звуку в сучасному медійному просторі); систематизації (узагальнення матеріалу у висновках). ***Наукова новизна*** полягає в диференціальному підході, пов'язаному з етапом сприйняття запису звуку від аналого-цифрового сигналу до цифрового-аналогового, як засобу впливу на підвищення рівня звуку на кінцевому етапі. ***Висновки.*** Під впливом широкого використання аудіовізуального контенту у статті проаналізовано складові аспекти звукозаписувального обладнання та відтворення звуку. Детально розглянуті структурні компоненти, які є складовою чинників впливу на формування звуку.

Ключові слова: звук; технологія; запис; мистецтво; медійний простір; аналоговий звукозапис; звукорежисер

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