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Original Theoretical Research

Main Directions of AR- and VR-Technologies Development in the Sphere of Culture

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Abstract

Introduction. The cultural sphere is a dynamically developing area, which quickly adapts to emerging economic, political, social and other factors of influence, as well as to the increasing demands of the 'consumer'. With the development of modern technologies, changes are taking place in many spheres of social life, including cultural life. The purpose of this study is to examine how AR and VR-technologies influence the sphere of culture. To achieve the goal, the following tasks were set: to analyse what multimedia technologies are used in socio-cultural projects, to identify and evaluate successful practices of implementing virtual and augmented reality technologies in various cultural areas, and to study the statistics of VR and AR-technologies application in recent years.

Materials and Methods. A comprehensive analysis has been carried out using a variety of research methods. The case study method was used to examine the use of virtual and augmented reality technologies on specific examples. A statistical analysis was conducted to identify the demand for further development of multimedia technologies in culture.

Results confirm the idea of active digitalisation of creative industries and allow us to conclude that the cultural sphere is currently one of the most promising areas for the development of virtual and augmented reality technologies.

Discussion and Conclusion. The case studies analysed in this article can be used by cultural institutions that are at the initial stage of introducing VR and AR technologies into their cultural products. The topic of application of modern technologies in the cultural sphere requires continuous and long-term analysis. Future research may explore the use of artificial intelligence in the cultural sphere.

Keywords: virtual reality, augmented reality, multimedia technologies, cultural sphere, interactive projects, project activity, film industry, theatre, exhibition activity, museum

Оригинальное теоретическое исследование

Основные направления развития AR- и VR- технологий в сфере культуры

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Аннотация

Введение. Сфера культуры представляет собой динамически развивающуюся область, которая оперативно адаптируется под возникающие экономические, политические, социальные и иные факторы воздействия, а также под возрастающие запросы «потребителя». С развитием современных технологий происходят изменения во многих сферах общественной жизни, в том числе и в культурной. Цель данного исследования – изучить, каким образом AR и VR-технологии влияют на сферу культуры. Для достижения цели были поставлены задачи: проанализиро-

вать, какие мультимедийные технологии применяются в социокультурных проектах, выделить и оценить успешные практики внедрения технологий виртуальной и дополненной реальности в различных культурных областях, а также изучить статистику применения VR и AR-технологий за последние годы.

Материалы и методы. Проведен комплексный анализ с применением различных методов исследования. Использован метод кейс-стади, чтобы на конкретных примерах рассмотреть использование технологий виртуальной и дополненной реальности. С целью выявления спроса на дальнейшее развитие мультимедийных технологий в культуре был проведен статистический анализ.

Результаты исследования подтверждают идею активной цифровизации креативных индустрий и позволяют сделать вывод, что в настоящее время сфера культуры представляется одной из наиболее перспективных областей развития технологий виртуальной и дополненной реальности.

Обсуждение и заключение. Проведенный в статье анализ кейсов может быть использован культурными учреждениями, которые находятся на начальном этапе внедрения VR и AR-технологий в свои культурные продукты. Тема применения современных технологий в культурной сфере требует постоянного и долгосрочного анализа. В дальнейшем может быть изучен вопрос использования искусственного интеллекта в культурной сфере.

Ключевые слова: виртуальная реальность, дополненная реальность, мультимедийные технологии, сфера культуры, интерактивные проекты, проектная деятельность, киноиндустрия, театр, выставочная деятельность, музей

Introduction. One of the key conditions necessary to maintain a high level of the cultural sphere and its competitiveness in relation to other types of leisure activities is the introduction of new technologies of socio-cultural and cultural and leisure activities in some of its areas, as well as the improvement of existing and successfully used ones.

In recent years, in the sphere of socio-cultural design there is an obvious tendency to use various kinds of multimedia technologies: projections, holograms, 3D-modelling, video mapping, touch panels, tensor holography, etc. Projects using virtual and augmented reality are gaining popularity. The transition to the digital space became especially tangible in 2020, when unforeseen factors changed the usual way of life for more than half a year. The cultural sphere is forced to adapt to the current lockdown situation [1, p. 1]. Let us consider the main trends in the development of these technologies in the cultural sphere.

Materials and Methods. The object of the research article is VR and AR technologies. In order to achieve the set goal, a comprehensive analysis was carried out using various research methods. In order to explore what multimedia technologies are and how they are used in the creative industry, current scientific publications were analysed. In addition, a case study method was used to examine the use of virtual and augmented reality technologies through case studies. A statistical analysis was conducted to find out whether there will be a demand for further development of multimedia technologies in culture.

Results. AR or augmented reality is a technology that involves 'augmenting' the real world with virtual objects. It does not replace the space in which the user (viewer) is, but only makes changes to it. The most common use of augmented reality in the cultural sphere is in museum and exhibition activities. Augmented reality adds layers to the real world, i. e. people can still interact with the physical environment, receiving additional information from their devices or augmented reality applications [2, p. 4].

One of the brightest examples of successful integration of AR-technologies into the cultural space in the modern Russian cultural and creative environment can be called Artlife Fest. This is a festival of contemporary art held annually since 2018 by Artlife Academy with the support of the Moscow Department of Culture in the Manezh Central Exhibition Hall.

In addition to the demonstration of works by artists from all over the world, quests, lectures and masterclasses, this project involves active interaction between visitors and the paintings. A significant part of the works presented at Artlife Fest has the possibility of demonstrating an animated addition to the painting using augmented reality. The works with the use of AR-technologies that received the audience's sympathy are the following paintings: cSuite", "Tenderness", "Mother's Kiss", "Breakfast in the Grass" by Konstantin Sapronov; "Unison" by Anna Vetrograd", "Reborn" by Marko Melgrati, "The Box" by Maria Golosnaya and others.

Augmented reality technologies are also becoming widespread in the field of excursions. For example, in the context of urban excursions, they facilitate the work of a tour guide, allowing sightseers to visualise the information received about the object of an exhibition or exposition.

On a global scale, we can say that AR-technologies are gaining popularity not only in the field of excursion activities, but also in the field of cultural tourism in general. In this area, they can be useful not only in terms of perception of cultural objects, but also when choosing the direction of a tour or a trip, the purpose of which is cultural tourism.

An example of the introduction of augmented reality technologies into the sphere of theatre is the AR-performance "ATALANTA" directed by Maxim Didenko. It is a production based on the story of a book by the medieval alchemist Michael Mayer. The project was realised on the world's first augmented reality theatre platform "Immerse", created by producer Eugene Mandelstam and the studio "Trinity Monsters". The route of the performance is laid out in the Kitay-gorod district of Moscow, and its passage takes about an hour, during which the spectator manages to immerse himself in the atmosphere of the action of the treatise "Atalanta Fugiens" ("Atalanta Fleeing").

AR-technologies in a theatrical sphere are gradually becoming an important component of sets for performances or theatre paraphernalia. An example of this is the creation of 'masks' in social networks related to a particular production. For example, the Stanislavsky Electric Theatre in Moscow has a large collection of real masks for performances, which has been transferred to an online format. Their transfer into digital format engages a large number of people through social networks, who become potential spectators of the theatre and can come to a performance or tour to see the masks in person after getting acquainted with the paraphernalia in the online format.

The creation of augmented reality using Motion Capture or motion capture technology is gaining popularity in show performances. This method of animation involves digitising real human movements and transferring them to an augmented reality object, such as an avatar character. Among the popular shows that use this approach to creating augmented reality are Avatar (Russia), Avatar Singe (South Korea), Alter Ego (CIF), and Avadream (South Korea). In November 2023, the first AR Art Summit was held to showcase artists' achievements in the field of digital art. The main exhibits of the summit were artworks enhanced with AR technologies.

In the context of the development of AR-technologies in the cultural sphere, this event is notable for the fact that it was attended by artists from 192 countries, and the total audience was about 250,000 people around the world. These figures are direct evidence of the increasing popularity of AR-technologies in cultural design.

Augmented reality technologies allow to expand information about this or that cultural object, as a rule, at the expense of the visual component. For socio-cultural projects, the use of augmented reality technology presents the following advantages: increase of audience; expansion of the project space; reduction of costs for scenography, costumes, scenery, equipment, etc.

VR technologies – virtual reality – involve the creation of a virtual space with its own locations, objects and characters. This approach has a number of possibilities of implementation: creation of 3D-graphics within the framework of VR-projecting; possibility to develop various kinds of mobile VR-spaces; creation of browser-based virtual reality available in online mode, etc.

Virtual and augmented reality technologies are currently the most relevant technologies implemented in museums and exhibition centres [3]. For example, the MARS Centre for Contemporary Art, located in Moscow, focuses on the immersive component in its exhibitions.

The Centre is implementing a project fully aimed at demonstrating art in virtual reality format - VR-Gallery. Within the framework of this immersive project, viewers enter one of the virtual worlds and get acquainted with the works of Edvard Munch, Salvador Dali, Claude Monet, Tyrone Wright, Abraham Blumart, Hendrik ter Bruggen, Gerrit Dow, Frans Hals, Meindert Hobbema, Gerrit van Honthorst, Pieter de Hooch, Jan Lievens, Paulus Morel, Michael Suert, Jan Baptiste de Venix, Eman Witte and others. In addition, VR-technologies are used in other projects of the Centre: "Deep Inside", "Real Space", "You Only Live Once", "The Road to Nowhere", "Psychosis", "Behind the Glass'.

The creation of virtual theatre performances is technologically more complicated than the realisation of virtual exhibitions, but nevertheless, specialists all over the world are working on the production of VR-performances, and such projects are gradually gaining popularity among audiences. For example, the Royal National Theatre of Great Britain staged a performance "Draw Me Close", the plot of which is based on the memoirs of the writer and director Jordan Tannahill. Technically, the project is realised through the use of HTC Vive VR headset virtual reality equipment.

The film industry is also keeping up with global cultural trends and is actively introducing VR technologies into its projects. At the Venice Film Festival since 2020 there has been a separate programme for VR cinema – Venice VR Expanded. One of the most successful virtual reality films presented at this film festival is Michelle and Uri Crano's "The Hangman at Home", which won the Grand Prix in 2023.

AR- and VR-technologies are also becoming widespread in publishing, as books and other printed publications filled with multimedia content attract the audience's attention and form a new reading experience.

Currently, the following organisations are engaged in publishing AR-publications in Russia: DEVAR company, "Redkollegiya" publishing house, "Who is Who" fijital publishing house, "Russky Ostrov" publishing house and others. Eksmo Publishing House published 6 children's interactive encyclopaedias in 2021.

Libraries are also gradually introducing new technologies into their activities: their own AR-applications have been developed by the Anna Akhmatova Smart Library and the Kub Library. Anna Akhmatova Smart Library and Kub Library. In addition, virtual and augmented reality technologies are gradually being introduced into the educational process in the cultural sphere, as well as in profile educational organisations and organisations implementing training programmes in the

field of arts. VR-helmets become an excellent addition to lectures, and the creation of a virtual art space helps students studying creative specialities to practice their professional skills.

Despite the large number of areas in which the spread of virtual and augmented reality technologies is gaining momentum, AR and VR remain the most in-demand areas of computer games, which are now an integral part of the creative industries and the cultural sphere as a whole.

According to statistics cited by MarketSplash, a platform specialising in digital marketing and e-commerce, the number of installed virtual reality headsets worldwide has grown to 37 million by 2023, and the number of people interacting with virtual reality is approaching 200 million. Meanwhile, in 2015, there were only 2.9 million VR headsets in use. This dynamic demonstrates the public's growing interest in virtual reality technologies. Today, the global market for augmented reality is growing rapidly at an average annual growth rate of 37.66% (according to CAGR).

According to MarketSplash, the relevance of VR use among surveyed users is distributed as follows:
• games – 64%
• TV and films – 52%
• watching sports – 42%
• social networks – 38%.

Of the correspondents surveyed, 22% have used virtual reality technology to create music, videos or artwork. Analysts predict that the value of the VR technology market will reach $50.3 billion by 2028.

In addition to these cultural fields, AR and VR technologies are used in architecture, sculpture, photography, street art, video production, immersive and performative practices, as well as for tours and concerts. The increasing popularity of multimedia technologies such as VR and AR is due to their immersive nature. Cultural projects using virtual and augmented reality usually receive a strong emotional response from the audience.

It can be concluded that there is a clear trend in the cultural sphere worldwide towards the use of multimedia technologies, including augmented and virtual reality, in socio-cultural design. In some areas, these technologies are becoming widespread (museum and exhibition activities), while in some areas they remain local (theatre and film industry). This is due to the fact that in the first category AR and VR creators have to work, as a rule, with material objects (exhibits), and in the second category - with stage space and characters. In addition, the introduction of such technologies into stage arts is still problematic due to their high cost and specificity of application.

The most probable way of involving people in multimedia projects in the cultural sphere seems to be the creation of various mobile applications with support for augmented reality functions, allowing to attract the audience regardless of the time and space in which a person is located.

Digitalisation is fundamentally changing the cultural experience not only in terms of access, production and dissemination of new technologies, but also in terms of participation and creativity [1, p. 3]. It can be assumed that augmented and virtual reality technologies, especially AR, will continue to actively develop and spread in the cultural sphere, as today the digitalisation of everyday life of the global community has reached enormous proportions and people everywhere use mobile and computer technologies. These formats of receiving information and emotions seem to be the most understandable and familiar for a modern person.

In addition, the psychological factor plays an important role in the growing popularity of these technologies, i.e. immersive formats help people to get a vivid emotional experience that they want to repeat. It can be assumed that AR- and VR-technologies will also contribute to the development of cultural products and projects at the intersection of two or more types of art. For example, it will be possible to produce books with augmented reality, which will reflect fragments of a play or film based on the plot of a given work.

Discussion and conclusion. The study revealed that there is a trend towards the use of multimedia technologies in many cultural fields. Moreover, the audience's interest in theatre productions, books, films and exhibitions that use VR and AR technologies is increasing. The results of the research proved that the use of virtual and augmented reality technologies creates new opportunities not only for new cultural products, but also for attracting new audiences. The analysis of socio-cultural industry cases can be used by those theatres, publishing houses and other cultural organisations that plan to use VR and AR-technologies in their sphere in the near future.

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