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FEATURES OF CREATION TECHNOLOGIES FOR EDUCATIONAL PANORAMIC VIDEO CONTENT

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The technologies of creating modern educational content based on video with the effect of presence are considered. The features of the technology for creating a modern panoramic video and examples useful for creating educational content in different fields are given.

The aim of the work is to study the capabilities of modern panoramic video technologies for creating interactive educational content in medicine.

For several decades, information technology has been actively used in training. At the same time, a huge number of approaches for distance learning have been proposed, ranging from digitized training materials, video lectures, and test programs [1, 2], to the organization of video conferencing, interactive courses [3, 4] and modeling of typical situations using virtual reality tools [5, 6]. In medicine, such technologies make it possible to solve situational problems with virtual patients and simulate surgical operations with maximum realism [7, 8], while training engineers - to remotely perform laboratory work not only using virtual equipment, but also on real equipment using interactive systems with feedback [9, 10]. Despite the fact that a sufficient number of distance learning courses have been developed and applied throughout the world in various fields of knowledge, so far in the classical university educational process these technologies have been only a kind of high-tech support for traditional teaching methods and have been used mainly only to further consolidate practical skills, or with independent work of students.

Modern challenges associated with, for example, the pandemic of the COVID2019 virus, and the necessary strict measures of long-term total quarantine in an emergency situation, lead to a complete reorientation to distance learning methods, which from the auxiliary become the main ones throughout the entire teaching cycle of most disciplines. Therefore, along with the possibilities of placing electronic educational materials with presentations, calculation and test tasks, as well as organizing interactive interaction with students in video conferencing modes, it is necessary to provide the educational process with the most realistic content available for distance learning services. Video content based on panoramic video technologies can become such content at the present stage.

The aim of the study is to assess the capabilities of panoramic video to create modern educational content.

The widespread use of panoramic video technology appeared only a few years ago. Panoramic refers to video with viewing angles in the horizontal 360 ° and vertical 180 ° planes, respectively. Thanks to these viewing angles, this video is also called spherical. Moreover, in most viewing programs, the user can change the viewing angle interactively using manipulators or touch screen systems. Modern panoramic cameras, as a rule, have two wide-angle (over 180 °) overlapping lenses. There are models with a large number of standard lenses, for example: 6 (Insta 360 pro), 8 (VUZE 360) and even 24 (Surround×24). The advantage of multi-lens models is a smaller number of geometric distortions compared to the image formed by wide-angle lenses, however, there is a greater likelihood of artifacts from combining images formed by different cameras and differences in illumination may occur. In fact, to obtain panoramic video, the device registers video streams from different cameras, and then performs their combination - the so-called “stitching”.

Compared to traditional ones, panoramic videos take up a large amount, which is associated not only with an increase in visibility, but also due to, as a rule, high resolution, for example, 4K (3840 × 1920), 5.7K (5760 × 2880) and 8K (7680x4320) at a frequency of not less than 30 frames per second.

For example, when working with an Insta360 EVO device that has 2 recording cameras with wide-angle lenses (with a viewing angle of 200 °), 2 * .insv files from each camera are formed, which are then programmatically converted to a panoramic video file in * .mp4 format. So, a 9-second panoramic video with a resolution of 5K in * .mp4 format occupies 149 MB with the size of two * .insv files of 65 MB each; A 27-second panoramic video in the resolution of 1600 * 800 in the * .mp4 format occupies 420 MB with the size of two * .insv files of 169 MB each; 7 second panoramic video in low resolution 800 * 400 in * .mp4 format occupies 40 MB with the size of two * .insv files of 60 MB each. You can view this content directly from your smartphone using the specialized Holo Frame screen cover, 3D glasses, as well as standard virtual reality glasses (Oculus Go, Samsung Gear VR, etc.). It should be recognized that lowering the resolution below Full HD (1920 × 1080), or close to it, significantly degrades the image quality and does not allow to fully realize the effects of scaling [11]. Given the prospects for the development of technology, at the present stage it is advisable to use the resulting video with a resolution close to 4K (3840 × 1920).

Panoramic view, interactive control and high resolution allow you to realize the key advantage of such a panoramic video - the effect of presence. Considering that expensive equipment is often used in medicine, access to which is limited for development [2, 10], as well as various new approaches and methods, for example, in surgical treatment [12, 13], which must be demonstrated to acquire practical skills [14 , 15], it is advisable for these purposes to use panoramic training video content. Also, it is advisable for conducting laboratory workshops in technical disciplines [14-16], where students need to get the most out of the real work of not only one device, but, in some cases, a whole complex of complex equipment [17, 18]. Even when listening to a standard lecture, or filming a practical lesson, an interactive panoramic video allows you to create the effect of being in the audience, which is very important

for a long distance learning form, when for a long time the opportunity for real communication and being in the audience is lost.

Panoramic video technologies allow you to take training videos to a whole new level, providing an almost full-fledged presence effect for the student, allowing you to interactively change the angle of view and observe the manipulations in all directions of the space available for viewing. The prospect of work is the development of a feedback system with the possibility of remote interaction of the student with real equipment during practical and laboratory classes.

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