3D HOLOGRAMS OF THE FUTURE

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Engineering presents the knowledge and practical skills needed to solve various problems. For decades, engineering, which has constantly evolved and branched out, has helped humanity to survive and improve the quality of life.

"Software engineering" is currently considered to be a very popular domain. It has gone through quite rapid development. It is now a vast and well-developed area of computer science and technology, encompassing the cumulative mathematics, engineering, economics, and management aspects.

The ability to present 3D scenes with a constant sense of depth has a huge impact on virtual and augmented reality, human-computer interaction, education and learning. Computer holography provides 3D projection with high spatial-angular resolution through numerical simulations of diffraction and interference.

Older people remember various video games based on holograms, which were installed in various places in the form of semi-mechanical, semi-electronic slot machines popular at that time. Naturally, most people could then assume that the future would literally be filled with higher quality holographic games and even films. And, as you can see now, such a future has not yet come into being for a number of reasons. Nevertheless, this future is inevitable and sooner or later it will certainly set in due to the efforts of researchers and engineers who are constantly working to that end.

Researchers from the Massachusetts Institute of Technology have made a rather big step, which significantly brings the moment of the onset of the "three-dimensional holographic future". They, using the latest developments in artificial intelligence, have created a system capable of generating holographic images in real time. The new method is called tensor holography and it is so undemanding to computing resources that it can operate successfully on a smartphone or laptop.

Note that the technology of computer-generated holograms has been around for a long time. However, to calculate a huge number of physical quantities in the creation of such holograms, the computing power of a fairly serious supercomputer is required.

To create holographic images, each point of a three-dimensional scene must have its own depth, so it is almost impossible to apply algorithms that process the entire scene. Each pixel of the hologram is created by the interaction of several rays of light, which possess a specific intensity, color, phase and direction. Complex physical models are used to calculate the parameters of each ray of light.

If we take the most powerful of ordinary consumer computers, then the calculation of one static holographic image can take from several seconds to several minutes, depending on the size and other parameters of the reproduced scene. This time can be reduced, but at the same time the quality of the holographic image, which is already very far from the photorealistic one, will be significantly affected.

The idea, implemented by researchers at MIT, is to replace a lot of physics-based calculations with an artificial neural network that has gone through a process of prior specialized training. This replacement turned out to be so effective that even the processor of a modern smartphone in real time can cope with the task of converting a three-dimensional vector scene into a full-fledged holographic image.

However, at present, the processing power of a smartphone processor is enough only to create a holographic image with a frame rate that is already acceptable for perception. The researcher of this project says that their technology will make it possible to make high-quality holographic displays a reality in five to ten years. By this time, the computing power of smartphones and computers will increase so much that they will be enough with a margin not only for generating holograms, but also for other tasks, for calculating algorithms and physics, if we are talking about a game with a holographic interface, for example.

In addition to holographic displays, the new method of generating three-dimensional images can be used in technologies of virtual, augmented reality, three-dimensional printing, etc.

Many believe the technology can provide more lifelike landscapes and eliminate eye fatigue and other side effects as a result of prolonged VR use. This technology can also find application in displays capable of changing the phase of light waves. This is a significant leap that could completely change the way people think about holography.

Thus, we can say that at present, holography continues to actively develop, and every year new interesting solutions appear in this domain. There is no doubt that in the future pictorial holography will take an even more significant place in people's lives.

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