AR/VR TECHNOLOGY IN GAMING INDUSTRY

Melnikava D.V., Ponyatov A.A.

Belarusian State University of Informatics and Radioelectronics, Minsk, Republic of Belarus

Murzich L. F. – Lecturer

Annotation. AR/VR technology is a relatively new phenomenon in gaming. Augmented reality creates artificial things in real environment, while virtual reality creates an artificial environment to inhabit. To use AR technology only smartphone is needed. In comparison VR gaming demands a head-mounted display, gaming controls, and motion capture system. Gaming suits bring VR gaming to a new level, as they engage the whole body. 3D graphics, captive experience, real-time interactions and positive impact on a lifestyle are the reasons why VR and AR are the future of gaming industry.

Keywords. Augmented reality, virtual reality, 3D graphics, VR-sickness, head-mounted display, motion capture system, gaming controls, gaming suit, TESLASUIT, haptic feedback system.

All kinds of technology have naturally integrated into every field of human activity. It is impossible to imagine medicine, security, educational process, entertainment and other spheres without the last advances in computer technology. People's needs are growing every day, so the IT industry has to adjust itself to match those needs. The gaming industry is not an exception, as it is constantly developing itself to satisfy the pickiest gamers. One of many possibilities to exceed the expectations is to extend the zone of playing and to transfer some digital game elements to the real world. That is how the need for AR- and VR-technology has arisen. Nowadays more developers start making games using VR-technology or at least start turning their gaze to VR, which in turn helps them create new content or transform the past content and make it more appealing. This makes it possible for game development to create a broader spectrum of gaming offers.

To understand the potential that AR/VR technology has, first of all, both terms need to be explained.

Augmented reality (AR) is a combination of game visuals and audio content complimenting the user's real-time surroundings. In gaming industry AR creates a playing zone within the existing artificial environment.

The first commercial application of AR was the yellow-colored 'first down' line that appeared during the football game held in 1998. One of the well-known illustrations of AR appliance is Instagram masks, which change face features in real time, using an integrated into a mobile device camera and face-recognition algorithms to make the user look more hilarious or attractive. In gaming one of the most popular mobile games Pokémon Go is a great example of successful implementation of AR-technology.

This application uses a device's GPS and creates an image of a virtual Pokémon – an animal-like creature – on the screen of the gadget, as if this creature was next to the player. The game lets the users communicate with the Pokémons, train them and compete with other users – all of the above with the help of AR.

Virtual reality (VR) is a technology that is used to create a simulated environment, allowing users to experience an artificial world. Instead of viewing the screen the subject is immersed into the created environment and is able to get fully involved into the process of interacting with a virtual 3D world. VR stimulates human senses such as vision, hearing, sometimes even touch and smell. Nevertheless VR-technology is still imperfect. Even though there is a massive amount of successful VR-games, some developers struggle for finding a balance between the amount of game content and its technological realization.

A certain number of VR-games is sold poorly, because there is a problem of getting dizzy and even vomiting, when the speed of a person's motions inside the game does not match the speed of the real-life movements. This phenomenon is called 'VR-sickness'. However, everything comes with few limitations in an experience such as availability of content as well as a cheaper range of computing power.

VR and AR are the two sides of one coin. Augmented reality imitates artificial things in real environment, whereas VR creates an artificial environment to inhabit. In augmented reality 3D graphics are used to superimpose the computer-generated images over the user's view of the real world, due to computer sensors and algorithms that determine the orientation of a camera. In virtual reality a computer uses similar algorithms, but instead of getting image from real cameras within the physical environment,

VR technology utilizes the user's eyes to locate within the imitated environment. That means, that if the user's head turns, then the graphic is going to react respectively.

Whereas to get AR experience it is necessary to possess a mobile device with a GPS receiver and a camera, there are more difficulties with VR-supplies. To be able to enter an artificial world, the user has to have at least a head-mounted display that delivers synchronized optical and acoustical simulations. The simplest and the cheapest devices consist of cardboard made goggles with a smartphone in them and a connected pair of headphones. More common headsets include digital glasses that densely fit a person's face, isolating her or his eyes from visual signals of the outer-world. Those glasses have two separated rooms for both eyes, each one containing its own display, to create an ultimate 3D-image. Another important part of a headset are high quality soundproof headphones that are able to create an illusion of 3D-sound. Aside of technical part of the headset, which is necessary for providing VR experience, there is a built-in ventilator that helps maintain appropriate temperature of the whole device. Those technical supplies are necessary for creating an artificial world around the gamer, but they are not enough for engaging with this world. Special controls and tracking systems are another crucial tools that deliver interactive experience with virtual environment.

There are two types of motion capture systems, which can be applied to VR-gaming. The first one consists of several external detectors (at least two), which scan the surroundings and are able to follow precisely every single movement of the player. The second type uses one single camera in front of the player that tracks specific spots of the body. The second type in comparison with the first one is less accurate, but it is cheaper and, therefore, more affordable.

Gaming controls are portable wireless devices that are placed in user's hands. Not only is their position being continuously tracked, so the gamers have a control and overview of their hand movements in every single moment of the gaming process, but they also often have a touchpad and several keys that provide different kinds of interaction with the game.

One of the last words in gaming technology is gaming suits, which promise to bring your gaming experience to a new level. This tool was developed not essentially for gaming purposes, but for educational, military and medical aims. The main idea is to combine both gathering and providing data through a full-body suit. Firstly, such an item has an integrated motion capture system to track positions of specific parts of human body and to follow every single movement of an individual, so the external tracking system is not needed. Moreover, the suit also analyzes gamer's biometrical parameters, for instance, his emotional and physiological state and stress level to be able to adjust the load. Secondly, a suit delivers haptic feedback that provides a wide range of realistic sensations through embedded electrodes.

Even though gaming suits appear to be a relatively new technology, modern market already provides a variety of offers. It is of a great interest to study a specific one of them, which is called TESLASUIT, not only because it provides a wide range of functions and adjustable parameters, but also because this successful project is created by alumni of the Belarussian State University of Informatics and Radioelectronics.

TESLASUIT is compatible with all major game engines and has an open application programming interface (API) that allows a better integration into simulated environments. The suit's main function is helping by particular trainings, using three main components. Firstly, the full body haptic feedback system provides stimulations with electro-impulses. It realizes an increased immersion by engaging muscle memory and raising the awareness of the user's own body. Secondly, the motion capture system enhances motor skills by enabling haptic guidance. Thirdly, TESLASUIT's biometric system ensures the tracking of physical state of a trainee and analyzes his or her improvement or regress over time.

Overall it is hard to underestimate the perspectives of AR/VR technology that are determined to bring revolutionary changes to the gaming world. For a start, this technology grants the revival of 3D.

The concept of 3D is not new to the world. However, it had not found its appeal to the consumers until the very recent time. Nowadays there are existing concerns related to the AR and VR role in gaming industry. High-quality equipment and games cost a fortune, while poorer-quality products disappoint its target audience and decrease interest to VR-gaming. AR/VR specialists work hard on making 3D experience more affordable and more appealing. And in many cases, they do succeed in it, making quality 3D effects that provide the player an enthralling experience and act as the backbone of the game.

AR/VR technology provides a captive experience, which, if the quality of technology is high enough, does not allow its users to differentiate between the real and virtual environments. Computer game analysts are certain, that it can act as a key feature for the success of any game in the modern world. Software engineers and 3D artists need to establish an ideal gaming situation, in which gamer could play, using his or her own appearance and its modifications.

The real-time interaction has its positive impact on future development of AR/VR gaming. AR technology is best known for bringing together the real and virtual. Once the complete unity of digital information and real-time is achieved, it will become the game-changer for game manufacturers.

Active gaming also causes the change of a lifestyle.

This has become especially useful during the pandemic. Those, who didn't have an opportunity to leave their houses, but still wanted to move around and provide their brain with some extra serotonins, turned to active digital games, such as dancing games that use motion capture system or VR games.

Although there are still some critical concerns for an easy AR/VR adoption, a fresh digital transformation process in the gaming industry is underway.

The modern technological development makes VR gadgets more affordable not only for location-based entertainment centers, but also for mainstream consumers. AR and VR have brought a revolution into the world. Gamers have a lot more to see with the advent of time.

References:

1. Summer Nguen, How AR and VR can transform the gaming industry? [Electronic resource]. – Access mode: https://www.mageplaza.com/blog/how-ar-vr-transform-gaming-industry.html. – Date of Access: 26.03.2021.

2. Tonhy Johnes, VR, AR and the Future of Gaming [Electronic resource]. – Access mode: https://dmarket.com/blog/vr-ar-in-gaming. – Date of Access – 26.03.2021.

3. TESLASUIT Product Presentation [Electronic resource]. – Access mode: https://teslasuit.io/media. – Date of Access: 24.03.2021.