

Development of a simulator based on virtual and augmented reality

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Abstract

This article is devoted to the development of virtual reality in emergencies, the use of the latest achievements of computer simulation of emergency response actions in the professional training of firefighters and rescuers is one of the priorities. Realization of this direction with the help of the “virtual reality” technology allows to achieve the effect of the full presence of a simulated emergency situation in a three-dimensional scene.

Keywords: virtual reality, computer simulators, personnel training, emergency situation, civilian equipment.

1 Introduction

The problem of training new qualified specialists within a short period of time has always been very acute. This is connected with various changes that occur in our daily life, social and technological environment. This is one of the reasons for the development of virtual reality (VR), since our brain absorbs visually acquired information three times better, which in turn improves the quality of learning.

A great advantage of virtual reality is the student's involvement in the process, besides VR allows you to change scenarios, influence the course of an experiment, or solve a mathematical task while playing and in easy-to-understand form. It should also be noted that the student's focus increases significantly and allows to concentrate on the material due to the full immersion.

2 Overview

Today, virtual reality is called an important branch of the technology industry. By the way, in the USA they consider this direction to be the third most important one, after atomic and space. In the past, VR success was prevented by two main elements: developer support and input devices. All these obstacles were overcome with occurrence of new, more compact and simpler production processes, and also as a result of increased interest of consumers.

Virtual reality is also used in civil defense for police training. At the same time, the Pentagon has been long investing funds in the development and use of virtual reality systems for its own purposes, and it should be said, successfully. Even now, some elements of contactless war were demonstrated in the course of hostilities in Iraq, when the US Army, using high-precision weaponry and remotely controlled vehicles, attacked Iraqi troops without direct contact.

Today, VR industry is accumulating huge investments to create unique products. VR glasses and OculusRift already exist. Every year more and more new gadgets for

the VR industry appear [1].

It is essential to recall that the range of application of virtual reality is very wide, which excites investors who see it changing everything, from online education to corporate meetings and video games. Investments stimulate big bets on VR from Google, Microsoft and Sony.

It would be useful to say a few words about the future of virtual reality, namely, about the forecasts for the development of this sphere. For example, LETA Capital prepared a report on the future of virtual reality.

The report contains information that games will have become the largest sources of revenue for VR by 2020. To be more precise, approximately 4.5% is spent on the gaming industry, 2% on technology, 1.7% on film industry, 1% on theme parks and 0.8% on niche market [2].

Moreover, according to the company's specialists, it is planned to invest 30 billion dollars in this industry until 2020. Although this is not the entire report, it is clear even from this point that this sphere will gain momentum in the near future. If there is a demand, there will be an offer. And it is commonly known that many people are looking forward to the development of this sphere.

3 Decision

Analysts predict that by 2025 the potential of using VR-devices will reach its peak, and the number of users will exceed 100 million people only within the United States. If today most of the latest glasses and helmets are used by gamers and cinema lovers, then in a decade, improved glasses will become a common device, like today's mobile phones. Virtual reality will allow people to educate without leaving their homes, make deals, conduct business with foreign partners, attend any concerts and public events. A new round awaits cinema and visual arts, which will have more opportunities for implementation of new projects. Today, the largest companies such as Facebook, Microsoft, Google and Sony are actively working on the development

of VR devices [3].

The technology applied is widely used in various simulators for training pilots of airplanes, drivers, ship captains, rescuers' training, and allowing placing a trainee in appropriate simulated situations (including emergency ones). In devices that simulate human interaction with a virtual environment, several basic types of systems are used to form and output an image: Virtual reality helmet or glasses, retinal monitor, MotionParallax 3D displays.

Interaction with the surrounding objects of the virtual world is carried out with the help of various manipulators, for example gloves, which can be a set of virtual reality suit tracking change in the position of the entire body and besides transmitting tactile, temperature and vibration sensations. A freely rotating ball may serve as the device for tracking movements of the user, into which the user is placed, or it may be carried out only with the help of a virtual reality suit hanging in the air or immersed in liquid. Technical tools are also used to simulate odors, smoke and sound. Finding a position and orientation of the user in space is carried out using special sensors and markers. Sensors remove a signal from a real object when it is moved and transmit the received information to a computer.

References

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Three-dimensional objects for modeling an emergency situation are created in automated design systems, such as: AutoCAD, ArchiCAD, 3DMax, etc.

Completed 3D-models can be combined into an information model of a specific part of the city. Using a single information model of a specific part of the city, it is possible to carry out analysis, modeling, forecasting of accidental and emergency situations and to work out actions to eliminate them. In the process of preparing firefighters and rescuers, virtual reality technology allows to immerse in the three-dimensional world, in which it is possible to move and interact with what is happening around and make decisions while being in safe conditions. This technology is recommended to be used to practice actions in emergency situations at highly dangerous facilities, this will allow to prepare firefighters and rescuers emotionally for an emergency situation and reduce the death of rescuers in a real emergency situation.

In general, virtual reality systems are used in the industry where it is necessary to work with three-dimensional data, that is, almost everywhere; there are plenty of examples, and this industry will be systematically and differentially developed.

- [6] *Virtual reality (VR): past, present and future* **E-source:** <http://vrmania.ru/stati/virtualnaya-realnost.html>